Building an Equitable Construction Workforce:

Understanding and Increasing the Proportion of Women and People of Color in Construction

insight
POLICY RESEARCH

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Glossary

AAI: American Apprenticeship Initiative

ACS: American Community Survey

Active apprentice: In this report, an "active apprentice" refers to an apprentice who was registered in their apprenticeship program during a calendar year, including apprentices who started or exited their program during that year.

Apprentice: An apprentice is a paid, productive employee who receives a combination of on-the-job learning and related classroom instruction to master occupational skills.

BLS: U.S. Bureau of Labor Statistics

DOL: U.S. Department of Labor

EA: Economic Area. The 179 economic areas presented in this report were established by the U.S. Bureau of Economic Analysis in 2004.

EEOC: U.S. Equal Employment Opportunity Commission

IIJA: Infrastructure Investment and Jobs Act, 2021

LHP: Local hiring provision

New apprentice: In this report, a "new apprentice" refers to an apprentice who started in their apprenticeship program during the current calendar year.

OFCCP: Office of Federal Contract Compliance Programs, U.S. Department of Labor

Onsite construction occupations: Onsite construction occupations are construction occupations which are primarily based on construction work sites rather than in office buildings.

O*NET: Occupational Information Network

PUMS: Public-Use Microdata Sample, from the American Community Survey

RAPIDS: Registered Apprenticeship Partners Information Database System

Similar occupations: In this report, "similar occupations" refers to occupations with similar job requirements to those for onsite construction occupations.

SOC: Standard Occupation Classification

Underutilization: Underutilization refers to the state of utilization for an identified demographic group when the representation of workers who are in the identified group falls below the available workforce of that group within an occupation.

Utilization: Utilization is the percentage of total workers in an occupation from an identified demographic group.

Utilization gap: The utilization gap refers to the percentage point difference between onsite construction utilization rates and the utilization rates of similar occupations.

Executive Summary

Employment in the construction industry continues to grow as legislation, such as the 2021 Infrastructure Investment and Jobs Act[1] (IJA), and overall economic trends create increased demand for construction workers (Federal Reserve Bank of St. Louis, 2023). This anticipated growth and ongoing expansion of the construction industry may serve as an opportunity to build a more representative and equitable construction workforce. Historically, construction occupations employ disproportionately low numbers of women and Black or African American, Asian, and Indigenous workers (Equal Employment Opportunity Commission [EEOC], 2023). Further, underrepresentation of women and people of color[2] is more acute in higher paid and higher skilled construction occupations (EEOC, 2023).

This report examines the degree to which representation of women and people of color could be increased in onsite[3] construction occupations and identifies potential strategies employers could use to attract more women and people of color into construction jobs.

The report begins with details on the history of the underrepresentation of women and people of color in onsite construction occupations. Chapter 2 describes an analysis of the onsite construction workforce compared with the workforce of occupations requiring similar job skills. Chapter 3 enumerates and expands on related research questions and recommends potential pathways for future study of the available workforce for onsite construction. Chapter 4 addresses strategies for improving representation within the onsite construction workforce, such as apprenticeship programs and local hiring provisions, and presents an analysis of individuals enrolled in registered apprenticeship programs related to onsite construction. Finally, chapter 5 concludes with a summary of findings across analyses in the report and recommendations for acting on these findings.

Current State of Participation in Onsite Construction

Many onsite construction occupations employ women and people of color at rates different from those in similar occupations. For each onsite construction occupation, we compared the rate of employment for women and people of color with a set of occupations requiring similar skills. The difference between these rates reflects the degree to which representation of women and people of color could increase in construction work to resemble similar occupations. Key findings from this analysis include the following:

- While women represent 3 percent of onsite construction workers nationally, they represent 12 percent of workers in occupations similar to onsite construction nationally.

- While Black or African American workers represent 6 percent of onsite construction workers nationally, they represent 12 percent of workers in occupations similar to construction nationally.

- Onsite construction occupations employ proportionately fewer women across all States and to a more extreme extent in Midwest States when compared with similar occupations.

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[1] Infrastructure Investment and Jobs Act available at: https://www.congress.gov/bill/117th-congress/house-bill/3684.
[2] In this report, people of color refers to individuals who identify with at least one of the following race and ethnicity categories: Asian, Black or African American, Hispanic or Latino, American Indian or Alaska Native, or Native Hawaiian or Pacific Islander.
[3] Onsite construction refers to construction occupations which are primarily based on construction work sites rather than in office buildings. The specific onsite construction occupations examined in this report are available in Table 1.1.

- Onsite construction occupations employ proportionately fewer Black or African American workers and Asian workers across most States when compared with similar occupations.

- Onsite construction occupations employ proportionately more White workers in Midwest States and proportionately fewer White workers in Southwest States when compared with similar occupations.

- Onsite construction occupations employ proportionately more Hispanic or Latino workers across most States, especially in Southern States, when compared with similar occupations.

The estimates from this analysis are constrained by limitations in data and methodological considerations (see chapter 2 and appendix Est-2). As a result, they do not directly answer some of the key questions facing policymakers. In particular, we cannot directly measure the number of women and people of color affected by barriers to employment in onsite construction, nor estimate the number of women and people of color who could be available to work if those barriers were eliminated.

Improving Estimates of Participation in Construction Occupations

To identify what information could help capture the full extent of potential workers impacted by barriers to employment in onsite construction and potential worker availability in the absence of such barriers, we consider the following three questions:

- What is the degree of underutilization associated with barriers to employment and retention?

- What is the current number, and what are the characteristics, of workers who have the specific skills and interest needed for construction jobs?

- What worker attributes are associated with success in onsite construction occupations?

To address these questions, we recommend that policymakers explore using existing data sources to predict the worker characteristics associated with success in construction occupations. If successful, the results of this exercise could provide policymakers with more information about the number and characteristics of workers potentially well-suited for onsite construction jobs. The results could also give employers and employment and training providers actionable information they could use when hiring and placing workers.

Strategies for Increasing Employment of Women and People of Color in Construction

To build on findings that women and people of color are underrepresented in onsite construction, we consider registered apprenticeship programs and other strategies employers and local officials can use to recruit more women and people of color into onsite construction.

An analysis of registered apprenticeship programs finds that across all construction occupations, larger shares of apprentices are women, Black or African American workers, or Asian workers, when compared with the national construction workforce. However, while the rates of participation for these demographic groups are higher in apprenticeship compared with the workforce, the rates of apprenticeship completion for these groups are low. Therefore, while registered apprenticeships may exhibit greater proportions of women, Black or African American, or Asian workers, low completion rates for these groups interrupt the flow of these workers from apprenticeship into construction occupations.

Evidence suggests pre-apprenticeship and apprenticeship programs provide women and people of color with access to construction trades. However, to be successful, supportive services—such as childcare, transportation support, and housing support—and accountability efforts are likely needed to ensure the pre-apprenticeship and apprenticeship programs are effective in achieving sustainable employment gains.

Conclusions and Recommendations

Construction occupations are a core component of the labor market that historically employs disproportionately low numbers of women and most people of color (BLS, 2022a). We find that women, Black or African American workers, and Asian workers are underrepresented in onsite construction occupations when compared with similar occupations at the national, State, and local levels.

The growing need for construction workers, exacerbated by the 2021 IIJA, provides an opportunity to increase representation of women and people of color in construction occupations. Policymakers can look to pre-apprenticeship and apprenticeship programs as potential tools to increase access to construction trades for these workers. That said, for pre-apprenticeship and apprenticeship programs to be effective, they likely need to be coupled with supportive services. Making supportive services available could address key barriers that tend to be more common in historically underrepresented populations within onsite construction.

To further explore barriers to employment in onsite construction, the study team recommends that researchers and policymakers rely on existing data sources to identify which worker attributes—regardless of current occupation—are associated with success in construction. This approach could give the Department of Labor and other policymakers additional insights into the size and characteristics of the workforce available for construction jobs. It also could provide employers and employment and training providers with actionable information they could use when hiring and placing workers.

Chapter 1. Introduction

This study finds that onsite[4] construction occupations employed an estimated 7 million workers in the United States in 2019, accounting for about 4 percent of the total workforce. The number of jobs in these occupations is projected to grow, spurred by overall economic trends and the Infrastructure Investment and Jobs Act[5] (IIJA), enacted in 2021. The U.S. Bureau of Labor Statistics (BLS) estimates the number of jobs in construction and related occupations will increase 4 percent from 2021 to 2031, with almost 650,000 annual job openings required to cover both job replacement and employment growth (Federal Reserve Bank of St. Louis, 2023).

While construction occupations are a core component of the labor market, they historically employ disproportionately low numbers of women and Black or African American, Asian, and Indigenous workers (Equal Employment Opportunity Commission [EEOC], 2023). Between 2003 and 2019, women held only 10 percent of construction jobs. Similarly, in 2020, Black or African American workers held only 5 percent of construction jobs, even though they constitute 11 percent of the total workforce (BLS, 2022a). Underrepresentation of women and people of color[6] is more acute in higher paid and higher skilled construction occupations (EEOC, 2023).

The causes of underrepresentation, or underutilization, of women and people of color are difficult to disentangle. Underutilization may reflect a cycle in which, because few members of a demographic group are represented in construction, members of that demographic group lack access to the network and connections needed to secure construction jobs (Worksystems Inc., et al., 2018). It may reflect outright hiring discrimination and worksite conditions, including harassment, in which some demographic groups feel uncomfortable or unwelcomed (EEOC, 2023). The study team speculates that underutilization may also reflect limited onsite services such as childcare and different worker preferences among different demographic groups. Further complicating researchers' ability to disentangle the causes of underutilization is that the demographic groups of interest – women and people of color – are not mutually exclusive; women of color may face compounded barriers to employment.

The number of unfilled construction job openings is at record levels. Between September 2021 and June 2023, an average of 387,000 construction job openings were available each month, with nine months within that period having over 400,000 openings. These trends reflect overall growth in the construction industry and a shortage of construction workers (Federal Reserve Bank of St. Louis, 2023).

This report examines how the representation of women and people of color can increase in construction. Increasing demographic representation will expand the workforce available to fill the increasing number of job openings, but it can also address the historical underutilization of key demographic groups in the construction industry. The remainder of this introduction details historical trends for women and people of color in construction occupations. It also presents an overview of the role the Office of Federal Contractor Compliance Programs (OFCCP) plays in ensuring equal access to jobs. It identifies key opportunities for improving the representation of underrepresented groups and

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[4] Onsite construction refers to construction occupations which are primarily based on construction work sites rather than in office buildings. The specific onsite construction occupations examined in this report are available in Table 1.1.
[5] Infrastructure Investment and Jobs Act available at: https://www.congress.gov/bill/117th-congress/house-bill/3684.
[6] In this report, people of color refers to individuals who identify with at least one of the following race and ethnicity categories: Asian, Black or African American, Hispanic or Latino, American Indian or Alaska Native, or Native Hawaiian or Pacific Islander.

the ability to measure the size of the workforce available for onsite construction occupations. The section concludes with an overview of the remainder of this report.

A. Historical Trends in Representation of Women and People of Color in Construction Occupations

Construction occupations include those workers who help build and repair residential and commercial properties, transportation infrastructure, and utilities. In total, the construction industry employed over 11 million workers in 2019 (BLS, 2022a)—this number includes onsite construction workers and "office" jobs supporting construction (accounting, human resources, sales, etc.). The majority of entry-level construction occupations do not require a bachelor's degree or higher educational attainment, and construction occupations paid a median salary of $48,000 in 2021 (BLS, 2022a).

Women have historically and consistently been a small portion of the total construction workforce. Between 2003 and 2019, only 9 or 10 percent of the total construction workforce (including onsite and office workers) were women (figure 1.1; BLS, 2022a), even though women accounted for 47 percent of the total workforce in 2019 (BLS, 2022b).

Figure 1.1. Composition of Construction Workforce by Sex, 2003–2019
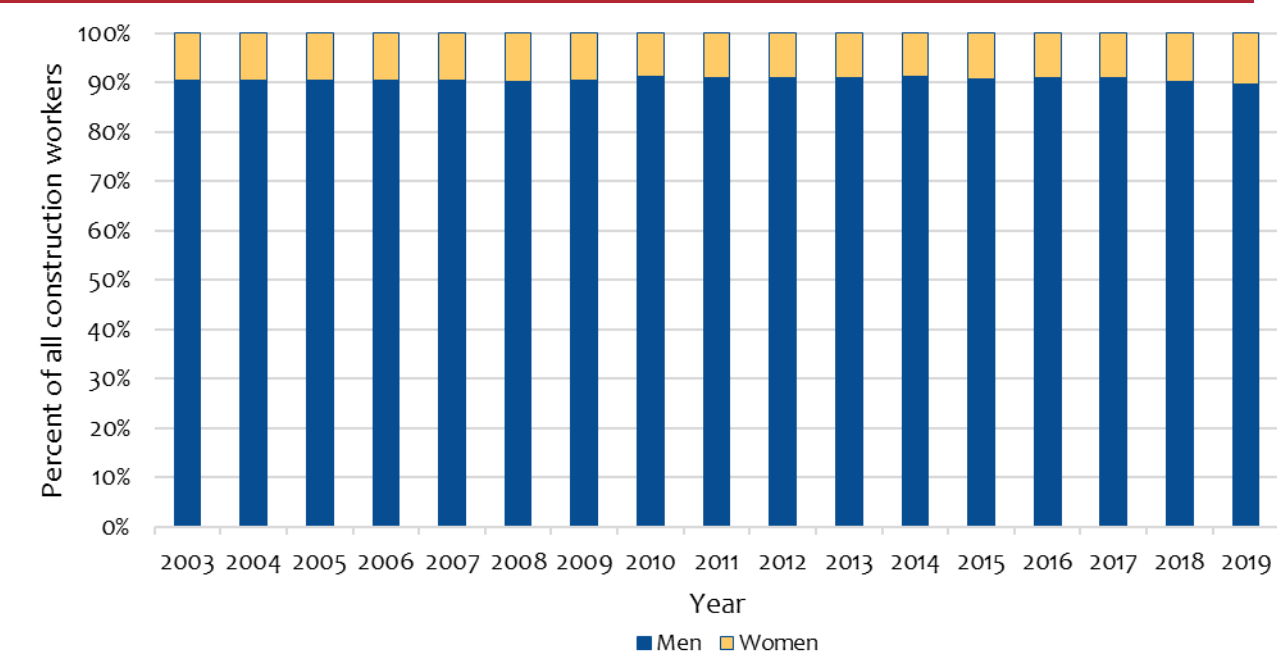
Note: The population of women and men presented in this figure is defined by self-reported data on an individual's sex in the Current Population Survey (CPS). This figure uses the term "women" to refer to individuals who identified as female in the CPS and "men" to refer to individuals who identified as male in the CPS.
Source: U.S. Bureau of Labor Statistics, 2022a

Similarly, the percentages of all construction workers who are Black or African American or Asian have remained consistently low. Between 2003 and 2019, Black or African American workers constituted only about 5 percent of the total construction workforce (figure 1.2; BLS, 2022a) despite accounting for more than 11 percent of the total workforce (BLS, 2022a). Asian Americans accounted for less than 2 percent of the construction workforce despite accounting for more than 6 percent of the total workforce (BLS,

2022a). During this period, the percentage of total construction workers who were White decreased from 71 percent to 60 percent while the percentage who were Hispanic or Latino increased from 20 percent to 30 percent (BLS, 2022a).

Figure 1.2. Composition of Construction Workforce by Race/Ethnicity, 2003–2019
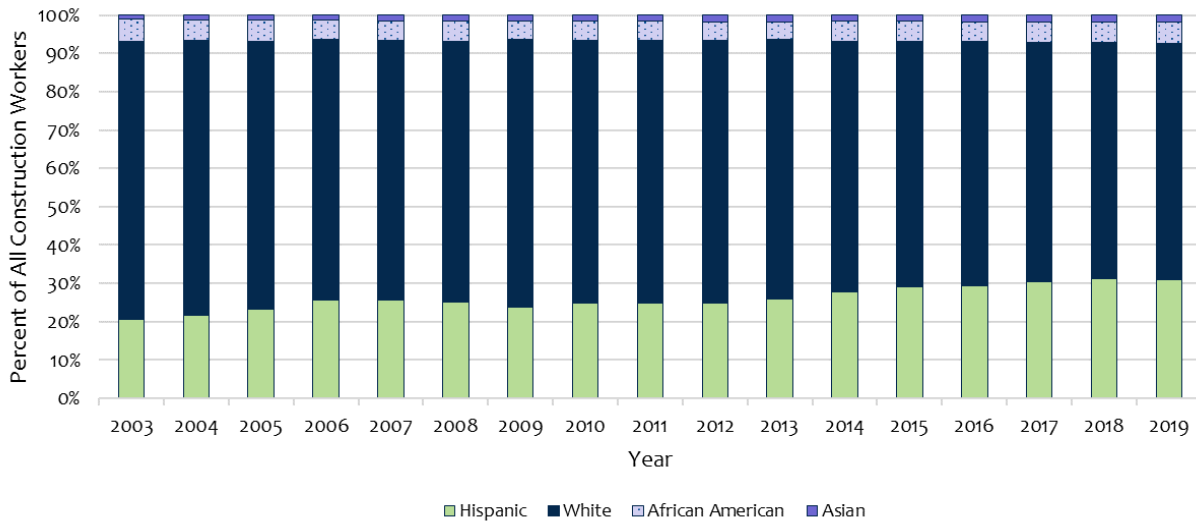
Note: The race and ethnicity groups presented in this figure are defined by self-reported data on an individual's race in the Current Population Survey.
Source: U.S. Bureau of Labor Statistics, 2022a

This report focuses on onsite construction occupations, or construction occupations which are primarily based on construction work sites rather than in office buildings – such as carpenters, electricians, pipelayers, plumbers, and drywall installers. As discussed in chapter 2, this study finds that onsite construction occupations employed an estimated 7 million of the 11 million construction workers in 2019. Table 1.1 includes the individual construction occupations (as defined by the American Community Survey [ACS] occupation codes) that are defined as onsite construction occupations using Standard Occupational Classification codes.

Table 1.1. Onsite Construction Occupations and Estimated Workforce Size, 2019

American Community Survey Occupation Code	Estimated Workforce Size (Number of Workers)
Boilermakers	16,017
Brickmasons, blockmasons, stonemasons, and reinforcing iron and rebar workers	150,095
Carpenters	1,245,393
Carpet, floor, and tile installers and finishers	152,664
Cement masons, concrete finishers, and terrazzo workers	61,040
Construction laborers	1,855,578
Construction equipment operators	363,482
Drywall installers, ceiling tile installers, and tapers	147,129
Electricians	847,866
Glaziers	42,447

American Community Survey Occupation Code	Estimated Workforce Size (Number of Workers)
Insulation workers	44,152
Painters and paperhangers	592,011
Pipelayers, plumbers, pipefitters, and steamfitters	55,239
Solar thermal installers and technicians	539,528
Plasterers and stucco masons	29,232
Roofers	221,175
Sheet metal workers	128,103
Structural iron and steel workers	59,904
Solar photovoltaic installers	14,996
Helpers, construction trades	42,118
Construction and building inspectors	95,107
Elevator and escalator installers and repairers	25,462
Fence erectors	30,136
Hazardous materials removal workers	31,457
Highway maintenance workers	101,165
Rail-track laying and maintenance equipment operators	10,105
Other construction and related workers	54,050
Total	**6,901,601**

Source: IPUMS-USA

Women and people of color face several barriers to employment in onsite construction occupations. Persistent discrimination is one cause of underutilization of women and people of color in construction. A recent EEOC report (2023, p. 5) concludes—

> *Discrimination in recruitment, apprenticeships, and hiring blocks access to good-paying construction careers while unequal treatment in the terms and conditions of employment— including training, hours, and work assignments—hinders advancement and pushes many women and workers of color out of the industry.*

This same report also cites harassment as a related barrier, with one in four women in construction experiencing "near constant" sexual harassment and one in five women of color reporting frequent racial harassment. It also notes that men of color commonly experience racial harassment in construction occupations (EEOC, 2023).

In an in-depth construction workforce market study, Worksystems Inc. et al. (2018) found that women and people of color sometimes receive poor quality training, leaving them ill-prepared when entering the field. Even when they receive comparable training, they may not have the opportunity to do the work they have been trained to do. The construction workforce market study also found that, once in the industry, women and people of color have historically had fewer opportunities for career advancement (such as becoming owners, superintendents, or foremen) (Worksystems Inc., et al., 2018).

Many points of entry to construction jobs, such as knowledge of hiring opportunities and training, happen through personal networks and referrals. Women and people of color have limited social

networks within the construction industry, minimizing hiring opportunities within those communities (EEOC, 2023; Worksystems Inc., et al., 2018).

The nonstandard schedules of the construction industry—long hours, lack of steady work, and periodic overnight travel—can have an oversized impact on female workers and workers of color (Worksystems Inc., et al., 2018). These factors can also complicate family logistics such as childcare support, for which women are primarily responsible (Hegewisch, 2021b).

Finally, some women may assume that construction industry jobs include uncomfortable working conditions (such as working outdoors in hot, cold, and rain) or require skills they perceive they do not have. These assumptions can discourage applicants from even considering work in the industry. Through a survey of qualified experts involved in construction projects, Tapia et al. (2019) found that issues surrounding representation and the reputation of "macho" jobsite culture may be associated with few women and people of color entering the industry.

B. The Role of OFCCP in Ensuring Equal Access to Jobs

OFCCP is responsible for ensuring Federal contractors and subcontractors provide equal opportunity to all employees and adopt affirmative action hiring practices. In fiscal year 2019, the Federal Government spent $149 billion on construction contracts (Associated General Contractors of America, 2024). OFCCP strives to identify Federal contractors and subcontractors that may underutilize labor of specific marginalized groups, including women and people of color. To monitor and assess equal opportunity, OFCCP sets hours-based utilization goals—a target percentage of hours to be worked—as the target employment percentages of women and racial and ethnic groups.[7]

OFCCP's history traces back to Executive Order 11246 (OFCCP, 2014), signed by President Lyndon Johnson in 1965, which charged the Secretary of Labor with the responsibility of ensuring equal opportunity for racial minorities in Federal contractors' recruitment, hiring, training, and other employment practices. Subsequent executive orders have expanded OFCCP's mission to include ensuring equal earning opportunities for women and prohibiting discrimination based on sexual orientation and gender identity.

OFCCP has established a target utilization rate[8] for women in construction as 6.9 percent across the country (OFCCP, 2019). The target utilization rates for people of color differ by Standard Metropolitan Statistical Area or economic area (EA). These goals are for all contractors' construction sites, including those for Federal and federally assisted contracts.

To inform utilization metrics, employers, worker advocacy groups, and enforcement agencies need the best available estimates on how barriers to employment could affect utilization for women and people of color, how many workers could be available, and how much utilization rates could increase if employers reduced those barriers. To support construction employers in increasing employment among underutilized demographic groups, stakeholders seek information on successful strategies for increasing employment among these groups.

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[7] For more information on OFCCP efforts, visit the OFCCP website at https://www.dol.gov/agencies/ofccp.
[8] Utilization rate refers to the percentage representation of a group of workers within an occupation of set of occupations.

C. Report Outline

This report is organized into five chapters. Chapter 2 examines the current state of representation in onsite construction by sex and race and ethnicity compared with the current state of representation in occupations similar to those in the construction industry. The research questions and methodology for the related analysis on the current state of representation are presented within the chapter. Chapter 3 builds off of chapter 2 to explore what additional information could help determine the availability of workers for onsite construction occupations more directly. Chapter 4 identifies strategies employers and local officials can use to recruit more women and people of color into construction, including local hiring provisions and apprenticeship programs. The research questions and methodology for an analysis of representation within construction apprenticeship programs are addressed within chapter 4 as well. Chapter 5 summarizes conclusions and recommendations for moving forward. Appendices to this report include details on the methodology for the review of local hiring provisions, details on local hiring provisions in 5 U.S. cities, utilization estimates at the local level, details on the methodology for estimating utilization, and detailed data tables with utilization estimates at the national, State, and local levels.

Chapter 2. Current State of Participation in Onsite Construction

This chapter compares estimates of the participation of women and people of color in onsite construction occupations with participation in occupations that require similar skills. The differences in participation between the two sets of occupations presented in this chapter approximate the degree to which representation of women and people of color in onsite construction work could increase to resemble similar occupations. For individual demographic groups, when the share of workers in onsite construction is less than the share of workers in similar occupations, the study team considered the demographic group to be underutilized, or not employed to the full extent possible, in onsite construction.

The historically low rates of employment among women and most people of color coupled with a persistent shortage of workers in onsite construction give rise to a few questions:

▸ To what extent are women and most people of color underutilized in the construction occupations?

▸ How much of that underutilization may be the result of explicit discrimination, and how much may be attributed to other barriers to entering the construction workforce?

▸ What are the size and characteristics of the available workforce with the relevant skills for construction employment?

A. Estimating the Extent of Underutilization

Answers to those questions require that researchers identify the total workforce of individuals with the skills and interests required to succeed in construction occupations and a comprehensive set of reasons that such available workers are not seeking employment in construction. However, the study team is not aware of any nationally representative data with sufficient information on individuals' construction-related skills and occupational preferences or individuals' reasons for remaining outside the construction workforce.

Using existing data, researchers can instead estimate the *utilization* of women and people of color—the percentage representation of workers who are women and people of color out of all workers—in onsite construction and compare those estimates with the estimated utilization for the same demographic groups in occupations with similar job requirements, or occupations referred to as *similar occupations*. Based on the overlap in job requirements, it is assumed the proportions of the onsite construction workforce that are women and people of

Key Terms

Onsite construction occupations – construction occupations which are primarily based on construction work sites rather than in office buildings.

Similar occupations – occupations with similar job requirements to those for onsite construction occupations.

Utilization – the percentage of total workers in an occupation from an identified demographic group.

Underutilization – the state of utilization for an identified demographic group when the representation of workers who are in the identified group falls below the available workforce of that group within an occupation.

color could rise at least to the level of the proportions in similar occupations.

The remainder of this section summarizes the data and methods used to estimate the current state of utilization in onsite construction and similar occupations, addresses the use of similar occupations as the comparison group, and describes limitations of the study approach. Additional details about the study methodology are available in appendix Est-2 ("Est" refers to estimation).

1. Data

To estimate the current characteristics of the workforces in onsite construction and similar occupations, the study team relied on two data sources. The study team used nationally representative data from the Census Bureau's 2015–2019 ACS 5-Year Estimates Public Use Microdata Sample (PUMS) data to estimate employment in each occupation and data from edition 26.3 of the Occupational Information Network (O*NET) database to capture the job requirements of occupations. Figure 2.1 demonstrates the relationship between the data sources and the methodology. Additional information about the data and methodology is available in appendix Est-2.

Figure 2.1. Data Sources Used in Utilization Estimation

Occupational Information Network Database (edition 26.3)	1. Capture job requirements at occupation level 2. Identify similar occupations
American Community Survey 2019 5-Year Public Use Microdata Sample Data	1. Capture demographic characteristics of populations within relevant occupations 2. Measure utilization by sex and by race and ethnicity 3. Compare utilization in onsite construction with utilization in similar occupations

2015–2019 ACS 5-Year PUMS data

The ACS PUMS captures individual person- or household-level data that enable users to explore information about subsets of the U.S. population not available through ACS pretabulated products. The study team used the 2015–2019 ACS 5-Year PUMS person-level data[9] to examine the characteristics of the population of U.S. workers in the total workforce, the workforce of onsite construction occupations, and the workforce of similar occupations. The 2015–2019 ACS 5-Year PUMS data pool individual ACS responses from 2015 to 2019, providing multiyear estimates that improve the statistical reliability of the data, particularly for subnational and subpopulation estimates. The ACS 5-Year PUMS data have an unweighted sample of nearly 16 million total individuals in the United States and an unweighted sample of 297,105 workers in onsite construction occupations. Throughout this report, estimates produced using the 2015–2019 ACS 5-Year PUMS data are considered estimates for calendar year 2019 to simplify reader interpretation.

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[9] The study team accessed the ACS PUMS data through IPUMS-USA, https://usa.ipums.org/usa/.

Note: Data do not reflect pandemic-related employment disruptions

Given the major workforce disruptions associated with the COVID-19 pandemic that started in 2020, the study team did not use the most recently available ACS data; instead, the team examined ACS data through 2019. However, to the extent that the current labor market characteristics differ from the 2015–2019 period, the results will not reflect those differences.

Edition 26.3 of the O*NET database

The O*NET database, sponsored by the U.S. Department of Labor's Employment and Training Administration, provides occupation-level data based on the 2018 Standard Occupational Classification (SOC) system and consists of regularly updated occupational characteristics and worker requirements across nearly 1,000 occupations in the U.S. economy (National Center for O*NET Development, 2023). The study team used O*NET edition 26.3 data, released in May 2022, to identify 44 onsite construction occupations and their similar occupations, which form the foundation of the study's analyses.

2. Identifying Similar Occupations

The basis of comparison for understanding the representation of demographic groups in onsite construction is a set of occupations deemed similar to onsite construction based on the skills required for employment. To measure the similarity between occupations and identify the set of most similar occupations, the study team used 43 descriptors from the O*NET database that characterize each occupation based on worker skills, worker interests, working conditions, and occupational experiences. Onsite construction occupations represent a subset of the SOC major category 47, Construction and Extraction, that excludes management-related occupations.

The team narrowed the list of all occupations represented in the O*NET database to those most similar to the onsite construction occupations through a two-step process. The first step in the process involved excluding occupations that differ substantially from onsite construction based on required education level, required strength level, frequency of difficult or hazardous working conditions, and average annual earnings. The second step involved calculating similarity scores between each onsite construction occupation and each of the remaining occupations not excluded in step one. To calculate similarity scores, the study team used 43 descriptors of job requirements associated with each occupation from the O*NET database (see appendix Est-2).

Similarity scores serve as a measure of the relatedness of two occupations based on job requirements (Bendick et al., 2011). For example, the study team calculated a score for the similarity of an onsite construction occupation, such as the carpenters occupation, and one of the potential similar occupations remaining after step one, such as the aircraft structure assemblers occupation. A higher score value denotes greater similarity between the job requirements of carpenters and aircraft structure assemblers (see appendix Est-2 for additional details on the specific calculations the study team used to measure similarity). The job requirements considered when measuring the similarity between two occupations include a measure of the frequency with which workers face difficult or hazardous working conditions—a critical component of onsite construction work. While the initial step in this process removed all occupations that did not meet a minimum threshold for difficult or hazardous working

conditions, the second step ensures similar occupations are as close to the onsite construction occupations as possible. As a result, the pool of workers in similar occupations likely faces difficult or hazardous working conditions similar to those seen in onsite construction work.

For each onsite construction occupation, the study team defined the set of similar occupations as the top 50 occupations with the highest similarity scores. It should be noted that, for any given onsite construction occupation, other onsite construction occupations may be included as similar occupations. Because virtually all onsite construction occupations are subject to some level of underutilization, the inclusion of onsite construction occupations as similar occupations will lead to smaller utilization differences between onsite construction and similar occupations.

The decision to include onsite construction occupations in the set of similar occupations was driven by two factors. First, because onsite construction occupations require specialized skills, few nonconstruction occupations are, indeed, similar. To generate reliable estimates of utilization, the study approach needs to identify a large number of similar occupations (as stated above, this approach includes 50 other occupations). If the study excludes other onsite construction occupations—which are typically the most similar—from the process, the occupations that get selected have relatively low similarity scores and lack face validity. For example, when other onsite occupations are excluded, the occupations identified as similar to plumbers include animal trainers.

The second reason to include onsite construction occupations is to ensure comparability with prior estimates of utilization (Bendick et al., 2011). If the set of similar occupations excludes onsite construction occupations, the differences in utilization for any one demographic group tend to increase, suggesting the onsite construction occupations' utilization for the group differs more substantially from the group's utilization in the set of similar occupations. Appendix Est-2 presents utilization gap estimates for different demographic groups when onsite construction occupations are excluded from similar occupations.

3. Comparing the Onsite Construction and Similar Occupations Workforces to the Total Workforce

Figure 2.2 provides a general comparison of the distributions of the total workforce, onsite construction workforce, and workforce of similar occupations by sex and by race and ethnicity. Each demographic group is represented by a distinct color, and each demographic group section is divided into the population of workers who earn a mid to high wage and who earn a low wage.[10] In the figure, the subsection of workers who earn a low wage is denoted with an asterisk (*).

Compared with the total workforce, onsite construction occupations employ mostly men (96.8 percent of the onsite construction workforce are men compared with 52.7 percent of the total national workforce); a greater percentage of workers who are people of color (45.3 percent compared with 37.2 percent of the total national workforce); and a greater percentage of low-wage workers (47.6 percent compared with 40.8 percent of the total national workforce).

Compared with similar occupations, onsite construction occupations still employ proportionately more men (96.8 percent of onsite construction compared with 87.2 percent of similar occupations). They

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[10] Workers who earn a low wage are defined as those who make an hourly wage below two-thirds of the median hourly wage for men working full time/full year. See appendix Est-2 for additional details on the calculation of low-wage workers, and see Ross and Bateman (2019) for the Brookings Institution's definition of workers who earn a low wage.

employ about the same percentage of workers who are people of color (45.3 percent in onsite construction compared with 43.4 percent in similar occupations). However, among people of color, onsite construction occupations employ proportionately more Hispanic and Latino workers (36.1 percent compared with 26.3 percent in similar occupations) and fewer Black or African American workers (6.0 percent compared with 11.8 percent in similar occupations). Onsite construction occupations also employ a slightly smaller percentage of low-wage workers compared with similar occupations (47.6 percent compared with 49.3 percent).

Figure 2.2. Estimated Workforce Distributions by Sex and Race/Ethnicity, 2019
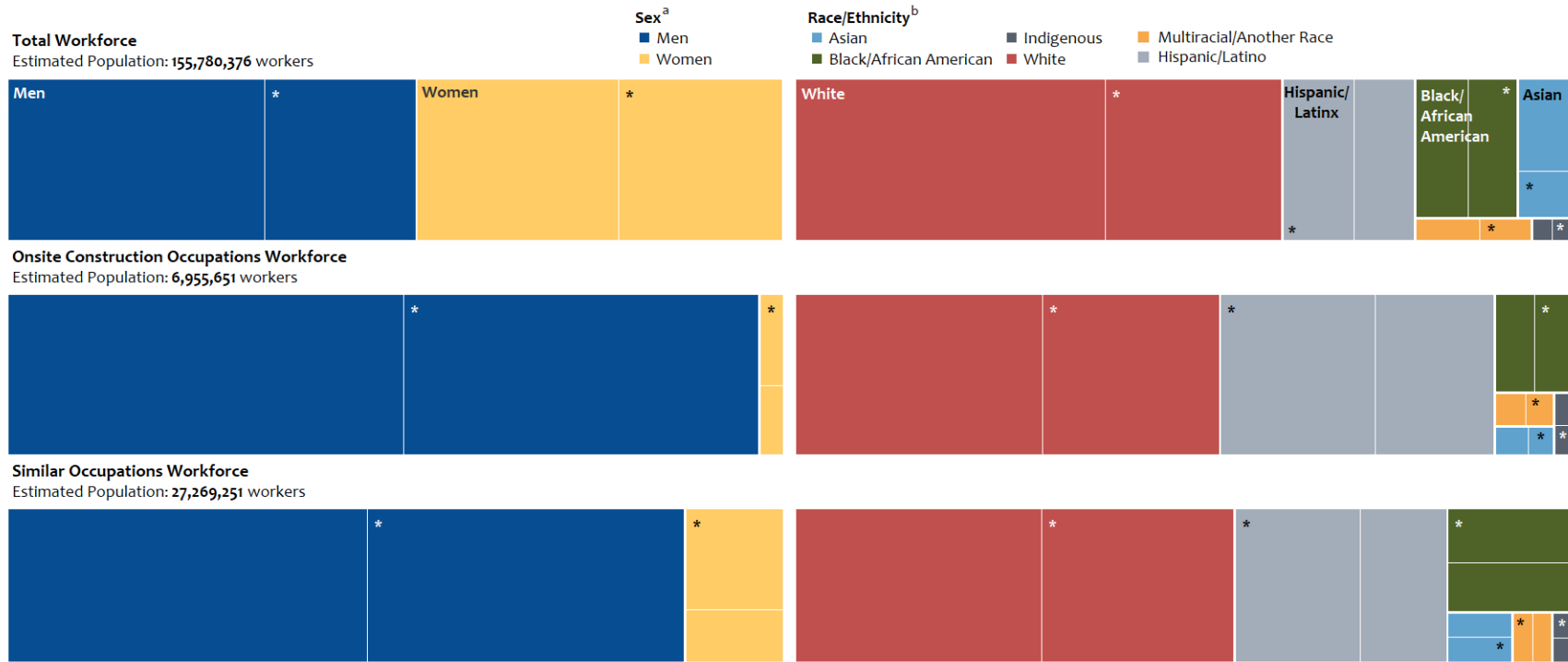
Note: Data for Figure 2.2 is available in Table Est-3.1 in Appendix Est-3. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.

O*NET = Occupational Information Network

* Workers who earn a low wage are defined as those who make an hourly wage below two-thirds of the median hourly wage for men working full time/full year. See Ross and Bateman (2019) for Brookings Institution's definition of workers who earn a low wage.

[a] The population of women and men described in this study is defined by self-reported data on an individual's sex in the American Community Survey's (ACS) Public Use Microdata Sample (PUMS) data. The survey includes two categories for sex—female and male. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS.

[b] Throughout this study, the specific race and ethnicity categories used are Asian, Black or African American, Indigenous, White, multiracial or another race, and Hispanic or Latino. These categories were constructed based on self-reported race and ethnicity information in the ACS PUMS data and are mutually exclusive. Therefore, individuals identified as Asian, Black or African American, Indigenous, White, and multiracial or another race do not identify as Hispanic or Latino. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS.

Source: IPUMS-USA

4. Measuring Utilization Gaps

In this study, the comparative measure of representation in onsite construction occupations and representation in similar occupations is referred to as the *utilization gap*. **The utilization gap is the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction for a specific demographic group.**

A positive utilization gap represents a higher proportion of workers in similar occupations compared with onsite construction occupations, and a negative gap represents a lower proportion of workers in similar occupations compared with onsite construction occupations. This gap is intended to reflect the degree to which representation of women and people of color could increase to resemble similar occupations.

Note that the methodology makes no assumptions about labor force dynamics. Instead, the static calculations supporting the utilization gap methodology[11] require that whenever there is a positive utilization gap, there will be offsetting negative utilization gaps of equal magnitude. Because the study team compared differences in the percentage distribution of occupations—and because all percentage distributions are normalized to fall between 0 and 100—whenever a positive utilization gap for one population is observed, an offsetting negative utilization gap for at least one other population will also be observed. However, this does not mean efforts to increase utilization for one population will necessarily take away construction opportunities from other populations. For example, in an expanding labor market, opportunities for one population can be increased without reducing the number of workers from other populations.

5. Limitations

The estimates presented in this report are limited by features of the data and methodology. Chapter 3 of this report explores strategies for improving estimates of the characteristics of the workforce of onsite construction occupations. Limitations of the approach described in this section include the following:

▶ **Likely underutilization in similar occupations:** Utilization gaps reflect the degree to which the proportion of underrepresented workers in onsite construction could increase to resemble similar occupations. The utilization gaps do not reflect how construction occupations would change in the absence of discrimination and other barriers; similar occupations may also face similar barriers that lead to the underutilization of women and people of color. Because the identification of similar occupations is designed to maximize similarity, some sets of similar occupations include other onsite construction occupations. To the extent that women and people of color face similar barriers in onsite construction and similar occupations, estimates of utilization gaps will not capture the total effects of the barriers facing these groups.

▶ **Data limitations in the ACS:** This study used the ACS nationally representative survey data to capture reliable information about the U.S. population. However, the ACS may not fully represent employment for subgroups of the population in the occupations of interest. This

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[11] The utilization gap methodology used in this study is adopted from Bendick et al. (2011).

possibility may lead to inaccurate or unstable estimates for these subpopulations based on small sample sizes in the occupations in the data. The U.S. Census designed the ACS to capture details of the U.S. population, but it is not intended as a tool to capture the occupational breakdown of the U.S. population. To alleviate this concern, this study includes margins of error for all estimates.

▸ **Data limitations in O*NET:** The study team selected similar occupations based on the information in the O*NET database. The O*NET database describes an occupation using employment requirements and worker attributes. Analysts and occupational experts provide information on the abilities and skills required for each occupation instead of examining the existing workforce[12]. These expert assumptions may capture relevant occupational details for a wide range of workers but may fall short of capturing characteristics specific to the subgroups of interest in this study. This approach may affect the extent to which the O*NET data accurately reflect the skills and experiences of workers in each occupation.

▸ **Exclusion of nonsimilar occupations:** The study cannot measure the full potential workforce for onsite construction occupations. This analysis relies on the workforce composition of similar occupations, yet workers employed in nonsimilar occupations may be successful candidates for onsite construction occupation job openings.

This section of the report explores utilization gap estimates at the national and State levels. Each subsection provides estimates by sex, by race and ethnicity, and over time. Additional details about estimates at the local level are available in appendix Est-1.

B. National Estimates of Onsite Construction Utilization

When examining national utilization gaps, this study finds that, compared with similar occupations, onsite construction occupations employ—

▸ Proportionately fewer women[13] (3 percent of onsite construction occupation workforces are women compared with 12 percent of the workforce of similar occupations)

▸ Proportionately fewer Black or African American workers (6 percent compared with 12 percent), Asian workers (1 percent compared with 3 percent), and White workers (54 percent compared with 57 percent)

▸ Proportionately more Hispanic or Latino workers (36 percent compared with 26 percent)

National utilization gaps for Indigenous workers and workers who identify as multiracial or another race are nearly zero.

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[12] See https://www.onetcenter.org/dataCollection.html for additional details on the O*NET database data collection process.
[13] The population of women and men presented in this study is defined by self-reported data on an individual's sex in the ACS PUMS data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS. Therefore, proportion of women in an occupation and the proportion of men in an occupation are complements of one another.

At the national level, this study examines utilization gaps across all onsite construction occupations for individual onsite construction occupations and for aggregate groups of onsite construction occupations—craft workers and laborers and helpers.[14]

When considering aggregate groups, the study team sorted onsite construction occupations into craft workers and laborers and helpers based on the *EEO-1 [Equal Employment Opportunity-1] Component 1 Job Classification Guide* (EEOC, 2022a). According to the *EEO-1 Report Instruction Booklet* (EEOC, 2022b), occupations in the craft workers category "include higher skilled occupations in construction" (p. 46), and occupations in the laborers and helpers category "include workers with more limited skills who require only brief training to perform tasks that require little or no independent judgment" (p. 47). The median hourly wage of workers in onsite construction occupations in the craft workers category is higher than the median hourly wage of workers in onsite construction occupations in the laborers and helpers category (about $17/hour and $14/hour, respectively). While about 44 percent of workers in craft worker onsite construction occupations earn a low wage,[15] nearly 58 percent of workers in laborers and helpers onsite construction occupations earn a low wage. The specific onsite construction occupations that fall into each of these groups are available in appendix Est-2.

Appendix Est-3 also contains tables with further details of the national utilization estimates and gaps produced for all onsite construction occupations (Table Est-3.3a and Table Est-3.3b). See *Munkacsy et al. (2024)* and its associated appendices for more details on national, State-level, and EA-level utilization estimates.

1. National Workforce Gaps by Sex

The percentage of all onsite construction workers who are women is 8.9 percentage points lower than for similar occupations. Women are underrepresented across both major onsite construction occupation categories. The gap for craft workers is 8.5, and it is 10.4 for laborers and helpers (figure 2.3).

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[14] Each onsite construction occupation is sorted into two categories based on the *EEO-1 [Equal Employment Opportunity-1] Component 1 Job Classification Guide*: craft workers and laborers and helpers. This classification encompasses all onsite construction occupations except one occupation, construction and building inspectors, which is not assigned to either group but is included in the aggregate.

[15] Workers who earn a low wage are defined as those who make an hourly wage below two-thirds of the median hourly wage for men working full time/full year. See appendix Est-2 for additional details on the calculation of low-wage workers, and see Ross and Bateman (2019) for the Brookings Institution's definition of workers who earn a low wage.

Figure 2.3. National Aggregate-Level Percentage Point Utilization Gaps for Women, 2019
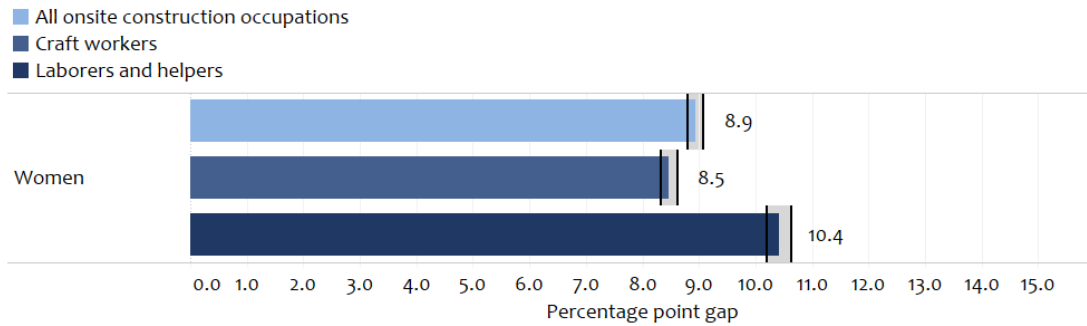
Note: Data for Figure 2.3 is available in Table Est-3.3a in Appendix Est-3. Onsite construction occupations are classified as either craft workers or laborers and helpers, with the exception of one occupation, construction and building inspectors, which is not assigned to either group but is included in the "all onsite construction occupations" group. The population of women and men presented in this study is defined by self-reported data on an individual's sex in the American Community Survey (ACS) Public Use Microdata Sample data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.
Source: IPUMS-USA

Figure 2.4 displays the national utilization gaps for women by onsite construction occupation, sorted according to median hourly wage.[16] In the figure, margins of error are included in parentheses next to each gap. The utilization rates of women in each onsite construction occupation and its similar occupation counterparts are available in table Est-3.3a in appendix Est-3.

Although the narrowest gap (4.4 percent; see figure 2.4) for women is in the onsite construction occupation with the lowest median hourly wage (painters and paperhangers), gaps for women tend to remain consistent regardless of an occupation's median hourly wage.

When considering individual onsite construction occupations, the utilization gap for women generally remains between 7.0 and 10.0 percentage points (see figure 2.4). Of the 27 onsite construction occupations examined in this analysis, all but 6 occupations have a share of women between 0.7 and 3.8 percent, while the shares of women in the associated similar occupations range from 9.5 to 15.2 percent (see table Est-3.3a). The widest positive gaps by occupation are for roofers (13.4 percentage points; see figure 2.4), where women make up 1.8 percent of the workforce and 15.2 percent of the workforce of similar occupations (see table Est-3.3a), and plasterers and stucco masons (12.8 percentage points; see figure 2.4), where women make up 0.7 percent of the workforce and 13.5 percent of the workforce of similar occupations (see table Est-3.3a). The workforce of one onsite construction occupation, hazardous materials removal workers, has a share of women that is greater than the share in similar occupations[17] (19.8 and 7.0 percent, respectively; see table Est-3.3a).

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[16] The median hourly wage for each onsite construction occupation is calculated using individuals' income information in the 2019 5-year ACS PUMS data.
[17] This departure from the pattern seen for the other onsite construction occupations may reflect an uneven distribution of women among the hazardous materials removal workers across race and ethnicity groups. Because of sample size restrictions, this study does not report on utilization by sex and race and ethnicity.

Figure 2.4. National Occupation-Level Percentage Point Utilization Gaps for Women, 2019

Onsite Construction Occupation	Median Hourly Wage Level	Percentage Point Gap (Margin of Error)
6410-Painters and paperhangers	$	4.4 (0.4)
6710-Fence erectors	$	10.0 (1.0)
6240-Carpet, floor, and tile installers and finishers	$	10.3 (0.6)
6600-Helpers, construction trades	$	7.8 (1.0)
6330-Drywall installers, ceiling tile installers, and tapers	$	8.7 (0.6)
6260-Construction laborers	$	10.8 (0.2)
6515-Roofers	$	13.4 (0.4)
6460-Plasterers and stucco masons	$	12.8 (0.6)
6230-Carpenters	$	8.5 (0.2)
6220-Brickmasons, blockmasons, stonemasons, and reinforcing iron and rebar workers	$$	9.6 (0.3)
6765-Other construction and related workers	$$	9.1 (0.9)
6540-Solar photovoltaic installers	$$	8.6 (1.7)
6250-Cement masons, concrete finishers, and terrazzo workers	$$	10.0 (0.4)
6720-Hazardous materials removal workers	$$	-12.8 (2.5)
6360-Glaziers	$$	8.9 (0.8)
6400-Insulation workers	$$	7.0 (1.3)
6730-Highway maintenance workers	$$	10.0 (0.8)
6441-Pipelayers, plumbers, pipefitters, and steamfitters	$$	7.6 (0.8)
6520-Sheet metal workers	$$	7.6 (0.7)
6442-Solar Thermal Installers and Technicians	$$$	8.4 (0.2)
6305-Construction equipment operators	$$$	7.7 (0.3)
6355-Electricians	$$$	9.8 (0.3)
6530-Structural iron and steel workers	$$$	8.6 (0.8)
6210-Boilermakers	$$$	8.0 (1.5)
6660-Construction and building inspectors	$$$	10.0 (1.4)
6740-Rail-track laying and maintenance equipment operators	$$$	11.2 (1.2)
6700-Elevator and escalator installers and repairers	$$$$	7.8 (1.1)

Higher utilization rates in onsite construction compared with similar occupations (legend minimum: -25.0)

Lower utilization rates in onsite construction compared with similar occupations (legend maximum: 25.0)

Note: Data for Figure 2.4 is available in Table Est-3.3a in Appendix Est-3. Individual onsite construction occupations are listed according to their American Community Survey (ACS) Census Code. The population of women and men presented in this study is defined by self-reported data on an individual's sex in the ACS Public Use Microdata Sample data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.
$ = median hourly wage less than $15 per hour; $$ = median hourly wage equal to or greater than $15 and less than $20 per hour; $$$ = median hourly wage equal to or greater than $20 and less than $30 per hour; $$$$ = median hourly wage equal to or greater than $30 per hour
O*NET = Occupational Information Network
Source: IPUMS-USA

2. National Workforce Gaps by Race/Ethnicity

On average, all onsite construction occupations utilize a smaller percentage of the following workers than in similar occupations:

▸ Asian workers

▸ Black or African American workers

▸ White workers

These relationships remain generally consistent when dividing all onsite work into the craft workers and laborers and helpers categories (see figure 2.5).

For example, Asian workers and Black or African American workers have positive utilization gaps for all onsite construction occupations, craft workers, and laborers and helpers. This finding indicates that onsite construction employs lower proportions of Asian workers and Black or African American workers compared with similar occupations in all three aggregate categories of onsite construction occupations. For Asian workers, all onsite construction occupations, craft workers, and laborers and helpers have utilization gaps between 1 and 2 percentage points. The utilization gaps for Black or African American workers fall between 5 and 6 percentage points.

The utilization gaps for Indigenous workers and workers who identify as multiracial or another race are consistently close to zero for all onsite construction occupations, craft workers, and laborers and helpers.

Unlike the other race and ethnicity groups, differences between utilization gaps for all onsite construction occupations, craft workers, and laborers and helpers are evident for White workers and Hispanic or Latino workers. For White workers, the utilization gap for laborers and helpers (7 percentage points) is over three times the size of the gap for all onsite construction occupations (2 percentage points) and the gap for craft workers (2 percentage points). All three gaps, however, indicate that onsite construction occupations employ a lower percentage of White workers compared with similar occupations. The increased gap size for laborers and helpers is also associated with occupations that pay a lower median wage, suggesting White workers may be less represented in onsite construction occupations that pay lower wages.

For Hispanic or Latino workers, the utilization gap for laborers and helpers (-13 percentage points) is wider than the gap for all onsite construction occupations (-10 percentage points) and the gap for craft workers (-9 percentage points). In this case, all three gaps indicate that onsite construction occupations employ a greater percentage of Hispanic or Latino workers compared with similar occupations. The wider gap size for laborers and helpers is associated with occupations that pay a lower median wage, suggesting Hispanic or Latino workers may be more represented in onsite construction occupations that pay lower wages.

Figure 2.5. National Aggregate-Level Percentage Point Utilization Gaps by Race/Ethnicity, 2019

Note: Data for Figure 2.5 is available in Table Est-3.3b in Appendix Est-3. Onsite construction occupations are classified as either craft workers or laborers and helpers, with the exception of one occupation, construction and building inspectors, which is not assigned to either group but is included in the all onsite construction occupations group. The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the American Community Survey (ACS) Public Use Microdata Sample data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.
O*NET = Occupational Information Network
* Indicates gaps where the 95 percent confidence interval contains zero.
Source: IPUMS-USA

Figure 2.6 displays the national utilization gaps by race and ethnicity for onsite construction occupations. The figure sorts the occupations by median hourly wage, and margins of error are included in parentheses next to each gap. According to these estimates, two populations—White workers and Hispanic or Latino workers—were observed to have utilization gap patterns that differ by occupation median hourly wage. Compared with similar occupations, the estimated proportion of White workers in higher wage construction occupations is greater than the estimated proportion in lower wage construction occupations, while the estimated proportion of Hispanic or Latino workers is greater in lower wage construction occupations, and the estimated proportion is lower in higher wage construction occupations. Utilization gap patterns for other race or ethnicity groups do not vary substantially by occupation wage. These patterns at the individual occupation level are important to keep in mind when considering gaps for all onsite construction occupations combined.

Figure 2.6. National Occupation-Level Percentage Point Utilization Gaps by Race/Ethnicity, 2019

Onsite Construction Occupation	Median Hourly Wage Level	Percentage Point Gap (Margin of Error)					
		Asian	Black/African American	Indigenous	White	Multiracial/Another Race	Hispanic/Latino
6410-Painters and paperhangers	$	1.9 (0.2)	7.7 (0.4)	0.3 (0.1)	14.4 (0.5)	0.1 (0.2)*	-24.3 (1.2)
6710-Fence erectors	$	2.5 (0.4)	8.2 (1.7)	-0.6 (0.7)*	1.8 (3.1)*	-0.1 (1.0)*	-11.9 (4.3)
6240-Carpet, floor, and tile installers and finishers	$	1.5 (0.3)	8.3 (0.6)	0.3 (0.2)	7.4 (1.4)	0.6 (0.3)	-18.1 (2.2)
6600-Helpers, construction trades	$	1.7 (0.7)	3.2 (1.9)	-0.2 (0.6)*	7.6 (2.5)	-1.9 (1.5)	-10.3 (3.1)
6330-Drywall installers, ceiling tile installers, and tapers	$	2.1 (0.2)	8.8 (0.6)	-0.7 (0.4)	21.4 (1.2)	0.7 (0.3)	-32.3 (2.4)
6260-Construction laborers	$	0.8 (0.1)	5.4 (0.3)	0.0 (0.1)*	7.2 (0.4)	0.1 (0.1)*	-13.6 (0.6)
6515-Roofers	$	2.9 (0.2)	7.5 (0.7)	-0.1 (0.2)*	17.1 (1.2)	0.3 (0.3)*	-27.7 (1.8)
6460-Plasterers and stucco masons	$	2.5 (0.2)	8.7 (1.5)	0.6 (0.2)	23.9 (3.3)	0.8 (0.6)	-36.5 (4.4)
6230-Carpenters	$	1.7 (0.1)	5.1 (0.3)	0.0 (0.1)*	3.8 (0.4)	0.1 (0.1)*	-10.7 (0.8)
6220-Brickmasons, blockmasons, stonemasons, and reinforcing iron and rebar workers	$$	2.3 (0.3)	2.9 (0.9)	-0.1 (0.3)*	7.7 (1.8)	0.2 (0.4)*	-13.0 (1.7)
6765-Other construction and related workers	$$	1.2 (0.5)	3.9 (1.7)	-0.3 (0.5)*	-2.8 (2.0)	-0.5 (0.7)*	-1.5 (2.0)*
6540-Solar photovoltaic installers	$$	1.7 (1.0)	3.7 (3.4)	-0.3 (0.9)*	-2.0 (4.6)*	-0.6 (1.3)*	-2.5 (4.2)*
6250-Cement masons, concrete finishers, and terrazzo workers	$$	2.3 (0.1)	1.4 (1.7)*	0.1 (0.4)*	13.0 (2.0)	-0.1 (0.6)*	-16.7 (2.8)
6720-Hazardous materials removal workers	$$	0.1 (1.1)*	-6.7 (2.6)	0.3 (0.3)	13.5 (3.1)	-0.5 (0.9)*	-6.6 (2.7)
6360-Glaziers	$$	1.1 (0.6)	7.7 (1.0)	0.5 (0.3)	-12.5 (2.3)	0.0 (0.7)*	3.1 (2.8)
6400-Insulation workers	$$	1.9 (0.5)	4.7 (1.6)	-0.1 (0.6)*	12.0 (2.0)	0.0 (0.7)*	-18.6 (3.4)
6730-Highway maintenance workers	$$	2.2 (0.3)	2.4 (1.4)	-0.3 (0.3)	-17.9 (0.8)	0.4 (0.4)	13.1 (1.4)
6441-Pipelayers, plumbers, pipefitters, and steamfitters	$$	1.8 (0.5)	3.2 (1.5)	-0.1 (0.4)*	-0.6 (2.5)*	0.1 (0.6)*	-4.5 (2.6)
6520-Sheet metal workers	$$	0.8 (0.5)	6.6 (1.1)	0.2 (0.2)	-15.0 (1.1)	-0.2 (0.4)*	7.5 (1.4)
6442-Solar Thermal Installers and Technicians	$$$	1.6 (0.2)	1.9 (0.4)	0.0 (0.1)*	-1.7 (0.7)	0.0 (0.2)*	-1.9 (0.8)
6305-Construction equipment operators	$$$	1.9 (0.2)	4.8 (0.5)	-0.8 (0.3)	-14.9 (0.9)	0.4 (0.2)	8.6 (0.9)
6355-Electricians	$$$	1.0 (0.2)	1.6 (0.3)	0.0 (0.1)*	-4.0 (0.7)	0.0 (0.2)*	1.5 (0.5)
6530-Structural iron and steel workers	$$$	1.9 (0.4)	4.2 (1.4)	-0.5 (0.5)*	-8.1 (0.7)	-0.4 (0.6)*	2.9 (2.4)
6210-Boilermakers	$$$	1.0 (1.2)*	4.7 (2.9)	-0.5 (1.0)*	-10.7 (2.2)	0.5 (0.7)*	4.9 (4.1)
6660-Construction and building inspectors	$$$	0.0 (0.5)*	-0.1 (1.1)*	0.1 (0.3)*	-4.9 (1.3)	0.0 (0.5)*	4.8 (1.1)
6740-Rail-track laying and maintenance equipment operators	$$$	2.1 (0.7)	-4.5 (4.8)*	-0.5 (1.1)*	-5.5 (4.9)	-0.2 (1.5)*	8.6 (5.9)
6700-Elevator and escalator installers and repairers	$$$$	1.0 (0.8)	2.9 (1.9)	0.2 (0.5)*	-10.4 (2.3)	-0.3 (1.0)*	6.6 (2.8)

Higher utilization rates in onsite construction compared with similar occupations (legend minimum: -25.0)

Lower utilization rates in onsite construction compared with similar occupations (legend maximum: 25.0)

Note: <u>Data for Figure 2.6 is available in Table Est-3.3b in Appendix Est-3</u>. Individual onsite construction occupations are listed according to their American Community Survey (ACS) Census Code. The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the ACS Public Use Microdata Sample data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.

$ = median hourly wage less than $15 per hour; $$ = median hourly wage equal to or greater than $15 and less than $20 per hour; $$$ =median hourly wage equal to or greater than $20 and less than $30 per hour; $$$$ = median hourly wage equal to or greater than $30 per hour; O*NET = Occupational Information Network

* Indicates gaps where the 95 percent confidence interval contains zero.

Source: IPUMS-USA

3. National Workforce Gaps Over Time

Low utilization of women and people of color in onsite construction has been a persistent problem (BLS, 2022a). To understand whether and how these low rates of utilization have changed, the study team examined trends between 2010[18] and 2019.

As figure 2.7 illustrates, the utilization gap for Black or African American workers expanded, and the gaps for White workers and Hispanic or Latino workers narrowed between 2010 and 2019. Gaps for other demographic groups remained mostly unchanged. The very slight growth (0.2 percentage points; see figure 2.7) in the women's utilization gap can be attributed to slight increases in the proportion of women in onsite construction occupations and similar occupations (0.7 and 0.9 percentage point increases, respectively; see table Est-3.3a).

National gaps for Black or African American workers and Asian workers also increased. The gap expansion for Black or African American workers (1.6 percentage point increase; see figure 2.7) reflects a decrease in the proportion of Black or African American workers employed in onsite construction occupations and an increase in the proportion of workers employed in similar occupations (0.1 percentage point decrease and 1.5 percentage point increase, respectively; see table Est-3.3b). For Asian workers, the 0.4 percentage point gap expansion reflects greater growth in the proportion of workers employed in similar occupations compared with onsite construction (0.5 and 0.1 percentage point increases, respectively; see table Est-3.3b).

Over time, Hispanic or Latino workers have been employed at higher rates in onsite construction compared with similar occupations. However, the national gap for Hispanic or Latino workers narrowed by 1.0 percentage points between 2010 and 2019. This change reflects that proportionately more Hispanic or Latino workers joined similar occupations compared to onsite construction occupations during this period (1.7 percentage point increase and 0.7 percentage point increase, respectively; see table Est-3.3b).

In contrast to many other trends, the national gap for White workers decreased by 3.2 percentage points as a result of a larger drop in the population of White workers in similar occupations compared with onsite construction (4.1 and 1.0 percentage point decreases, respectively; see table Est-3.3b).

The gap for workers who identify as multiracial or another race had relatively little change across this period (0.2 percentage point increase; see figure 2.7), and the gap for Indigenous workers also changed very slightly (0.1 percentage point increase; see figure 2.7).

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[18] The study team used the Census Bureau's 2010 ACS 5-Year Estimates PUMS data to estimate employment in onsite construction and similar occupations for 2010.

Figure 2.7. Change in National Percentage Point Utilization Gaps by Sex and Race/Ethnicity Across All Onsite Construction Occupations, 2010 to 2019
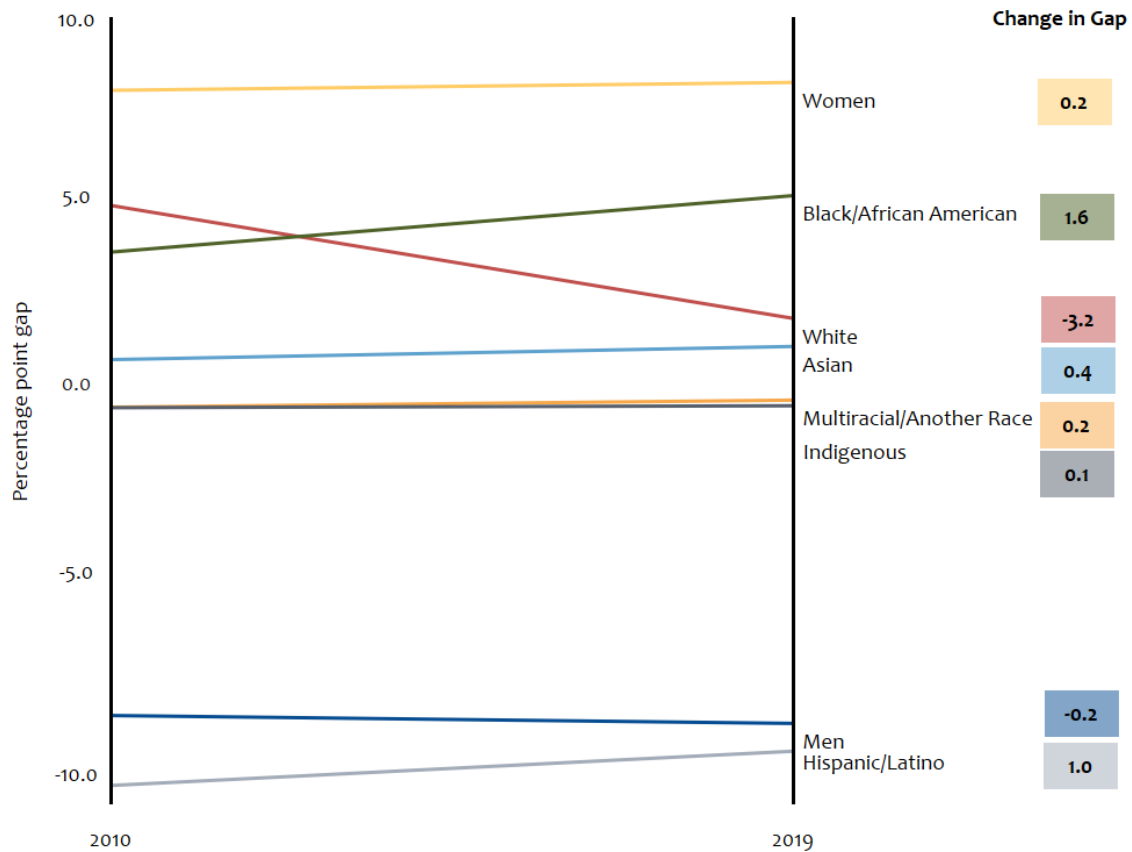
Note: Figure 2.7 data on the gaps for women and men are available in Table Est-3.3a and data on gaps for each race and ethnicity group are available in Table Est-3.3b in Appendix Est-3. The population of women and men presented in this study is defined by self-reported data on an individual's sex in the American Community Survey (ACS) Public Use Microdata Sample (PUMS) data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS. The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the ACS PUMS data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.
O*NET = Occupational Information Network
Source: IPUMS-USA

4. Discussion

When comparing estimates of utilization in onsite construction to estimates of utilization in similar occupations at the national level, the representation of women, Black or African American workers, and Asian workers falls short. Meanwhile, the representation of White workers and Hispanic or Latino workers varies in alignment with the median hourly wage offered by onsite construction occupations.

White workers are generally less utilized in onsite construction compared with similar occupations but are more utilized in onsite construction occupations that offer higher median hourly wages compared with similar occupations. Conversely, Hispanic or Latino workers are generally more utilized in onsite construction compared with similar occupations but are less utilized in onsite construction occupations that offer higher median hourly wages compared with similar occupations. These trends, and the little-to-no changes in them over time, may suggest workers with the job skills and interests to work in onsite construction are available to increase utilization in underutilized sex and race and ethnicity groups in the national onsite construction workforce. Such increases in utilization may help ensure that the representation of workers in onsite construction by sex and race and ethnicity is more equitable. That said, equitable distribution must also take into account the hourly wages onsite construction occupations offer.

C. State Estimates of Onsite Construction Utilization

When examining utilization gaps at the State level, this study finds that, compared with similar occupations, onsite construction occupations employ—

▶ Proportionately fewer women across all States and to a more extreme extent in Midwest States

▶ Proportionately fewer Black or African American workers and Asian workers across most States

▶ Proportionately more White workers in Midwest States and proportionately few White workers in Southwest States

▶ Proportionately more Hispanic or Latino workers across most States, especially in Southern States

Utilization gaps for Indigenous workers and workers who identify as multiracial or another race are nearly zero or insignificant for most States (see table Est-3.4b).

State trends in utilization gaps largely mirror those at the national level. While State-level variations exist across all the gaps the study team calculated, no State shows consistently low or high gaps across all demographic groups (see tables Est-3.4a and Est-3.4b).

The State-level estimates presented here focus on the combined set of all onsite construction occupations. Tables Est-3.4a and Est-3.4b in appendix Est-3 further detail the State-level estimates produced for all onsite construction occupations.

1. State Workforce Gaps By Sex

At the State level, the onsite construction workforce has a smaller share of women than the workforce of similar occupations.

▶ The utilization gap for women is generally between 6.0 and 10.0 percentage points, meaning the onsite construction occupations workforce includes between 6.0 and 10.0 percentage points fewer women than similar occupations.

- Gaps range from 2.6 percentage points in Wyoming to 13.3 percentage points in Indiana,[19] and three of the five States with the largest utilization gaps for women are located in the Midwest (Indiana, Wisconsin, and Michigan).

- No State has a negative gap, meaning similar occupations employ a greater percentage of women than onsite construction occupations across all States.

See figure 2.8 for a map of the State gaps for women across all onsite construction occupations. The specific State-level estimates and gaps for all onsite construction occupations appear in appendix Est-3.

Figure 2.8. State Percentage Point Utilization Gaps for Women Across All Onsite Construction Occupations, 2019
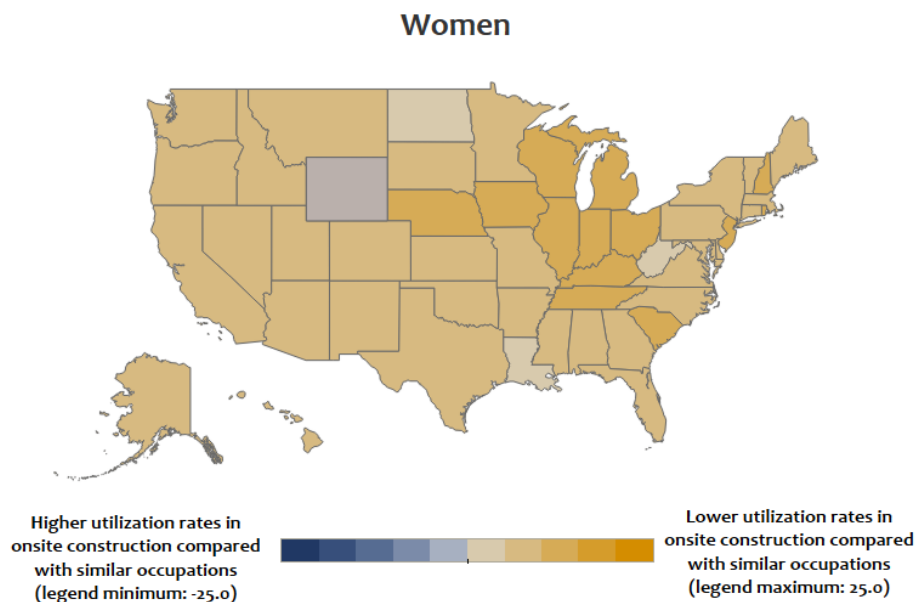
Note: Data for Figure 2.8 is available in Table Est-3.4a in Appendix Est-3. States are grayed out in the map if the 95 percent confidence interval for the gap contains zero. The population of women and men presented in this study is defined by self-reported data on an individual's sex in the American Community Survey (ACS) Public Use Microdata Sample data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.
O*NET = Occupational Information Network
Source: IPUMS-USA

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[19] The 95 percent confidence intervals for the gaps in Wyoming and the District of Columbia contain zero, suggesting these locations may not have a gap between the utilization of women in onsite construction and similar occupations.

2. State Workforce Gaps by Race/Ethnicity

Patterns in State-level workforce gaps by race and ethnicity mirror patterns seen at the national level.

▶ At the State level, onsite construction occupations generally employ a lower proportion of Asian workers and Black or African American workers and a higher share of Hispanic or Latino workers than in similar occupations.

▶ The direction of utilization gaps for Indigenous workers and workers who identify as multiracial or another race varies by State, and these gaps are often close to zero. Estimates for these groups are subject to limitations because of sample size.

▶ The direction of utilization gaps for White workers varies by State: 19 States have positive gaps, 30 States and the District of Columbia have negative gaps, and Hawaii has no gap.[20]

See figure 2.9 for maps of the State gaps by race and ethnicity across all onsite construction occupations.

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[20] The 95 percent confidence intervals for the utilization gaps for White workers include the value of 0 for 5 of the 19 States with positive gaps, the District of Columbia, 10 of the 30 States with negative gaps, and Hawaii.

Figure 2.9. State Percentage Point Utilization Gaps by Race/Ethnicity Across All Onsite Construction Occupations, 2019

Asian

Black/African American

Indigenous

White

Multiracial/Another Race

Hispanic/Latino

Higher utilization rates in onsite construction compared with similar occupations (legend minimum: -25.0)

Lower utilization rates in onsite construction compared with similar occupations (legend maximum: 25.0)
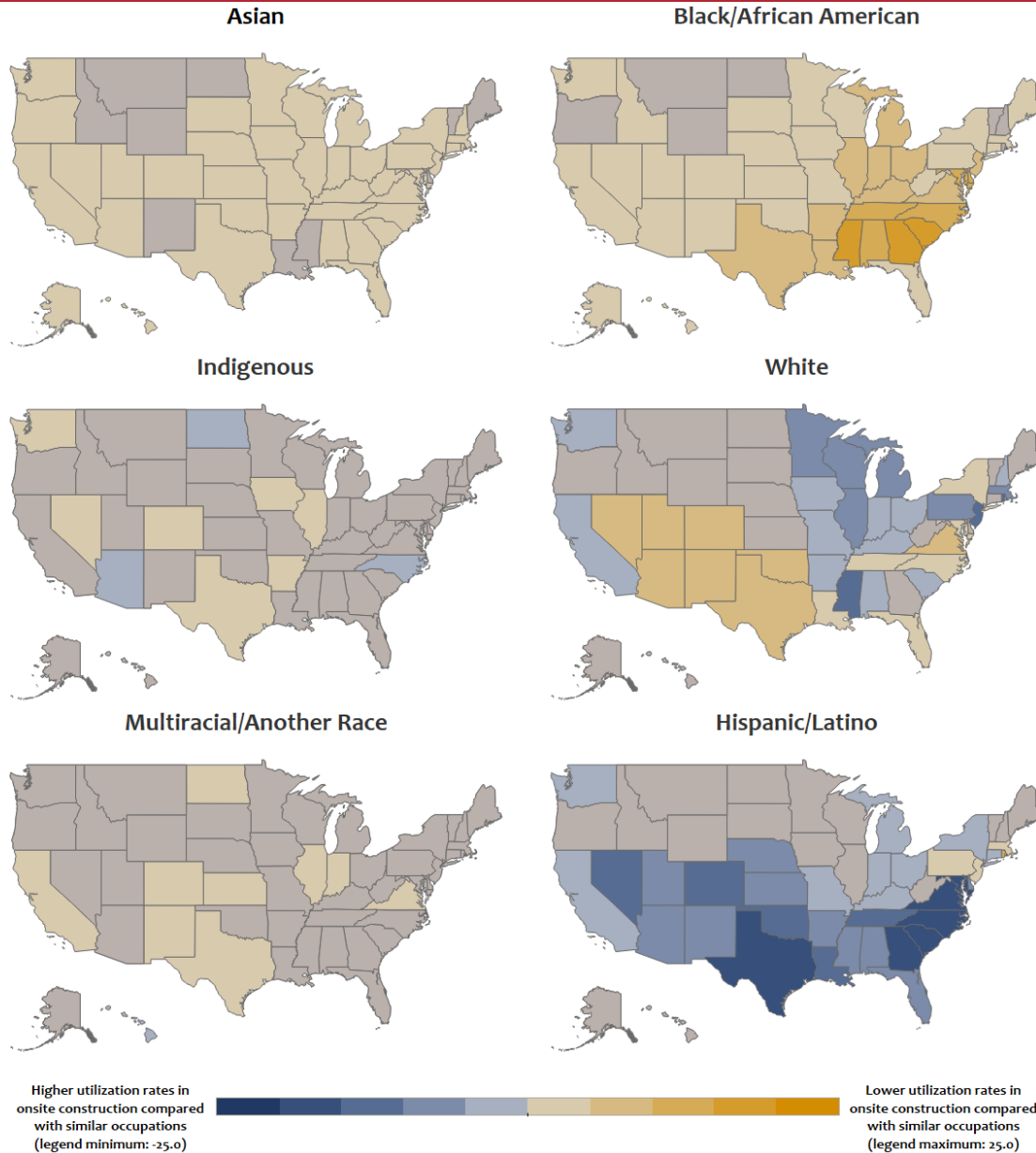
Note: Data for Figure 2.9 is available in Table Est-3.4b in Appendix Est-3. States are grayed out in the map if the 95 percent confidence interval for the gap contains zero. The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the American Community Survey (ACS) Public Use Microdata Sample data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.
O*NET = Occupational Information Network
Source: IPUMS-USA

3. State Workforce Gaps Over Time

Trends in State gaps in utilization align with the patterns observed at the national level. While most groups see small changes in gaps across the States, Black or African American workers tend to see an expansion in gaps across most States, and White workers tend to see a decrease in gaps across most States. Figure 2.10 displays the changes in State utilization gaps for each group, comparing estimates from 2010[21] with estimates from 2019. The States with the greatest gap increase and decrease are highlighted for each group. Additional details about State-level utilization gap changes over time are available in Munkacsy et al. (2024) and its associated appendices.

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[21] The study team used the Census Bureau's 2010 ACS 5-Year Estimates PUMS data to estimate employment in onsite construction and similar occupations for 2010.

Figure 2.10. Greatest Changes in State Percentage Point Utilization Gaps by Sex and Race/Ethnicity Across All Onsite Construction Occupations, 2010 to 2019

4. Discussion

State-level comparisons of estimates of utilization in onsite construction and estimates of utilization in similar occupations mostly mirror those seen at the national level. Utilization of women, Black or African American workers, and Asian workers in onsite construction consistently fall short across States, while utilization of Hispanic or Latino workers exceeds that of similar occupations across States. Further examination of regions where these gaps are expanded, such as in the Southeast for Black or African American workers and throughout the South for Hispanic or Latino workers, may help identify some of the roots of disparities in representation. Given that the utilization gaps measure the difference between utilization in onsite construction and similar occupations within a specific geographic region, these gaps do not reflect trends in the distribution of the general population or workforce of these regions but rather offer information about workers with the relevant skills joining occupations in the construction industry over other similar occupations.

State-level utilization gaps for White workers highlight variation not captured at the national level. While national estimates of the utilization gap between onsite construction and similar occupations suggest White workers are employed at lower rates in onsite construction, State-level estimates demonstrate variation across States and between regions of the United States. For instance, White workers are employed in onsite construction occupations at higher rates in the Midwest but lower rates in the Southwest. While the utilization gaps for some demographic groups vary across States, patterns in how the gaps have changed over time remain relatively consistent across States.

This study also considers utilization at a local level, using Economic Areas (EAs). EAs are regional markets encompassing one or more statistical areas and the surrounding counties. As of 2004, the U.S. Bureau of Economic Analysis delineated 179 EAs with full coverage of the 50 States and the District of Columbia (Johnson and Kort, 2004). EAs represent regional markets for labor, products, and information. The comparison of the utilization of workers in onsite construction and similar occupations by sex and race and ethnicity at the EA level continues to emphasize trends found at the State level. One particularly apparent EA-level pattern is that many EAs with the largest gaps for Black or African American workers and Hispanic or Latino workers are in the Southeast. These gaps represent opposite patterns for these two groups. For Black or African American workers, the wide gaps in the Southeast represent lower rates of employment in onsite construction occupations compared with similar occupations, whereas the wide gaps for Hispanic or Latino workers represent higher rates of employment in onsite construction compared with similar occupations. More details about the EA-level findings are available in appendix Est-1.

D. Summary

The estimates presented in this section emphasize the disproportionate employment of women and most people of color in onsite construction occupations when compared with occupations that require similar skills. In particular, women, Black or African American workers, and Asian workers face especially low rates of employment in onsite construction nationally and at the State level.

For groups such as Hispanic or Latino workers that see higher representation in onsite construction, this study found that such representation may be accompanied by disparities in wage. Consider, for instance, that this study found that an estimated 57 percent of Hispanic or Latino workers in onsite construction earn low wages, whereas the next highest percentage of low-wage workers within a race and ethnicity group (Black or African American workers) is 48 percent.

While general patterns of underrepresentation for women, Black or African American workers, and Asian workers in onsite construction compared with similar occupations remain consistent across the national, State, and local levels, the estimates indicate some States and local regions may demonstrate more extreme disparities. For example, underutilization of Black or African American workers when compared with similar occupations persists across the United States, but it is particularly magnified in the southeastern region of the nation.

Although comparisons of estimates between 2010 and 2019 indicate some changes in the measured utilization gaps, representation of women and people of color do not seem to have substantially improved over time in onsite construction occupations when compared with similar occupations.

As national infrastructure plans expand and the construction industry seeks to employ more workers to meet demand, historically low rates of employment for these workers could be improved, and wage disparities could be addressed. Chapter 3 explores pathways to producing more reliable estimates of the state of utilization in onsite construction. Then, chapter 4 explores efforts to reach the populations of workers available for onsite construction.

Chapter 3. Improving Estimates of Participation in Construction Occupations

The utilization gap estimates in the previous chapter provide insight into the degree to which smaller shares of women and people of color are employed in onsite construction occupations than are employed in similar occupations. However, the data and methods used to derive these estimates have limitations, rendering the estimates imprecise. Because similar occupations may face some of the same barriers onsite construction occupations face, utilization gap estimates do not answer all the relevant questions policymakers have.

For example, because similar occupations may also suffer from underutilization of women and people of color, utilization gaps do not reflect the total effects of the factors that drive underutilization (e.g., discrimination, lack of supports, insufficient networks) (EEOC, 2023; Hegewisch, 2021b). If all those factors were eliminated, utilization for women and people of color in onsite construction could increase by more than the utilization gap. Another factor leading the estimates to be imprecise is that the similar occupations do not capture the total labor market available for onsite construction. There may be women and people of color who come from other, less similar occupations that would thrive in onsite construction jobs.

This chapter discusses what data and assumptions would be needed to improve estimates of the utilization of women and people of color in onsite construction. It begins by defining the potential questions policymakers may want to answer with data about onsite construction jobs. The chapter then explores each question individually, discussing currently available data and the data needed to answer the question accurately.

A. Utilization Questions Relevant to Policymakers

Policymakers seeking to expand the available workforce for construction occupations while promoting greater access to underutilized populations have different questions about the utilization of women and people of color in onsite construction. Each question requires different types of data, methods, and assumptions to answer them. Four key questions follow.

Question 1: What is the degree of underutilization associated with barriers to employment and retention?

This question seeks to determine the difference between current utilization trends and what would happen if there were no barriers for women and people of color. Answering this question would provide insights into what proportions of onsite construction workers would be women and people of color if there were no discrimination, if they had equal access to employment networks, if they had sufficient supports such as childcare, etc. Refined versions of this question include identifying the degree of underutilization caused by each individual barrier (for example, how many workers reported lack of childcare as the primary reason that prevented them from entering that occupation?).

Policymakers could use the answers to this question to establish employment goals for contractors that could be supported through targeted interventions to address the largest barriers underrepresented groups face. Note, however, the answer to this question assumes sufficient numbers of women and

people of color would have the skills for and interest in construction to work in the industry if the barriers were eliminated.

Question 2: What is the current number, and what are the characteristics, of the workers who have the specific skills and interest needed for construction jobs?

This question seeks to identify the current number of women and people of color who are available to work in onsite construction. It differs from question 1 because it directly estimates the size of the workforce currently available for construction jobs. This estimate would be derived from the total available workforce. It would identify the number of individuals who have the relevant skills for onsite construction—and an interest in working in onsite construction—regardless of whether they currently work in similar occupations. This would include considering, for example, which individuals are open to working in the difficult or hazardous working conditions often associated with onsite construction work, regardless of their current occupation. Policymakers and trade organizations could use this information to identify which workers might be tapped to equitably increase the supply of workers to meet the growing demand in construction occupations.

Question 3: What worker attributes are associated with success in onsite construction occupations?

Policymakers and employers would benefit from knowing what experience, skills, and other attributes—including, for example, willingness to work in difficult or hazardous working conditions—are predictive of success in gaining and maintaining construction. Knowing these attributes would benefit employers that seek to hire employees in general and especially if they want to increase representation of women and people of color. This information would also benefit employment and training programs that seek to match workers to occupations and to target training efforts.

The remainder of this chapter examines how these questions could be answered and what data would be needed to answer them.

B. Requirements for Answering Utilization Questions

Researchers are currently unable to create accurate answers to the three utilization questions. The answer to each question would require representative data currently unavailable. However, it is useful to consider how these questions might be answered, and what data would be required to derive those answers. Future investments in data collection could provide greater insights into the utilization and availability of women and people of color in onsite construction.

Question 1: What is the degree of underutilization associated with barriers to employment and retention?

This question seeks to determine the difference between current utilization trends and a scenario in which women and people of color have no barriers to employment. In particular, it would be useful to know the roles played by the individual component barriers discussed in chapter 1, including discrimination, harassment, limited employment networks, and a lack of supports such as childcare (EEOC, 2023; Hegewisch, 2021b). The effects of these barriers cannot be observed directly. Instead, the answer to this question would require rigorous measures of how the barriers contribute to the underutilization of women and people of color and/or proxies for the share of workers affected.

To the study team's knowledge, no studies have explicitly measured the degree of underutilization caused by specific barriers. Researchers have evaluated underutilization of labor and possible discrimination in construction occupations using two other strategies. First is the approach used in chapter 2, comparing utilization in construction with utilization in similar occupations. This approach uses similar occupations as the benchmark. However, this approach does not measure the total effect of barriers such as discrimination because similar occupations may also face these barriers.

The second strategy focuses explicitly on measuring the impact of discrimination in hiring practices (Quillian & Midtbøen, 2021). Many studies have measured discrimination through the use of fake applicants or resumes. In these "audit" studies, the fake applicants have identical qualifications but differ in race or gender. These studies generate estimates of the relative share of applicants denied jobs because of discrimination explicitly. While this approach has been used in employment studies around the world, the study team has not identified any studies that have used this approach for domestic onsite construction occupations specifically.

In short, to answer the question of how much underutilization in onsite construction is caused by individual barriers, a new approach would need to be developed.

Potential approaches

An ideal approach would be to compare the U.S. construction labor market with another labor market with no barriers, but this is infeasible in practice. For this study to be valid, it would require an onsite construction labor market comparable with the U.S. labor market in which women and people of color do not face discrimination, have equal access to employment networks, and have access to the supports needed to work in onsite construction. The patterns in this proxy labor market could then be extrapolated to the U.S. labor market to generate estimates of how the barriers facing women and people of color affect utilization rates. This approach is likely infeasible. In many potential comparison labor markets, key populations of interest in this analysis (e.g., Black or African American and Asian workers) are the predominant worker and do not face barriers driven by their race. In other labor markets where the predominant worker is White, other differences in national economic trends would make them incompatible with the United States. Barriers driven by race and gender are not unique to the United States, and it is unlikely that another country could represent employment patterns in the absence of these barriers.

Alternatively, a more realistic approach is for researchers to "build up" estimates of the individual component barriers using results from current and future research. Studies could examine the impact of specific barriers on the participation of women and people of color in onsite construction. Although there would be limitations, these barriers could then be added together to approximate their total combined impact. Individual barriers could be estimated as follows:

▶ **Discrimination.** Researchers could develop estimates of the degree to which discrimination affects participation in onsite construction jobs using at least two approaches that may provide complementary information.

First, researchers could use audit methods such as those described in Quillian and Midtbøen (2021). Researchers could create resumes or online job profiles for fictional people who are similarly qualified but have names that differ statistically in prevalence by gender, race, and ethnicity and then track callback rates by demographic group. Applicants with identical qualifications but different genders, races, and ethnicities could also apply for the same onsite

construction jobs; researchers could use differences in how these candidates advance through the process to identify the degree to which discrimination possibly affects job applicants. The results of these studies could then be used to estimate the total number of individuals denied jobs because of possible discrimination at each stage in the hiring process.

For example, if researchers knew that applicants who identify as women were 50 percent less likely than equally qualified applicants who identify as men to receive an onsite construction job, they could estimate the total number of women denied jobs because of discrimination by dividing the number of women in onsite construction jobs by 0.50. Note that this approach would estimate only the number of applicants directly affected by discrimination; it would not measure the role of policies designed to offset discrimination. This approach also would not capture any chilling effect on the number of applications if candidates anticipated they would face discrimination.

Second, researchers could compare the demographics of workers across construction employers that are subject to differing requirements for hiring and employment under Federal equal opportunity policies. For example, Federal antidiscrimination laws only apply to businesses with at least 15 employees, and past research suggests these laws result in higher employment of women and Black or African American workers (Carrington et al., 2000; Chay, 1998). OFCCP's utilization goals also apply specifically to construction business with Federal contracts, and past studies suggest that becoming a Federal contractor was associated with greater employment of Black or African American workers (Kurtulus, 2016; Rodgers & Spriggs, 1996).

Hence, future research could measure differences in the shares of employees who are women or people of color between construction businesses with total workforces above and below the 15-employee threshold. Researchers could also prospectively track changes in employment of women and people of color among construction companies as they become Federal contractors. To assess the effects of equal opportunity policies, such studies would need to use statistical methods to identify construction businesses that differ in size or the types of projects they take on but are otherwise similar. These studies could measure net changes in the demographics of the workforce associated with these policies, though only among businesses at the edge of the policies' "reach" (for example, those with slightly more than 15 employees or those that enter into Federal contracting).

▸ **Employment networks.** Weak employment networks in onsite construction may serve as a barrier to underrepresented groups. Because these networks are local to a confined geographic area, one way to assess the effects of these networks is to determine whether variation in the strength of networks is correlated with variation in onsite construction employment rates for these groups. This approach would require developing a measure of the strength of a community's employment network in onsite construction.

It may be possible to collect the necessary data for these measures through a self-reported survey of workers. As long as the survey collected data from enough workers of each demographic group in each locality, and as long as the survey was administered in a sufficiently large number of localities, researchers could measure the variation in network strength. They could then see how increases or decreases in network strength are associated with increases or decreases in employment for related groups.

Estimation of the effects of employment networks may also be possible by conducting experiments that test efforts to strengthen networks. Such experiments could identify the degree to which an increase in network strength results in increased rates of employment.

Such approaches could begin to inform the degree to which employment networks serve as barriers. However, this approach would have substantial methodological limitations. First, employment networks are a nebulous concept, and any attempt to create a standardized measure of network strength runs the risk of oversimplifying the role of employment networks. Second, any correlational analysis of survey data would not show definitive causal relationships; a third factor may affect both the strength of the network and rates of employment for some groups. Finally, conducting experiments to capture the degree to which employment networks serve as barriers would require experimental interventions that can effectively create measurable changes in the strength of employment networks.

▶ **Supports.** Lack of employment supports for onsite construction occupations may disproportionately affect different demographic groups. For example, lack of onsite childcare could serve as a barrier to women who are parents seeking onsite construction jobs (Hegewisch, 2021b). For construction projects outside urban areas, lack of transportation supports could serve as a barrier to populations concentrated in urban areas and without personal transportation options, and this barrier may disproportionately affect people of color. Some workers might identify alternate arrangements, such as home-based childcare or car/vanpooling. For example, 16 percent of all onsite construction workers use ridesharing when commuting to work (compared with 8 percent of workers in other occupations), as do almost 23 percent of Hispanic or Latino workers and 24 percent of Indigenous workers in onsite construction.[22] However, such arrangements may come with additional time costs and may not be equally available to all groups or in all areas. The study team does not know of any study that measures the degree to which a lack of formal supports (or alternate options) for onsite construction occupations affects specific demographic groups differently.

Researchers could field a survey of workers to better understand these issues. The survey would ask workers whether the lack of individual supports precluded them from applying for or accepting a job in onsite construction or how they sought out alternate options for support to address potential barriers. This approach could be susceptible to respondent bias; respondents who cite a lack of support as a barrier to onsite construction may still not take an onsite construction job if those supports were provided.

Alternatively, experiments testing interventions to provide employment supports could identify the degree to which individual supports increase rates of employment. Experiments could focus on individual supports (e.g., childcare) or on targeting supports to meet individual workers' needs. While the latter would be more complicated (and expensive), it could better serve to address the degree to which supports in general can improve rates of employment in onsite construction.

Using these different methods, researchers could begin to estimate the number of women and people of color these onsite construction barriers affect. The estimates for individual barriers could then be combined to generate an estimate of the number of women and minorities affected by these barriers. However, that process would be inherently imprecise. These barriers are not mutually exclusive—the same women may be affected by discrimination and a lack of supports. Studies of specific barriers could

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[22] The statistics on ridesharing are based on the authors' tabulations using the U.S. Census Bureau's data explorer for ACS 1-Year Estimates Public Use Microdata Sample, available at https://data.census.gov/mdat/#/.

also be based on different populations of workers, limiting the ability to combine results across studies. Researchers would need to derive some assumptions about the overlap of these individual barriers and populations. These assumptions would introduce additional noise into estimates already imprecise.

Feasibility and implications

Identifying how underutilization in onsite employment is explained by barriers would require further research that is costly and might not yield reliable evidence for policymakers. Efforts to collect robust information on discrimination, employment networks, and sensitivity to supports would require large-scale data collection efforts and/or experiments to measure differences across key demographic groups. These data collection efforts would be costly. Given limitations in the individual research efforts and assumptions needed to combine information across research efforts, the resulting estimates would carry significant uncertainty and, in the end, might not provide decision makers the level of precision they need to direct policy.

Question 2: What is the current number, and what are the characteristics, of workers who have the specific skills and interest needed for construction jobs?

Policymakers looking to address historic disparities and employers looking to address labor shortages may be interested in the number and characteristics of individuals who could be available for onsite construction occupations if barriers were reduced. In particular, they may like to know the number of women and minorities who have the relevant skills and interest for each individual onsite construction occupation.

The approach presented in chapter 2 and originally developed by Bendick et al. (2011) is an attempt to inform this question. This approach uses differences between the onsite construction occupations and similar occupations to infer the number of people who could be available for onsite construction. However, this approach makes assumptions that limit its ability to answer question 2 directly. The availability of labor depends on the requirements of onsite construction occupations, which may include specific, applied skills and certifications. Individuals employed in occupations deemed similar via O*NET data may still not have the complete set of skills (or certifications) required for onsite construction. These similar occupations may not be the only occupations in which individuals available for onsite construction are currently employed. An individual with the requisite skills and certifications may be employed in some other, dissimilar occupation. Finally, only a subset of workers who meet these requirements may ultimately be interested in entering a particular construction occupation.

Therefore, to truly measure the size and characteristics of the workforce available for onsite construction jobs, the approach presented in chapter 2 would need to be expanded to examine more occupations and refined to study worker skills and interests directly.

Potential approaches

The current approach is constrained because this analysis does not examine individuals' skills but, rather, the skills often required for an individual occupation. The approach assumes similar occupations require the same specific skills as their corresponding onsite construction occupation, all employees in a similar occupation have those skills, and all workers in a similar occupation may be interested in becoming an onsite construction worker. Each of these assumptions is flawed, resulting in differences between the estimated and actual numbers of workers in each demographic group available for onsite construction jobs.

The best way to address these issues would be with worker-level data on skill proficiency and occupational interests. Researchers could directly address Question 2 by studying patterns across workers from a wide swath of occupations, comparing workers' level of proficiency on an array of skills, certifications, and licenses with requirements for onsite construction occupations. Researchers could also assess the extent to which workers in nonconstruction occupations may be interested in switching to a construction job. Using such a database, researchers could examine disparities in onsite construction employment rates among workers with the same sets of skills, certifications and licenses, and an interest in construction. Researchers could also identify the size of the population of workers who have the relevant skills, certifications, licenses, and interest, regardless of their current occupation.

Feasibility and implications

Identifying the size and characteristics of workers with skills and interest in onsite construction would be costly. As with efforts to answer question 1, efforts to answer this question would require large-scale data collection to measure differences across key demographic groups. Considering skills, training, wages, and even interests can change, such data would be most beneficial if collected over time. While collecting such data on a large scale is feasible, the added precision may not warrant the added costs. Policymakers could still approximate the size and characteristics of the populations of interest using the current, similar occupation approach and the lower cost efforts to answer question 3.

Question 3: What worker attributes are associated with success in onsite construction occupations?

Question 3 seeks to identify the specific skills, experiences, and other attributes that predict success in onsite construction. Success can be defined in several ways, including successfully securing an onsite construction job, successfully staying in onsite construction jobs over time, and/or having successful wage growth in onsite construction occupations over time. Knowing which worker attributes predict success can help employers in the hiring process—this approach can be particularly helpful when employers want to increase the number of workers from populations they do not typically hire (such as women and people of color). This approach can also help employment and training centers match workers to apprenticeships and career pathways for onsite construction and target occupational training for workers learning important skills that could support them as they transition to onsite construction.

Potential approaches

Data on worker occupations and attributes could be used to predict the likelihood individuals will succeed in onsite construction. Using predictive analytics, researchers could identify which worker attributes predict outcomes, such as obtaining an onsite construction job and construction worker wage growth over time. Such efforts could provide insights into the skills and other attributes important for

success. Predictive analytics could also be used to generate estimates of the number of workers (total and by demographic group) with the attributes needed for success.

Various datasets could be explored for this effort. For example, standardized American Job Centers[23] (AJC) participant records and State unemployment insurance (UI) and wage records[24] could provide useful information on outcomes such as occupation changes, occupational skills training, job tenure, and wage growth. Another data source may be the Current Population Survey[25] (CPS), for which respondents participate for a total of 8 of 16 months. The CPS contains detailed worker occupation and employment data and supplemental information on job tenure, prior work, and earnings; these data could be used to predict successful transitions to onsite construction occupations and successful retention in onsite construction jobs. Using the National Longitudinal Survey of Youth[26] (NLSY) 1979 and 1997, researchers could correlate transitions to construction with high-level indicators of the types of tasks individual workers performed in a past job[27] and the occupation-level descriptors for that job based on O*NET. However, all these data have limited information on workers' interests and levels of specific skills, and the NLSY samples are limited,[28] so any predictive models could be limited as a result.

A more targeted effort to identify attributes associated with success could include a demonstration effort through AJCs. When identifying jobseekers to support in preparing for and obtaining a construction job, AJCs could collect detailed information on worker attributes, construction-related skills, and construction-related interests. Some AJCs may already administer career assessments and inventories that capture this information. These data could then be used to identify which worker attributes are associated with success in construction jobs after receiving AJC services. A demonstration might draw on UI wage records or surveys to consider success over a longer timeframe than the 1-year period covered by standardized AJC participant records. Such an effort would collect more detailed and more construction-related worker data than are available through extant administrative or survey data. The results could help AJCs improve worker placements in construction while also help policymakers learn about specific skills that future programs and services might support.

Feasibility and implications

The study team believes it is feasible and insightful to use AJCs to identify worker attributes associated with success in construction occupations. While data sources such as CPS and NLSY could be used to explore the relationship between attributes and success, the team suspects these data sources will lack the level of detail and sample sizes needed to provide useful insights. A demonstration using AJCs would produce more robust worker information with available data sources. This approach would limit the costs while maximizing insights. The effort could be piloted with a small number of AJCs and scaled up based on the initial pilot.

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[23] Additional information about American Job Centers is available at https://www.dol.gov/general/topic/training/onestop.
[24] Additional information about State wage record data is available at https://www.bls.gov/wrp/.
[25] Additional information about the Current Population Survey is available at https://www.census.gov/programs-surveys/cps/about.html.
[26] Additional information about the National Longitudinal Survey of Youth is available at https://www.bls.gov/nls/.
[27] Examples of the job-task questions in the NLSY include how much of the workday involved carrying out short, repetitive tasks; doing physical tasks; managing others; problem solving; using advanced math; reading documents; and interacting with coworkers, customers, and others in the work setting.
[28] The NLSY 1979 survey includes only individuals born from 1957 to 1964, and the NLSY 1997 survey includes only individuals born from 1980 to 1984. A 2021 study of how NLSY job-task data was related to other measures of current employment (Dey et al., 2021) included fewer than 3,700 respondents to each of the two surveys.

C. Summary

The study team's current approach to examining utilization gaps provides insights into the degree to which utilization of women and people of color in onsite construction differs from those of similar occupations. However, this approach does not explicitly address key questions policymakers ask. The approach cannot tell how much underutilization is caused by individual barriers to construction occupations, the number and characteristics of all workers who have the skills needed for onsite construction, and the attributes of workers who could succeed in construction with the right training.

Unfortunately, answering most of these questions requires extensive amounts of data not currently available. If the data were available, the study team is uncertain robust estimates could even be developed.

The study team believes the most promising opportunity for DOL would be to explore using AJC data to identify which worker attributes—regardless of current occupation—are associated with success in construction. Because this effort would use available data sources, it would require substantially fewer resources than efforts to collect worker-level skill data. If such a model effectively predicted worker success, it would provide OFCCP and other policymakers with additional insights into the size and characteristics of the workforce available for construction jobs.

Efforts to identify worker attributes associated with success could be combined with strategies for identifying and recruiting women and people of color to increase their representation in onsite construction. Chapter 4 discusses strategies for increasing the employment of women and people of color in onsite construction.

Chapter 4. Strategies for Increasing Employment of Women and People of Color in Construction

Employing more women and people of color in onsite construction occupations could be beneficial from the perspectives of industry, workers, and the government. Greater utilization of these groups could help meet the high and growing demand for construction workers, including additional demand related to Federal infrastructure investments such as the IIJA[29] (Federal Reserve Bank of St. Louis, 2023). Increases in employment would increase the presence of these historically underrepresented groups in construction jobs, an outcome that aligns with policymakers' objectives for achieving equal opportunity.

However, policymakers and researchers are still learning about the strategies that can successfully attract, place, and retain women and people of color in construction jobs. While DOL's Clearinghouse for Labor Evaluation and Research includes results for over 350 workforce programs and services that led to or contributed to higher employment rates, this body of evidence covers only three programs/services focused on construction.[30] Two of these were sector partnerships, a model that may be challenging to replicate and scale (Holzer, 2015). The other was YouthBuild, an organization that provides youth with education, training, stipends, and supportive services funded through substantial public investments (over $24,000 per participant as of 2017 per Miller et al., 2018).

The following sections describe two additional strategies for increasing participation of these groups that policymakers might consider, though the strategies have not yet been formally evaluated for their effects on construction utilization rates. First, the chapter describes the role of **apprenticeship programs**, which have recently enrolled over 200,000 new participants per year and served as a traditional access point for construction (DOL, 2021a). Second, it describes **local hiring provisions in 5 U.S. cities**, where municipal governments have adopted guidance for employing more members of underrepresented groups.

A. Apprenticeship as a Strategy to Increase Utilization of Underrepresented Groups

Marginalization of women and people of color in the construction trades has long been recognized as a problem closely related to how Americans access jobs in the industry (Marshall & Briggs, 1967). Apprenticeship programs provide "earn and learn" opportunities for entering and moving up a career pathway in an occupation or industry, and evidence suggests they can improve the work outcomes of participants from diverse backgrounds (The White House, 2022). This report relies on findings from Butrica et al. (2024) to show that women and people of color are better represented in apprenticeships than in the national construction workforce. These improved rates of representation suggest that apprenticeships also have the potential to be a "win-win" strategy for closing some of the utilization gaps described in chapter 2. However, women and people of color may face barriers to starting or completing apprenticeships, so additional approaches to supporting these groups may be required to fully unlock apprenticeship as a strategy for addressing utilization gaps in onsite construction.

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[29] Infrastructure Investment and Jobs Act available at: https://www.congress.gov/bill/117th-congress/house-bill/3684.

[30] Searching the CLEAR database in September 2023, the study team found 352 studies that had "moderate" or "high" evidence ratings and demonstrated positive impacts on employment. Adding the term "construction" narrowed the pool to 12 results. A review of the CLEAR summaries of these studies indicated they covered three district programs or services that help people prepare for or advance in construction occupations. Specifically, Michaelides et al. (2016) describe results for two construction sector partnerships, one of which Maguire et al. (2010) also studied; Miller et al. (2018) describe results for YouthBuild's programs.

Sections that follow present additional background, summarizing key features of the apprenticeship model, findings from past evaluations, and expansions in apprenticeship. The report then describes apprenticeship utilization rates for women and people of color and completion rates by demographic group. Next, it highlights approaches to use with apprenticeship to help more members of these groups enter jobs in construction. The section concludes with emerging opportunities for increasing utilization of underrepresented groups through apprenticeship.[31]

1. Background on Apprenticeship

Apprenticeship is a work-based training model that combines classroom learning with paid on-the-job training from experienced mentors and provides an industry-recognized credential upon completion. The National Apprenticeship Act of 1937 established the Federal registered apprenticeship system in the United States, and although apprenticeships are available in a range of sectors, they have been most extensively used in construction (Helmer & Conway, 2014). Completing an apprenticeship can better position participants to gain employment in an occupation or industry and open the door to further postsecondary study (Fuller et al., 2022).

Not all U.S. apprenticeships are registered with DOL, but those that are registered are referred to as the gold standard (U.S. Department of Education [ED], 2016) in workforce training because of their program standards, rigor, and wages that increase over the course of the apprenticeship and industry-recognized credentials. Federal regulations recommend that registered apprenticeship programs include at least 144 hours of related technical instruction and at least 2,000 hours of on-the-job learning, although most construction apprenticeship programs require more hours.[32]

Evaluation studies have documented employment and earnings gains linked to participation in apprenticeship among workers from diverse backgrounds.

▶ A study of registered apprenticeship in 10 States suggests significant employment gains of 8.6 percentage points and annual earnings gains of $8,406 for participants in the sixth year after starting the apprenticeship, compared with nonparticipants (Reed et al., 2012).[33] The results indicate potential lifetime gains of $125,832 in earnings and $32,105 in fringe benefits. While the study showed greater gains for men than for women, both groups benefited from participation. For example, compared with nonparticipants, sixth-year employment rates were 8.6 percentage points higher for men and 6.8 percentage points higher for women who participated in registered apprenticeship.

▶ An evaluation of 46 American Apprenticeship Initiative (AAI) grants found the earnings of AAI apprentices grew faster than comparable workers from 1 year before starting the apprenticeship to 2.5 years after starting (43 percent growth versus 16 percent growth, respectively; Katz et al., 2022). DOL issued these grants to expand registered apprenticeships in new occupations and provide opportunities to underrepresented populations.

▶ The evaluation of AAI grants also found all demographic groups gained significantly more in earnings as AAI apprentices than comparable workers (Katz et al., 2022). Based on data for

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[31] All subsections on apprenticeship draw mainly from a brief produced for this project by Butrica et al. (2024).
[32] The standards required of all registered apprenticeship programs are outlined in "29 § CFR 29.5 – Standards of Apprenticeship," Cornell Law School Legal Information Institute, October 29, 2008, https://www.law.cornell.edu/cfr/text/29/29.5.
[33] The earnings estimates from Reed et al. (2012) cited in this bullet have been adjusted to 2022 dollars.

2,601 AAI apprentices, earnings growth[34] was higher for women than for men, higher for Hispanic or Latino apprentices than for White apprentices, and lower for Black or African American apprentices than for White apprentices (Walton et al., 2022). Additional descriptive analyses suggest these differences may be partly attributable to the occupations in which each demographic group of apprentices received training. For example, more Black or African American women apprentices were trained for lower paying occupations than White women apprentices (Walton et al., 2022).

Almost 600,000 registered apprentices were actively training in the United States across all occupations as of 2021 (DOL, 2021a). As figure 4.1 shows, this number represents a 66 percent increase over the number of active apprentices in 2011. Over the same 2011–2021 period, the number of new apprentices increased by 85 percent, from 130,391 to 241,849 (figure 4.1). Part of this growth may result from DOL investments, such as the AAI, which began in 2015, and expansions of the Women in Apprenticeship and Nontraditional Occupations (WANTO) grants program.[35] The number of new apprenticeship programs registered each year more than doubled from 2011 to 2021, with most of this growth occurring after 2015 (Butrica et al., 2024). Over the same period, total annual WANTO grant awards also increased from approximately $1 million to over $3.5 million (DOL, 2011; 2021b).

Key Terms

Apprentice – a paid, productive employee who receives a combination of on-the-job learning and related classroom instruction to master occupational skills.

Active apprentice – an apprentice who was registered in their apprenticeship program during a calendar year, including apprentices who started or exited their program during that year.

New apprentice – an apprentice who started in their apprenticeship program during the current calendar year.

Figure 4.1. Number of Active and New Registered Apprentices, by Year, 2008–2021
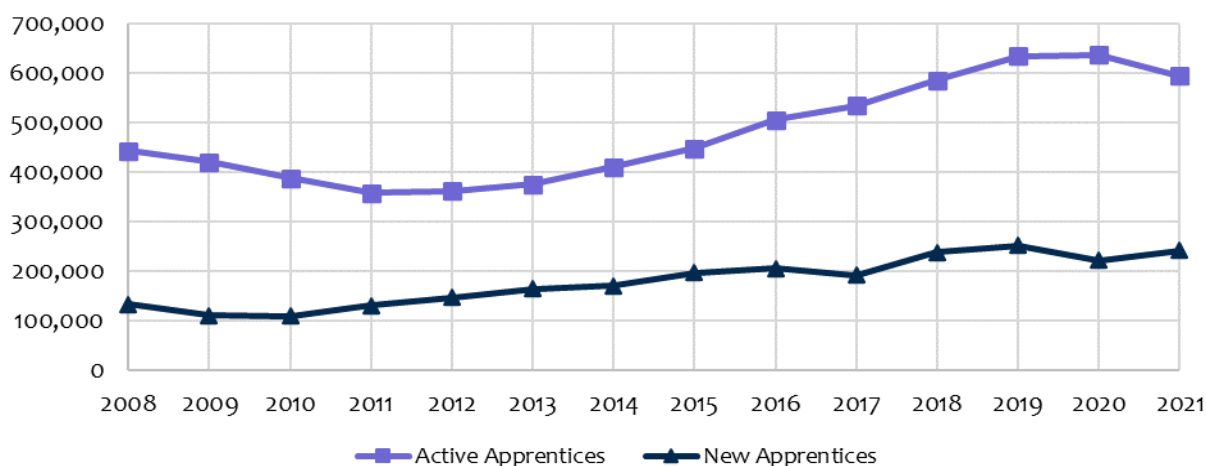
Note: Active apprentices refer to apprentices who were in the national apprenticeship system prior to fiscal year 2021 and remain in the system in fiscal year 2021. New apprentices refer to apprentices who entered the national apprenticeship system in fiscal year 2021. Counts of active and new apprentices are mutually exclusive.
Source: DOL, 2021a

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[34] Walton et al. (2022) measured earnings growth using an apprentice's quarterly earnings for the four calendar quarters prior to the start of their apprenticeship program and their quarterly earnings for the quarter directly following their program expected completion date. Quarterly earnings data come from the Administration of Children and Families' National Directory of New Hires.
[35] The WANTO grant program is run by the Women's Bureau of the Department of Labor. Additional information on WANTO is available at https://www.dol.gov/agencies/wb/grants/wanto.

While apprenticeships in nonconstruction trades have been growing as a result of policy priorities (Gardiner et al., 2021; Goger & Sinclair, 2021), almost half (48 percent) of active apprentices are registered in construction occupations—more apprentices than in any other occupation group.[36] Many construction apprentices are clustered within a small number of trades: Electricians, plumbers, and carpenters together make up over 60 percent of construction apprenticeships. Nearly three-quarters (74 percent) of construction apprentices are also in programs lasting 3 or more years.

2. Apprenticeship Utilization and Completion Among Diverse Groups

Although the shares of new apprentices who are women and people of color have been growing, these groups are still underrepresented in construction apprenticeship programs (Bilginsoy et al., 2022; Butrica et al., 2024; Casey, 2013; Childers, Hegewisch & Jackson, 2020; Kelly et al., 2022; Petrucci, 2022). **Even so, if utilization of women and people of color in apprenticeship programs is higher than in the national construction workforce, scaling apprenticeship can increase the representation of these groups in construction jobs.**

To assess this possibility, Butrica et al. (2024) examined apprenticeship programs for 23 construction occupations using data from the Registered Apprenticeship Partners Information Database System (RAPIDS) for 2022.[37] The researchers compared apprenticeship utilization rates with utilization rates in the same occupations for the national workforce in 2022, as estimated by Munkacsy et al. (2024).[38]

Their results show that **within most individual construction occupations, the shares of women, Asian apprentices, and/or Black or African American apprentices were significantly higher than in the national construction workforce for that occupation**. For example—

▸ Women apprentices were represented at higher rates in 18 of 23 occupations. The highest utilization of women in construction apprenticeships was in the construction and building inspector occupation, for which over 18 percent of apprentices were women compared with 11 percent of the national workforce.

▸ Asian apprentices were represented at higher rates in 21 of 23 occupations, with particularly high utilization in apprenticeships for solar thermal installers and technicians (8 percent compared with 1 percent of the national workforce).

▸ Black or African American apprentices were represented at higher rates in 18 of 23 occupations. Utilization of Black or African American apprentices was particularly high in apprenticeships for boilermakers (15 percent compared with 9 percent of the national workforce) and brickmasons, blockmasons, stonemasons, and reinforcing iron and rebar workers (15 percent compared with 7 percent of the national workforce).

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[36] The statistics on active apprentices cited in this paragraph are based on information for apprentices active in 2022, as reported by Butrica et al. (2024).

[37] RAPIDS provides administrative data on registered apprenticeships in 46 States (Minnesota, Oregon, Vermont, Washington, and the District of Columbia currently do not submit data to RAPIDS).

[38] The estimates for apprenticeship programs reported in the text and comparisons with the national workforce are based on 23 construction occupations for which RAPIDS recorded at least 10 active apprenticeships in 2022. Butrica et al. (2024) list these occupations in appendix tables 1–7 of their brief.

However, Butrica et al. (2024) found that occupation-level representation rates in apprenticeship did not follow as clear a pattern for Hispanic or Latino workers. In 12 of the 23 construction occupations, utilization of Hispanic or Latino apprentices was higher than in the national workforce for those occupations; in 11 occupations, utilization of Hispanic or Latino apprentices was lower than in the national workforce for those occupations.

Across all construction occupations, Butrica et al. (2024) found that larger shares of apprentices were women, Asian, or Black or African American, compared with the national workforce, while smaller shares of apprentices were Hispanic or Latino. Figure 4.2 illustrates the utilization rates in construction apprentice programs relative to the share of a group that would be in those programs if its members were represented in each occupation at the same rate as in the national construction workforce, following Butrica et al. (2024). Based on this comparison, Butrica et al. (2024) found that construction apprenticeship programs employed twice as many women as would have been employed if they were represented in apprenticeship occupations at rates comparable with their representation in the national construction workforce (5 versus 3 percent, respectively). Similarly, apprenticeship programs employed 1.98 times as many Asian workers (3 percent versus 1 percent, respectively), nearly 1.5 times as many Black or African American workers (9 percent versus 6 percent, respectively), but a little under one times as many Hispanic or Latino workers (27 percent versus 30 percent, respectively) as predicted based on rates of representation in the national construction workforce.

Figure 4.2. Utilization Rates for Active Apprentices and Predicted Apprentice Utilization Based on Occupational Patterns in Workforce by Sex and Race/Ethnicity, 2022
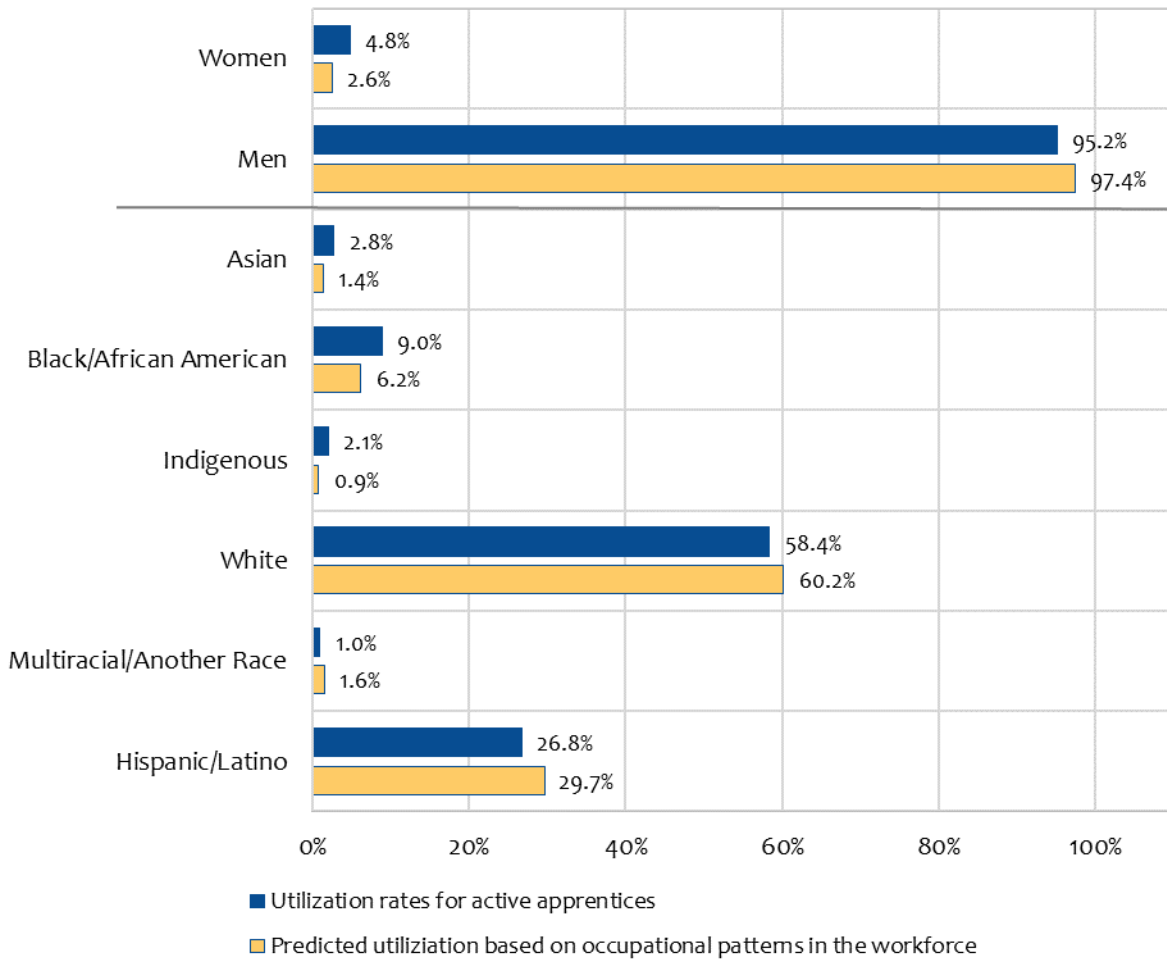
Note: Both series are based on occupation-specific estimates that cover most of the same onsite occupations described in chapter 2 for construction occupations (see the notes to figure 2.2), with the exception of occupations in which RAPIDS indicated fewer than 10 active apprentices in 2022. The utilization rate for active apprentices in each group is a weighted average of the percentage of active apprentices in each occupation in 2022, with percentages based on active apprentices by demographic group and occupation reported in RAPIDS. Predicted utilization based on occupational patterns in the workforce is a weighted average of the percentage of the overall workforce in each occupation in 2019, with percentages based on the American Community Survey (ACS) Public Use Microdata Sample (PUMS) data described in chapter 1. In both cases, the study team calculated weighted averages with the weights set to the total number of active apprentices for each occupation in 2022, based on RAPIDS. Data on women and men used for the figure are based on information self-reported by apprentices and ACS survey respondents. The apprenticeship registration forms and ACS questionnaires ask respondents to select either "male" or "female" to describe their sex. Data on racial and ethnic groups used for the figure are based on self-reported information by apprentices and ACS survey respondents, and the categories in the figure are mutually exclusive. The apprenticeship registration forms and ACS questionnaires include separate questions about race and ethnicity and allow respondents to make multiple selections for race. Apprenticeship registration forms include five options for race: (1) American Indian or Alaska Native, (2) Asian, (3) Black or African American, (4) Native Hawaiian or Pacific Islander, and (5) White. Data on apprentices used for the figure include additional category for individuals who self-identified multiple races and an Indigenous category that includes individuals who selected either the American Indian or Alaska Native option or the Native Hawaiian or Pacific Islander option for race. In addition to the race options included in apprenticeship registration forms, the ACS includes more options for respondents to identify specific Asian countries of origin and the option to select "some other race." As indicated in the notes to figure 2.2, workforce participation estimates based on the ACS use a single Asian race category that includes all the specific Asian countries of origin and a single category for respondents selecting "some other race" or multiple races. Apprenticeship registration forms allow registrants to select "Hispanic or Latino" or "Not Hispanic or Latino," and the ACS allows respondents to identify a specific group of Hispanic, Latino, or Spanish countries of origin or select "No, not of Hispanic, Latino, or Spanish origin." For both data on apprentices and workforce participation estimates in the figure, the category "Hispanic/Latino" includes all individuals self-identifying as Hispanic/Latino or a Hispanic/Latino/Spanish origin, regardless of which racial categories they selected. Therefore, each racial category in the figure includes only members of the racial group who did not self-identify as Hispanic/ Latino or a Hispanic/Latino/Spanish origin.
Source: Calculations using RAPIDS and estimates based on ACS PUMS data reported by Butrica et al. (2024; appendix tables 1–7 in the source)

While relatively high utilizations of women and people of color in the apprenticeship system compared to their national occupation counterparts might lead to greater utilization of these groups in the construction workforce, this entry pathway could be affected by differences in completion across demographic groups. **Completion rates for women and people of color in construction programs through 2022 were lower than for men and White apprentices, respectively (see table 4.1)**.

▸ For construction apprentices who were expected to complete their apprenticeship in 2022, table 4.1 shows women in this cohort had a completion rate of 35 percent, compared with 44 percent for men. Considering race and ethnicity, completion rates were highest among White apprentices and lowest among Black or African American apprentices and those reporting multiple races.

▸ An analysis of construction apprenticeship data from 1999 to 2019 similarly found women had lower completion rates and higher cancellation (i.e., quit or layoff) rates than men, and people of color had lower completion rates and higher cancellation rates than White apprentices (Bilginsoy et al., 2022).

Table 4.1. Completion Rates Through 2022 for Apprentices Expected to Complete in 2021, by Sex and Race/Ethnicity

Category of Apprentice		Completion Rate (Percent)
All apprentices		43.0
Sex	Women	35.3
	Men	43.5
Race and ethnic group	Asian	44.7
	Black or African American	29.4
	Indigenous	33.8
	White	46.4
	Multiple Race	28.8
	Hispanic/Latino	41.9

Note: Completion rates are calculated following guidance from the DOL Employment and Training Administration Bulletin 2015-10 and represent the share of apprentices who complete their program within a year of their expected completion date. Data are based on a cohort of 71,973 apprentices with an expected completion date in 2021 who did not cancel their program during a probationary period equal to the lesser of 1 year or one-quarter of the expected length of their apprenticeship. Data on women and men used for the figure are based on self-reported information by apprentices and American Community Survey (ACS) survey respondents. Both apprenticeship registration forms and ACS questionnaires ask respondents to select either "male" or "female" to describe their sex. Data on racial and ethnic groups used for the figure are based on information self-reported by apprentices, and the categories in the figure are mutually exclusive. Apprenticeship registration forms and ACS questionnaires include separate questions about race and ethnicity. These forms allow respondents to make multiple selections for race, among five options for race: (1) American Indian or Alaska Native, (2) Asian, (3) Black or African American, (4) Native Hawaiian or Pacific Islander, and (5) White. This figure excludes apprentices who reported Native Hawaiian or Pacific Islander. Apprenticeship registration forms allow registrants to select "Hispanic or Latino" or "Not Hispanic or Latino." The category "Hispanic/Latino" includes all individuals self-identifying as Hispanic/Latino, regardless of which racial categories they selected. Therefore, each racial category in the figure includes only members of the racial group who did not self-identify as Hispanic/Latino.
Source: This table replicates calculations using RAPIDS reported by Butrica et al. (2024; table 4).

Qualitative evidence suggests these differences in completion rates could be related to barriers to successful participation experienced by women and people of color. From interviews with women apprentices, WANTO grantees, and State-registered apprenticeship directors, Reed et al. (2012) heard that women face three primary barriers to participating in and completing construction apprenticeship programs: (1) incomplete knowledge about skilled trades, the necessary skills, and the wage and benefits gains; (2) unrealistic expectations about working in the trades; and (3) harassment and exclusion at male-dominated worksites. The authors also heard from interviewed women that the lack

of childcare and cost of childcare were major challenges for participating in and completing apprenticeships. In their interviews with DOL State Apprenticeship Expansion grantees, the lack of support systems was reported to be a barrier to staying or completing the apprenticeship program for groups underrepresented in the programs (Sattar et al., 2020).

Increasing apprenticeship completion rates for women and people of color may help improve representation in construction occupations. As demonstrated in figure 4.2, nationally, registered apprenticeship programs see higher participation of demographic groups that are underrepresented in onsite construction occupations, such as Black or African American workers, Asian workers, and women. This trend suggests that expanding apprenticeship training may be an effective strategy for improving the representation of these groups in onsite construction. However, capturing the impact of expanding apprenticeship training on employment in national onsite construction occupations is complicated and relies on detailed data on the turnover rates of individual demographic groups within specific occupations.

Rather than estimate how the overall construction workforce might change in response to an expansion of registered apprenticeship, this report considers how utilization rates in new construction hires might change with such an expansion. The U.S. Bureau of Labor Statistics publishes projected annual job openings, including both net new jobs and replacements for workers who transfer to different occupations or exit the labor force, in the Occupation Outlook Handbook.[39] Comparing the projected annual job openings by occupation for 2022 to 2032 with apprenticeship completions by occupation for 2022 provides approximations for the share of projected annual job openings that may be filled by apprentice completers (see table 4.2).

The size of the flow of apprentice completers compared to annual job openings varies by occupation. For example, apprenticeship is a relatively more common source of new hires for electricians; apprentices who complete an electrician apprenticeship represent 37 percent of projected annual job openings. The impact that registered apprenticeship expansion will have on the construction industry therefore depends on both occupational utilization rates and the importance of apprenticeship in an occupation. Apprenticeship expansion may have a smaller effect on an occupation where it is less common.

Table 4.2. Projected Annual Construction Job Openings and Apprenticeship Completions, 2022–2032

Onsite Construction Occupation	Projected Annual Job Openings, 2022–2032	Apprentice Completions, 2022	Apprentice Completions Share of Projected Annual Job Openings (%)
6260, 6600-Construction laborers and helpers	151,400	10,045	6.63
6230-Carpenters	79,500	13,889	17.47
6355-Electricians	73,500	27,221	37.04
6441-Pipelayers, plumbers, pipefitters, and steamfitters	42,600	14,732	34.58
6305-Construction equipment operators	42,300	2,693	6.37

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[39] The BLS Occupational Outlook Handbook is available at https://www.bls.gov/ooh/.

Onsite Construction Occupation	Projected Annual Job Openings, 2022–2032	Apprentice Completions, 2022	Apprentice Completions Share of Projected Annual Job Openings (%)
6220, 6250, 6460-All masons and reinforcing iron and rebar workers	21,200	3,936	18.57
6660-Construction and building inspectors	15,700	299	1.90
6515-Roofers	12,200	2,692	22.07
6520-Sheet metal workers	11,400	3,894	34.16
6240-Carpet, floor, and tile installers and finishers	9,800	1,197	12.21
6410-Painters and paperhangers	9,300	2,715	29.19
6330-Drywall installers, ceiling tile installers, and tapers	9,000	3,001	33.34
6530-Structural iron and steel workers	8,100	3,843	47.44
6360-Glaziers	5,500	799	14.53
6400-Insulation workers	4,800	1,026	21.38
6442-Solar thermal installers and technicians	3,500	0	0.00
6540-Solar photovoltaic installers	3,500	2	0.06
6700-Elevator and escalator installers and repairers	2,100	1,599	76.14
6210-Boilermakers	1,100	1,197	108.82

Note: Occupational projections for masons and reinforcing iron and rebar workers are reported collectively for all types of masons, so 6220, 6250, and 6460 are combined for this table. Similarly, occupational projections are reported collectively for construction laborers and helpers, so 6260 and 6660 are combined for this table.

Source: Apprentice shares are calculated by reported by Butrica et al. (2024) using the Registered Apprenticeship Partners Information Database System (RAPIDS). Projected annual job openings are from the Bureau of Labor Statistics' Occupational Outlook Handbook, https://www.bls.gov/ooh/construction-and-extraction/home.htm. The RAPIDS dataset includes 367,168 apprentices in construction occupations.

On average, about 8 percent of apprenticeship completers in 2022 were women, about 8 percent of completers were Black or African American, and about 38 percent of completers were Hispanic or Latino (Butrica et al., 2024). While no comparable data exist on the share of projected occupational hires by demographic group nor the post-completion experiences of registered apprentices, Butrica et al. (2024) estimate the effect of apprenticeship expansion on utilization rates for new onsite construction jobs under two assumptions—

▶ **Assumption 1**: Before any expansion of the apprenticeship system, the shares of new hires in onsite construction by demographic group are equal to the shares of the total workforce in onsite construction by demographic group.

▶ **Assumption 2**: All apprenticeship completers are employed in their occupation at the time of completion.

Relying on these two assumptions, Butrica et al. (2024) estimate that doubling the number of apprenticeship completers will increase the number of women hired into onsite construction occupations by 12 percent, the number of Black or African American individuals hired by 8 percent, and the number of Asian individuals hired by 18 percent.

The actual change in utilization in onsite construction in response to an expansion of apprenticeship may differ from these estimates if the rate of growth for apprenticeship training varies by occupations or if

the demographic distribution of apprentices shifts as apprenticeship training expands. Retention and turnover rates within onsite construction may also limit the impact of the flow of workers from apprenticeship to construction occupations. For these reasons, the occupational projections presented are uncertain. However, these estimates suggest that apprenticeship expansion may be one tool for gender and racial equity in construction.

3. Approaches for Increasing Apprenticeship Participation and Completion

In reviewing the literature and looking to current practice, Butrica et al. (2024) identify four approaches for helping more workers start and successfully complete apprenticeship programs, particularly given the barriers noted in the previous section. The following subsections summarize these four approaches: (1) pre-apprenticeship, (2) supportive services, (3) childcare assistance, and (4) changes in workplace practices.

Pre-apprenticeship

A pre-apprenticeship program is designed to prepare individuals for entry into apprenticeship. Pre-apprenticeship programs may last from a few weeks to a few months and may or may not include paid work experience. Although pre-apprenticeship programs vary in their designs and practices, at their core they aim to help people learn about an industry and related occupations, build occupational and workplace skills, and provide access to employment pathways that include apprenticeship programs. (DOL has guidance on the elements of a quality pre-apprenticeship program.[40]) Therefore, the supports available through pre-apprenticeships have the potential to attract and help retain more women workers and workers of color in construction, and some program designs may be more promising than others in accomplishing this increase in utilizations.

Pre-apprenticeship programs are more diverse than apprenticeship. Pre-apprenticeship in construction dates back to the 1970s when it was used as a strategy to help increase employment opportunities for Black or African American people in the construction trades (Roberts, 1970). More recently, in their evaluation of the AAI grant program, Gardiner et al. (2021) found that a larger proportion of pre-apprentices than apprentices were from underrepresented populations and that pre-apprentices represented greater diversity in gender, race, and ethnicity than apprentices. For example, the authors reported that 36 percent of AAI pre-apprentices were women, compared with only 26 percent of AAI apprentices.

While construction pre-apprentices may not consistently transition to apprenticeships, pre-apprenticeship was shown to be a meaningful pathway into construction. In a 2009 survey of pre-apprenticeship programs in construction (n = 236), most programs reported fewer than 50 percent of pre-apprentices participated in a registered apprenticeship, even though most programs had high completion rates (Conway & Gerber, 2009). The evaluation of AAI grants found that 71 percent of construction pre-apprentices continued to a registered apprenticeship (Walton et al., 2022); this relatively high rate may tie to grantees having targets for placing program completers in apprenticeships.

While not all pre-apprentices transition to apprenticeships, many construction apprentices and workers have participated in pre-apprenticeships. For example, a survey of women (n = 2,635) working in the construction trades found 62 percent had completed a pre-apprenticeship program—with 25 percent

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[40] The information in this paragraph is based on DOL's description of pre-apprenticeship, retrieved from https://www.apprenticeship.gov/employers/explore-pre-apprenticeship.

having completed a women-only pre-apprenticeship program (Hegewisch & Mefferd, 2021a). While this survey may not represent the population as a whole, about three-quarters of respondents who had participated in a pre-apprenticeship program cited their participation as a "very important" or "somewhat important" factor contributing to their success in the trades (Hegewisch & Mefferd, 2021a).

The design of pre-apprenticeship programs may influence the extent to which they lead to greater utilization of underrepresented groups in construction. Although pre-apprenticeship has no universal set of standards, Butrica et al. (2024) note several organizations have put forward design principles (such as flexibility, modularization, and compensation) that could improve successful completion among people with diverse needs and constraints. Union involvement may also play a role, given that construction apprenticeship programs cosponsored by unions utilized and retained greater shares of women and people of color than nonunion programs (Bilginsoy et al., 2022). Women-only programs can also offer women a supportive learning environment for skill-building (Chuang, 2019) and a source of ongoing information, guidance, and support as women transition to apprenticeships and other work (Hegewisch & Mefferd, 2021b; Kelly et al., 2022).

Supportive services

Based on the Workforce Innovation and Opportunity Act (2014), a range of supportive services may be made available to participants in workforce development programs. These services may include referrals to community services, transportation assistance, dependent care assistance, housing assistance, and need-related payments. Services may also include educational testing assistance, reasonable accommodations for individuals with disabilities, legal aid services, and healthcare referrals. Supportive services may also include assistance with work-related expenses (e.g., uniforms, tools, protective gear) and education-related expenses (e.g., books, fees, school supplies) and payments and fees for employment and training-related applications, tests, and certifications.

Studies of supportive services suggest they may increase overall completion rates for apprenticeship programs. For example, highway construction apprentices in Oregon who received financial supportive services were more likely to complete their program (Wilkinson & Kelly, 2017). Another study of highway construction apprentices in Oregon found higher completion rates associated with nonfinancial supportive services (e.g., a budget class, mentoring, and referrals) and financial assistance (e.g., for travel, childcare, and job supplies such as work tools, work clothing, and protective equipment) (Kelly et al., 2022).

Making supportive services available to apprentices could address barriers that tend to be more common in historically underrepresented populations. For example, among AAI apprentices (n = 2,601), Walton et al. (2022) found 54 percent of women reported personal or family problems as reasons for not completing their apprenticeship programs, compared with 33 percent of men. These types of barriers were reported by 46 percent of apprentices who are Black or African American, 54 percent who are Hispanic or Latino, and 35 percent who are White. An evaluation of highway construction apprentices (n = 231) in Oregon also found nonfinancial services and hardship funds had a larger positive impact on completion rates for women and people of color than for White men (Kelly et al., 2022).

Childcare assistance

While there are no national data on the share of apprentices who are parents, about half of the women in construction trades surveyed by Hegewisch and Mefferd (2021a) had children under age 18, and 22

percent had children under age 6. Therefore, subsidies for childcare, direct provision of childcare, and referrals to partners providing affordable childcare may improve participation and successful completion of these programs—particularly among women. Given the difficulties coordinating childcare with job schedules reported by the women Reed et al. (2012) interviewed, initiatives that help apprentices and pre-apprentices identify flexible and affordable care may help.

Workplace practices

Unfair treatment, discrimination, and harassment can make apprenticeship participation and completion challenging. Among women, these practices may be relatively common. For example, a 2021 survey of women[41] working in the construction trades (n = 2,635) found 48 percent reported frequently or always being held to a higher standard of work than men (Hegewisch & Mefferd, 2021b). Tradeswomen responding to the survey also reported never or rarely ever being treated equally to men in several ways, with the most common being promotions (33 percent), leadership (30 percent), layoffs (27 percent), hiring (22 percent), and respect (22 percent). Almost 56 percent of all tradeswomen respondents reported experiencing gender-based harassment at least sometimes. The survey also revealed 44 percent of the tradeswomen left or considered leaving the trades, and more than half of these women cited harassment and lack of respect as their reason.

Changing such practices may give underrepresented groups more opportunities to thrive in apprenticeship programs. Although the study team is not aware of formal evaluations of changes in workplace practices, labor organizations and employers have undertaken initiatives to promote equity and reduce discrimination and harassment. For example, Vicki O'Leary, a member of the Ironworkers International union[42], led campaigns believed to be successful in encouraging coworkers to not be bystanders to workplace harassment (Tuchman & Rubin, 2020). Research suggests that workplace culture might be changed through consistent messaging from the top, including quick responses to breaches of policy (Bridges et al., 2020) and respectful workplace training for employees and supervisors (Kelly et al., 2022).

4. Emerging Opportunities to Increase Utilization of Women and People of Color via Apprenticeship

Looking ahead, investments in training, career preparation, and diversity initiatives could be promising strategies that further improve the potential for apprenticeship to increase construction employment opportunities for underrepresented groups.

▶ New Federal infrastructure initiatives may create more opportunities in construction apprenticeship opportunities for women and people of color. For example, the IIJA and the Creating Helpful Incentives to Produce Semiconductors and Science Act could together create hundreds of thousands of new construction jobs (Butrica et al., 2024). Filling these jobs can create opportunities for new construction apprenticeships—which, given the findings above, may utilize historically underrepresented groups at higher rates than the construction workforce. These opportunities may be amplified by Registered Apprenticeship Technical Assistance Centers of Excellence, which DOL funded in 2021 to support the expansion and modernization of apprenticeship and increase opportunities for women and people of color (among other groups).

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[41] Hegewisch & Mefferd (2021b) surveyed workers who identify as women and workers who identify as non-binary individuals.
[42] Details on the Ironworkers International union are available at https://www.ironworkers.org/s/.

- Several States have also taken legislative and administrative action to expand and diversify apprenticeship, which may lead to further opportunities in construction (Harrington et al., 2022; Hentze et al., 2019; Rosenberg & Dunn, 2020). For example, in 2016, Alabama established a tax credit for employers that accept apprentices; in 2020, California set a goal of serving 500,000 apprentices by 2029; and in 2021, Missouri partnered with the State chamber of commerce to develop a service to match employers with apprentices (Council of State Governments, 2021). A meaningful share of these additional apprenticeships may focus on construction; Butrica et al. (2024) note construction accounts for almost half of all current apprenticeships (48 percent).

- Other Federal and State investments in career preparation for youth can broaden participation in apprenticeship among groups that may not otherwise consider it. The U.S. Department of Education (ED) and State and local education agencies have taken a growing interest in youth apprenticeship as a supplement to career and technical education (ED, 2021; Kreamer & Zimmerman, 2017). Several States—Colorado, Georgia, Kentucky, Maryland, and North Carolina—and private foundations such as the Richard M. Fairbanks Foundation have also invested in expanding youth apprenticeship (Baddour & Hauge, 2020; Fiddian-Green, 2020; Lerman et al., 2019). Such early experiences may lead to more awareness of, interest in, and readiness for adult apprenticeship programs, possibly resulting in increases in the size and diversity of the construction workforce through existing apprenticeship pathways.

- Both public- and private-sector efforts to increase diversity may further increase utilization of women and people of color in apprenticeships. At the Federal level, several executive orders have aimed to advance diversity and equity[43] by creating incentives for federally funded programs—including apprenticeships—to prioritize serving members of underrepresented communities. State apprenticeship programs are also taking steps to better serve underrepresented groups; for example, Nevada revised its nondiscrimination provisions for apprenticeship programs, and New Jersey is prioritizing new supportive services offered to apprentices (Council of State Governments, 2021). As Butrica et al. (2024) note, in the wake of social and political movements related to equity, firms, industries, and trade organizations have developed and adopted new approaches to workplace inclusion and equity. These efforts may address barriers noted previously in this section and in chapter 1, thereby helping more women and people of color succeed in apprenticeship.

B. Local Hiring Provisions as a Strategy to Increase Utilization of Underrepresented Groups

Some local governments have established hiring provisions intended to increase the utilization of historically underrepresented groups, either in the local workforce overall or in local construction jobs.

The study team conducted a literature review to better understand how these provisions are designed and the extent of evidence suggesting the specific approaches for implementing these provisions might increase employment among underrepresented groups (appendix LHP-1 describes how the study team conducted this review; "LHP" refers to local hiring provisions.). The team identified relevant local hiring provisions with publicly available documentation for five U.S. cities—Boston, Chicago, Los Angeles, Portland (Oregon), and Seattle. These provisions include utilization targets for labor hours, which may

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[43] President Biden signed the Executive Order on Advancing Racial Equity and Support for Underserved Communities Through the Federal Government on January 20, 2021; the Executive Order on Diversity, Equity, and Inclusion in the Federal Workforce on June 25, 2021; and the Executive Order on Further Advancing Racial Equity and Support for Underserved Communities Through the Federal Government on February 16, 2023.

surpass those OFCCP set, and contract awards, along with varied approaches to enforcement, recruitment, and retention.

The following sections summarize the local hiring provisions in the five cities examined for this study and describe specific approaches that may be particularly promising for increasing the utilization of underrepresented groups. The chapter concludes with the discussion of the five cities' levels of success in attaining the employment or contracting goals they set out.

1.   Key Features of Local Hiring Provisions in Five Cities

The study team retrieved information for five U.S. cities about local hiring provisions that specify goals for utilizing women and people of color, or the businesses they own, in construction. Table 4.3 summarizes these local hiring provisions, and appendix LHP-2 presents more details. The rest of this section summarizes key similarities and differences identified when comparing local hiring provisions across the five cities.

Table 4.3. Summary of Local Hiring Provisions in Five U.S. Cities

City	Key Targets Used	Enforcement	Key Supports for Recruitment	Key Supports for Retention
Boston, Massachusetts	Boston Residents Jobs Policy (hours worked) • People of color: 40 percent • Women: 12 percent	• Good faith efforts • Withholding payment	• Job referral program	[*None identified*]
Chicago, Illinois	Construction Set Aside Ordinance (government contracting dollars) • Minority-owned business enterprises (MBEs): 26 percent • Women-owned business enterprises (WBEs): 6 percent	• Good faith efforts	• Assistance with bonding and financing • Small business loans • Designation of certifying agencies for MBEs and WBEs	• Investigation of discrimination against MBEs and WBEs
Los Angeles (LA), California	LA County Community Workforce Agreement (labor hours) • Targeted workers (who face employment barriers): 10 percent • Apprentices: 20 percent LA County Department of Public Works Project Labor Agreement (labor hours) • Apprentices: 20 percent • Disadvantaged workers: 10 percent	• Good faith efforts • Complaint resolution system	• Community outreach • Guidance on union entry, lack of equipment/tools, financial barriers • Strengthen pre-apprenticeship and apprenticeship pipelines	• Support for transition from pre-apprenticeship to apprenticeship and employment • Mentoring for apprentices

City	Key Targets Used	Enforcement	Key Supports for Recruitment	Key Supports for Retention
Portland, Oregon	Regional Workforce Equity Agreement (labor hours) • Women: 8 percent in 2022 • Minorities: 21 percent in 2022 • Apprentices: 20 percent Construction Diversity Inclusion Policy (hard construction costs) • Underrepresented and underutilized businesses: 25 percent • MBEs: 16 percent • WBEs: 8 percent Workforce Training and Hiring Program (labor hours) • Apprentices: 20 percent • Minorities (apprentice and journey-level workers): 18 percent • Women (apprentice- and journey-level workers): 9 percent	• Good faith efforts • Complaint resolution system • Payment of damages • Debarment	• Community outreach • Additional outreach and advertising for MBEs and WBEs • Strengthening pre-apprenticeship and apprenticeship pipelines	• Clean and accessible toilet facilities • Job placements to reduce feelings of isolation
Seattle, Washington	Priority Hire Ordinance (labor hours) • Residents living in economically distressed areas: 20 percent • Women and people of color: project-specific goals Community Workforce Agreement • Apprentices: 15–20 percent of labor hours • MBEs and WBEs: project-specific subcontracting goals	• Good faith efforts • Withholding of payments • Debarment	• Community outreach • Additional outreach and mentoring for MBEs and WBEs • Strengthening pre-apprenticeship and apprenticeship pipelines	• Support to increase graduation, retention, and employment of pre-apprentices and apprentices • Training and technical assistance for MBEs/WBEs

Note: People of color and minorities refer to individuals who identify with a race or ethnicity other than White only, non-Hispanic. Disadvantaged worker refers to an individual who had (a) a household income less than 50 percent of the Area Median Income; or (b) faces at least one of the following barriers to employment: experiences homelessness, receives public assistance, lacks a GED or high school diploma, has a history of involvement with the justice system, is a single parent, or suffers from chronic unemployment or underemployment. Journey-level workers are workers who completed their apprenticeship training or have at least 4 years of experience in their trade or occupation.
Sources: Documents and journal articles identified through the study team's literature search.

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Most cities listed in table 4.3 developed hiring goals for women and people of color on construction projects and/or the contracting dollars awarded to business owners from these groups, although the specific targets differed across locations.

▸ The provisions varied in the groups prioritized—people of color, women, minority-owned business enterprises (MBEs), and/or women-owned business enterprises (WBEs), and residents of the municipal area in many cases. For example, Boston set targets for employing women and people of color, Chicago's targets focused entirely on contracting with MBEs and WBEs, and Portland and Seattle set targets for both hiring and contracting with the businesses of underrepresented groups, while Los Angeles did not set any targets related to demographics but focused on workers who face employment barriers or disadvantaged workers.

▸ The provisions also varied in the level of the utilization targets. For example, targets for hiring people of color ranged from 18 percent in Portland's Contractor and Workforce Training and Hiring initiative to 40 percent in the Boston Residents Jobs Policy.

All five cities required "good faith efforts" toward targets, making these targets more recommendations than strict mandates, and the level of enforcement varied across locations. For example, Boston, Portland, and Seattle can enforce targets by withholding payments, and Portland and Seattle can also use debarment to enforce targets. Additionally, Los Angeles and Portland use a complaint resolution system to address potential noncompliance on a case-by-case basis. (The study team did not identify any actions taken by Chicago to enforce targets.)

The cities also varied in their approaches to supporting the provisions through recruitment and retention of people in the targeted groups, as the following examples show:

▸ To increase recruitment of workers, Boston uses a job referral program, and Los Angeles, Portland, and Seattle engage in outreach with community organizations and seek to strengthen pre-apprenticeship and apprenticeship pipelines. Los Angeles also employs coordinators who can offer guidance and support related to union initiation and registration fees, lack of personal protective equipment and tools, and other financial barriers to new workers. These approaches offer pathways into construction that do not rely on social networks in the industry, which tend to be less accessible to women and people of color (Oregon Tradeswomen, 2018).

▸ Chicago, Portland, and Seattle also offer support to potential MBEs and WBEs that might be interested in contracting. Chicago can assist businesses with obtaining bonding and financing, provide information about city-sponsored small business loan programs, and designate additional certifying agencies to increase the number of certified MBEs and WBEs. Portland requires outreach about opportunities for historically underutilized contractors through information about solicitation packages and contract requirements and advertising throughout the local industry. Seattle encourages outreach and mentoring for MBEs and WBEs.

▸ To support retention, Chicago investigates and resolves complaints of discrimination against MBEs/WBEs. Also, Los Angeles requires unions in the county Community Workforce Agreement (CWA) to establish mentoring programs for local women apprentices, and the CWA encourages multiple parties to support graduates of pre-apprenticeship programs. Portland aims to make the workplace more welcoming by providing "clean, accessible and locked" toilet facilities to women on jobsites and reduce feelings of isolation by employing multiple women or people of color on one site (City of Portland, 2022, p. 25). Seattle offers support to increasing graduation,

retention, and employment rates of women, people of color, and priority workers[44], as well as training and technical assistance to MBEs and WBEs about the city's CWA.

2. Promising Approaches Used in Local Hiring Provisions to Increase Utilization of Women and People of Color

The study team identified two approaches to increase utilization of women and people of color in construction that appear to be supported by research and used in several of the five cities studied: (1) pre-apprenticeship/apprenticeship, used in Los Angeles, Portland, and Seattle, and (2) accountability monitoring, used in Boston and Los Angeles. The following subsections include more information about how the five cities implemented these approaches and additional promising approaches identified in the literature that could also be used in coordination with local hiring provisions.

Local hiring provisions related to pre-apprenticeship/apprenticeship

Both pre-apprenticeship and apprenticeship programs could help municipalities achieve their goals for utilizing more women and people of color in construction. As discussed in chapter 4, section A, apprenticeships may offer pathways into construction for more members of these groups, which are better represented in construction-related apprenticeships than in the construction workforce overall—and pre-apprenticeships may offer pathways into employment for a particularly diverse set of participants. Three cities designed local hiring provisions to use and connect with these pathways:

▸ In Los Angeles, the CWA includes requirements for mentoring women apprentices; encourages employers to collaborate with pre-apprenticeship programs; and specifies that unions must allow workers in targeted groups to receive credit toward an apprenticeship based on relevant experience (regardless of whether the experience was as a union member).

▸ In Portland, the Workforce Training and Hiring Program sets targets for hiring apprentices, women, and people of color and recommends that women apprentices and apprentices of color who may need support are matched with a mentor. The rules for this program and the Regional Workforce Equity Agreement also note employers may hire available pre-apprentices when apprenticeship programs are not feasible to implement.

▸ In Seattle, the director of Finance and Administrative Services may assist local pre-apprentice or apprentice training programs in developing additional programs and courses to increase graduation, retention, and employment rates of women and people of color, among other pre-apprentice groups.

Accountability and local hiring provisions

Monitoring progress toward targets may be necessary to facilitate change. Moir et al. (2011) found that, contractors with targets for hiring women and people of color did not, overall, increase the representation of these groups, but compliance reviews were associated with an increase in workforce diversity (Moir et al., 2011). A "robust and active compliance system," including clear workforce goals with expected outcomes, active monitoring, and consequences when and if those expected goals are

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[44] Priority workers are workers who live in economically distressed ZIP codes. Economically distressed ZIP codes are determined based on the relative number of people living under 200 percent of the federal poverty line in the ZIP code, the unemployment rate for residents in the ZIP code, and the relative number of people over age 25 without a college degree.

not reached, may lead to increased utilization (Herrera et al., 2014, pp. 80–85). Two cities established independent entities to assess and facilitate compliance with local hiring provisions:

▶ In Boston, compliance monitors review local contractors' employment projections, workforce composition, and hiring efforts to check alignment against the targets set out in the city's local hiring provision. Contractors must work with the city-designated compliance monitor to avoid fines and other penalties.

▶ In Los Angeles, the CWA makes unions responsible for helping employers meet local targets for hiring, with a county-assigned project labor coordinator monitoring compliance.

Other promising approaches that could bolster local hiring provisions

The literature review on local hiring provisions (see appendices LHP-1 and LHP-2) also identified supportive services and changes in workplace practices as promising approaches for attracting and retaining underrepresented groups in the construction workforce. The rationale for why these approaches might have promise is essentially the same as the reasons that these approaches might help increase apprenticeship participation and completion (see chapter 4, section A.3). While the study team is not aware of these approaches being explicitly adopted or promoted in the five cities the team studied, supportive services and changes in workplace practices have the potential better position some cities to meet the employment and contracting targets set out in their local hiring provisions.

3. Success of Cities in Meeting Targets Set by Local Hiring Provisions

Public information on overall progress toward local employment targets in three of the cities studied shows the following findings:[45]

▶ Los Angeles and Portland were generally successful in achieving their employment targets set by hiring provisions. In Los Angeles, 2021 a progress report showed that the labor hours residents and other targeted groups worked exceeded the goals set out in the CWA (Los Angeles County, 2021). In Portland, a policy equity audit determined the city either met or was close to meeting all hiring and contracting targets to increase utilization of women and people of color in construction (Portland City Auditor, 2020).

▶ Boston was not successful in achieving its targets for employing women or people of color in 2022, when considering all construction projects subject to these targets. Additional statistics maintained by the city indicated, while public projects did meet the target for employing people of color, the same was not true of private projects. Neither public nor private projects met the city's target for employing women in construction (Singer, 2023).

This study is not able to attribute progress to particular approaches used in these cities, given the small number of cities, the extensive differences across cities, and the level of detail available in public documents.

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[45] No progress information was available for Chicago and Seattle.

C. Summary

Federal, State, and local policymakers may be interested in increasing the utilization of women and people of color in construction, particularly considering the growing demand for construction workers. However, there is little concrete evidence on scalable solutions for increasing employment that focus on construction and no evidence on "what works" to attract, place, and retain members of underrepresented groups in construction jobs.

Apprenticeship could be promising a strategy for helping members of these groups access and succeed in construction jobs. Although construction apprenticeship programs have not been separately evaluated, the apprenticeship model has been proven effective at increasing employment and earnings in general, and almost half of all current apprenticeships are in construction trades. Apprenticeship programs in construction utilize women and people of color at higher rates than the workforce as a whole, which suggests that scaling apprenticeship could increase utilization of underrepresented groups in construction jobs.

Apprenticeship might be more successful if coupled with additional supports for workers interested in construction. For example, pre-apprenticeship programs are designed to prepare workers to start an apprenticeship, and pre-apprenticeship programs serve a relatively more diverse population of participants. Childcare, other supportive services, and fairer workplace practices might each address some key barriers to success cited by women and people of color.

Local governments can also enact hiring provisions to increase the representation of underrepresented groups by companies they regulate or do business with, although the effects of such provisions have not been rigorously evaluated. Local hiring provisions can also encourage companies and trade associations to use pre-apprenticeship and apprenticeships programs to meet employment targets. Considering local hiring provisions often rely on good faith efforts toward those targets, it may also be important to couple the provisions with a clearly defined system for monitoring and compliance.

Chapter 5. Conclusions and Recommendations

Construction occupations are a core component of the labor market that historically employs disproportionately low numbers of women and most people of color (BLS, 2022a). In particular, this study found that women, Black or African American, and Asian workers face especially low rates of employment in onsite construction nationally and at State and local levels.

▸ While women represent 3 percent of onsite construction workers, they represent 12 percent of workers in occupations similar to onsite construction.

▸ While Black or African American workers represent 6 percent of onsite construction workers, they represent 12 percent of workers in occupations similar to construction.

General patterns of underrepresentation in onsite construction when compared with similar occupations remain consistent across the national, State, and local levels, but the estimates indicate some States may demonstrate more extreme disparities. For example, while underutilization of Black or African American workers persists across the United States, it is particularly magnified in the southeastern region of the nation.

Despite the underrepresentation of key demographic groups when compared with similar occupations— or perhaps because of it—the number of unfilled construction job openings is at record levels (Federal Reserve Bank of St. Louis, 2023). This situation provides an opportunity to increase representation of women and people of color in construction occupations.

Policymakers can look to pre-apprenticeship and apprenticeship programs as potential tools to increase access to construction trades for women and people of color. Evaluations document employment and earnings gains linked to participation in apprenticeship among women and workers from diverse backgrounds. Across all construction occupations, larger shares of apprentices are women, Asian, or Black or African American, compared with the national workforce, while smaller shares of apprentices are Hispanic or Latino. Pre-apprenticeship programs are even more diverse. While not all pre-apprentices transition to apprenticeships, pre-apprenticeship is still a meaningful pathway into construction, particularly for women.

For pre-apprenticeship and apprenticeship programs to be effective, they likely need to be coupled with supportive services. Making supportive services available could address key barriers that tend to be more common in historically underrepresented populations. Pre-apprenticeship and apprenticeship programs often are part of local hiring provisions designed to increase representation of women and people of color in construction occupations. These local efforts also tend to include accountability efforts to ensure employers work to achieve the goals of the local hiring provisions.

Unfortunately, the data used to examine utilization of women and people of color in construction occupations are limited, as discussed in chapter 3. These data limitations hamper the study team's ability to answer the most pressing questions about what barriers lead directly to underutilization and how many workers could be available for onsite construction jobs if those barriers were eliminated. DOL could explore expanded data collection activities to gain better insights into these issues, but such effort could be costly and is subject to budget availability.

Instead, the study team recommends DOL employ existing data to identify which worker attributes— regardless of current occupation—are associated with success in construction. This approach could give OFCCP and other policymakers additional insights into the size and characteristics of the workforce

available for construction jobs. It also could provide employers and employment and training providers with actionable information they could use when hiring and placing workers.

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Appendix LHP-1. Methodology for Review of Local Hiring Provisions to Increase Hiring of Groups Underrepresented in Construction

The team conducted an environmental scan and literature review to find information related to the following research questions:

> ▶ What local hiring provisions exist in municipalities across the United States to increase and improve the representation of women and people of color in construction occupations?
>
> ▶ Within the context of these provisions, what specific approaches have been used to improve utilization of women and people of color in the construction industry?
>
> ▶ What is the evidence of the success of the specific approach used to support local hiring provisions?

The team used Google search to find municipalities with local hiring provisions intended to increase the participation of women and people of color in the construction industry. These provisions require or incentivize businesses that receive public resources or contracts to hire workers who live in a particular geographic area or are from specific populations within the community (All-In Cities, 2022).

The team also searched State, county, and city websites and related news articles for local hiring provisions focused on increasing the representation of specific groups. Researchers identified many articles about goals for changes to local hiring policies to improve diversity and inclusion but fewer actual policy changes or hiring provisions.

The study team documented specific approaches adopted to support these local provisions and research findings about the effectiveness of these strategies. The team followed references listed among the resources in the searches on local hiring provisions and searched for additional publications on Google Scholar. The study team searched for a variety of key terms, such as *minority + participation + construction* and *women + participation + construction*. Once the team identified relevant papers, researchers located additional papers cited in their references or more recent articles that had cited the original reference.

The team ultimately identified 26 journal articles or other publications for the literature review. The team created a coding scheme to classify the contents of these publications using the qualitative coding software NVivo.[46] The coding scheme enabled researchers to label sections of text related to specific approaches (effective and ineffective) and identify whether the approaches were specific to women, people of color, or both. This categorization provided a framework to assess the specific approaches used by areas with a local hiring provision.

Lastly, the team searched for any evidence of success associated with these local hiring provisions. The team defined evidence of success as documented progress in reaching the outlined goals. Because local labor market conditions and other unaccounted-for interventions may have contributed to changes in

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[46] The study team used NVivo 14.

the composition of the workforce, the team does not necessarily view the documented evidence on attaining goals as causal.

Reference Cited in This Appendix

All-In Cities. (2022). *Local and targeted hiring*. PolicyLink. https://allincities.org/toolkit/local-targeted-hiring

Appendix LHP-2. Details of Local Hiring Provisions in Five U.S. Cities

This appendix provides details of the local hiring provisions in each of the five cities identified in the environmental scan described in appendix LHP-1. Table LHP-2.1 describes key features of these hiring provisions, including information about utilization targets and how the provisions were enforced and supported through recruitment and retention efforts in Boston and Portland.[47] The following five subsections contain additional information about hiring provisions for each city.

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[47] Details on how provisions were enforced and whether they were effective were not available for all 5 U.S. cities.

Table LHP-2.1. Key Features of Local Hiring Provisions Identified in Five U.S. Cities

City	Date of Adoption	Targets Used	Enforcement of Targets	Supports for Recruitment	Supports for Retention
Boston, Massachusetts	Original ordinance: October 14, 1983 Latest amendment: January 25, 2017	Boston Residents Jobs Policy—labor hours • Residents: 51 percent • People of color: 40 percent • Women: 12 percent	• Documentation of good faith efforts • City can withhold payment	• Job referral program • Compliance coordinators review contractors' employment patterns and hiring plans	[*No evidence of retention supports*]
Chicago, Illinois	Established 1990 Last updated 2016	Construction Set Aside Ordinance for women-owned business enterprises (WBEs) and minority-owned business enterprises (MBEs)—government contracting dollars • MBEs: 26 percent • WBEs: 6 percent	• Documentation of good faith efforts	• Target market program • Review and assistance with bonding, insurance, and other requirements • City-sponsored small business loan programs • Designation of certifying agencies to increase number of MBEs and WBEs	• Complaints of discrimination against MBE and WBE are referred to Chicago Commission of Human Relations and inspector general for investigation and resolution
Los Angeles, California	Los Angeles County: 2019 Los Angeles City: 2015 (with updates in 2020)	Los Angeles County Community Workforce Agreement—labor hours • Residents: 30 percent • Targeted workers: 10 percent • Apprentices: 20 percent • Targeted workers and residents: 50 percent Los Angeles County Department of Public Works Project Labor Agreement—labor hours • Residents: 30 percent • Apprentices: 20 percent • Disadvantaged workers: 10 percent	• Unions must work to meet labor requirements • Employers must document recruiting and hiring efforts and are monitored by project labor coordinators and job coordinators • Complaints are referred to project labor coordinator or submitted for arbitration	• Outreach and supports for new workers organized by project labor coordinators and job coordinators • Collaboration with pre-apprenticeship programs • Mentoring programs for women in pre-apprenticeship programs • Targeted workers with relevant experience eligible for credit toward apprenticeship and post-apprenticeship employment	• Project labor coordinators and job coordinators work with employers and unions to support transitions from pre-apprenticeship to apprenticeship and employment • Project labor coordinators also monitor retention of apprentices • Unions required to establish mentoring program for women apprentices

City	Date of Adoption	Targets Used	Enforcement of Targets	Supports for Recruitment	Supports for Retention
Portland, Oregon	2022: replaced similar programs established in 2017	Regional Workforce Equity agreement—labor hours • Women: 8 percent of hours in 2022; increase to 16 percent in 2026 • Minorities: 21 percent in 2022; 25 percent in 2026 • Apprentices: 20 percent Construction Diversity Inclusion Policy—hard construction costs • Underrepresented and underutilized businesses: 25 percent • MBEs: 16 percent • WBEs: 8 percent Contractor and Workforce Training and Hiring—labor hours • Apprentices: 20 percent • Minorities (apprentice and journey-level): 18 percent • Women (apprentice and journey-level): 9 percent	• Good faith efforts • Parties meet to discuss issues, with disputes resolved by arbitration • Contractors may be required to pay damage • Failure to comply can lead to withholding progress payments, notification of possible debarment	• Community engagement and outreach • Mentoring of apprentices who are women or people of color	• Reviews and trainings related to equal employment opportunity and affirmative action policies • Clean and accessible toilet facilities • Information for women and racial minorities in construction to increase awareness of available supports • Job placements to reduce feelings of isolation

City	Date of Adoption	Targets Used	Enforcement of Targets	Supports for Recruitment	Supports for Retention
Seattle, Washington	2017	**Priority Hire Ordinance—labor hours** • Residents living in economically distressed areas: 20 percent in 2016; 40 percent by 2025 • Women and people of color: project specific goals **Executive Order**—contract-specific-provisions for each project over $5 million, subject to monitoring and enforcement **Community Workforce Agreement** • Apprentice: 15–20 percent of labor hours • MBEs and WBEs: project-specific goals for subcontracting	• Good faith efforts • If noncompliant, withholding of invoice payments or debarment	• Director may assist pre-apprentice or apprentice training programs in developing additional programs • Job coordinators can work with community and other organizations to identify, recruit, and support job candidates who qualify as priority workers • Preferred entry program for apprenticeship that identifies women, people of color, and priority workers; unions prioritize placement of these apprentices • Outreach for MBEs and WBEs	• Director may assist pre-apprentice or apprentice training programs in increasing graduation, retention, and employment rates of women, people of color, and priority workers • Training and technical assistance for MBEs and WBEs

Note*:* This table summarizes information presented throughout this appendix, using the references cited in the city-specific subsections of the appendix. Note: People of color and minorities refer to individuals who identify with a race or ethnicity other than White only, non-Hispanic. Disadvantaged worker refers to an individual who had (a) a household income less than 50 percent of the Area Median Income; or (b) faces at least one of the following barriers to employment: experiences homelessness, receives public assistance, lacks a GED or high school diploma, has a history of involvement with the justice system, is a single parent, or suffers from chronic unemployment or underemployment. Journey-level workers are workers who completed their apprenticeship training or have at least 4 years of experience in their trade or occupation.

Sources*:* Documents and journal articles identified through the study team's literature search.

A. Boston, Massachusetts

The Boston Residents Jobs Policy (BRJP) standards were developed through an ordinance in 1983 and updated in 2017 (City of Boston, 2022). The BRJP standards have utilization goals for journey people[48] and apprentices employed for city-funded construction projects and large private construction projects. Across all such projects, 51 percent of hours must be worked by Boston residents, 40 percent of hours must be worked by people of color, and 12 percent of hours must be worked by women. The BRJP applies to public and private contractors—a broader reach compared with other local hiring requirements.

The BRJP has a program to refer targeted workforce populations to general contractors, construction managers, and subcontractors. The policy states a compliance monitor is responsible for reviewing plans and creating inclusive job postings (City of Boston, 2022). In addition to the BRJP, the State of Massachusetts requires that State-assisted construction contracts include goals for 6.9 percent of work hours to be performed by women and 15.3 percent of work hours to be performed by minorities (Mass.gov, 2023).

1. Compliance and Enforcement

Contractors are in compliance with the BRJP if they meet the BRJP standards, work with a compliance monitor to meet standards close to those of the BRJP or provide evidence that the standards are "highly impractical" for the contract and trade (City of Boston, 2022). Contractors can request workers in proportion to the BRJP standards from union hiring halls, hiring agents, general contractors' or construction managers' associations, or community referral sources. If the workforce compositions fall short of the goals, the contractors must adjust the workforce proportions provided to the hiring sources. If the hiring sources cannot meet the standards, the compliance monitor reaches out to confirm the goals are not met because of a lack of supply of workers who are residents, women, or people of color.

Contractors may provide evidence that complying with the BRJP is "highly impractical" for the project and trade upon written authorization by the project compliance monitor (City of Boston, 2022). In this case, contractors are required to sponsor a specified number of apprentices who are residents, women, or people of color and retain the apprentices throughout the project. Contractors must work with the BRJP or Boston Planning and Development Agency compliance office to avoid fines and other penalties (City of Boston, 2022).

The Boston Employment Commission (BEC) enforces the BRJP and issues penalties to noncompliant contractors, including barring contractors from public contracts for up to 3 years (City of Boston, 2022). To enforce BRJP's goals, Boston would need to prove there is a sufficient supply of construction workers who are local residents, racial minorities, and women (Singer, 2023). Because no data are collected on demographics, no formal enforcement measures have been implemented. Instead of enforcing hiring requirements, the city requires contractors to file paperwork proving good faith efforts to recruit and hire construction workers who are local residents, minorities, or women (Singer, 2023). If contractors do not comply with these forms, the city withholds payment. The study team found no published reports examining whether this strategy of enforcement is successful.

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[48] Journey people are workers who completed their apprenticeship training or have at least 4 years of experience in their trade or occupation.

2. Extent of Success in Meeting Targets

The overall pool of construction projects subject to the BRJP did not meet the BRJP labor hours targets in 2022, although public projects met the target for employing people of color. According to public data the BEC maintains (City of Boston, 2022), across all such projects in 2022, Boston residents worked 24 percent of the labor hours, people of color worked 37 percent of the labor hours, and women worked 8 percent of the labor hours. Based on separate statistics for public and private projects BEC reported, people of color worked 46 percent of the labor hours on public projects (above the BRJP target) and 35 percent of the labor hours on private projects (below the BRJP target). However, neither public nor private projects met the BRJP targets for employing residents or employing women.

A State audit of hiring provisions in Massachusetts also demonstrated noncompliance (Massachusetts Office of the State Auditor, 2022). The State agency responsible for major public construction and real estate in Massachusetts, the Division of Capital Asset Management and Maintenance (DCAMM), was audited in 2022. The audit determined DCAMM did not have processes to ensure contractors meet workforce participation goals. The State auditor also found DCAMM did not have documentation to support data included in annual reports or policies to monitor contractors' completion of projected staffing documents to identify female and minority workers. The auditing agency found utilization of women and minorities was reported by year instead of by project.

Of 127 DCAMM construction projects reviewed, 25 percent had no people of color in the work crew, and 60 percent employed no women. The DCAMM had no documentation to support its claim of 17.8 percent of work hours performed by minorities and 3.1 percent of work hours performed by women (Massachusetts Office of the State Auditor, 2022). The organization also failed to maintain records of employee training and update procedures as a result of the COVID-19 pandemic (Massachusetts Office of the State Auditor, 2022). Recommendations from the audit included developing policies and procedures that ensure compliance, enforcement, and retention of relevant records, documents, and data. Compliance with workforce participation goals has since been added to contractor evaluation (Mass.gov, 2023).

B. Chicago, Illinois

Chicago's Set Aside Ordinance develops biannual goals for increased participation of MBEs and WBEs in construction (City of Chicago, 2021). These goals indicate 26 percent and 6 percent of the annual dollar value of all construction contracts must be awarded to qualified MBEs and WBEs, respectively. The ordinance includes a 5-year "sunset provision" and an economic cap of $2.38 million for personal net worth of MBE and WBE owners. As of 2016, the ordinance opened the target market program to all small businesses regardless of race, which allows small businesses to compete for the role of prime contractor. The updated ordinance does not include Asian workers as "presumptively socially disadvantaged," while Black or African American workers, Hispanic or Latino workers, and women are included in this group (Spielman, 2016).

The chief procurement officer can also establish contract-specific goals for MBE and WBE participation. If good faith efforts are not met, potential sanctions include disqualification from contracting or subcontracting on city contracts for up to 3 years or the amount of the discrepancy between the amount of the commitment (City of Chicago, 2021).

The City of Chicago's ordinance also recommends segmenting contracts, creating a target market program for bidding on city prime contracts by small local businesses, and, if applicable, limiting the

performance of prime contractors. To overcome financial barriers, the City of Chicago can assist businesses with obtaining bonding and financing, refer owners to city-sponsored small business loan programs, and, to the extent practical, award contracts with expenditure funds not exceeding $10,000 to small local business enterprises. Chicago's contracting equity officer can also designate additional certifying agencies to increase the number of certified MBEs and WBEs. To address potential challenges and overall retention, the City of Chicago recommends that complaints of discrimination against MBEs and WBEs be referred to the Chicago Commission of Human Relations and the inspector general for investigation and resolution (City of Chicago, 2021).

Agencies such as the Metropolitan Pier and Exposition Authority also outline goals for using MBEs and WBEs in their affirmative action plans. For fiscal year 2022, the agency's goal was to award at least 25 percent and 5 percent of the annual dollar value to MBEs and WBEs, respectively (Chicago Metropolitan Pier and Exposition Authority, 2021). The affirmative action plan includes outreach programs for minorities and women and mentoring programs to support MBEs and WBEs. Chicago Public Schools (2023) also adopted goals for MBE and WBE participation: 30 percent and 7 percent of all contracting dollars on all districtwide construction projects, respectively.

C. Los Angeles, California

Los Angeles created the CWA in 2019, negotiated between the county and several construction union groups (Los Angeles County, 2020). The CWA includes a Local and Targeted Worker Hiring Policy that sets goals for 30 percent of construction labor hours to be performed by local residents, 10 percent by targeted workers (defined as residents who face barriers to employment), and 20 percent by apprentices, with 50 percent of the apprentice-worked labor hours to be performed by apprentices who are targeted workers or local residents.

The CWA discusses support for recruitment and retention in Los Angeles by union groups, labor coordinators hired by the county, and job coordinators hired by contractors and employers (Los Angeles County, 2020). Unions are required to recruit and refer workers to help employers meet their labor requirements, as related to the Local and Targeted Worker Hiring Policy, and to document these recruitment and referral efforts; employers must also document their hiring efforts.

Labor coordinators and job coordinators support recruitment by coordinating among union groups, county departments, and community groups to conduct outreach to individuals interested in starting a career in construction. Coordinators also work with the union groups and the county to offer guidance and support related to union initiation and registration fees, lack of personal protective equipment and tools, and other financial barriers to new workers. Job coordinators support implementation of and ensure contractor/employer compliance with the Local and Targeted Hiring Requirements. Labor coordinators monitor compliance with the CWA and retention of apprentices on behalf of the county. Complaints or wage noncompliance issues are referred to the county labor coordinator or submitted for arbitration (Los Angeles County, 2020).

The CWA also includes several provisions to spur hiring through apprenticeship programs. For example, unions are required to take steps to establish mentoring programs for local women apprentices and partner with local pre-apprenticeship programs that teach a core curriculum related to multiple craft trades. To increase participation in pre-apprenticeship programs, contractors and unions conduct outreach and recruitment with county departments and community groups that interact with and support local residents and targeted workers. Groups such as the Women in Trades Advisory Council also offer mentorship opportunities for female pre-apprentices (Los Angeles County, 2020).

After participants graduate from one of these pre-apprenticeship programs, project labor coordinators and jobs coordinators work with employers and unions to support local residents and targeted workers' transition to apprenticeship programs or employment. The CWA also requires that unions allow workers in targeted groups to receive credit toward an apprenticeship or post-apprenticeship placement based on relevant experience (regardless of whether the experience was as a union member).

The Los Angeles City Department of Public Works has a Public Labor Agreement (PLA) with several union groups that, starting in 2015, included goals for utilization of local residents, apprentices, and disadvantaged workers on local construction projects (City of Los Angeles, 2023). The goals are currently 30 percent of hours to be worked by local residents, 20 percent of hours by apprentices, and 10 percent of hours by transitional workers (defined as local residents who are veterans, justice-involved, or homeless or face multiple employment barriers). The Department of Public Works has interactive data reports on its website.

As with the county CWA, the city PLA relies on unions to refer residents and transitional workers to local contractors and employers. Union groups are expected to support the development of local construction apprentices who qualify as transitional workers and track the retention of apprentices (City of Los Angeles, 2023). The PLA also encourages participation in pre-apprenticeship programs but does not assign any specific party responsibility for the identification, establishment, or maintenance of such programs. Contractors and employers are required to document their hiring efforts to locate and hire residents and transitional workers via a jobs coordinator. The city's contract administration office is responsible for monitoring compliance with PLA, including the targeted hiring provisions, and recommending enforcement measures.

The 2020 progress report of the Los Angeles CWA illustrates that labor hour utilization for local residents and target hires was exceeded (Los Angeles County, 2021). The report notes 50 percent of hours for covered projects were worked by local residents, 13 percent of hours were worked by targeted workers, and 61 percent of hours were worked by apprentices who were local residents or targeted workers. The report also observes that 981 local residents and 195 targeted workers were employed on covered projects in 2020, receiving $17.6 million and $4.8 million in wages and benefits, respectively. Although Los Angeles used pre-apprenticeship programs and accountability strategies, the progress report demonstrates the city's success in meeting the aspirational goals but does not provide insight into which strategies were successful.

D. Portland, Oregon

The City of Portland, Oregon, outlined several initiatives and policies for equity, diversity, and inclusion in construction and contracting, including the Regional Workforce Equity Agreement, Construction Diversity Inclusion Plan, Prime Contractor Development Program, Subcontractor Equity Plan, Section 3 Provision, and Workforce Training & Hiring Program.

The Regional Workforce Equity Agreement between metropolitan governments and unions in the Portland metropolitan area has worker hour utilization goals for women and minority workers that increase annually from 2022 to 2026 (City of Portland, 2022c). The goal is for women to work 8 percent of hours in 2022, increasing up to 16 percent in 2026. The goal for minority workers is to work 21 percent of hours in 2022, increasing yearly up to 25 percent in 2026. Metropolitan governments will review these goals in the second and fourth years of the agreement. Prime contractors and subcontractors must demonstrate good faith efforts to meet these goals.

The Regional Workforce Equity Agreement also outlines apprentice utilization goals of 20 percent of work hours per trade (City of Portland, 2022c). The Regional Workforce Equity Agreement goals can be met by assigning current crewmembers to perform covered work, using existing programs, or considering qualifying workers available from other sources. The oversight committee reviews workforce and contracting data; discusses implementation, extension, or amendment; and develops recommendations about the policy (City of Portland, 2022c).

1. Enforcement

In cases of potential noncompliance, the grieving and responding parties meet to discuss the issues. If an issue cannot be resolved, the dispute can be settled by arbitration. Contractors or subcontractors may be required to pay liquidated damages. Failure to comply can lead to withholding of progress payments, notification of possible debarment, or other remedies (City of Portland, 2022c).

2. Construction Diversity Inclusion Policy

The construction diversity inclusion policy includes goals for 25 percent of hard construction contract dollars to go to historically underrepresented and underutilized businesses: 16 percent for MBEs and 8 percent for WBEs (City of Portland, 2022b). To comply with the construction diversity inclusion policy, contractors and subcontractors must develop an outreach plan as part of their construction procurement plan. Contractors must prepare solicitation packages; advertise the opportunity; and answer questions from potential proposers, bidders, and subcontractors. Contractors must submit documentation of their outreach process, including bid results, responses to solicitations, utilization plans, and a list of contractors at every tier level with disaggregated participation percentages (City of Portland, 2022b).

Contractors and subcontractors are also required to support all MBEs and WBEs to ensure successful completion of work, including technical assistance to build the financial, operational, and management capacities of MBEs and WBEs. Documents such as utilization plans, solicitation packages and results, payment records, technical assistance requests, summaries of issues and successes in equity efforts, and other reports must be sent by contractors and subcontractors to the contract compliance specialist. In cases of noncompliance, contractors may face withholding of progress payments, liquidated damages, nonresponsible designation for city projects, termination, or other remedies (City of Portland, 2022b).

3. Other Provisions and Policies

The City of Portland has established other programs and provisions to increase the utilization of women and people of color in apprenticeship and the utilization of MBEs and WBEs (City of Portland, 2023). For example, the Workforce Training & Hiring Program sets targets for utilization of minorities and women in apprenticeship (City of Portland, 2023). The program requires at least 20 percent of labor hours on construction projects funded by the city to be from apprentices, and it requires good faith efforts to have 18 percent of labor hours worked by minorities and 9 percent of hours worked by women between apprentices and journey-level workers. The program informs contractors about new recruitment methods to access more female and minority candidates and encourages fair employment practices.

The Subcontractor Equity program sets goals of 20 percent of "hard construction costs" to be paid to Certification Office for Business Inclusion and Diversity (COBID) subcontractors, 14 percent of which must be paid to disadvantaged business enterprises (DBEs), MBEs, or WBEs (City of Portland, 2022a).

The city offers a Prime Contractor Development program to provide technical assistance and educational opportunities for COBID contractors.

The city also has provisions related to the U.S. Department of Housing and Urban Development (HUD) Section 3 program (City of Portland, 2023). This program requires recipients of HUD funding to direct opportunities for work, training, and contracting to individuals with low incomes (Section 3 workers) and businesses that employ such individuals (Section 3 businesses). Portland's Section 3 provisions state 25 percent of all labor hours should go to Section 3 residents, and 5 percent of hours should go to Section 3 workers employed by a Section 3 business (City of Portland, 2023).

4. Recruitment and Retention Strategies

The City of Portland outlines a comprehensive set of strategies to improve recruitment and retention in the Regional Workforce Equity Agreement (City of Portland, 2022c). The main strategies employed require community outreach and involvement; review, training, and dissemination of equal employment opportunity and affirmative action policies; and increased accessibility and inclusion.

The Regional Workforce Equity Agreement requires contractors and unions to recruit women and people of color to the construction trades by engaging with the community. Contractors and unions must attend community events, such as job fairs, semiannually during the project. Scheduled jobsite visits by the community are also used to increase awareness of construction job training and opportunities (City of Portland, 2022c).

To improve compliance and retention, the City of Portland requires contractors to review equal employment opportunity and affirmative action policies to determine compliance and review these policies with employees. At the start of each project, contractors must review the Regional Workforce Equity Agreement and projected workforce requirements with unions and the owner. The agreement requires contractors to document their compliance with recruitment and retention policies. All managers, supervisors, and principals are required to complete cultural competency training and conduct annual reviews of their adherence to equal employment opportunity and affirmative action policies (City of Portland, 2022c).

The City of Portland also provides strategies to support women and people of color in construction. Contractors must provide "clean, accessible and locked" toilet facilities to women on the jobsite. They can work to reduce feelings of isolation by employing multiple women or racial minorities on one jobsite and informing women and racial minorities about support systems available to them (City of Portland, 2022c).

5. Extent of Success in Meeting Targets

A 2020 audit of the City of Portland's equity in construction contracting policies showed Portland either met or was close to meeting all hiring and contracting targets to increase utilization of women and people of color in construction (Portland City Auditor, 2020). These policies include targets for the percentage of labor hours worked by women, minorities, and apprentices and are enforced with arbitration, withholding of payments, and possible debarment.

The audit found the Workforce and Contractor Diversity grant initiative, which allocates 1 percent of construction funds for grants that promote a diverse pool of contractors and construction workers, was less effective and more expensive than anticipated. The audit noted the city's procurement office had

not reported on equity results of Portland's contracting since 2017, and reports were inconsistent in prior years. Therefore, the audit recommended improving progress reporting to increase awareness of successes and inform potential program and policy changes.

The audit identified several issues with the Prime Contractor Development program, which limits bidding on prime contracts valued at under $1 million to a pool of prequalified firms that are MBEs, WBEs, or "emerging" small businesses (Portland City Auditor, 2020). Because of the eligibility of veteran-owned and other small businesses, most businesses awarded prime contracts through the program were White-owned businesses. Many program-eligible contracts were also awarded outside the program, about half without clear documentation of the reason for not awarding the contract through the program.

The auditing agency also questioned the integrity of the equity programs and recommended the City of Portland create criteria to limit gamesmanship. The audit noted workarounds such as bundling smaller contracts to improve efficiency and the establishment of small businesses by former dominant contractors or their female spouses (Portland City Auditor, 2020).

E. Seattle, Washington

In 2015, Seattle established a CWA with local construction union groups to meet requirements for a priority hire program explained in the city's municipal code of ordinances (City of Seattle, 2021). The priority hire program sets project-specific requirements focused on hiring residents who live in "economically distressed"[49] ZIP Codes in the greater Seattle area (City of Seattle, 2021, p. 17). This program initially applied to public works construction projects of $5 million or more. The CWA also includes apprentice utilization goals for women and minorities and support for contractor efforts to utilize MBEs and WBEs.

The Priority Hire Ordinance states the director of Finance and Administrative Services (FAS) will create separate, project-specific hour requirements for priority workers, apprentices, and other workers for each covered project (City of Seattle, 2023). The director of FAS will use previous projects to determine the "greatest practicable required percentage" of hours for priority workers, as well as hours for women and people of color (City of Seattle, 2023). The percentage will be no more than 2 percentage points higher than the previous performance and will be adjusted annually. The ordinance sets overall goals across all covered projects of 20 percent of labor hours performed by priority hires by 2016 and 40 percent of labor hours performed by priority workers by 2025. Contractors are required to demonstrate good faith efforts in meeting labor hour goals for women and people of color.

The director of FAS is also responsible for ensuring the availability of job coordinators, who can work with community and other organizations to identify, recruit, and support job candidates who qualify as priority workers. The Priority Hire Ordinance also states the FAS director may assist local pre-apprentice or apprentice training programs in developing additional programs and courses to increase graduation, retention, and employment rates of priority workers, women, and people of color. To enforce the ordinance, the director of FAS may withhold payments on invoices, to the extent allowable by each contract, and debar contractors (City of Seattle, 2023).

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[49] Economically distressed ZIP codes are determined based on the relative number of people living under 200 percent of the federal poverty line in the ZIP code, the unemployment rate for residents in the ZIP code, and the relative number of people over age 25 without a college degree.

The CWA describes additional roles and responsibilities for unions in helping construction contractors meet their requirements for utilizing priority workers (City of Seattle, 2021). Based on the CWA, unions are to dispatch priority workers first, above other workers, in response to contractors' labor needs.

The CWA also states contractors should employ apprentices, with project-specific targets ranging from 15 to 20 percent, and outlines additional goals for the participation of women, people of color, and individuals from economically distressed areas (City of Seattle, 2021). To support these goals, unions are required to prioritize the dispatch of apprentices who graduated from pre-apprenticeship programs as part of a Preferred Entry program for apprenticeship that identifies women, people of color, and individuals from economically distressed areas.

The CWA encourages contractors, the city, and unions to support MBEs and WBEs by conducting outreach, training, and mentoring for such entities (City of Seattle, 2021). The city, contracts, and unions must provide technical assistance about the requirements of the CWA to interested entities, and the Priority Hire Ordinance notes FAS may provide such assistance to MBEs and WBEs (City of Seattle, 2023).

FAS must evaluate the priority hire program based on metrics that may include utilization and graduation rates of priority workers, women, and racial minorities from pre-apprenticeship and apprentice training programs (City of Seattle, 2023). Additional metrics for evaluation include dollars paid to MBEs and WBEs working on covered projects, project costs, project completion time, and safety. FAS must report findings annually and review program results to determine opportunities for expansion or amendments to the program.

In 2017, the mayor of Seattle signed an executive order to expand training and career opportunities in construction created under the city's priority hire program (City of Seattle, 2017). The executive order requires the FAS director to also review private projects where the city would pay at least $5 million for rights or public benefits. Three large existing redevelopment projects must follow the City of Seattle CWA, including the priority hire program and provisions for MBE and WBE utilization (City of Seattle, 2021). The director will recommend "the most robust" application of provisions related to priority hires and MBE/WBE utilization for projects in which (1) the budget is at least $5 million, (2) a "substantial share" of a private project's cost is public, and (3) the city has an ongoing interest in the project infrastructure (City of Seattle, 2017, pp. 2–3).

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Appendix Est-1. Economic Area Onsite Construction Utilization Estimation

Economic Areas represent regional markets for labor, products, and information. The U.S. Bureau of Economic Analysis constructed the 179 EAs under the assumption that counties in an EA are economically related to one another. Some geographically larger EAs contain counties spanning multiple States. For some smaller EAs, a single EA may encompass an entire State, such as Hawaii.

When examining utilization gaps at the EA level, this study finds that, compared with similar occupations, onsite construction occupations employ—

▶ Proportionately fewer women across all EAs and to a more extreme extent in Midwest EAs (see table Est-3.5a)

▶ Proportionately fewer Black or African American workers and Asian workers across most EAs (see table Est-3.5b)

▶ Proportionately more Hispanic or Latino workers across many EAs, especially in southern EAs (see table Est-3.5b)

Utilization gaps for White workers vary more than other race and ethnicity groups across EAs, and Indigenous workers and workers who identify as multiracial or another race are nearly zero or insignificant for most EAs.

This section focuses on EA-level results for all onsite construction occupations. At the EA level, trends in onsite construction utilization continue to align with those seen at the national and State levels. Appendix Est-3 contains tables with further details of the EA-level estimates produced for all onsite construction occupations. See Munkacsy et al. (2024) and its associated appendices for more details on EA-level utilization estimates.

A. EA Workforce Gaps By Sex

At the EA level, across all onsite construction occupations, the utilization gap for women is generally between 6.0 and 11.0 percentage points.

▶ Gaps range from 0.5[EST-1.1] percentage points in the Gulfport-Biloxi-Pascagoula, Mississippi, EA to 15.0 percentage points in the Montgomery-Alexander City, Alabama, EA.

▶ Similar to the State gaps, many EAs with the largest utilization gaps for women are located in the Midwest. In fact, three of the five widest gaps for women occur in EAs in the Midwest.

▶ As with States, all EAs have a positive gap for women, meaning onsite construction occupations employ a smaller percentage of women than similar occupations.

See figure Est-1.1 for a map of the EA gaps for women across all onsite construction occupations.

[EST-1.1] The 95 percent confidence interval for the utilization gap for women in the Gulfport-Biloxi-Pascagoula, Mississippi, EA contains zero.

Figure Est-1.1. Economic Area Percentage Point Utilization Gaps for Women Across All Onsite Construction Occupations, 2019

Women

Higher utilization rates in onsite construction compared with similar occupations (legend minimum: -25.0)

Lower utilization rates in onsite construction compared with similar occupations (legend maximum: 25.0)
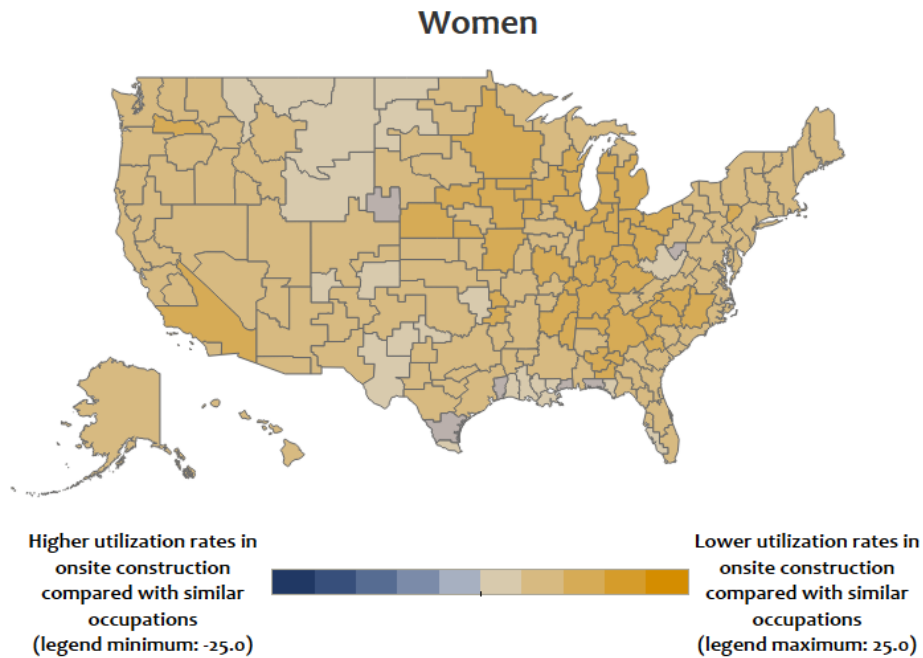
Note: Data for Figure Est-1.1 is available in Table Est-3.5a in Appendix Est-3. Economic areas are grayed out in the map if the 95 percent confidence interval for the gap contains zero. The population of women and men presented in this study is defined by self-reported data on an individual's sex in the American Community Survey (ACS) Public Use Microdata Sample data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations. O*NET = Occupational Information Network
Source: IPUMS-USA

B. EA Workforce Gaps by Race/Ethnicity

At the EA level, relationships between the onsite construction workforce and the workforce of similar occupations vary the by race and ethnicity category and remain consistent with gaps at the State level. See figure Est-1.2 for maps of the EA gaps by race and ethnicity across all onsite construction occupations.

Figure Est-1.2. Economic Area Percentage Point Utilization Gaps by Race/Ethnicity, 2019

Asian

Black/African American

Indigenous

White

Multiracial/Another Race

Hispanic/Latino

Higher utilization rates in onsite construction compared with similar occupations (legend minimum: -25.0)

Lower utilization rates in onsite construction compared with similar occupations (legend maximum: 25.0)
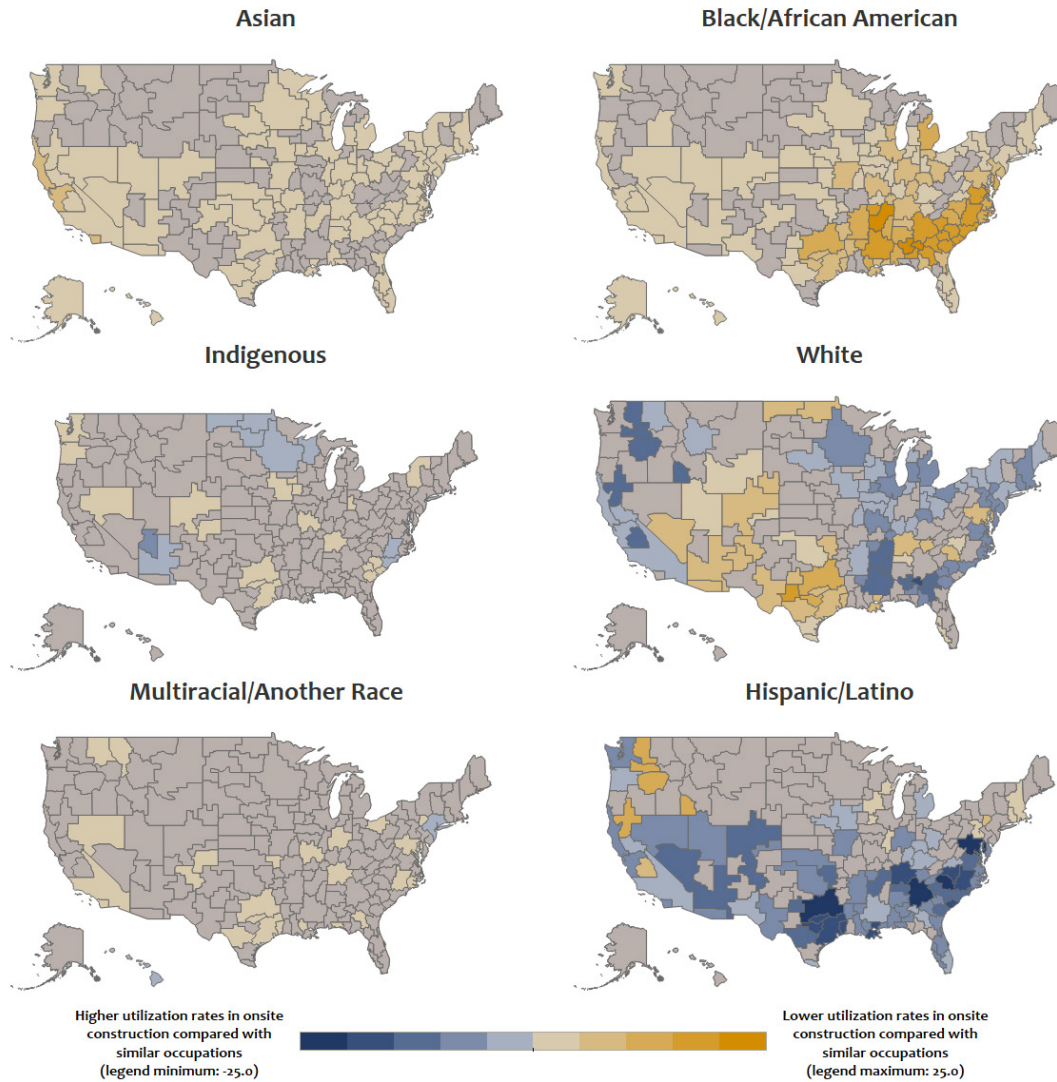
Note: Data for Figure Est-1.2 is available in Table Est-3.5b in Appendix Est-3. Economic areas are grayed out in the map if the 95 percent confidence interval for the gap contains zero. The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the American Community Survey (ACS) Public Use Microdata Sample data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.
O*NET = Occupational Information Network
Source: IPUMS-USA

C. EA Workforce Gaps Over Time

As with State and national gaps, gaps at the EA level stayed relatively constant over time for each group. Gaps for Black or African American workers increased slightly, and gaps for White workers decreased slightly across EAs. Figure Est-1.3 displays the changes in EA utilization gaps for each group, comparing estimates from 2010[EST-1.2] with estimates from 2019. The EAs with the greatest gap increase and decrease are highlighted for each group. Additional details about EA-level utilization gap changes over time are available in Munkacsy et al. (2024) and its associated appendices.

[EST-1.2] The study team used the Census Bureau's 2010 ACS 5-Year Estimates PUMS data to estimate employment in onsite construction and similar occupations for 2010.

Figure Est-1.3. Greatest Changes in Economic Area Percentage Point Utilization Gaps by Sex and Race/Ethnicity Across All Onsite Construction Occupations, 2010 to 2019
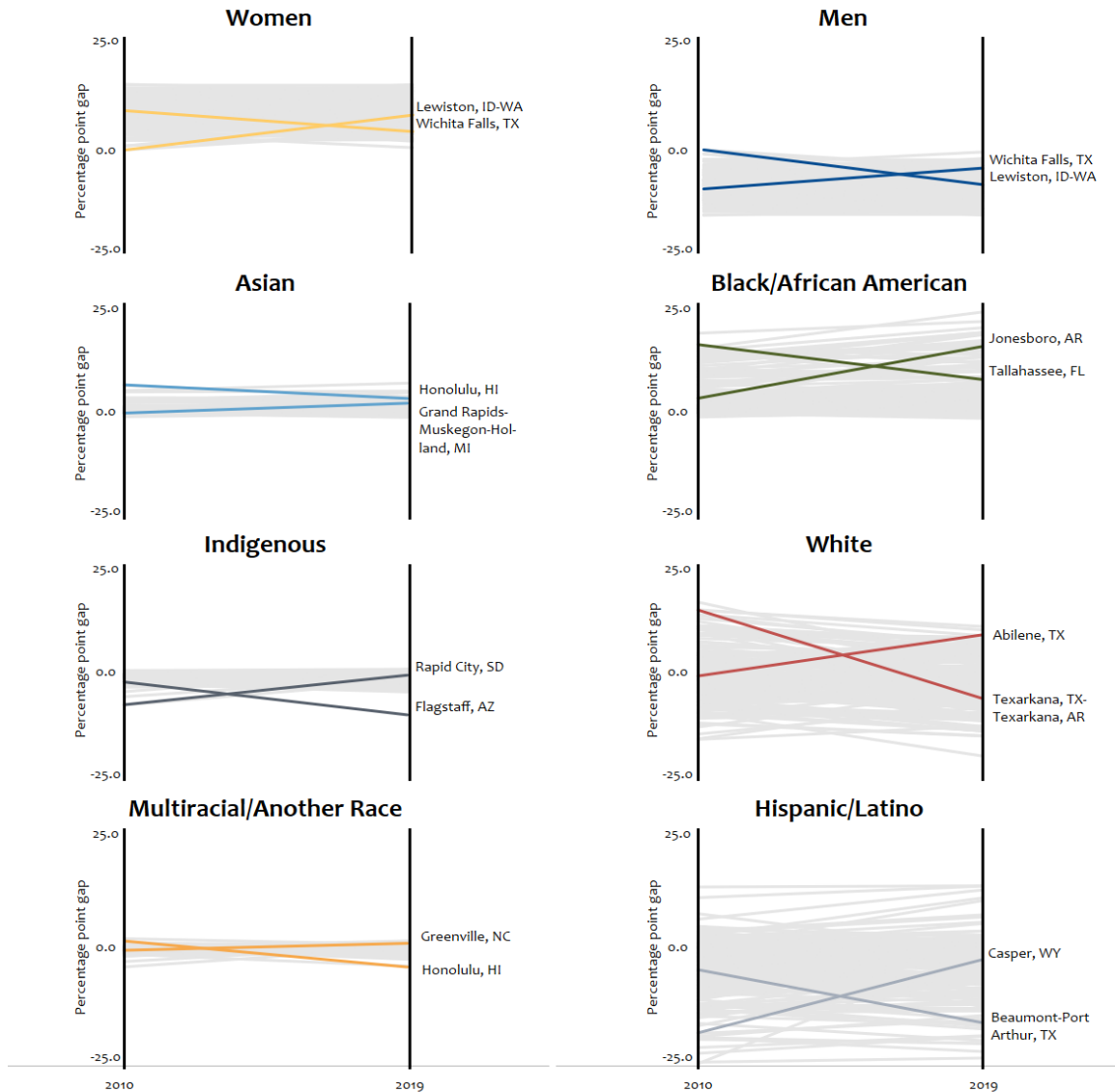
Note: Figure Est-1.3 data on the gaps for women and men are available in Table Est-3.5a and data on gaps for each race and ethnicity group are available in Table Est-3.5b in Appendix Est-3. The population of women and men presented in this study is defined by self-reported data on an individual's sex in the American Community Survey (ACS) Public Use Microdata Sample (PUMS) data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS. The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the ACS PUMS data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS. Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction. Positive percentage point differences represent lower utilization rates in onsite construction when compared with similar occupations and negative percentage point differences represent higher utilization rates in onsite construction compared with similar occupations. Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2. Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.
O*NET = Occupational Information Network
Source: IPUMS-USA

D. Discussion

Utilization gaps at the EA-level confirm trends identified at the State level. At the more local level, utilization of women, Black or African American workers, and Asian workers in onsite construction continues to fall short when compared to similar occupations across EAs, while utilization of Hispanic or Latino workers continues to exceed that of similar occupations across EAs. Regional variation in gaps also continues to follow the trends seen at the State level. General patterns in disparities are further amplified at the local level, where utilization estimates for Black or African American workers in the southeast and Hispanic or Latino workers throughout the south demonstrate large gaps between onsite construction and similar occupations. Local utilization gaps for White workers also continue to highlight the variation captured at the State level. As also seen at the State level, changes in utilization gaps trend in the same direction across EAs for each demographic group.

Appendix Est-2. Methodological Details

This appendix summarizes the methodology the study team used to estimate the proportion of individuals in onsite construction and similar occupations by sex and by race and ethnicity. The appendix begins by describing the data used to capture relationships between occupations and to approximate the population within each occupation. The appendix then details the processes the study team employed to determine similarity between occupations and to estimate the distribution of workers across sex and race and ethnicity categories in an occupation or set of occupations. The appendix also describes the variance estimation methods used for the estimates and the approach to estimating the number of low-wage workers in each workforce.

A. Data

The O*NET database provides occupation-level data based on the 2018 SOC system and consists of regularly updated occupational characteristics and worker requirements across nearly 1,000 occupations in the U.S. economy (National Center for O*NET Development, 2023). The study team used O*NET edition 26.3 data, released in May 2022, to identify 44 onsite construction occupations and their similar occupations, which form the foundation of the study's analyses.

The study team used the Census Bureau's 2019 American Community Survey (ACS) 5-Year Estimates Public Use Microdata Sample person-level data[EST-2.1] to examine the characteristics of the population of U.S. workers in the total workforce, the workforce of onsite construction occupations, and the workforce of similar occupations. The 2019 5-Year ACS PUMS data pool individual ACS responses from 2015 to 2019, providing multiyear estimates that improve the statistical reliability of the data, particularly for subnational and subpopulation estimates. The study team also used the 2010 5-Year ACS PUMS data, which pool individual ACS responses from 2006 to 2010, for longitudinal analysis.

B. Occupations

The study team defines the onsite construction occupations considered in this study by 44 distinct SOC codes and 27 ACS Census occupation codes derived from the SOC codes. Table Est-2.1 shows the SOC codes and their ACS Census code equivalents.

Table Est-2.1. Onsite Construction Occupation Codes

Standard Occupational Classification Code	American Community Survey Census Code
47-2011.00-Boilermakers	6210-Boilermakers
47-2021.00-Brickmasons and Blockmasons	6220-Brickmasons, blockmasons, stonemasons, and reinforcing iron and rebar workers
47-2022.00-Stonemasons	6220-Brickmasons, blockmasons, stonemasons, and reinforcing iron and rebar workers
47-2031.00-Carpenters	6230-Carpenters
47-2041.00-Carpet Installers	6240-Carpet, floor, and tile installers and finishers
47-2042.00-Floor Layers, Except Carpet, Wood, and Hard Tiles	6240-Carpet, floor, and tile installers and finishers
47-2043.00-Floor Sanders and Finishers	6240-Carpet, floor, and tile installers and finishers

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Standard Occupational Classification Code	American Community Survey Census Code
47-2044.00-Tile and Stone Setters	6240-Carpet, floor, and tile installers and finishers
47-2051.00-Cement Masons and Concrete Finishers	6250-Cement masons, concrete finishers, and terrazzo workers
47-2053.00-Terrazzo Workers and Finishers	6250-Cement masons, concrete finishers, and terrazzo workers
47-2061.00-Construction Laborers	6260-Construction laborers
47-2071.00-Paving, Surfacing, and Tamping Equipment Operators	6305-Construction equipment operators
47-2073.00-Operating Engineers and Other Construction Equipment Operators	6305-Construction equipment operators
47-2072.00-Pile Driver Operators	6305-Construction equipment operators
47-2081.00-Drywall and Ceiling Tile Installers	6330-Drywall installers, ceiling tile installers, and tapers
47-2082.00-Tapers	6330-Drywall installers, ceiling tile installers, and tapers
47-2111.00-Electricians	6355-Electricians
47-2121.00-Glaziers	6360-Glaziers
47-2131.00-Insulation Workers, Floor, Ceiling, and Wall	6400-Insulation workers
47-2132.00-Insulation Workers, Mechanical	6400-Insulation workers
47-2141.00-Painters, Construction and Maintenance	6410-Painters and paperhangers
47-2142.00-Paperhangers	6410-Painters and paperhangers
47-2151.00-Pipelayers	6441-Pipelayers, plumbers, pipefitters, and steamfitters
47-2152.00-Plumbers, Pipefitters, and Steamfitters	6441-Pipelayers, plumbers, pipefitters, and steamfitters
47-2152.04-Solar Thermal Installers and Technicians	6442-Solar thermal installers and technicians
47-2161.00-Plasterers and Stucco Masons	6460-Plasterers and stucco masons
47-2181.00-Roofers	6515-Roofers
47-2211.00-Sheet Metal Workers	6520-Sheet metal workers
47-2221.00-Structural Iron and Steel Workers	6530-Structural iron and steel workers
47-2231.00-Solar Photovoltaic Installers	6540-Solar photovoltaic installers
47-3011.00-Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters	6600-Helpers, construction trades
47-3012.00-Helpers--Carpenters	6600-Helpers, construction trades
47-3013.00-Helpers--Electricians	6600-Helpers, construction trades
47-3014.00-Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons	6600-Helpers, construction trades
47-3015.00-Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters	6600-Helpers, construction trades
47-3016.00-Helpers--Roofers	6600-Helpers, construction trades
47-4011.00-Construction and Building Inspectors	6660-Construction and building inspectors
47-4021.00-Elevator and Escalator Installers and Repairers	6700-Elevator and escalator installers and repairers
47-4031.00-Fence Erectors	6710-Fence erectors
47-4041.00-Hazardous Materials Removal Workers	6720-Hazardous materials removal workers
47-4051.00-Highway Maintenance Workers	6730-Highway maintenance workers
47-4061.00-Rail-Track Laying and Maintenance Equipment Operators	6740-Rail-track laying and maintenance equipment operators
47-4071.00-Septic Tank Servicers and Sewer Pipe Cleaners	6765-Other construction and related workers
47-4091.00-Segmental Pavers	6765-Other construction and related workers

Sources: U.S. Bureau of Labor Statistics; IPUMS-USA

The study team included all the occupations in table Est-2.1 in the estimates for all onsite construction occupations. Tables Est-2.2a and Est-2.2b show the team's classifications of these occupations into craft workers and laborers and helpers, based on the classifications defined in EEO-1 reports (EEOC, 2022).

Table Est-2.2a. Onsite Construction Occupations Classified as Craft Workers

Onsite Construction Occupations Classified as Craft Workers
47-2011.00-Boilermakers
47-2021.00-Brickmasons and Blockmasons
47-2022.00-Stonemasons
47-2031.00-Carpenters
47-2041.00-Carpet Installers
47-2042.00-Floor Layers, Except Carpet, Wood, and Hard Tiles
47-2043.00-Floor Sanders and Finishers
47-2044.00-Tile and Stone Setters
47-2051.00-Cement Masons and Concrete Finishers
47-2053.00-Terrazzo Workers and Finishers
47-2071.00-Paving, Surfacing, and Tamping Equipment Operators
47-2073.00-Operating Engineers and Other Construction Equipment Operators
47-2072.00-Pile Driver Operators
47-2081.00-Drywall and Ceiling Tile Installers
47-2082.00-Tapers
47-2111.00-Electricians
47-2121.00-Glaziers
47-2131.00-Insulation Workers, Floor, Ceiling, and Wall
47-2132.00-Insulation Workers, Mechanical
47-2141.00-Painters, Construction and Maintenance
47-2142.00-Paperhangers
47-2151.00-Pipelayers
47-2152.00-Plumbers, Pipefitters, and Steamfitters
47-2152.04-Solar Thermal Installers and Technicians
47-2161.00-Plasterers and Stucco Masons
47-2181.00-Roofers
47-2211.00-Sheet Metal Workers
47-2221.00-Structural Iron and Steel Workers
47-2231.00-Solar Photovoltaic Installers
47-4021.00-Elevator and Escalator Installers and Repairers
47-4031.00-Fence Erectors
47-4041.00-Hazardous Materials Removal Workers
47-4051.00-Highway Maintenance Workers
47-4061.00-Rail-Track Laying and Maintenance Equipment Operators
47-4091.00-Segmental Pavers

Note: The study did not assign 47-4011.00-Construction and Building Inspectors to either crafter workers or laborers and helpers based on the Equal Employment Opportunity-1 categories.
Source: U.S. Equal Employment Opportunity Commission

Table Est-2.2b. Onsite Construction Occupations Classified as Laborers and Helpers

Onsite Construction Occupations Classified as Laborers and Helpers
47-2061.00-Construction Laborers
47-3011.00-Helpers--Brickmasons, Blockmasons, Stonemasons, and Tile and Marble Setters
47-3012.00-Helpers--Carpenters
47-3013.00-Helpers--Electricians
47-3014.00-Helpers--Painters, Paperhangers, Plasterers, and Stucco Masons
47-3015.00-Helpers--Pipelayers, Plumbers, Pipefitters, and Steamfitters
47-3016.00-Helpers--Roofers
47-4071.00-Septic Tank Servicers and Sewer Pipe Cleaners

Note: 47-4011.00-Construction and Building Inspectors is not assigned to either crafter workers or laborers and helpers.
Source: U.S. Equal Employment Opportunity Commission

Table Est-2.3 shows the SOC codes for all the occupations the study team determined to be similar to at least one onsite construction occupation.[EST-2.2]

Table Est-2.3. Occupations Similar to at Least One Onsite Construction Occupation

Similar Occupation Standard Occupational Classification Code
19-4071.00-Forest and Conservation Technicians
29-2056.00-Veterinary Technologists and Technicians
33-9093.00-Transportation Security Screeners
37-2021.00-Pest Control Workers
37-3011.00-Landscaping and Groundskeeping Workers
37-3012.00-Pesticide Handlers, Sprayers, and Applicators, Vegetation
37-3013.00-Tree Trimmers and Pruners
39-2011.00-Animal Trainers
39-2021.00-Animal Caretakers
45-2092.00-Farmworkers and Laborers, Crop, Nursery, and Greenhouse
45-2093.00-Farmworkers, Farm, Ranch, and Aquacultural Animals
45-3031.00-Fishing and Hunting Workers
45-4011.00-Forest and Conservation Workers
45-4021.00-Fallers
47-4099.03-Weatherization Installers and Technicians
47-5011.00-Derrick Operators, Oil and Gas
47-5012.00-Rotary Drill Operators, Oil and Gas
47-5013.00-Service Unit Operators, Oil and Gas
47-5022.00-Excavating and Loading Machine and Dragline Operators, Surface Mining
47-5032.00-Explosives Workers, Ordnance Handling Experts, and Blasters
47-5041.00-Continuous Mining Machine Operators
47-5043.00-Roof Bolters, Mining
47-5044.00-Loading and Moving Machine Operators, Underground Mining
47-5051.00-Rock Splitters, Quarry
47-5071.00-Roustabouts, Oil and Gas
47-5081.00-Helpers--Extraction Workers

[EST-2.2] The set of similar occupations also includes onsite construction occupations listed in table Est-2.1.

Similar Occupation Standard Occupational Classification Code

49-2021.00-Radio, Cellular, and Tower Equipment Installers and Repairers

49-2022.00-Telecommunications Equipment Installers and Repairers, Except Line Installers

49-2092.00-Electric Motor, Power Tool, and Related Repairers

49-3011.00-Aircraft Mechanics and Service Technicians

49-3021.00-Automotive Body and Related Repairers

49-3023.00-Automotive Service Technicians and Mechanics

49-3031.00-Bus and Truck Mechanics and Diesel Engine Specialists

49-3041.00-Farm Equipment Mechanics and Service Technicians

49-3042.00-Mobile Heavy Equipment Mechanics, Except Engines

49-3043.00-Rail Car Repairers

49-3051.00-Motorboat Mechanics and Service Technicians

49-3052.00-Motorcycle Mechanics

49-3053.00-Outdoor Power Equipment and Other Small Engine Mechanics

49-3091.00-Bicycle Repairers

49-3092.00-Recreational Vehicle Service Technicians

49-3093.00-Tire Repairers and Changers

49-9011.00-Mechanical Door Repairers

49-9021.00-Heating, Air Conditioning, and Refrigeration Mechanics and Installers

49-9031.00-Home Appliance Repairers

49-9041.00-Industrial Machinery Mechanics

49-9043.00-Maintenance Workers, Machinery

49-9044.00-Millwrights

49-9051.00-Electrical Power-Line Installers and Repairers

49-9052.00-Telecommunications Line Installers and Repairers

49-9071.00-Maintenance and Repair Workers, General

49-9081.00-Wind Turbine Service Technicians

49-9092.00-Commercial Divers

49-9094.00-Locksmiths and Safe Repairers

49-9095.00-Manufactured Building and Mobile Home Installers

49-9096.00-Riggers

49-9097.00-Signal and Track Switch Repairers

49-9098.00-Helpers--Installation, Maintenance, and Repair Workers

49-9099.01-Geothermal Technicians

51-2011.00-Aircraft Structure, Surfaces, Rigging, and Systems Assemblers

51-2041.00-Structural Metal Fabricators and Fitters

51-2051.00-Fiberglass Laminators and Fabricators

51-2092.00-Team Assemblers

51-3021.00-Butchers and Meat Cutters

51-3022.00-Meat, Poultry, and Fish Cutters and Trimmers

51-3023.00-Slaughterers and Meat Packers

51-4021.00-Extruding and Drawing Machine Setters, Operators, and Tenders, Metal and Plastic

51-4022.00-Forging Machine Setters, Operators, and Tenders, Metal and Plastic

51-4023.00-Rolling Machine Setters, Operators, and Tenders, Metal and Plastic

51-4031.00-Cutting, Punching, and Press Machine Setters, Operators, and Tenders, Metal and Plastic

Similar Occupation Standard Occupational Classification Code

51-4032.00-Drilling and Boring Machine Tool Setters, Operators, and Tenders, Metal and Plastic

51-4033.00-Grinding, Lapping, Polishing, and Buffing Machine Tool Setters, Operators, and Tenders, Metal and Plastic

51-4034.00-Lathe and Turning Machine Tool Setters, Operators, and Tenders, Metal and Plastic

51-4035.00-Milling and Planing Machine Setters, Operators, and Tenders, Metal and Plastic

51-4041.00-Machinists

51-4051.00-Metal-Refining Furnace Operators and Tenders

51-4052.00-Pourers and Casters, Metal

51-4061.00-Model Makers, Metal and Plastic

51-4071.00-Foundry Mold and Coremakers

51-4072.00-Molding, Coremaking, and Casting Machine Setters, Operators, and Tenders, Metal and Plastic

51-4111.00-Tool and Die Makers

51-4121.00-Welders, Cutters, Solderers, and Brazers

51-4122.00-Welding, Soldering, and Brazing Machine Setters, Operators, and Tenders

51-4191.00-Heat Treating Equipment Setters, Operators, and Tenders, Metal and Plastic

51-4192.00-Layout Workers, Metal and Plastic

51-4193.00-Plating Machine Setters, Operators, and Tenders, Metal and Plastic

51-4194.00-Tool Grinders, Filers, and Sharpeners

51-5113.00-Print Binding and Finishing Workers

51-6062.00-Textile Cutting Machine Setters, Operators, and Tenders

51-6064.00-Textile Winding, Twisting, and Drawing Out Machine Setters, Operators, and Tenders

51-6091.00-Extruding and Forming Machine Setters, Operators, and Tenders, Synthetic and Glass Fibers

51-6093.00-Upholsterers

51-7011.00-Cabinetmakers and Bench Carpenters

51-7021.00-Furniture Finishers

51-7032.00-Patternmakers, Wood

51-7041.00-Sawing Machine Setters, Operators, and Tenders, Wood

51-7042.00-Woodworking Machine Setters, Operators, and Tenders, Except Sawing

51-8099.01-Biofuels Processing Technicians

51-9012.00-Separating, Filtering, Clarifying, Precipitating, and Still Machine Setters, Operators, and Tenders

51-9021.00-Crushing, Grinding, and Polishing Machine Setters, Operators, and Tenders

51-9022.00-Grinding and Polishing Workers, Hand

51-9032.00-Cutting and Slicing Machine Setters, Operators, and Tenders

51-9041.00-Extruding, Forming, Pressing, and Compacting Machine Setters, Operators, and Tenders

51-9051.00-Furnace, Kiln, Oven, Drier, and Kettle Operators and Tenders

51-9111.00-Packaging and Filling Machine Operators and Tenders

51-9124.00-Coating, Painting, and Spraying Machine Setters, Operators, and Tenders

51-9151.00-Photographic Process Workers and Processing Machine Operators

51-9191.00-Adhesive Bonding Machine Operators and Tenders

51-9192.00-Cleaning, Washing, and Metal Pickling Equipment Operators and Tenders

51-9193.00-Cooling and Freezing Equipment Operators and Tenders

51-9195.00-Molders, Shapers, and Casters, Except Metal and Plastic

51-9195.03-Stone Cutters and Carvers, Manufacturing

51-9195.04-Glass Blowers, Molders, Benders, and Finishers

Similar Occupation Standard Occupational Classification Code
51-9196.00-Paper Goods Machine Setters, Operators, and Tenders
51-9197.00-Tire Builders
51-9198.00-Helpers--Production Workers
53-3011.00-Ambulance Drivers and Attendants, Except Emergency Medical Technicians
53-3032.00-Heavy and Tractor-Trailer Truck Drivers
53-3033.00-Light Truck Drivers
53-4013.00-Rail Yard Engineers, Dinkey Operators, and Hostlers
53-5011.00-Sailors and Marine Oilers
53-5022.00-Motorboat Operators
53-5031.00-Ship Engineers
53-6031.00-Automotive and Watercraft Service Attendants
53-7011.00-Conveyor Operators and Tenders
53-7051.00-Industrial Truck and Tractor Operators
53-7062.00-Laborers and Freight, Stock, and Material Movers, Hand
53-7063.00-Machine Feeders and Offbearers
53-7064.00-Packers and Packagers, Hand
53-7072.00-Pump Operators, Except Wellhead Pumpers
53-7073.00-Wellhead Pumpers
53-7081.00-Refuse and Recyclable Material Collectors
53-7121.00-Tank Car, Truck, and Ship Loaders

Sources: IPUMS-USA; the Occupational Information Network database edition 26.3

C. Similar Occupations

To measure the similarity between occupations, the study team used 43 descriptors from the O*NET database that characterize each occupation based on worker skills, worker interests, working conditions, and occupational experiences. The study team limited the analysis to onsite construction occupations, which represent a subset of the SOC major category 47, Construction and Extraction, that excludes management-related occupations. The team narrowed the list of all occupations to those most similar to the onsite construction occupations through the following process. Following the Bendick et al. (2011) approach, the team excluded occupations and removed them from the list of considered occupations based on an occupation's required education level, required strength level, frequency of difficult or hazardous working conditions, and average annual earnings.

▶ The team discarded occupations that require at least a 4-year college degree because the educational requirements for most onsite construction occupations fall below that threshold.

▶ The team discarded occupations with a required strength level less than the strength level required for Operating Engineers.[EST-2.3]

▶ The team discarded any occupation with a frequency of hazardous working conditions less than the minimum frequency across the onsite construction occupations.

[EST-2.3] The study team used the operating engineers occupation as the threshold for strength level according to the original methodology Bendick et al. devised in 2011. The operating engineers occupation has one of the lowest strength scores across all onsite construction occupations.

- The team used the 2019 5-Year ACS PUMS data to determine the average annual earnings by occupation across the U.S. population. The team removed from the list of consideration any occupation with average annual earnings greater than the maximum average annual earnings across the onsite construction occupations.

This process narrowed the list of occupations from 874 to 241. Then, for each of the onsite construction occupations, the study team used the 43 descriptors (table Est-2.4) of job requirements associated with each occupation from the O*NET database to calculate a similarity score. Similarity scores serve as a measure of the relatedness of two occupations based on job requirements. The study team calculated a similarity score between each onsite construction occupation and each of the remaining 241 occupations. For example, the study team calculated a score for the similarity of the carpenters occupation and the aircraft structure assemblers occupation, where a higher score value denoted greater similarity between the job requirements of carpenters and aircraft structure assemblers.

Bendick et al. (2011) calculated the similarity score as the Euclidean distance between any 2 occupations (e.g., carpenters and aircraft structure assemblers): The difference between the scores for each feature for the 2 occupations is squared, and squared differences are summed across the 43 features. However, many characteristics used in this calculation are highly correlated with one another. Therefore, the study team used a dimensionality reduction technique called principal components analysis (PCA) to account for the high correlation of the features and minimize noise. PCA selects linear combinations of standardized features to capture as much variation between observations as possible (Jolliffe, 2006). Applying this technique to the occupation data narrowed the 43 descriptors into 2 principal components[55] that retained 98 percent of the variation in the data. The team then calculated the similarity score as the Euclidean distance between any 2 occupations (e.g., carpenters and aircraft structure assemblers) using the 2 principal components in place of the original 43 features.

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[55] Following best practice in PCA, only the first two principal components were used because their eigenvalues were greater than 1.

Table Est-2.4. O*NET Database Job Requirements

O*NET Database Job Requirements	
1.A.1.a – Verbal ability	1.B.2.c – Recognition values
1.A.1.b – Reasoning	1.B.2.d – Relationships values
1.A.1.c – Quantitative ability	1.B.2.e – Support values
1.A.1.d – Memory	1.B.2.f – Independence values
1.A.1.e – Perceptual ability	1.C.1.a – Achievement/Effort
1.A.1.f – Spatial ability	1.C.1.b – Persistence
1.A.1.g – Attentiveness	1.C.1.c – Initiative
1.A.2.a – Fine manipulation	1.C.2.b – Leadership
1.A.2.b – Physical control	1.C.3.a – Cooperation
1.A.3.a – Strength	1.C.3.b – Concern for others
1.A.3.b – Endurance	1.C.3.c – Social orientation
1.A.3.c – Flexibility/coordination	1.C.4.a – Self control
1.A.4.a – Visual acuity	1.C.4.b – Stress tolerance
1.A.4.b – Auditory acuity	1.C.4.c – Adaptability/Flexibility
1.B.1.a – Realistic interests	1.C.5.a – Dependability
1.B.1.b – Investigative interests	1.C.5.b – Attention to detail
1.B.1.c – Artistic interests	1.C.5.c – Integrity
1.B.1.d – Social interests	1.C.6 – Independence
1.B.1.e – Enterprising interests	1.C.7.a – Innovation
1.B.1.f – Conventional interests	1.C.7.b – Analytical thinking
1.B.2.a – Achievement values	
1.B.2.b – Working conditions values	

O*NET = Occupational Information Network
Source: O*NET database edition 26.3

The study team used the similarity score between each pair of occupations (i.e., each onsite construction occupation compared with each of the 241 occupations) to identify a set of similar occupations for each onsite construction occupation. The team then determined a threshold for similarity based on the similarity between onsite construction occupations. The study team used the median similarity when considering only similarities between the various onsite construction occupations as a cutoff. Occupations are considered similar if their similarity score is less than or equal to the median similarity score. The team limited the set of similar occupations for each onsite construction occupation to the top 50 most similar occupations if necessary.

Because onsite construction occupations often require specialized skills, this approach to identifying sets of similar occupations enables onsite construction occupations to be similar to one another. Excluding other onsite construction occupations could result in a set of similar occupations that are not particularly similar. However, given underutilization of women and people of color persists across construction occupations, the gaps estimated from this approach are lower than if the study team had excluded onsite construction occupations from the similar set.

In particular, if the team excluded onsite construction occupations from the set of similar occupations, the utilization gap estimates would be 10.56 percentage points for women, 1.89 percentage points for Asian workers, 7.06 percentage points for Black or African American workers, -0.10 percentage points for Indigenous workers, 2.85 percentage points for White workers, 0.10 percentage points for workers who identify as multiracial or another race, and -11.81 percentage points for Hispanic or Latino workers. With onsite construction occupations included in the set of similar occupations, the study team calculated the utilization gap estimates as 8.94 percentage points for women, 1.58 percentage points for Asian workers, 5.78 percentage points for Black or African American workers, -0.08 percentage points

for Indigenous workers, 2.36 percentage points for White workers, 0.08 percentage points for workers who identify as multiracial or another race, and -9.72 for Hispanic or Latino workers.

D. Utilization and Gap Estimation

The study team used the 2019 5-Year ACS PUMS data to estimate the total number of individuals in each relevant occupation in the United States and the number of individuals within each sex and each race and ethnicity group based on the PUMS person-level weights. The team considered only employed members of the labor force in this analysis.[EST-2.4] For each demographic group, the team compared the labor force share in the set of similar occupations with the share in a given onsite construction occupation to calculate the gap between the two. The team mapped the SOC occupation codes from the O*NET database to Census occupation codes the ACS uses. When multiple SOC codes were included in a single Census occupation code, the team combined the sets of similar occupations associated with each SOC code to represent the similar occupations associated with the single Census occupation code.

The study team also produced aggregate estimates for all onsite construction occupations and for two broad categories of onsite construction occupations: (1) craft workers and (2) laborers and helpers. The team classified onsite construction occupations into craft worker occupations and laborers and helpers occupations according to the classifications defined in EEO-1 reports collected by the EEOC. To calculate estimates for these aggregate groups, the team used a weighted sum.

When summing across the onsite construction occupations included in an aggregate group, the team weighted the sum of workers in similar occupations by the proportion of total workers in the aggregate group who are in the specific onsite construction occupation associated with those similar occupations. For example, if the total number of craft workers were 1 million and carpenters represented 100,000 of those workers, in the sum of workers in similar occupations for craft workers, the similar occupations associated with the carpenters occupation would have a weight of 0.1 (100,000/1,000,000).[EST-2.5]

The ACS PUMS data include the State and Public Use Microdata Area (PUMA)[EST-2.6] of residence for each survey respondent. The study team used the ACS State subsamples to calculate the State-level estimates in the study (see chapter 2, section C). The team used the ACS PUMA subsamples to calculate estimates at the EA[EST-2.7] level in the study (see appendix Est-1). For the EA-level estimates, the team mapped the 982 PUMAs in the 2010 Census to the 179 EAs. About 63 percent of PUMAs map to a single EA. The remaining 37 percent are split between PUMAs and sometimes across State lines. When a PUMA was in multiple EAs, the team captured data related to the PUMA in all EAs of which it is a part. Therefore, EA estimates are not always independent of one another.

E. Variance Estimation

The estimates in this study are presented with 95 percent confidence intervals. The study team calculated the margins of error (MOEs) used to construct these intervals using the 80 person-level replicate weights the ACS PUMS data include. PUMS documentation recommends using the successive

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[EST-2.4] The 2019 5-Year ACS PUMS data estimate the employed labor force at 155,780,376 based on a sample of 7,433,260 individuals.
[EST-2.5] These numbers are used for demonstrative purposes and do not represent the actual numbers of craft workers or workers in the carpenters occupation.
[EST-2.6] PUMAs are statistical geographic areas containing at least 100,000 people and cover the entirety of the United States, Puerto Rico, and Guam. They do not cross State lines.
[EST-2.7] EAs are regional markets encompassing one or more statistical areas and the surrounding counties. As of 2004, the U.S. Bureau of Economic Analysis delineated 179 EAs with full coverage of the 50 States and the District of Columbia (Johnson and Kort, 2004).

difference replication (SDR) method to calculate standard errors for estimates derived from the PUMS data. The SDR method uses the 80 person-level replicate weights to construct 80 replicate estimates in addition to the point estimate calculated using the base person-level weight. The standard error for an estimate is then calculated using the following formula:

$$MOE(X) = 1.96 * \sqrt{\frac{4}{80} \sum_{r=1}^{80} (X_r - X)^2}$$

—where X is the estimate based on the person-level weight and the values of X_r are the 80 individual estimates based on each of the replicate weights.

Using the MOEs for the estimated **number** of workers from the previous formula, the study team constructed the MOEs associated with the **share** of workers from a specific demographic group in each occupation. For the share of workers, the team calculated the MOEs using the following formula:

$$MOE(\hat{P}) = \frac{1}{\hat{Y}} \sqrt{[MOE(\hat{X})]^2 - (\hat{P}^2 * [MOE(\hat{Y})]^2)}$$

—where $\hat{X}$ is the number of workers in an occupation who belong to a specific demographic group; $\hat{Y}$ is the total number of workers in an occupation; and $\hat{P}$ is $\frac{\hat{X}}{\hat{Y}}$, or the share of workers in an occupation who belong to a specific demographic group.

Finally, the MOEs for the gap estimates—calculated as the percentage point difference between the **share** of workers from a specific demographic group in occupations similar to an onsite construction occupation and the **share** of workers from a specific demographic group in the associated onsite construction occupation—are calculated using the following formula:

$$MOE(gap) = 1.96 * \sqrt{[\frac{MOE(\hat{P}_{similar})}{1.96}]^2 - [\frac{MOE(\hat{P}_{constr.})}{1.96}]^2}$$

F. Estimating Low-Wage Workers

The study team included information about the population of low-wage workers in the study (see chapter 2). The team defined this low-wage distinction according to a definition presented in the Brookings Institution's *Meet the Low-Wage Workforce* report (2019). Workers are considered low wage according to an hourly wage threshold. The team defined this threshold as two-thirds of the median hourly wage for men working full time/full year.[EST-2.8]

To estimate the hourly wages for individuals in the population, the study team relied on person-level data from the 2019 5-Year ACS PUMS. The ACS collects information on the number of weeks[EST-2.9] an individual worked over the previous year and the number of hours worked per week on average. The

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[EST-2.8] Based on the Brookings Institution approach, the study team considered workers to be full time/full year if they worked greater than or equal to 35 hours per week on average and at least 51 weeks during the previous year.
[EST-2.9] The ACS collects the number of weeks worked as a categorical variable, in which each value represents a range of weeks. In accordance with the Brookings Institution method, the study team used the midpoint of each range as the value for the number of weeks worked for each individual.

team used these details to approximate an hourly wage for each individual in the 2019 5-Year ACS PUMS. The team then compared these hourly wages with the low-wage worker threshold.

G. References Cited in This Appendix

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Appendix Est-3. Detailed Tables

This appendix includes additional tables with estimates related to Chapter 2 of this report. Section A of this appendix includes two tables with estimates related to the total workforce, the workforce of onsite construction, and the workforce of similar occupations. Sections B, C, and D include tables with the utilization and gap estimates for onsite construction occupations organized by geographic level.

Section A, National Workforce Estimates, include two tables with details about the total workforce, the workforce of onsite construction, and the workforce of similar occupations. The estimates in these tables are used in figure 2.2 in this report. Table Est-3.1 includes the estimated number of workers in each workforce by demographic group. Table Est-3.2 includes the estimated percentage of low-wage workers within each workforce and demographic group.

Section B, National Estimates of Utilization and Percentage Points Gaps by Onsite Construction Occupation, includes two tables at the national level. Table Est-3.3a includes the estimated percentage of women and men in onsite construction and the gap between the percentage in onsite construction and similar occupations for aggregate groups of occupations and each individual onsite construction occupation. Table Est-3.3b includes the same information for each race and ethnicity group in the study. In both tables, the MOE associated with each estimate is included in parentheses.

Section C, State Estimates of Utilization and Percentage Point Gaps for All Onsite Construction Occupations, includes tables Est-3.4a and Est-3.4b. Contents of the tables include the estimated percentage of individuals in onsite construction and the gap between the percentage in onsite construction and similar occupations by sex or by race and ethnicity for each State and the District of Columbia. In all tables, the MOE associated with each estimate is included in parentheses.

Section D, Economic Area Estimates of Utilization and Percentage Point Gaps for All Onsite Construction Occupations, also includes two tables (Est-3.5a and Est-3.5b) that parallel the tables in the State section. The tables include the estimated percentage of individuals in onsite construction and the gap between the percentage in onsite construction and similar occupations by sex or by race and ethnicity for each of the 179 EAs. In all tables, the MOE associated with each estimate is included in parentheses.

The 2019 5-Year ACS PUMS data did not include individuals for every subpopulation of interest. For example, the sample of individuals in New Mexico did not include any Asian workers in onsite construction. Therefore, the study team could not estimate the share of workers in construction and the gap for this group. The – symbol in tables Est-3.4a, Est-3.4b, Est-3.5a, and Est-3.5b indicates these cases. In other cases, the estimated number of individuals in a demographic group and specific location may be small enough that the share is estimated to be 0 percent, but the MOE is a nonzero value.

A. National Workforce Estimates

Table Est-3.1. National Number of Workers Within Each Workforce by Demographic Group, 2019

Workforce	Total workforce	Onsite construction occupation workforce	Similar occupations workforce
Men	82,155,803	6,735,929	23,785,346
Women	73,624,573	219,722	3,483,905
Asian	9,140,913	97,029	745,790
Black/African American	17,746,533	424,348	2,936,799
Indigenous	1,085,480	60,872	225,204
White	97,861,587	3,807,164	15,444,901
Multiracial/Another Race	3,296,206	109,893	458,683
Hispanic/Latino	26,649,657	2,456,345	7,457,874
Total	**155,780,376**	**6,955,651**	**27,269,251**

Table Est-3.2. National Percentage of Low-Wage Workers Within Each Workforce by Demographic Group, 2019

Demographic Group	Total workforce	Onsite construction occupation workforce	Similar occupations workforce
Men	37.1	47.3	46.8
Women	44.9	57.1	65.9
Asian	33.5	43.3	49.8
Black/African American	48.2	48.3	52.8
Indigenous	48.5	48.3	51.2
White	36.2	41.8	43.8
Multiracial/Another Race	44.9	47.1	52.2
Hispanic/Latino	54.2	56.8	59.0
Total	**40.8**	**47.6**	**49.3**

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B. National Estimates of Utilization and Percentage Point Gaps by Onsite Construction Occupation

Table Est-3.3a. National Utilization and Percentage Point Gap Estimates by Onsite Construction Occupation and by Sex, 2019

Onsite Construction Occupation*	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
All onsite construction occupations	3.29 (0.10)	8.94 (0.13)	96.71 (0.07)	-8.94 (0.11)
Craft workers	3.20 (0.12)	8.47 (0.15)	96.80 (0.09)	-8.47 (0.11)
Laborers and helpers	3.63 (0.18)	10.42 (0.21)	96.37 (0.11)	-10.42 (0.14)
6210-Boilermakers	2.70 (1.52)	7.99 (1.52)	97.30 (2.97)	-7.99 (2.98)
6220-Brickmasons, blockmasons, stonemasons, and reinforcing iron and rebar workers	0.87 (0.31)	9.59 (0.32)	99.13 (0.45)	-9.59 (0.46)
6230-Carpenters	2.13 (0.17)	8.47 (0.21)	97.87 (0.19)	-8.47 (0.24)
6240-Carpet, floor, and tile installers and finishers	2.90 (0.56)	10.34 (0.56)	97.10 (0.17)	-10.34 (0.19)
6250-Cement masons, concrete finishers, and terrazzo workers	0.91 (0.39)	10.00 (0.41)	99.09 (0.94)	-10.00 (0.94)
6260-Construction laborers	3.32 (0.16)	10.77 (0.20)	96.68 (0.07)	-10.77 (0.11)
6305-Construction equipment operators	2.32 (0.30)	7.71 (0.32)	97.68 (0.33)	-7.71 (0.34)
6330-Drywall installers, ceiling tile installers, and tapers	2.58 (0.55)	8.69 (0.56)	97.42 (0.76)	-8.69 (0.77)
6355-Electricians	2.28 (0.21)	9.83 (0.26)	97.72 (0.27)	-9.83 (0.30)
6360-Glaziers	2.06 (0.81)	8.87 (0.82)	97.94 (1.08)	-8.87 (1.09)
6400-Insulation workers	4.67 (1.31)	6.97 (1.31)	95.33 (1.55)	-6.97 (1.56)
6410-Painters and paperhangers	7.05 (0.38)	4.37 (0.39)	92.95 (0.58)	-4.37 (0.59)
6441-Pipelayers, plumbers, pipefitters, and steamfitters	2.19 (0.79)	7.60 (0.80)	97.81 (0.68)	-7.60 (0.68)
6442-Solar thermal installers and technicians	1.54 (0.18)	8.42 (0.24)	98.46 (0.32)	-8.42 (0.33)
6460-Plasterers and stucco masons	0.73 (0.57)	12.80 (0.58)	99.27 (0.29)	-12.80 (0.30)
6515-Roofers	1.78 (0.40)	13.44 (0.43)	98.22 (0.20)	-13.44 (0.22)
6520-Sheet metal workers	4.93 (0.72)	7.64 (0.73)	95.07 (1.24)	-7.64 (1.24)
6530-Structural iron and steel workers	2.71 (0.79)	8.59 (0.80)	97.29 (1.24)	-8.59 (1.25)
6540-Solar photovoltaic installers	3.25 (1.69)	8.58 (1.70)	96.75 (1.11)	-8.58 (1.11)
6600-Helpers, construction trades	5.91 (0.97)	7.81 (0.98)	94.09 (1.86)	-7.81 (1.86)
6660-Construction and building inspectors	11.34 (1.38)	10.01 (1.42)	88.66 (0.18)	-10.01 (0.30)

Onsite Construction Occupation*	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
6700-Elevator and escalator installers and repairers	1.65 (1.04)	7.84 (1.05)	98.35 (1.52)	-7.84 (1.53)
6710-Fence erectors	2.82 (1.04)	10.02 (1.04)	97.18 (0.78)	-10.02 (0.79)
6720-Hazardous materials removal workers	19.80 (2.54)	-12.79 (2.54)	80.20 (3.22)	12.79 (3.22)
6730-Highway maintenance workers	3.64 (0.75)	10.04 (0.76)	96.36 (1.07)	-10.04 (1.07)
6740-Rail-track laying and maintenance equipment operators	1.00 (1.14)	11.22 (1.15)	99.00 (1.77)	-11.22 (1.77)
6765-Other construction and related workers	3.79 (0.86)	9.12 (0.87)	96.21 (0.54)	-9.12 (0.54)

Note: Each onsite construction occupation is sorted into two categories based on the Equal Employment Opportunity-1 report: craft workers and laborers and helpers. This classification encompasses all onsite construction occupations except one occupation, construction and building inspectors, which is not assigned to either group but is included in the aggregate.

The population of women and men presented in this study is defined by self-reported data on an individual's sex in the American Community Survey (ACS) Public Use Microdata Sample data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS.

Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction.

Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.

EEO = Equal Employment Opportunity; MOE = margin of error; O*NET = Occupational Information Network

* Individual onsite construction occupations are listed according to their ACS code.

Source: IPUMS-USA

Table Est-3.3b. National Utilization and Percentage Point Gap Estimates by Onsite Construction Occupation and by Race/Ethnicity, 2019

Onsite Construction Occupation*	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
All onsite construction occupations	1.27 (0.05)	1.58 (0.07)	6.00 (0.14)	5.78 (0.18)	0.91 (0.05)	-0.08 (0.05)	54.20 (0.16)	2.36 (0.16)	1.56 (0.06)	0.08 (0.07)	36.07 (0.38)	-9.72 (0.41)
Craft workers	1.15 (0.06)	1.77 (0.07)	5.72 (0.15)	5.46 (0.19)	0.91 (0.06)	-0.10 (0.06)	56.68 (0.06)	1.97 (0.08)	1.49 (0.07)	0.16 (0.07)	34.05 (0.44)	-9.26 (0.46)
Laborers and helpers	1.68 (0.13)	0.94 (0.13)	6.94 (0.30)	5.19 (0.32)	0.91 (0.10)	-0.04 (0.10)	45.65 (0.58)	6.96 (0.59)	1.79 (0.21)	-0.16 (0.22)	43.02 (0.56)	-12.89 (0.60)
6210-Boilermakers	1.66 (1.22)	1.00 (1.22)	8.50 (2.87)	4.74 (2.87)	1.34 (1.04)	-0.53 (1.04)	66.54 (2.22)	-10.66 (2.22)	1.09 (0.73)	0.53 (0.73)	20.87 (4.07)	4.91 (4.08)
6220-Brickmasons, blockmasons, stonemasons, and reinforcing iron and rebar workers	0.67 (0.25)	2.29 (0.26)	7.14 (0.91)	2.89 (0.92)	0.91 (0.29)	-0.10 (0.29)	50.79 (1.81)	7.69 (1.81)	1.40 (0.38)	0.21 (0.38)	39.08 (1.69)	-12.97 (1.70)
6230-Carpenters	1.36 (0.12)	1.73 (0.13)	4.54 (0.25)	5.07 (0.28)	0.88 (0.09)	-0.04 (0.09)	57.43 (0.42)	3.83 (0.44)	1.60 (0.13)	0.07 (0.13)	34.20 (0.74)	-10.67 (0.77)
6240-Carpet, floor, and tile installers and finishers	1.26 (0.30)	1.54 (0.30)	3.51 (0.61)	8.28 (0.62)	0.57 (0.22)	0.27 (0.22)	46.35 (1.40)	7.44 (1.41)	1.04 (0.30)	0.60 (0.30)	47.28 (2.19)	-18.14 (2.19)
6250-Cement masons, concrete finishers, and terrazzo workers	0.08 (0.11)	2.26 (0.13)	9.93 (1.72)	1.43 (1.73)	0.77 (0.44)	0.12 (0.44)	41.63 (1.98)	12.99 (1.98)	1.68 (0.58)	-0.11 (0.58)	45.90 (2.78)	-16.69 (2.79)
6260-Construction laborers	1.75 (0.11)	0.84 (0.12)	6.63 (0.25)	5.45 (0.28)	0.89 (0.07)	-0.01 (0.08)	45.19 (0.36)	7.22 (0.37)	1.54 (0.12)	0.09 (0.13)	44.00 (0.56)	-13.59 (0.60)
6305-Construction equipment operators	0.63 (0.16)	1.90 (0.17)	6.16 (0.47)	4.77 (0.48)	1.62 (0.25)	-0.79 (0.26)	72.52 (0.87)	-14.88 (0.87)	1.26 (0.22)	0.36 (0.22)	17.80 (0.84)	8.64 (0.86)
6330-Drywall installers, ceiling tile installers, and tapers	0.39 (0.18)	2.10 (0.19)	3.10 (0.60)	8.80 (0.61)	1.47 (0.36)	-0.66 (0.36)	31.40 (1.16)	21.39 (1.16)	1.00 (0.28)	0.68 (0.28)	62.64 (2.36)	-32.30 (2.37)
6355-Electricians	1.80 (0.17)	0.96 (0.18)	7.03 (0.32)	1.60 (0.35)	0.80 (0.11)	-0.02 (0.11)	68.98 (0.68)	-3.96 (0.69)	1.79 (0.20)	-0.04 (0.21)	19.60 (0.46)	1.46 (0.50)
6360-Glaziers	1.26 (0.61)	1.09 (0.62)	3.74 (0.97)	7.71 (0.99)	0.41 (0.33)	0.48 (0.33)	66.77 (2.30)	-12.46 (2.30)	1.53 (0.73)	0.05 (0.73)	26.29 (2.77)	3.13 (2.79)
6400-Insulation workers	0.99 (0.54)	1.90 (0.54)	6.49 (1.62)	4.73 (1.62)	0.96 (0.55)	-0.10 (0.55)	47.50 (2.00)	12.02 (2.00)	1.64 (0.69)	0.01 (0.69)	42.42 (3.44)	-18.56 (3.44)
6410-Painters and paperhangers	1.21 (0.17)	1.85 (0.18)	4.90 (0.36)	7.66 (0.39)	0.53 (0.11)	0.26 (0.11)	42.56 (0.50)	14.38 (0.51)	1.54 (0.16)	0.10 (0.16)	49.26 (1.18)	-24.25 (1.20)
6441-Pipelayers, plumbers, pipefitters, and steamfitters	1.08 (0.46)	1.85 (0.46)	6.63 (1.52)	3.23 (1.52)	0.88 (0.40)	-0.10 (0.40)	59.94 (2.46)	-0.61 (2.46)	1.53 (0.60)	0.10 (0.60)	29.94 (2.59)	-4.47 (2.60)
6442-Solar thermal installers and technicians	1.14 (0.17)	1.61 (0.18)	6.77 (0.41)	1.95 (0.44)	0.78 (0.13)	0.03 (0.14)	65.75 (0.68)	-1.68 (0.68)	1.68 (0.20)	0.03 (0.21)	23.88 (0.71)	-1.93 (0.75)

Onsite Construction Occupation*	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
6460-Plasterers and stucco masons	0.14 (0.23)	2.52 (0.24)	4.01 (1.47)	8.67 (1.48)	0.26 (0.21)	0.63 (0.21)	29.60 (3.34)	23.92 (3.35)	0.94 (0.60)	0.75 (0.60)	65.05 (4.42)	-36.51 (4.42)
6515-Roofers	0.67 (0.19)	2.89 (0.20)	4.69 (0.67)	7.51 (0.69)	0.79 (0.22)	-0.05 (0.22)	38.55 (1.15)	17.06 (1.15)	1.35 (0.34)	0.27 (0.34)	53.95 (1.78)	-27.68 (1.79)
6520-Sheet metal workers	2.21 (0.45)	0.81 (0.46)	6.93 (1.09)	6.61 (1.10)	0.56 (0.18)	0.24 (0.18)	71.27 (1.06)	-14.95 (1.06)	1.80 (0.42)	-0.17 (0.42)	17.24 (1.37)	7.46 (1.38)
6530-Structural iron and steel workers	1.04 (0.39)	1.86 (0.39)	6.15 (1.38)	4.25 (1.39)	1.28 (0.48)	-0.48 (0.48)	66.55 (0.72)	-8.13 (0.73)	2.04 (0.62)	-0.45 (0.63)	22.95 (2.42)	2.94 (2.43)
6540-Solar photovoltaic installers	1.35 (1.04)	1.70 (1.04)	8.98 (3.37)	3.65 (3.38)	1.05 (0.95)	-0.26 (0.95)	56.95 (4.63)	-1.99 (4.63)	2.25 (1.29)	-0.62 (1.29)	29.43 (4.18)	-2.48 (4.18)
6600-Helpers, construction trades	1.24 (0.66)	1.68 (0.66)	8.80 (1.89)	3.18 (1.89)	1.01 (0.57)	-0.18 (0.57)	46.71 (2.48)	7.55 (2.48)	3.57 (1.55)	-1.92 (1.55)	38.67 (3.12)	-10.32 (3.12)
6660-Construction and building inspectors	2.93 (0.45)	0.02 (0.46)	7.72 (1.10)	-0.09 (1.12)	0.65 (0.27)	0.12 (0.28)	74.41 (1.24)	-4.87 (1.26)	2.09 (0.46)	-0.02 (0.47)	12.18 (1.03)	4.84 (1.07)
6700-Elevator and escalator installers and repairers	1.77 (0.78)	0.99 (0.78)	5.89 (1.87)	2.88 (1.88)	0.61 (0.46)	0.22 (0.46)	74.81 (2.29)	-10.36 (2.29)	2.02 (0.99)	-0.33 (0.99)	14.90 (2.79)	6.60 (2.80)
6710-Fence erectors	0.63 (0.44)	2.55 (0.44)	5.22 (1.73)	8.24 (1.73)	1.37 (0.72)	-0.58 (0.72)	54.14 (3.11)	1.81 (3.11)	1.68 (0.98)	-0.06 (0.99)	36.97 (4.27)	-11.95 (4.28)
6720-Hazardous materials removal workers	2.61 (1.07)	0.11 (1.07)	15.15 (2.55)	-6.71 (2.55)	0.49 (0.31)	0.34 (0.31)	50.85 (3.14)	13.46 (3.14)	2.24 (0.94)	-0.55 (0.94)	28.65 (2.74)	-6.64 (2.75)
6730-Highway maintenance workers	0.59 (0.27)	2.19 (0.28)	10.14 (1.38)	2.43 (1.39)	1.20 (0.32)	-0.32 (0.32)	73.32 (0.84)	-17.86 (0.85)	1.14 (0.39)	0.44 (0.39)	13.61 (1.36)	13.12 (1.37)
6740-Rail-track laying and maintenance equipment operators	0.59 (0.67)	2.07 (0.67)	17.13 (4.77)	-4.50 (4.78)	1.42 (1.06)	-0.51 (1.06)	63.23 (4.88)	-5.48 (4.88)	1.83 (1.48)	-0.21 (1.48)	15.80 (5.90)	8.63 (5.90)
6765-Other construction and related workers	1.52 (0.50)	1.24 (0.51)	8.71 (1.65)	3.86 (1.66)	1.19 (0.53)	-0.34 (0.53)	56.72 (2.04)	-2.78 (2.04)	2.08 (0.67)	-0.49 (0.68)	29.79 (1.96)	-1.50 (1.97)

Note: Each onsite construction occupation is sorted into two categories based on the Equal Employment Opportunity-1 report: craft workers and laborers and helpers. This classification encompasses all onsite construction occupations except one occupation, construction and building inspectors, which is not assigned to either group but is included in the aggregate.

The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the American Community Survey (ACS) Public Use Microdata Sample data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS.

Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction.

Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.

Constr. = construction; EEO = Equal Employment Opportunity; MOE = margin of error; O*NET = Occupational Information Network

* Individual onsite construction occupations are listed according to their ACS Census code.

Source: IPUMS-USA

C. State Estimates of Utilization and Percentage Point Gaps for All Onsite Construction Occupations

Table Est-3.4a. State-Level Utilization and Percentage Point Gap Estimates for All Onsite Construction Occupations by Sex, 2019

State	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
Alabama	3.93 (0.86)	9.69 (1.17)	96.07 (1.19)	-9.69 (1.24)
Alaska	3.11 (1.39)	5.18 (2.22)	96.89 (2.26)	-5.18 (2.99)
Arizona	3.24 (0.58)	7.09 (0.77)	96.76 (0.46)	-7.09 (0.77)
Arkansas	3.89 (0.98)	9.99 (1.20)	96.11 (1.06)	-9.99 (1.29)
California	2.37 (0.25)	9.73 (0.37)	97.63 (0.20)	-9.73 (0.23)
Colorado	3.51 (0.64)	6.60 (0.88)	96.49 (1.23)	-6.60 (1.43)
Connecticut	2.76 (0.68)	8.92 (1.01)	97.24 (1.48)	-8.92 (1.55)
Delaware	2.39 (1.69)	8.60 (2.20)	97.61 (2.82)	-8.60 (3.34)
District of Columbia	6.23 (6.93)	6.76 (7.75)	93.77 (6.64)	-6.76 (7.53)
Florida	3.87 (0.39)	5.92 (0.50)	96.13 (0.43)	-5.92 (0.45)
Georgia	4.16 (0.63)	9.74 (0.78)	95.84 (0.82)	-9.74 (0.91)
Hawaii	1.97 (0.92)	5.91 (1.26)	98.03 (1.74)	-5.91 (2.06)
Idaho	3.14 (1.27)	8.01 (1.71)	96.86 (0.61)	-8.01 (1.14)
Illinois	3.37 (0.45)	10.70 (0.66)	96.63 (0.37)	-10.70 (0.40)
Indiana	3.38 (0.59)	13.29 (0.90)	96.62 (1.05)	-13.29 (1.12)
Iowa	3.10 (0.77)	10.75 (1.03)	96.90 (0.93)	-10.75 (1.21)
Kansas	2.95 (0.96)	9.71 (1.34)	97.05 (0.40)	-9.71 (0.63)
Kentucky	2.80 (0.68)	12.42 (0.94)	97.20 (1.49)	-12.42 (1.67)
Louisiana	4.10 (1.01)	3.74 (1.24)	95.90 (0.61)	-3.74 (0.86)
Maine	2.65 (1.20)	6.92 (1.80)	97.35 (0.80)	-6.92 (1.10)
Maryland	2.60 (0.44)	6.31 (0.74)	97.40 (0.27)	-6.31 (0.49)
Massachusetts	2.97 (0.68)	9.00 (0.92)	97.03 (0.36)	-9.00 (0.49)
Michigan	4.12 (0.71)	11.85 (0.90)	95.88 (1.00)	-11.85 (1.00)
Minnesota	3.31 (0.75)	9.96 (1.02)	96.69 (0.64)	-9.96 (0.74)
Mississippi	5.00 (1.61)	9.14 (1.80)	95.00 (1.56)	-9.14 (1.60)
Missouri	3.33 (0.57)	9.78 (0.80)	96.67 (0.72)	-9.78 (0.84)
Montana	3.23 (1.46)	5.47 (1.84)	96.77 (1.51)	-5.47 (1.90)

State	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
Nebraska	2.85 (1.19)	10.07 (1.49)	97.15 (1.03)	-10.07 (1.42)
Nevada	3.43 (0.90)	7.77 (1.24)	96.57 (0.33)	-7.77 (0.54)
New Hampshire	2.57 (0.96)	11.91 (1.60)	97.43 (1.39)	-11.91 (1.96)
New Jersey	2.22 (0.47)	10.11 (0.73)	97.78 (0.33)	-10.11 (0.38)
New Mexico	2.82 (1.07)	5.08 (1.46)	97.18 (1.19)	-5.08 (1.89)
New York	2.72 (0.37)	6.53 (0.50)	97.28 (0.28)	-6.53 (0.48)
North Carolina	4.25 (0.60)	9.67 (0.75)	95.75 (0.43)	-9.67 (0.63)
North Dakota	4.35 (2.16)	4.80 (2.52)	95.65 (2.55)	-4.80 (2.62)
Ohio	3.66 (0.58)	11.58 (0.76)	96.34 (0.41)	-11.58 (0.53)
Oklahoma	4.01 (1.17)	5.30 (1.38)	95.99 (0.74)	-5.30 (0.86)
Oregon	3.64 (0.91)	7.58 (1.11)	96.36 (0.97)	-7.58 (1.19)
Pennsylvania	2.99 (0.55)	8.89 (0.71)	97.01 (0.46)	-8.89 (0.46)
Rhode Island	2.47 (0.95)	10.99 (1.94)	97.53 (1.74)	-10.99 (2.12)
South Carolina	4.39 (0.94)	10.56 (1.17)	95.61 (1.43)	-10.56 (1.56)
South Dakota	4.55 (2.56)	7.82 (3.14)	95.45 (1.19)	-7.82 (1.64)
Tennessee	4.20 (0.73)	11.51 (0.98)	95.80 (0.79)	-11.51 (0.84)
Texas	2.93 (0.27)	6.22 (0.38)	97.07 (0.34)	-6.22 (0.40)
Utah	3.76 (1.31)	9.46 (1.57)	96.24 (0.79)	-9.46 (1.03)
Vermont	5.54 (2.37)	6.37 (3.09)	94.46 (3.00)	-6.37 (3.33)
Virginia	3.61 (0.55)	7.91 (0.79)	96.39 (0.49)	-7.91 (0.65)
Washington	3.98 (0.62)	7.58 (0.77)	96.02 (0.63)	-7.58 (0.68)
West Virginia	3.41 (1.37)	3.85 (1.61)	96.59 (1.34)	-3.85 (1.44)
Wisconsin	3.05 (0.62)	12.11 (0.87)	96.95 (0.94)	-12.11 (1.08)
Wyoming	5.27 (2.34)	2.63 (2.73)	94.73 (2.18)	-2.63 (2.61)

Note: The population of women and men presented in this study is defined by self-reported data on an individual's sex in the American Community Survey (ACS) Public Use Microdata Sample data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS.

Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction.

Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2.

Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.

MOE = margin of error; O*NET = Occupational Information Network
Source: IPUMS-USA

State	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
Alabama	0.19 (0.15)	0.49 (0.23)	16.11 (1.43)	13.47 (1.72)	0.95 (0.46)	-0.31 (0.49)	64.86 (1.71)	-3.62 (1.82)	1.87 (1.52)	-0.69 (1.54)	16.03 (1.82)	-9.34 (1.88)
Alaska	2.63 (1.89)	3.95 (2.28)	1.03 (1.15)	2.57 (1.78)	17.00 (4.26)	-3.18 (4.64)	64.88 (6.27)	-2.29 (6.78)	7.02 (2.64)	-1.24 (3.09)	7.44 (3.18)	0.19 (3.84)
Arizona	0.37 (0.17)	1.14 (0.27)	1.68 (0.52)	2.04 (0.61)	4.32 (0.61)	-0.71 (0.67)	33.68 (1.39)	6.81 (1.62)	1.10 (0.51)	0.28 (0.58)	58.85 (1.95)	-9.55 (2.19)
Arkansas	0.25 (0.29)	0.87 (0.36)	6.15 (1.59)	8.94 (1.78)	0.45 (0.33)	0.90 (0.46)	69.78 (1.90)	-2.40 (2.11)	2.12 (0.89)	-0.51 (0.93)	21.26 (2.46)	-7.79 (2.55)
California	3.11 (0.21)	4.43 (0.29)	2.06 (0.21)	1.69 (0.28)	0.72 (0.14)	-0.02 (0.15)	27.19 (0.62)	-3.21 (0.69)	1.32 (0.15)	0.31 (0.18)	65.59 (0.70)	-3.19 (0.76)
Colorado	0.44 (0.20)	1.80 (0.34)	1.44 (0.44)	2.12 (0.57)	0.49 (0.22)	0.37 (0.27)	48.53 (1.11)	8.40 (1.38)	1.21 (0.38)	0.50 (0.47)	47.89 (2.27)	-13.18 (2.43)
Connecticut	0.54 (0.31)	1.70 (0.48)	5.43 (1.11)	3.99 (1.40)	0.05 (0.07)	0.06 (0.08)	62.23 (1.66)	-0.86 (1.92)	3.24 (1.39)	-1.21 (1.45)	28.51 (2.63)	-3.67 (2.90)
Delaware	1.56 (1.23)	-0.66 (1.29)	9.13 (3.05)	11.36 (3.59)	0.58 (0.59)	-0.11 (0.65)	64.86 (5.09)	-5.12 (5.37)	0.89 (0.85)	0.76 (1.13)	22.98 (4.26)	-6.21 (4.62)
District of Columbia	0.34 (0.62)	-0.09 (0.68)	40.62 (2.41)	24.18 (6.08)	1.12 (1.40)	-0.66 (1.52)	15.42 (8.76)	-4.60 (9.25)	1.20 (1.30)	-0.15 (1.52)	41.30 (10.34)	-18.67 (11.30)
Florida	0.45 (0.11)	0.73 (0.14)	10.19 (0.77)	4.57 (0.85)	0.21 (0.09)	0.07 (0.10)	41.77 (1.13)	2.19 (1.25)	1.39 (0.26)	-0.07 (0.29)	45.99 (1.11)	-7.49 (1.26)
Georgia	0.80 (0.22)	1.27 (0.28)	15.25 (1.35)	18.04 (1.47)	0.32 (0.18)	-0.09 (0.19)	46.16 (1.39)	-0.61 (1.51)	1.02 (0.32)	0.19 (0.35)	36.45 (1.53)	-18.80 (1.60)
Hawaii	29.23 (2.54)	3.44 (3.12)	0.93 (0.62)	1.02 (0.87)	12.64 (2.42)	-0.14 (2.63)	18.49 (2.71)	0.00 (3.13)	27.34 (3.40)	-3.80 (3.79)	11.38 (3.20)	-0.52 (3.43)
Idaho	0.53 (0.49)	0.17 (0.57)	0.12 (0.20)	0.45 (0.33)	1.35 (0.79)	-0.16 (0.86)	78.22 (3.56)	-1.27 (3.94)	1.36 (0.72)	0.33 (0.82)	18.42 (2.96)	0.47 (3.10)
Illinois	0.92 (0.27)	1.36 (0.32)	4.29 (0.49)	6.21 (0.67)	0.04 (0.04)	0.10 (0.07)	65.37 (0.36)	-8.67 (0.59)	0.85 (0.24)	0.33 (0.28)	28.54 (1.46)	0.66 (1.62)
Indiana	0.36 (0.19)	1.03 (0.30)	2.73 (0.62)	5.22 (0.80)	0.30 (0.18)	0.01 (0.20)	81.21 (1.47)	-2.17 (1.52)	0.72 (0.25)	0.66 (0.32)	14.68 (1.45)	-4.75 (1.51)
Iowa	0.24 (0.22)	1.97 (0.42)	1.41 (0.78)	2.87 (0.99)	0.15 (0.14)	0.25 (0.19)	86.40 (1.38)	-3.58 (1.53)	0.79 (0.59)	0.27 (0.65)	11.01 (1.78)	-1.77 (1.89)
Kansas	0.67 (0.55)	2.47 (0.78)	2.62 (0.85)	2.98 (1.03)	1.07 (0.49)	-0.21 (0.54)	67.03 (2.39)	1.66 (2.66)	1.21 (0.45)	0.73 (0.58)	27.39 (2.87)	-7.64 (3.00)
Kentucky	0.15 (0.12)	0.68 (0.22)	3.93 (1.02)	5.54 (1.23)	0.15 (0.25)	0.06 (0.27)	85.19 (0.83)	-3.02 (0.87)	1.69 (0.92)	-0.30 (0.96)	8.89 (1.73)	-2.97 (1.77)

State	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
Louisiana	0.91 (0.61)	0.38 (0.66)	20.68 (1.54)	9.18 (1.85)	0.70 (0.44)	0.06 (0.47)	54.71 (1.51)	3.36 (1.65)	1.35 (0.42)	-0.06 (0.48)	21.65 (2.00)	-12.92 (2.08)
Maine	0.47 (0.48)	0.68 (0.73)	0.17 (0.20)	0.70 (0.38)	0.67 (0.41)	0.01 (0.52)	96.71 (2.34)	-1.82 (2.45)	1.37 (0.72)	-0.09 (0.81)	0.61 (0.47)	0.51 (0.63)
Maryland	1.18 (0.31)	1.56 (0.47)	14.02 (1.64)	13.21 (1.97)	0.20 (0.12)	0.01 (0.15)	41.95 (1.60)	4.33 (1.77)	1.37 (0.41)	0.34 (0.48)	41.28 (1.53)	-19.45 (1.67)
Massachusetts	1.92 (0.45)	2.52 (0.60)	3.92 (0.67)	2.00 (0.83)	0.27 (0.30)	0.02 (0.32)	76.64 (1.44)	-7.70 (1.51)	2.96 (0.65)	-0.19 (0.72)	14.30 (1.68)	3.34 (1.86)
Michigan	0.11 (0.08)	1.47 (0.21)	5.01 (0.68)	8.62 (0.84)	0.73 (0.26)	-0.22 (0.28)	82.73 (1.76)	-7.69 (1.77)	1.61 (0.45)	0.18 (0.49)	9.82 (1.05)	-2.36 (1.10)
Minnesota	0.74 (0.28)	4.22 (0.48)	1.70 (0.68)	3.72 (0.95)	0.81 (0.31)	-0.26 (0.32)	86.80 (1.77)	-6.85 (1.77)	1.66 (0.60)	-0.19 (0.64)	8.28 (1.42)	-0.64 (1.55)
Mississippi	0.40 (0.61)	-0.08 (0.62)	25.72 (2.57)	16.74 (2.89)	0.51 (0.38)	-0.22 (0.39)	62.29 (2.88)	-10.42 (3.02)	0.40 (0.31)	0.33 (0.38)	10.68 (1.78)	-6.33 (1.84)
Missouri	0.44 (0.30)	0.64 (0.34)	5.32 (1.12)	4.42 (1.29)	0.74 (0.32)	-0.12 (0.35)	84.74 (1.31)	-3.57 (1.32)	1.28 (0.48)	0.32 (0.53)	7.48 (0.99)	-1.69 (1.06)
Montana	0.19 (0.37)	-0.09 (0.39)	0.49 (0.51)	-0.15 (0.56)	5.00 (1.64)	-0.83 (1.85)	88.45 (4.33)	1.83 (4.47)	1.57 (1.07)	0.40 (1.26)	4.31 (1.81)	-1.16 (2.00)
Nebraska	0.18 (0.25)	2.15 (0.52)	2.35 (1.12)	2.80 (1.37)	0.66 (0.46)	-0.04 (0.52)	71.47 (1.87)	1.19 (2.10)	1.62 (1.20)	-0.01 (1.27)	23.72 (3.86)	-6.08 (3.99)
Nevada	1.16 (0.45)	1.86 (0.67)	2.66 (0.78)	3.04 (1.11)	0.82 (0.31)	0.80 (0.44)	36.83 (2.20)	7.33 (2.73)	1.60 (0.67)	0.69 (0.81)	56.93 (4.41)	-13.71 (4.67)
New Hampshire	0.42 (0.45)	1.77 (0.74)	0.84 (0.62)	0.74 (0.79)	0.17 (0.24)	-0.01 (0.27)	93.89 (2.05)	-4.19 (2.34)	1.03 (0.64)	0.28 (0.80)	3.65 (1.25)	1.40 (1.43)
New Jersey	0.98 (0.25)	2.66 (0.41)	4.56 (0.65)	7.47 (0.89)	0.17 (0.10)	-0.06 (0.11)	56.85 (1.19)	-13.15 (1.33)	1.66 (0.42)	-0.09 (0.48)	35.78 (1.99)	3.17 (2.16)
New Mexico	–	–	0.77 (0.48)	1.01 (0.66)	9.80 (1.68)	-1.17 (1.91)	21.94 (2.53)	6.85 (2.98)	0.46 (0.34)	0.61 (0.55)	67.03 (4.24)	-7.86 (4.63)
New York	4.02 (0.48)	0.99 (0.54)	9.25 (0.52)	1.44 (0.67)	0.21 (0.11)	0.07 (0.12)	54.95 (0.82)	2.59 (0.95)	2.06 (0.28)	-0.13 (0.33)	29.51 (1.32)	-4.95 (1.44)
North Carolina	0.50 (0.21)	1.40 (0.26)	10.35 (0.95)	13.34 (1.13)	2.34 (0.43)	-0.93 (0.44)	50.91 (1.02)	3.79 (1.21)	1.09 (0.35)	0.37 (0.40)	34.81 (1.36)	-17.97 (1.44)
North Dakota	0.80 (0.72)	0.23 (1.05)	3.52 (2.69)	0.88 (2.96)	6.43 (2.69)	-3.38 (2.82)	81.54 (2.30)	2.10 (2.95)	1.20 (0.71)	1.00 (0.91)	6.49 (2.90)	-0.83 (3.05)
Ohio	0.29 (0.15)	1.02 (0.22)	5.48 (0.67)	5.49 (0.81)	0.10 (0.06)	0.10 (0.11)	86.36 (0.63)	-4.93 (0.74)	1.59 (0.41)	-0.15 (0.43)	6.19 (0.80)	-1.53 (0.83)
Oklahoma	0.29 (0.26)	1.56 (0.41)	4.23 (1.19)	1.87 (1.37)	6.89 (0.99)	0.83 (1.10)	53.70 (1.92)	7.79 (2.17)	5.34 (1.20)	0.27 (1.28)	29.55 (2.24)	-12.32 (2.35)

State	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
Oregon	0.91 (0.48)	2.14 (0.71)	0.94 (0.37)	0.37 (0.44)	1.06 (0.43)	0.38 (0.48)	72.90 (2.03)	-2.03 (2.04)	2.53 (0.61)	-0.09 (0.71)	21.67 (2.36)	-0.76 (2.50)
Pennsylvania	0.52 (0.17)	1.70 (0.25)	5.12 (0.84)	2.16 (0.92)	0.12 (0.07)	0.02 (0.09)	84.69 (0.89)	-5.53 (0.94)	1.26 (0.31)	-0.03 (0.35)	8.29 (1.35)	1.67 (1.41)
Rhode Island	0.77 (0.62)	1.71 (0.95)	3.35 (2.09)	2.36 (2.41)	0.30 (0.25)	-0.05 (0.31)	79.09 (2.12)	-14.73 (2.63)	0.98 (0.60)	0.43 (0.79)	15.51 (4.09)	10.28 (4.60)
South Carolina	0.28 (0.15)	0.68 (0.25)	16.28 (1.96)	17.60 (2.21)	0.25 (0.16)	0.07 (0.18)	57.50 (1.68)	-3.26 (1.77)	1.17 (0.57)	0.05 (0.61)	24.51 (1.76)	-15.14 (1.83)
South Dakota	0.28 (0.52)	1.89 (1.03)	1.75 (1.05)	2.60 (1.47)	3.92 (1.41)	0.41 (1.70)	84.86 (2.14)	-2.56 (2.95)	1.94 (1.30)	-0.50 (1.42)	7.25 (3.78)	-1.83 (3.97)
Tennessee	0.20 (0.15)	0.84 (0.22)	7.13 (1.14)	10.86 (1.34)	0.26 (0.15)	0.08 (0.18)	67.54 (0.48)	2.78 (0.91)	1.11 (0.40)	0.12 (0.45)	23.75 (1.67)	-14.69 (1.72)
Texas	0.52 (0.08)	1.44 (0.13)	3.93 (0.39)	7.24 (0.50)	0.18 (0.06)	0.10 (0.07)	21.38 (0.57)	8.66 (0.65)	0.53 (0.14)	0.33 (0.16)	73.47 (0.87)	-17.77 (0.95)
Utah	0.53 (0.34)	1.62 (0.48)	0.48 (0.34)	0.50 (0.42)	2.66 (0.71)	-0.17 (0.78)	62.47 (1.57)	5.12 (2.08)	1.19 (0.50)	0.59 (0.62)	32.68 (3.20)	-7.66 (3.35)
Vermont	1.41 (1.14)	1.02 (1.71)	0.72 (0.81)	0.23 (1.00)	0.40 (0.90)	-0.22 (0.93)	94.89 (1.01)	-0.81 (1.70)	1.57 (0.97)	-0.30 (1.10)	1.01 (1.02)	0.08 (1.13)
Virginia	1.71 (0.34)	0.97 (0.44)	11.57 (1.18)	9.77 (1.38)	0.27 (0.16)	0.01 (0.19)	51.35 (1.11)	5.94 (1.19)	1.31 (0.41)	0.50 (0.46)	33.80 (2.03)	-17.18 (2.14)
Washington	2.39 (0.56)	2.94 (0.69)	1.82 (0.48)	1.53 (0.58)	1.25 (0.31)	0.73 (0.40)	68.26 (1.35)	-2.68 (1.57)	3.37 (0.47)	0.38 (0.59)	22.91 (1.53)	-2.89 (1.68)
West Virginia	0.03 (0.05)	0.13 (0.11)	1.04 (0.48)	1.19 (0.71)	0.33 (0.45)	-0.21 (0.47)	96.38 (0.52)	-0.83 (1.15)	0.70 (0.38)	0.04 (0.50)	1.52 (1.03)	-0.32 (1.08)
Wisconsin	0.33 (0.18)	2.10 (0.34)	2.23 (0.88)	3.00 (1.02)	1.16 (0.45)	-0.41 (0.47)	87.58 (0.88)	-6.06 (1.00)	1.09 (0.33)	0.05 (0.37)	7.61 (1.30)	1.33 (1.37)
Wyoming	0.18 (0.17)	-0.02 (0.25)	0.53 (0.91)	0.03 (1.03)	3.31 (2.36)	-1.72 (2.50)	81.32 (3.85)	4.00 (4.39)	1.40 (2.21)	0.52 (2.38)	13.26 (3.75)	-2.80 (4.05)

Note: The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the American Community Survey (ACS) Public Use Microdata Sample data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS.

Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction.

Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2.

Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.

The – symbol indicates groups for which the survey team could not estimate the share of workers in construction and the gap.

Constr. = construction; MOE = margin of error; O*NET = Occupational Information Network

Source: IPUMS-USA

D. Economic Area Estimates of Utilization and Percentage Point Gaps for All Onsite Construction Occupations

Table Est-3.5a. Economic Area–Level Utilization and Percentage Point Gap Estimates for All Onsite Construction Occupations by Sex, 2019

Economic Area	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
1-Aberdeen, SD	1.90 (1.48)	7.15 (2.18)	98.10 (2.28)	-7.15 (2.41)
2-Abilene, TX	2.18 (1.59)	5.10 (2.27)	97.82 (2.92)	-5.10 (3.05)
3-Albany, GA	3.42 (1.34)	9.96 (1.81)	96.58 (1.37)	-9.96 (1.41)
4-Albany-Schenectady-Amsterdam, NY	2.34 (1.03)	6.66 (1.48)	97.66 (0.84)	-6.66 (0.98)
5-Albuquerque, NM	3.02 (1.44)	6.51 (2.25)	96.98 (2.42)	-6.51 (2.85)
6-Alpena, MI	4.26 (1.81)	7.37 (2.32)	95.74 (1.58)	-7.37 (1.59)
7-Amarillo, TX	2.18 (1.34)	7.13 (1.80)	97.82 (1.87)	-7.13 (2.17)
8-Anchorage, AK	3.11 (1.39)	5.18 (2.22)	96.89 (2.26)	-5.18 (2.99)
9-Appleton-Oshkosh-Neenah, WI	2.19 (1.10)	13.29 (1.68)	97.81 (1.66)	-13.29 (2.05)
10-Asheville-Brevard, NC	2.46 (1.15)	10.60 (1.83)	97.54 (1.93)	-10.60 (2.33)
11-Atlanta-Sandy Springs-Gainesville, GA-AL	4.24 (0.64)	10.14 (0.80)	95.76 (0.80)	-10.14 (0.81)
12-Augusta-Richmond County, GA-SC	2.02 (1.22)	11.88 (2.05)	97.98 (1.74)	-11.88 (2.05)
13-Austin-Round Rock, TX	2.72 (0.76)	6.25 (1.11)	97.28 (1.16)	-6.25 (1.52)
14-Bangor, ME	3.89 (2.35)	6.10 (3.08)	96.11 (1.21)	-6.10 (1.76)
15-Baton Rouge-Pierre Part, LA	4.18 (1.81)	3.68 (2.12)	95.82 (1.69)	-3.68 (1.80)
16-Beaumont-Port Arthur, TX	4.90 (1.91)	2.17 (2.34)	95.10 (1.51)	-2.17 (1.56)
17-Bend-Prineville, OR	3.42 (2.26)	5.54 (2.70)	96.58 (1.98)	-5.54 (3.06)
18-Billings, MT	3.18 (1.21)	4.42 (1.53)	96.82 (1.78)	-4.42 (2.10)
19-Birmingham-Hoover-Cullman, AL	4.20 (1.14)	8.87 (1.48)	95.80 (1.93)	-8.87 (2.05)
20-Bismarck, ND	3.21 (1.98)	3.70 (2.42)	96.79 (0.98)	-3.70 (1.19)
21-Boise City-Nampa, ID	2.77 (1.61)	7.75 (2.00)	97.23 (1.19)	-7.75 (1.76)
22-Boston-Worcester-Manchester, MA-NH	2.91 (0.43)	9.60 (0.73)	97.09 (0.85)	-9.60 (0.86)
23-Buffalo-Niagara-Cattaraugus, NY	2.98 (1.32)	8.17 (1.58)	97.02 (0.75)	-8.17 (1.58)
24-Burlington-South Burlington, VT	4.62 (2.89)	7.01 (3.74)	95.38 (2.28)	-7.01 (2.90)

Economic Area	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
25-Cape Girardeau-Jackson, MO-IL	2.01 (1.56)	9.93 (2.33)	97.99 (2.10)	-9.93 (2.35)
26-Casper, WY	5.08 (2.09)	4.19 (2.40)	94.92 (0.41)	-4.19 (0.43)
27-Cedar Rapids, IA	2.87 (1.32)	12.39 (2.00)	97.13 (2.10)	-12.39 (2.29)
28-Champaign-Urbana, IL	3.74 (1.57)	8.64 (1.96)	96.26 (2.13)	-8.64 (2.50)
29-Charleston, WV	3.53 (1.53)	3.70 (1.78)	96.47 (1.85)	-3.70 (1.86)
30-Charleston-North Charleston, SC	4.64 (1.91)	8.00 (2.49)	95.36 (3.13)	-8.00 (3.16)
31-Charlotte-Gastonia-Salisbury, NC-SC	4.80 (1.11)	10.07 (1.28)	95.20 (1.02)	-10.07 (1.15)
32-Chicago-Naperville-Michigan City, IL-IN-WI	3.22 (0.49)	11.49 (0.79)	96.78 (0.49)	-11.49 (0.52)
33-Cincinnati-Middletown-Wilmington, OH-KY-IN	2.61 (0.81)	12.77 (1.52)	97.39 (1.28)	-12.77 (1.45)
34-Clarksburg, WV + Morgantown, WV	3.34 (2.84)	2.59 (3.22)	96.66 (3.17)	-2.59 (3.30)
35-Cleveland-Akron-Elyria, OH	3.88 (0.95)	10.45 (1.12)	96.12 (0.66)	-10.45 (0.78)
36-Colorado Springs, CO	3.99 (2.17)	5.93 (2.57)	96.01 (2.64)	-5.93 (2.73)
37-Columbia, MO	4.60 (1.85)	8.19 (2.39)	95.40 (1.54)	-8.19 (2.17)
38-Columbia-Newberry, SC	5.10 (2.12)	9.73 (2.38)	94.90 (1.01)	-9.73 (1.63)
39-Columbus-Auburn-Opelika, GA-AL	3.73 (1.87)	11.09 (2.87)	96.27 (4.85)	-11.09 (4.87)
40-Columbus-Marion-Chillicothe, OH	3.81 (1.26)	10.86 (1.57)	96.19 (1.22)	-10.86 (1.52)
41-Corpus Christi-Kingsville, TX	4.10 (2.60)	2.30 (2.75)	95.90 (2.07)	-2.30 (2.10)
42-Dallas-Fort Worth, TX	2.83 (0.46)	8.22 (0.64)	97.17 (0.32)	-8.22 (0.49)
43-Davenport-Moline-Rock Island, IA-IL	4.12 (1.54)	9.67 (2.13)	95.88 (2.66)	-9.67 (2.69)
44-Dayton-Springfield-Greenville, OH	3.30 (1.19)	14.39 (1.65)	96.70 (1.74)	-14.39 (2.02)
45-Denver-Aurora-Boulder, CO	3.68 (0.72)	6.42 (1.00)	96.32 (1.09)	-6.42 (1.33)
46-Des Moines-Newton-Pella, IA	2.78 (1.07)	10.71 (1.45)	97.22 (0.59)	-10.71 (1.01)
47-Detroit-Warren-Flint, MI	4.08 (0.84)	11.11 (1.08)	95.92 (1.34)	-11.11 (1.35)
48-Dothan-Enterprise-Ozark, AL	2.78 (1.36)	12.91 (2.26)	97.22 (2.87)	-12.91 (2.97)
49-Dover, DE	2.79 (1.89)	9.62 (2.63)	97.21 (2.54)	-9.62 (2.85)
50-Duluth, MN-WI	4.89 (2.40)	5.28 (2.73)	95.11 (1.60)	-5.28 (1.99)
51-El Paso, TX	2.21 (1.06)	5.66 (1.35)	97.79 (1.03)	-5.66 (1.73)
52-Erie, PA	3.79 (2.01)	6.09 (2.61)	96.21 (2.48)	-6.09 (2.66)
53-Eugene-Springfield, OR	3.08 (1.67)	7.42 (2.38)	96.92 (0.54)	-7.42 (1.59)

Economic Area	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
54-Evansville, IN-KY	2.44 (1.03)	11.50 (1.64)	97.56 (0.94)	-11.50 (1.62)
55-Fargo-Wahpeton, ND-MN	4.91 (2.50)	7.02 (2.91)	95.09 (3.13)	-7.02 (3.45)
56-Farmington, NM	4.11 (2.12)	4.56 (2.96)	95.89 (3.43)	-4.56 (3.96)
57-Fayetteville-Springdale-Rogers, AR-MO	3.95 (1.82)	11.87 (2.25)	96.05 (1.83)	-11.87 (2.21)
58-Flagstaff, AZ	3.68 (1.81)	5.43 (2.47)	96.32 (4.40)	-5.43 (5.44)
59-Fort Smith, AR-OK	2.69 (1.80)	11.81 (2.35)	97.31 (0.71)	-11.81 (1.55)
60-Fort Wayne-Huntington-Auburn, IN	5.93 (1.92)	13.60 (2.37)	94.07 (1.71)	-13.60 (1.91)
61-Fresno-Madera, CA	3.34 (2.25)	9.11 (2.39)	96.66 (2.24)	-9.11 (2.48)
62-Gainesville, FL	2.58 (1.47)	8.01 (2.72)	97.42 (3.32)	-8.01 (3.74)
63-Grand Forks, ND-MN	4.64 (2.92)	6.84 (3.21)	95.36 (0.89)	-6.84 (1.74)
64-Grand Rapids-Muskegon-Holland, MI	4.06 (1.38)	14.84 (1.78)	95.94 (2.01)	-14.84 (2.10)
65-Great Falls, MT	2.77 (2.15)	4.45 (2.63)	97.23 (2.40)	-4.45 (3.29)
66-Greensboro--Winston-Salem--High Point, NC	3.92 (1.19)	10.52 (1.46)	96.08 (1.72)	-10.52 (1.90)
67-Greenville, NC	5.34 (2.23)	8.31 (2.94)	94.66 (2.05)	-8.31 (2.31)
68-Greenville-Spartanburg-Anderson, SC	3.67 (1.64)	14.30 (2.09)	96.33 (2.31)	-14.30 (2.48)
69-Gulfport-Biloxi-Pascagoula, MS	7.64 (3.89)	0.50 (4.18)	92.36 (3.03)	-0.50 (3.07)
70-Harrisburg-Carlisle-Lebanon, PA	3.34 (1.55)	9.67 (1.82)	96.66 (0.36)	-9.67 (0.71)
71-Harrisonburg, VA	5.35 (3.04)	7.76 (3.64)	94.65 (2.81)	-7.76 (2.83)
72-Hartford-West Hartford-Willimantic, CT	3.69 (1.06)	9.17 (1.46)	96.31 (1.14)	-9.17 (1.52)
73-Helena, MT	2.94 (1.78)	6.27 (2.58)	97.06 (1.92)	-6.27 (2.18)
74-Honolulu, HI	1.97 (0.92)	5.91 (1.26)	98.03 (1.74)	-5.91 (2.06)
75-Houston-Baytown-Huntsville, TX	2.99 (0.46)	5.01 (0.67)	97.01 (0.82)	-5.01 (0.89)
76-Huntsville-Decatur, AL	3.80 (1.78)	11.66 (2.28)	96.20 (2.24)	-11.66 (2.51)
77-Idaho Falls-Blackfoot, ID	4.51 (2.19)	6.51 (3.13)	95.49 (2.45)	-6.51 (2.52)
78-Indianapolis-Anderson-Columbus, IN	3.30 (0.75)	13.54 (1.12)	96.70 (1.17)	-13.54 (1.27)
79-Jacksonville, FL	3.34 (1.20)	6.79 (1.63)	96.66 (1.30)	-6.79 (1.54)
80-Jackson-Yazoo City, MS	3.74 (1.66)	9.67 (1.89)	96.26 (1.48)	-9.67 (1.49)
81-Johnson City-Kingsport-Bristol (Tri-Cities), TN-VA	2.27 (0.91)	8.22 (1.60)	97.73 (0.62)	-8.22 (1.21)
82-Jonesboro, AR	3.39 (2.15)	9.13 (2.68)	96.61 (2.21)	-9.13 (2.76)

Economic Area	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
83-Joplin, MO	2.71 (1.20)	9.78 (1.91)	97.29 (1.39)	-9.78 (1.41)
84-Kansas City-Overland Park-Kansas City, MO-KS	3.01 (0.70)	10.29 (1.09)	96.99 (0.64)	-10.29 (0.93)
85-Kearney, NE	3.21 (2.11)	10.79 (3.11)	96.79 (1.96)	-10.79 (2.42)
86-Kennewick-Richland-Pasco, WA	3.37 (2.52)	10.76 (2.83)	96.63 (1.26)	-10.76 (1.95)
87-Killeen-Temple-Fort Hood, TX	2.04 (1.03)	8.62 (1.69)	97.96 (1.49)	-8.62 (2.29)
88-Knoxville-Sevierville-La Follette, TN	4.16 (1.68)	9.24 (2.19)	95.84 (2.18)	-9.24 (2.54)
89-La Crosse, WI-MN	3.01 (1.52)	9.89 (2.04)	96.99 (0.61)	-9.89 (1.71)
90-Lafayette-Acadiana, LA	2.64 (1.65)	4.91 (2.42)	97.36 (1.94)	-4.91 (2.14)
91-Lake Charles-Jennings, LA	3.44 (1.43)	3.62 (2.53)	96.56 (1.79)	-3.62 (2.06)
92-Las Vegas-Paradise-Pahrump, NV	3.60 (1.18)	5.99 (1.40)	96.40 (1.49)	-5.99 (1.62)
93-Lewiston, ID-WA	3.19 (2.19)	7.99 (3.62)	96.81 (3.94)	-7.99 (4.23)
94-Lexington-Fayette--Frankfort--Richmond, KY	1.97 (0.65)	11.32 (1.20)	98.03 (1.02)	-11.32 (1.18)
95-Lincoln, NE	1.98 (1.49)	10.14 (3.26)	98.02 (3.05)	-10.14 (3.41)
96-Little Rock-North Little Rock-Pine Bluff, AR	4.11 (1.33)	8.00 (1.55)	95.89 (1.38)	-8.00 (1.68)
97-Los Angeles-Long Beach-Riverside, CA	2.21 (0.31)	10.51 (0.46)	97.79 (0.26)	-10.51 (0.39)
98-Louisville-Elizabethtown-Scottsburg, KY-IN	3.84 (1.05)	13.97 (1.55)	96.16 (2.16)	-13.97 (2.17)
99-Lubbock-Levelland, TX	3.24 (1.43)	4.99 (1.79)	96.76 (0.90)	-4.99 (1.53)
100-Macon-Warner Robins-Fort Valley, GA	4.62 (1.48)	8.37 (1.94)	95.38 (2.30)	-8.37 (2.81)
101-Madison-Baraboo, WI	4.03 (1.19)	10.39 (1.46)	95.97 (0.43)	-10.39 (0.71)
102-Marinette, WI-MI	3.93 (2.02)	6.58 (2.48)	96.07 (2.30)	-6.58 (2.62)
103-Mason City, IA	3.02 (1.86)	10.22 (3.04)	96.98 (1.78)	-10.22 (1.98)
104-McAllen-Edinburg-Pharr, TX	2.42 (1.23)	3.55 (1.54)	97.58 (0.95)	-3.55 (1.01)
105-Memphis, TN-MS-AR	4.09 (1.17)	13.35 (1.51)	95.91 (1.12)	-13.35 (1.39)
106-Miami-Fort Lauderdale-Miami Beach, FL	3.31 (0.60)	5.88 (0.80)	96.69 (0.81)	-5.88 (0.91)
107-Midland-Odessa, TX	2.42 (1.49)	2.83 (1.68)	97.58 (2.01)	-2.83 (2.12)
108-Milwaukee-Racine-Waukesha, WI	3.01 (1.21)	13.43 (1.59)	96.99 (0.83)	-13.43 (1.19)
109-Minneapolis-St. Paul-St. Cloud, MN-WI	3.12 (0.66)	10.65 (0.92)	96.88 (0.65)	-10.65 (0.78)
110-Minot, ND	4.58 (3.00)	4.03 (3.28)	95.42 (0.27)	-4.03 (1.88)
111-Missoula, MT	4.60 (3.04)	4.41 (3.97)	95.40 (2.91)	-4.41 (4.15)

Economic Area	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
112-Mobile-Daphne-Fairhope, AL	4.68 (2.38)	6.26 (2.79)	95.32 (2.95)	-6.26 (3.03)
113-Monroe-Bastrop, LA	4.79 (5.69)	6.49 (6.22)	95.21 (5.04)	-6.49 (5.32)
114-Montgomery-Alexander City, AL	1.86 (0.82)	14.99 (2.19)	98.14 (2.53)	-14.99 (2.65)
115-Myrtle Beach-Conway-Georgetown, SC	3.92 (1.45)	9.13 (1.94)	96.08 (1.19)	-9.13 (1.79)
116-Nashville-Davidson--Murfreesboro--Columbia, TN	3.75 (0.96)	11.90 (1.22)	96.25 (1.20)	-11.90 (1.35)
117-New Orleans-Metairie-Bogalusa, LA	4.72 (1.35)	2.46 (1.67)	95.28 (0.23)	-2.46 (0.97)
118-New York-Newark-Bridgeport, NY-NJ-CT-PA	2.40 (0.30)	8.22 (0.45)	97.60 (0.13)	-8.22 (0.18)
119-Oklahoma City-Shawnee, OK	3.11 (1.09)	6.62 (1.36)	96.89 (1.65)	-6.62 (1.78)
120-Omaha-Council Bluffs-Fremont, NE-IA	3.10 (1.30)	9.94 (1.64)	96.90 (1.66)	-9.94 (2.10)
121-Orlando-The Villages, FL	3.87 (0.84)	6.53 (1.08)	96.13 (0.68)	-6.53 (1.10)
122-Paducah, KY-IL	1.85 (1.80)	11.12 (2.63)	98.15 (3.03)	-11.12 (3.39)
123-Panama City-Lynn Haven, FL	4.31 (1.95)	3.51 (2.57)	95.69 (3.15)	-3.51 (3.27)
124-Pendleton-Hermiston, OR	4.12 (2.84)	8.67 (3.60)	95.88 (1.60)	-8.67 (3.05)
125-Pensacola-Ferry Pass-Brent, FL	6.61 (3.45)	2.48 (3.87)	93.39 (2.11)	-2.48 (2.30)
126-Peoria-Canton, IL	3.66 (1.08)	7.48 (1.32)	96.34 (1.37)	-7.48 (1.51)
127-Philadelphia-Camden-Vineland, PA-NJ-DE-MD	3.20 (0.86)	8.74 (1.08)	96.80 (0.71)	-8.74 (1.05)
128-Phoenix-Mesa-Scottsdale, AZ	3.53 (0.71)	7.19 (0.95)	96.47 (0.34)	-7.19 (0.57)
129-Pittsburgh-New Castle, PA	2.57 (0.80)	5.45 (1.07)	97.43 (0.64)	-5.45 (0.93)
130-Portland-Lewiston-South Portland, ME	2.80 (1.32)	6.83 (2.01)	97.20 (1.39)	-6.83 (1.88)
131-Portland-Vancouver-Beaverton, OR-WA	3.68 (0.88)	7.19 (1.13)	96.32 (1.35)	-7.19 (1.45)
132-Pueblo, CO	5.05 (2.87)	4.64 (3.26)	94.95 (2.62)	-4.64 (2.88)
133-Raleigh-Durham-Cary, NC	4.27 (1.05)	10.20 (1.32)	95.73 (0.82)	-10.20 (1.13)
134-Rapid City, SD	3.50 (2.33)	5.17 (2.80)	96.50 (0.85)	-5.17 (1.08)
135-Redding, CA	2.65 (1.84)	5.51 (2.40)	97.35 (2.03)	-5.51 (2.59)
136-Reno-Sparks, NV	3.54 (1.67)	8.27 (2.19)	96.46 (2.42)	-8.27 (2.59)
137-Richmond, VA	3.18 (1.04)	8.10 (1.58)	96.82 (1.46)	-8.10 (1.57)
138-Roanoke, VA	4.32 (1.77)	8.19 (2.14)	95.68 (0.78)	-8.19 (1.56)
139-Rochester-Batavia-Seneca Falls, NY	2.96 (0.91)	9.50 (1.28)	97.04 (1.12)	-9.50 (1.59)
140-Sacramento--Arden-Arcade--Truckee, CA-NV	2.88 (1.12)	6.67 (1.43)	97.12 (0.24)	-6.67 (0.56)

Economic Area	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
141-Salina, KS	1.66 (1.16)	6.23 (2.03)	98.34 (1.22)	-6.23 (2.48)
142-Salt Lake City-Ogden-Clearfield, UT	3.79 (1.16)	9.67 (1.46)	96.21 (1.33)	-9.67 (1.50)
143-San Angelo, TX	1.79 (1.15)	4.69 (1.70)	98.21 (1.34)	-4.69 (1.39)
144-San Antonio, TX	2.82 (0.75)	5.24 (1.10)	97.18 (0.74)	-5.24 (1.09)
145-San Diego-Carlsbad-San Marcos, CA	2.41 (0.68)	8.78 (1.27)	97.59 (0.78)	-8.78 (1.24)
146-San Jose-San Francisco-Oakland, CA	2.35 (0.48)	8.93 (0.63)	97.65 (0.41)	-8.93 (0.68)
147-Santa Fe-Espanola, NM	3.63 (3.43)	6.06 (4.38)	96.37 (2.87)	-6.06 (4.47)
148-Sarasota-Bradenton-Venice, FL	3.99 (1.25)	4.44 (1.54)	96.01 (1.06)	-4.44 (1.25)
149-Savannah-Hinesville-Fort Stewart, GA	3.20 (1.10)	8.71 (1.56)	96.80 (2.04)	-8.71 (2.51)
150-Scotts Bluff, NE	7.08 (5.60)	1.97 (6.09)	92.92 (3.65)	-1.97 (4.27)
151-Scranton--Wilkes-Barre, PA	2.40 (1.82)	11.49 (2.38)	97.60 (2.13)	-11.49 (2.47)
152-Seattle-Tacoma-Olympia, WA	4.17 (0.69)	7.34 (0.90)	95.83 (0.82)	-7.34 (0.83)
153-Shreveport-Bossier City-Minden, LA	2.97 (1.57)	5.70 (2.24)	97.03 (2.95)	-5.70 (3.55)
154-Sioux City-Vermillion, IA-NE-SD	4.20 (1.85)	10.61 (2.28)	95.80 (0.82)	-10.61 (0.98)
155-Sioux Falls, SD	4.69 (2.84)	9.44 (3.32)	95.31 (2.38)	-9.44 (2.44)
156-South Bend-Mishawaka, IN-MI	5.74 (1.91)	13.59 (2.17)	94.26 (1.66)	-13.59 (1.92)
157-Spokane, WA	3.34 (1.51)	7.99 (2.15)	96.66 (0.42)	-7.99 (0.98)
158-Springfield, IL	3.35 (1.49)	6.85 (1.82)	96.65 (2.19)	-6.85 (2.23)
159-Springfield, MO	4.84 (1.80)	8.00 (2.15)	95.16 (0.66)	-8.00 (0.80)
160-St. Louis-St. Charles-Farmington, MO-IL	2.42 (0.60)	10.04 (0.99)	97.58 (1.64)	-10.04 (1.72)
161-State College, PA	2.40 (0.90)	6.92 (1.32)	97.60 (1.02)	-6.92 (1.34)
162-Syracuse-Auburn, NY	3.33 (1.14)	6.37 (1.38)	96.67 (0.89)	-6.37 (1.18)
163-Tallahassee, FL	3.87 (1.80)	7.28 (2.61)	96.13 (1.36)	-7.28 (1.47)
164-Tampa-St. Petersburg-Clearwater, FL	4.51 (1.13)	6.83 (1.46)	95.49 (0.84)	-6.83 (0.97)
165-Texarkana, TX-Texarkana, AR	2.44 (1.41)	8.70 (2.01)	97.56 (3.12)	-8.70 (3.59)
166-Toledo-Fremont, OH	4.26 (2.10)	14.31 (2.49)	95.74 (1.32)	-14.31 (1.39)
167-Topeka, KS	2.22 (0.84)	9.19 (1.84)	97.78 (1.10)	-9.19 (1.27)
168-Traverse City, MI	3.67 (1.56)	10.09 (2.13)	96.33 (1.21)	-10.09 (1.25)
169-Tucson, AZ	2.19 (1.27)	6.03 (1.69)	97.81 (0.71)	-6.03 (1.65)

Economic Area	Women		Men	
	Construction (MOE)	Gap (MOE)	Construction (MOE)	Gap (MOE)
170-Tulsa-Bartlesville, OK	4.93 (2.15)	4.20 (2.28)	95.07 (2.00)	-4.20 (2.14)
171-Tupelo, MS	4.92 (1.96)	11.27 (2.55)	95.08 (3.03)	-11.27 (3.46)
172-Twin Falls, ID	1.19 (1.15)	9.68 (2.21)	98.81 (2.27)	-9.68 (2.29)
173-Virginia Beach-Norfolk-Newport News, VA-NC	4.13 (0.86)	8.52 (1.22)	95.87 (2.18)	-8.52 (2.44)
174-Washington-Baltimore-Northern Virginia, DC-MD-VA-WV	3.04 (0.42)	6.35 (0.62)	96.96 (0.32)	-6.35 (0.57)
175-Waterloo-Cedar Falls, IA	2.57 (1.22)	11.01 (2.22)	97.43 (1.72)	-11.01 (2.13)
176-Wausau-Merrill, WI	3.25 (1.21)	9.46 (1.57)	96.75 (1.69)	-9.46 (1.87)
177-Wenatchee, WA	2.87 (1.77)	9.24 (2.33)	97.13 (2.27)	-9.24 (2.28)
178-Wichita Falls, TX	3.83 (2.27)	4.19 (2.50)	96.17 (2.45)	-4.19 (2.77)
179-Wichita-Winfield, KS	3.54 (1.43)	9.57 (1.86)	96.46 (0.79)	-9.57 (0.79)

Note: The population of women and men presented in this study is defined by self-reported data on an individual's sex in the ACS PUMS data. This study uses the term "women" to refer to individuals who identified as female in the ACS and "men" to refer to individuals who identified as male in the ACS.

Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction.

Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2.

Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.

MOE = margin of error; O*NET = Occupational Information Network

Source: IPUMS-USA

Table Est-3.5b. Economic Area–Level Utilization and Percentage Point Gap Estimates for All Onsite Construction Occupations by Race/Ethnicity, 2019

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
1-Aberdeen, SD	0.65 (1.20)	0.53 (1.79)	4.11 (4.54)	-0.06 (4.79)	7.84 (2.78)	-1.30 (3.18)	82.31 (1.97)	-1.77 (2.86)	1.04 (1.24)	0.75 (1.37)	4.05 (2.72)	1.85 (3.00)
2-Abilene, TX	–	–	1.59 (1.48)	2.55 (2.10)	–	–	49.12 (4.20)	9.51 (5.17)	0.94 (1.32)	-0.20 (1.38)	48.35 (8.72)	-12.24 (9.31)
3-Albany, GA	0.21 (0.26)	-0.07 (0.28)	19.08 (3.45)	16.71 (3.98)	0.25 (0.26)	-0.07 (0.30)	67.19 (5.19)	-12.87 (5.41)	0.30 (0.26)	0.41 (0.38)	12.96 (2.51)	-4.11 (2.65)
4-Albany-Schenectady-Amsterdam, NY	1.03 (0.61)	0.38 (0.76)	2.14 (0.85)	0.28 (0.97)	0.18 (0.20)	0.00 (0.24)	92.00 (1.57)	-0.77 (1.88)	1.40 (0.79)	0.30 (0.88)	3.25 (1.29)	-0.19 (1.39)
5-Albuquerque, NM	–	–	0.91 (0.80)	0.83 (1.08)	15.27 (2.77)	-2.81 (3.16)	19.53 (3.07)	6.77 (3.61)	0.51 (0.52)	0.64 (0.83)	63.79 (5.82)	-6.39 (6.40)
6-Alpena, MI	–	–	0.08 (0.19)	0.01 (0.22)	1.18 (0.88)	-0.44 (0.93)	95.75 (0.97)	-0.35 (1.83)	0.93 (0.67)	1.04 (1.05)	2.06 (1.83)	-0.37 (1.90)
7-Amarillo, TX	0.05 (0.10)	2.09 (0.67)	1.25 (1.03)	2.88 (1.39)	0.54 (0.50)	0.22 (0.69)	40.23 (4.65)	-2.14 (4.81)	0.90 (0.67)	0.19 (0.86)	57.02 (3.65)	-3.23 (4.01)
8-Anchorage, AK	2.63 (1.89)	3.95 (2.28)	1.03 (1.15)	2.57 (1.78)	17.00 (4.26)	-3.18 (4.64)	64.88 (6.27)	-2.29 (6.78)	7.02 (2.64)	-1.24 (3.09)	7.44 (3.18)	0.19 (3.84)
9-Appleton-Oshkosh-Neenah, WI	0.39 (0.41)	1.49 (0.66)	2.72 (2.84)	-1.23 (2.89)	1.78 (0.85)	-0.77 (0.89)	90.57 (2.75)	-2.83 (2.86)	0.79 (0.64)	0.49 (0.78)	3.74 (1.86)	2.85 (2.12)
10-Asheville-Brevard, NC	0.06 (0.11)	0.79 (0.47)	2.10 (1.74)	1.00 (1.97)	1.53 (1.44)	-0.20 (1.52)	81.29 (4.10)	3.93 (4.29)	0.70 (0.53)	0.21 (0.61)	14.32 (3.11)	-5.73 (3.42)
11-Atlanta-Sandy Springs-Gainesville, GA-AL	0.79 (0.23)	1.44 (0.30)	12.16 (1.30)	17.08 (1.42)	0.48 (0.23)	-0.20 (0.24)	46.98 (1.71)	1.60 (1.79)	1.05 (0.36)	0.16 (0.40)	38.54 (1.71)	-20.07 (1.79)
12-Augusta-Richmond County, GA-SC	0.67 (0.75)	-0.06 (0.82)	27.85 (5.11)	18.41 (5.60)	0.04 (0.07)	0.23 (0.19)	54.93 (3.03)	-9.36 (3.56)	1.37 (1.26)	-0.21 (1.34)	15.15 (3.74)	-9.02 (3.85)
13-Austin-Round Rock, TX	0.18 (0.16)	1.52 (0.43)	2.33 (0.76)	5.31 (1.08)	0.13 (0.15)	0.20 (0.21)	27.73 (1.91)	11.50 (2.21)	1.01 (0.95)	0.13 (1.01)	68.62 (3.33)	-18.65 (3.64)
14-Bangor, ME	–	–	0.23 (0.40)	0.16 (0.51)	0.76 (0.44)	0.02 (0.51)	96.29 (2.84)	0.42 (2.93)	1.76 (1.24)	-0.86 (1.30)	0.96 (0.89)	0.18 (1.08)
15-Baton Rouge-Pierre Part, LA	1.40 (1.83)	-0.43 (1.88)	25.55 (3.62)	13.21 (4.43)	0.45 (0.44)	0.37 (0.60)	56.01 (4.91)	-4.08 (5.14)	0.27 (0.33)	0.88 (0.73)	16.32 (3.31)	-9.96 (3.45)
16-Beaumont-Port Arthur, TX	0.78 (0.61)	0.76 (0.78)	14.90 (4.42)	6.68 (4.84)	0.72 (0.92)	-0.28 (0.98)	48.16 (4.41)	8.02 (4.78)	0.07 (0.12)	0.50 (0.40)	35.37 (5.02)	-15.67 (5.29)
17-Bend-Prineville, OR	–	–	0.36 (0.71)	-0.24 (0.73)	1.54 (0.89)	0.86 (1.13)	80.95 (6.46)	-7.14 (7.37)	1.43 (1.18)	0.23 (1.50)	15.72 (6.01)	5.78 (6.64)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
18-Billings, MT	0.41 (0.51)	-0.22 (0.53)	1.58 (1.67)	-0.11 (1.79)	5.40 (1.55)	-1.55 (1.72)	81.89 (3.74)	3.63 (3.94)	1.50 (1.04)	0.30 (1.17)	9.22 (2.82)	-2.05 (2.98)
19-Birmingham-Hoover-Cullman, AL	0.12 (0.16)	0.26 (0.24)	17.55 (3.01)	12.25 (3.29)	0.43 (0.43)	-0.25 (0.45)	66.54 (3.54)	-3.51 (3.68)	0.67 (0.37)	0.24 (0.46)	14.69 (2.32)	-8.98 (2.39)
20-Bismarck, ND	0.51 (0.94)	-0.27 (0.97)	3.77 (3.65)	-0.93 (3.87)	3.12 (1.70)	-0.38 (1.95)	86.14 (2.84)	-0.77 (2.91)	1.80 (1.71)	0.04 (1.83)	4.66 (2.03)	2.30 (2.37)
21-Boise City-Nampa, ID	0.54 (0.50)	0.02 (0.59)	0.09 (0.22)	0.59 (0.46)	0.86 (1.00)	0.23 (1.06)	73.67 (4.20)	-1.33 (4.79)	1.47 (0.95)	0.50 (1.10)	23.38 (4.86)	-0.01 (5.01)
22-Boston-Worcester-Manchester, MA-NH	1.62 (0.35)	2.10 (0.49)	3.27 (0.52)	1.60 (0.61)	0.29 (0.24)	-0.02 (0.26)	80.22 (1.34)	-6.60 (1.51)	2.50 (0.49)	-0.13 (0.54)	12.10 (1.08)	3.05 (1.23)
23-Buffalo-Niagara-Cattaraugus, NY	0.43 (0.35)	0.76 (0.52)	3.60 (1.11)	2.38 (1.54)	0.88 (0.62)	-0.33 (0.66)	91.96 (2.19)	-3.40 (2.19)	0.67 (0.44)	0.39 (0.55)	2.46 (1.14)	0.20 (1.24)
24-Burlington-South Burlington, VT	1.90 (1.52)	1.07 (2.21)	0.47 (0.88)	0.56 (1.13)	–	–	94.92 (2.96)	-1.60 (3.23)	1.97 (1.28)	-0.51 (1.44)	0.75 (0.82)	0.38 (1.02)
25-Cape Girardeau-Jackson, MO-IL	0.10 (0.19)	0.01 (0.22)	1.26 (0.92)	2.21 (1.20)	–	–	95.31 (2.82)	-2.80 (2.91)	0.75 (1.00)	0.12 (1.10)	2.58 (1.16)	0.40 (1.38)
26-Casper, WY	0.29 (0.29)	-0.11 (0.31)	0.44 (0.76)	0.07 (0.85)	2.88 (2.03)	-1.46 (2.13)	80.64 (2.26)	3.00 (2.80)	0.79 (0.63)	0.78 (0.90)	14.96 (3.83)	-2.28 (4.17)
27-Cedar Rapids, IA	0.51 (0.65)	0.91 (0.78)	2.30 (1.92)	2.85 (2.36)	0.04 (0.07)	0.29 (0.26)	85.57 (3.42)	-3.80 (3.43)	0.41 (0.35)	0.71 (0.87)	11.16 (3.90)	-0.95 (4.12)
28-Champaign-Urbana, IL	0.13 (0.23)	0.58 (0.52)	1.68 (1.28)	2.31 (1.52)	–	–	94.67 (0.13)	-4.34 (0.88)	1.47 (0.99)	-0.27 (1.08)	2.04 (1.17)	1.58 (1.40)
29-Charleston, WV	0.03 (0.05)	0.10 (0.13)	0.96 (0.56)	0.58 (0.72)	0.40 (0.56)	-0.08 (0.60)	96.40 (1.63)	-0.08 (1.97)	1.56 (1.10)	-0.86 (1.15)	0.65 (0.38)	0.34 (0.50)
30-Charleston-North Charleston, SC	0.62 (0.44)	0.36 (0.58)	22.76 (3.62)	18.94 (4.34)	0.06 (0.14)	0.45 (0.34)	49.96 (5.23)	-2.84 (5.47)	2.30 (2.17)	-0.95 (2.20)	24.31 (3.74)	-15.97 (3.90)
31-Charlotte-Gastonia-Salisbury, NC-SC	0.51 (0.32)	1.95 (0.48)	8.36 (1.46)	14.54 (1.77)	0.46 (0.32)	-0.15 (0.33)	52.23 (1.51)	5.34 (1.73)	1.12 (0.50)	0.20 (0.59)	37.32 (2.50)	-21.88 (2.58)
32-Chicago-Naperville-Michigan City, IL-IN-WI	1.06 (0.30)	1.53 (0.37)	4.78 (0.56)	6.98 (0.74)	0.11 (0.18)	0.05 (0.20)	58.70 (0.94)	-9.83 (1.22)	0.88 (0.28)	0.26 (0.33)	34.47 (1.67)	1.00 (1.83)
33-Cincinnati-Middletown-Wilmington, OH-KY-IN	0.28 (0.34)	1.34 (0.56)	4.27 (1.34)	7.46 (1.81)	0.12 (0.12)	0.30 (0.47)	86.28 (1.73)	-5.44 (1.81)	1.10 (0.56)	0.00 (0.63)	7.95 (1.93)	-3.67 (1.98)
34-Clarksburg, WV + Morgantown, WV	–	–	0.35 (0.59)	1.42 (1.09)	1.06 (1.71)	-0.77 (1.77)	97.58 (2.72)	-1.55 (3.03)	0.40 (0.65)	0.36 (0.82)	0.61 (0.55)	0.54 (0.73)
35-Cleveland-Akron-Elyria, OH	0.25 (0.26)	0.86 (0.35)	6.20 (1.02)	3.53 (1.15)	0.11 (0.12)	-0.01 (0.13)	88.00 (0.94)	-5.24 (1.00)	0.99 (0.38)	0.46 (0.45)	4.45 (0.98)	0.40 (1.04)
36-Colorado Springs, CO	0.74 (0.74)	0.92 (1.02)	2.17 (1.34)	2.40 (1.74)	0.67 (0.72)	0.30 (0.82)	60.51 (3.21)	4.29 (3.25)	1.63 (1.16)	0.82 (1.37)	34.27 (5.23)	-8.73 (5.60)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
37-Columbia, MO	0.69 (0.84)	0.10 (0.93)	2.72 (1.60)	2.09 (1.88)	1.09 (0.98)	-0.64 (1.02)	91.16 (2.43)	-3.06 (2.74)	1.46 (0.96)	0.13 (1.08)	2.88 (1.49)	1.39 (1.72)
38-Columbia-Newberry, SC	0.03 (0.06)	0.56 (0.31)	25.74 (3.67)	18.98 (4.17)	0.08 (0.11)	0.19 (0.19)	54.45 (2.46)	-7.97 (2.54)	1.25 (0.77)	0.06 (0.82)	18.45 (3.85)	-11.84 (3.95)
39-Columbus-Auburn-Opelika, GA-AL	–	–	24.83 (6.43)	23.78 (7.19)	0.48 (0.63)	-0.36 (0.63)	61.63 (6.86)	-18.61 (7.23)	1.95 (1.21)	-0.84 (1.29)	11.11 (3.78)	-4.57 (4.16)
40-Columbus-Marion-Chillicothe, OH	0.25 (0.28)	1.33 (0.44)	4.11 (1.31)	6.69 (1.68)	0.10 (0.12)	0.13 (0.17)	85.82 (1.53)	-4.10 (1.77)	2.38 (0.90)	-0.83 (0.95)	7.35 (1.86)	-3.21 (1.93)
41-Corpus Christi-Kingsville, TX	0.05 (0.12)	0.28 (0.22)	1.88 (1.71)	0.26 (1.81)	0.18 (0.27)	-0.04 (0.31)	11.94 (1.91)	4.67 (2.43)	0.41 (0.37)	0.08 (0.46)	85.54 (5.05)	-5.24 (5.46)
42-Dallas-Fort Worth, TX	0.54 (0.14)	1.79 (0.25)	3.38 (0.51)	10.12 (0.73)	0.52 (0.18)	0.24 (0.21)	27.57 (0.85)	10.71 (1.02)	0.88 (0.27)	0.43 (0.31)	67.10 (1.56)	-23.29 (1.68)
43-Davenport-Moline-Rock Island, IA-IL	0.26 (0.29)	1.01 (0.58)	0.12 (0.20)	4.59 (1.10)	0.12 (0.24)	0.13 (0.32)	91.88 (2.51)	-8.94 (2.60)	0.86 (0.71)	0.29 (0.87)	6.76 (2.46)	2.91 (2.74)
44-Dayton-Springfield-Greenville, OH	0.26 (0.33)	0.46 (0.39)	4.54 (1.86)	3.60 (2.04)	0.00 (0.01)	0.13 (0.08)	89.39 (1.77)	-2.70 (2.22)	0.64 (0.56)	0.54 (0.64)	5.18 (2.64)	-2.03 (2.68)
45-Denver-Aurora-Boulder, CO	0.39 (0.19)	1.84 (0.35)	1.14 (0.43)	2.13 (0.58)	0.46 (0.22)	0.38 (0.29)	48.77 (1.56)	8.50 (1.87)	1.21 (0.44)	0.35 (0.53)	48.03 (2.42)	-13.19 (2.57)
46-Des Moines-Newton-Pella, IA	0.10 (0.21)	3.02 (0.67)	0.92 (0.97)	2.63 (1.31)	0.10 (0.07)	0.22 (0.19)	83.98 (1.90)	-2.53 (2.01)	1.13 (1.10)	-0.15 (1.15)	13.77 (2.45)	-3.19 (2.65)
47-Detroit-Warren-Flint, MI	0.11 (0.11)	1.26 (0.22)	6.46 (0.95)	11.48 (1.19)	0.43 (0.29)	-0.09 (0.31)	81.31 (2.18)	-8.89 (2.21)	1.61 (0.63)	0.02 (0.67)	10.09 (1.39)	-3.78 (1.44)
48-Dothan-Enterprise-Ozark, AL	0.27 (0.58)	0.05 (0.60)	24.20 (5.91)	15.19 (6.39)	0.81 (0.69)	-0.54 (0.71)	62.61 (4.45)	-8.44 (5.02)	2.16 (1.22)	-0.98 (1.27)	9.94 (4.08)	-5.27 (4.18)
49-Dover, DE	1.50 (1.05)	-0.57 (1.12)	10.39 (3.09)	13.17 (4.15)	0.26 (0.35)	0.15 (0.46)	69.48 (4.91)	-7.24 (5.20)	1.32 (0.95)	0.27 (1.17)	17.05 (4.27)	-5.78 (4.51)
50-Duluth, MN-WI	0.06 (0.07)	0.48 (0.34)	0.29 (0.59)	0.05 (0.66)	3.13 (1.26)	-1.31 (1.34)	94.00 (1.15)	0.60 (1.52)	1.37 (1.41)	0.18 (1.54)	1.15 (0.53)	0.00 (0.71)
51-El Paso, TX	0.08 (0.14)	0.19 (0.25)	0.76 (0.71)	1.68 (1.00)	0.59 (0.43)	0.15 (0.53)	15.07 (3.05)	1.29 (3.31)	0.21 (0.22)	-0.01 (0.26)	83.30 (2.87)	-3.30 (3.10)
52-Erie, PA	–	–	0.89 (1.01)	1.35 (1.33)	0.55 (0.66)	-0.30 (0.70)	96.25 (2.29)	-3.13 (2.68)	1.15 (1.19)	0.26 (1.37)	1.17 (1.42)	0.67 (1.60)
53-Eugene-Springfield, OR	0.34 (0.46)	-0.04 (0.51)	0.11 (0.35)	0.97 (0.56)	1.11 (0.86)	0.37 (0.99)	84.13 (1.15)	-1.93 (1.94)	3.24 (1.39)	-0.86 (1.55)	11.09 (3.71)	1.49 (4.01)
54-Evansville, IN-KY	0.04 (0.07)	0.40 (0.18)	1.24 (0.74)	2.77 (0.99)	0.21 (0.36)	-0.04 (0.40)	94.33 (2.11)	-2.41 (2.14)	0.99 (1.14)	-0.13 (1.18)	3.19 (1.71)	-0.59 (1.78)
55-Fargo-Wahpeton, ND-MN	1.12 (0.95)	0.44 (1.32)	1.68 (1.71)	2.05 (2.05)	5.89 (2.88)	-3.69 (2.96)	83.90 (2.69)	2.54 (3.14)	1.51 (0.87)	0.50 (1.11)	5.89 (3.20)	-1.84 (3.35)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
56-Farmington, NM	–	–	0.30 (0.49)	-0.14 (0.53)	31.17 (5.64)	0.86 (6.63)	46.55 (6.46)	-3.24 (7.06)	0.36 (0.53)	1.11 (1.20)	21.62 (6.41)	1.10 (7.15)
57-Fayetteville-Springdale-Rogers, AR-MO	0.03 (0.07)	1.49 (0.44)	0.25 (0.27)	0.52 (0.41)	7.29 (1.78)	1.53 (2.03)	66.31 (4.01)	-1.88 (4.59)	2.61 (1.03)	1.05 (1.24)	23.50 (4.01)	-2.71 (4.39)
58-Flagstaff, AZ	–	–	1.20 (2.10)	-0.74 (2.17)	22.12 (3.60)	-9.08 (3.93)	65.17 (8.07)	7.68 (8.76)	0.47 (0.61)	0.03 (0.69)	11.04 (4.86)	1.56 (5.32)
59-Fort Smith, AR-OK	0.96 (1.25)	1.30 (1.48)	2.50 (2.02)	1.52 (2.25)	11.08 (3.17)	-2.24 (3.37)	62.32 (6.60)	2.10 (6.99)	6.86 (1.79)	-1.10 (1.94)	16.28 (4.58)	-1.60 (4.79)
60-Fort Wayne-Huntington-Auburn, IN	0.21 (0.27)	1.32 (0.56)	1.17 (0.80)	2.84 (1.09)	0.45 (0.51)	-0.22 (0.52)	85.61 (3.26)	-0.48 (3.33)	1.77 (0.92)	-0.28 (1.01)	10.78 (3.22)	-3.17 (3.35)
61-Fresno-Madera, CA	1.85 (1.11)	3.48 (1.38)	0.71 (0.48)	0.96 (0.61)	1.80 (1.57)	-1.15 (1.59)	34.89 (2.71)	-10.40 (2.96)	1.13 (0.73)	0.22 (0.82)	59.63 (4.25)	6.89 (4.34)
62-Gainesville, FL	0.87 (0.84)	-0.11 (0.93)	14.34 (4.74)	0.83 (5.53)	0.06 (0.11)	0.03 (0.14)	77.12 (7.76)	-2.74 (8.28)	0.53 (0.56)	0.84 (0.87)	7.10 (2.45)	1.15 (2.93)
63-Grand Forks, ND-MN	1.56 (1.32)	-0.91 (1.36)	0.91 (1.36)	1.43 (1.67)	6.99 (2.67)	-3.73 (2.76)	81.18 (2.41)	6.08 (2.84)	1.88 (1.29)	0.40 (1.49)	7.48 (4.37)	-3.28 (4.50)
64-Grand Rapids-Muskegon-Holland, MI	0.16 (0.16)	2.33 (0.52)	2.82 (1.07)	4.00 (1.32)	0.50 (0.33)	-0.10 (0.39)	82.84 (2.70)	-5.91 (2.90)	1.42 (0.91)	0.56 (1.04)	12.26 (2.46)	-0.88 (2.60)
65-Great Falls, MT	–	–	1.01 (1.15)	-0.71 (1.18)	8.83 (3.69)	-1.77 (4.09)	83.52 (4.10)	3.70 (4.33)	1.56 (1.41)	0.71 (1.86)	5.08 (2.73)	-1.93 (3.09)
66-Greensboro--Winston-Salem--High Point, NC	0.45 (0.31)	1.29 (0.48)	8.16 (1.93)	11.38 (2.29)	0.59 (0.44)	-0.25 (0.46)	57.71 (2.83)	4.51 (3.08)	1.82 (1.28)	-0.45 (1.33)	31.27 (3.18)	-16.48 (3.29)
67-Greenville, NC	0.01 (0.03)	0.59 (0.39)	17.30 (5.25)	11.77 (5.81)	0.38 (0.47)	-0.16 (0.50)	63.02 (6.21)	-6.64 (6.41)	0.44 (0.37)	1.28 (0.77)	18.84 (3.98)	-6.83 (4.24)
68-Greenville-Spartanburg-Anderson, SC	0.08 (0.14)	1.25 (0.44)	8.97 (2.21)	16.54 (2.73)	0.40 (0.32)	-0.19 (0.33)	64.91 (4.69)	-3.27 (4.69)	0.71 (0.45)	0.57 (0.61)	24.94 (3.15)	-14.90 (3.23)
69-Gulfport-Biloxi-Pascagoula, MS	1.35 (2.73)	0.04 (2.84)	12.64 (3.94)	5.58 (4.95)	0.04 (0.16)	0.07 (0.20)	67.50 (6.95)	3.30 (7.35)	1.04 (1.13)	0.78 (1.54)	17.43 (4.26)	-9.76 (4.58)
70-Harrisburg-Carlisle-Lebanon, PA	0.18 (0.13)	1.56 (0.52)	1.55 (0.72)	3.48 (0.96)	0.15 (0.15)	-0.02 (0.18)	92.82 (1.52)	-8.87 (1.66)	0.92 (0.47)	-0.05 (0.55)	4.39 (1.23)	3.90 (1.50)
71-Harrisonburg, VA	0.28 (0.43)	-0.03 (0.47)	1.02 (0.79)	2.39 (1.21)	0.78 (1.25)	-0.44 (1.29)	87.57 (2.98)	-0.49 (3.35)	0.67 (0.71)	0.21 (0.87)	9.67 (3.04)	-1.64 (3.39)
72-Hartford-West Hartford-Willimantic, CT	1.12 (0.61)	1.44 (0.80)	5.20 (1.64)	2.34 (1.88)	0.09 (0.11)	0.02 (0.13)	77.06 (2.29)	-7.50 (2.56)	1.80 (1.29)	-0.18 (1.33)	14.73 (3.36)	3.88 (3.63)
73-Helena, MT	0.48 (0.93)	-0.29 (0.98)	0.07 (0.15)	0.08 (0.22)	1.30 (0.78)	1.25 (1.36)	94.49 (0.99)	-2.75 (1.62)	0.91 (1.17)	0.74 (1.48)	2.75 (1.88)	0.96 (2.38)
74-Honolulu, HI	29.23 (2.54)	3.44 (3.12)	0.93 (0.62)	1.02 (0.87)	12.64 (2.42)	-0.14 (2.63)	18.49 (2.71)	0.00 (3.13)	27.34 (3.40)	-3.80 (3.79)	11.38 (3.20)	-0.52 (3.43)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
75-Houston-Baytown-Huntsville, TX	0.85 (0.19)	1.72 (0.31)	5.80 (0.93)	8.34 (1.13)	0.09 (0.06)	0.10 (0.10)	18.36 (1.01)	7.96 (1.20)	0.35 (0.11)	0.42 (0.17)	74.55 (1.41)	-18.53 (1.46)
76-Huntsville-Decatur, AL	0.13 (0.22)	0.41 (0.40)	6.70 (2.14)	8.25 (2.58)	0.68 (0.57)	0.21 (0.69)	68.35 (2.43)	3.24 (2.52)	1.00 (0.77)	0.56 (0.99)	23.15 (4.33)	-12.67 (4.44)
77-Idaho Falls-Blackfoot, ID	1.07 (1.41)	-0.54 (1.45)	–	–	3.23 (2.07)	-1.83 (2.15)	82.23 (2.93)	1.74 (2.96)	0.80 (0.78)	0.50 (1.00)	12.68 (4.34)	-0.16 (4.57)
78-Indianapolis-Anderson-Columbus, IN	0.48 (0.31)	1.18 (0.46)	2.34 (0.67)	5.55 (0.98)	0.24 (0.19)	0.05 (0.22)	81.87 (1.45)	-1.40 (1.48)	0.69 (0.37)	0.73 (0.45)	14.39 (1.71)	-6.11 (1.81)
79-Jacksonville, FL	0.87 (0.65)	1.10 (0.78)	13.75 (2.53)	8.57 (2.94)	0.22 (0.22)	0.22 (0.33)	64.51 (3.60)	-3.43 (3.71)	1.36 (0.77)	0.12 (0.89)	19.29 (3.05)	-6.58 (3.19)
80-Jackson-Yazoo City, MS	0.09 (0.10)	0.03 (0.15)	31.85 (3.12)	16.65 (3.58)	0.92 (0.58)	-0.39 (0.60)	60.42 (2.41)	-12.53 (2.53)	0.33 (0.35)	0.14 (0.39)	6.39 (1.47)	-3.90 (1.51)
81-Johnson City-Kingsport-Bristol (Tri-Cities), TN-VA	–	–	1.04 (0.77)	0.65 (0.86)	0.23 (0.27)	-0.11 (0.29)	92.81 (2.14)	1.53 (2.42)	1.59 (1.76)	-1.03 (1.78)	4.33 (1.42)	-1.22 (1.53)
82-Jonesboro, AR	0.03 (0.08)	0.06 (0.15)	5.61 (2.44)	15.65 (3.22)	–	–	81.83 (6.06)	-8.91 (6.33)	3.45 (2.11)	-1.93 (2.16)	9.08 (4.03)	-5.09 (4.16)
83-Joplin, MO	0.20 (0.36)	0.54 (0.44)	0.65 (0.98)	0.55 (1.05)	5.83 (1.68)	-1.22 (1.80)	83.16 (4.35)	-0.60 (4.56)	2.05 (1.06)	1.54 (1.25)	8.11 (2.39)	-0.80 (2.64)
84-Kansas City-Overland Park-Kansas City, MO-KS	0.54 (0.54)	1.22 (0.71)	4.03 (1.23)	5.03 (1.48)	0.85 (0.45)	-0.14 (0.50)	75.04 (1.41)	0.30 (1.58)	1.47 (0.70)	0.46 (0.80)	18.08 (2.26)	-6.86 (2.37)
85-Kearney, NE	0.66 (1.23)	-0.36 (1.30)	0.07 (0.20)	2.63 (1.02)	–	–	71.84 (4.06)	3.87 (4.27)	0.97 (1.12)	0.78 (1.35)	26.46 (7.05)	-7.11 (7.53)
86-Kennewick-Richland-Pasco, WA	1.15 (1.18)	0.09 (1.27)	0.30 (0.40)	0.47 (0.59)	1.71 (1.57)	-0.76 (1.61)	59.56 (2.69)	-13.90 (4.11)	1.26 (0.91)	0.59 (1.17)	36.01 (7.36)	13.51 (7.60)
87-Killeen-Temple-Fort Hood, TX	0.53 (0.62)	0.66 (0.74)	5.28 (2.08)	7.87 (2.44)	0.24 (0.32)	0.62 (0.48)	43.09 (2.86)	5.35 (3.28)	0.64 (0.42)	0.64 (0.60)	50.21 (4.30)	-15.13 (4.59)
88-Knoxville-Sevierville-La Follette, TN	–	–	1.43 (0.98)	2.93 (1.32)	0.40 (0.41)	-0.04 (0.44)	82.41 (3.41)	5.74 (3.56)	0.52 (0.59)	0.27 (0.67)	15.25 (2.65)	-9.31 (2.71)
89-La Crosse, WI-MN	0.08 (0.30)	1.52 (0.82)	0.36 (0.51)	0.67 (0.79)	0.31 (0.36)	0.46 (0.73)	96.58 (1.16)	-4.28 (1.56)	0.55 (0.60)	-0.04 (0.69)	2.11 (1.52)	1.66 (1.77)
90-Lafayette-Acadiana, LA	1.30 (1.85)	-0.23 (1.90)	17.63 (4.15)	4.31 (4.49)	0.53 (0.36)	-0.18 (0.42)	65.13 (5.93)	4.29 (6.44)	0.91 (0.87)	0.34 (1.03)	14.49 (3.13)	-8.53 (3.25)
91-Lake Charles-Jennings, LA	–	–	14.09 (4.95)	2.98 (5.48)	1.69 (1.62)	-0.86 (1.78)	75.40 (4.24)	-1.13 (4.92)	1.97 (1.86)	-0.52 (1.97)	6.86 (2.72)	-0.93 (3.10)
92-Las Vegas-Paradise-Pahrump, NV	1.25 (0.49)	1.42 (0.67)	2.82 (0.83)	2.84 (1.19)	1.67 (0.67)	0.07 (0.75)	38.65 (2.32)	9.38 (2.68)	1.59 (0.70)	0.49 (0.84)	54.02 (4.64)	-14.20 (4.83)
93-Lewiston, ID-WA	0.78 (1.09)	0.55 (1.63)	–	–	0.60 (0.70)	0.44 (0.96)	89.10 (7.28)	-6.32 (7.43)	2.90 (2.20)	-0.51 (2.60)	6.61 (5.90)	5.50 (6.22)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
94-Lexington-Fayette--Frankfort--Richmond, KY	0.20 (0.21)	0.32 (0.34)	3.02 (1.33)	2.44 (1.59)	0.12 (0.29)	0.08 (0.33)	87.33 (1.44)	0.35 (1.58)	1.82 (1.21)	-0.49 (1.28)	7.52 (2.00)	-2.70 (2.10)
95-Lincoln, NE	0.25 (0.49)	3.28 (1.20)	1.29 (1.33)	2.15 (2.07)	0.95 (1.58)	-0.12 (1.77)	80.45 (3.19)	0.77 (4.39)	3.23 (4.90)	-1.58 (5.04)	13.83 (5.75)	-4.51 (6.12)
96-Little Rock-North Little Rock-Pine Bluff, AR	0.02 (0.03)	0.51 (0.21)	8.87 (2.51)	10.73 (2.75)	0.27 (0.25)	0.23 (0.35)	74.39 (3.24)	-4.27 (3.50)	2.30 (1.29)	-1.06 (1.33)	14.15 (2.12)	-6.14 (2.22)
97-Los Angeles-Long Beach-Riverside, CA	2.51 (0.23)	2.92 (0.34)	2.00 (0.25)	1.68 (0.34)	0.47 (0.14)	-0.05 (0.15)	21.12 (0.75)	-2.70 (0.85)	0.90 (0.16)	0.25 (0.20)	73.00 (0.91)	-2.10 (0.97)
98-Louisville-Elizabethtown-Scottsburg, KY-IN	0.29 (0.25)	0.35 (0.30)	4.17 (1.48)	6.61 (1.81)	0.20 (0.38)	0.08 (0.41)	83.03 (1.79)	-2.66 (2.07)	1.77 (1.39)	-0.55 (1.44)	10.55 (2.95)	-3.82 (2.99)
99-Lubbock-Levelland, TX	–	–	2.34 (1.28)	1.10 (1.47)	0.30 (0.33)	0.05 (0.38)	35.65 (4.08)	-0.24 (4.32)	0.94 (0.77)	-0.16 (0.86)	60.77 (4.57)	-1.31 (4.94)
100-Macon-Warner Robins-Fort Valley, GA	0.10 (0.18)	0.15 (0.24)	23.75 (4.35)	18.72 (4.72)	0.01 (0.03)	0.06 (0.09)	62.84 (4.07)	-12.22 (4.40)	0.67 (0.63)	-0.25 (0.66)	12.63 (3.18)	-6.45 (3.28)
101-Madison-Baraboo, WI	0.41 (0.37)	0.32 (0.46)	0.51 (0.41)	1.42 (0.60)	0.91 (0.53)	-0.09 (0.57)	94.24 (1.40)	-4.10 (1.62)	1.03 (0.56)	-0.13 (0.63)	2.91 (1.33)	2.59 (1.49)
102-Marinette, WI-MI	–	–	0.27 (0.48)	0.63 (1.16)	4.58 (2.68)	-1.63 (2.81)	92.60 (2.14)	-0.14 (2.75)	1.90 (1.32)	0.05 (1.47)	0.65 (1.03)	0.50 (1.12)
103-Mason City, IA	0.44 (1.08)	0.15 (1.15)	0.20 (0.51)	0.66 (0.80)	–	–	94.89 (3.20)	-1.10 (3.24)	0.23 (0.38)	0.22 (0.50)	4.24 (2.38)	0.03 (2.83)
104-McAllen-Edinburg-Pharr, TX	–	–	0.36 (0.50)	0.34 (0.58)	0.13 (0.20)	0.00 (0.22)	1.76 (0.73)	2.40 (0.93)	0.03 (0.07)	0.14 (0.18)	97.73 (1.67)	-3.07 (1.92)
105-Memphis, TN-MS-AR	0.23 (0.22)	0.35 (0.29)	17.80 (2.41)	21.57 (2.75)	0.11 (0.16)	0.03 (0.18)	62.89 (1.47)	-10.47 (1.76)	1.23 (0.56)	-0.28 (0.63)	17.73 (2.37)	-11.21 (2.43)
106-Miami-Fort Lauderdale-Miami Beach, FL	0.31 (0.15)	0.43 (0.21)	13.02 (1.72)	4.48 (1.87)	0.11 (0.07)	-0.01 (0.08)	21.60 (1.46)	-0.06 (1.67)	1.01 (0.42)	-0.07 (0.45)	63.95 (1.30)	-4.75 (1.58)
107-Midland-Odessa, TX	–	–	2.18 (0.90)	0.60 (1.06)	1.12 (0.80)	-0.54 (0.84)	25.39 (3.34)	6.23 (3.64)	0.43 (0.46)	-0.04 (0.53)	70.88 (5.13)	-6.72 (5.54)
108-Milwaukee-Racine-Waukesha, WI	0.27 (0.22)	2.64 (0.53)	3.54 (1.57)	6.10 (1.87)	0.38 (0.31)	0.34 (0.39)	82.65 (2.24)	-9.35 (2.30)	0.98 (0.57)	0.00 (0.63)	12.18 (2.84)	0.27 (2.93)
109-Minneapolis-St. Paul-St. Cloud, MN-WI	0.60 (0.25)	3.96 (0.43)	1.53 (0.62)	3.26 (0.84)	1.02 (0.28)	-0.33 (0.30)	87.76 (1.42)	-6.25 (1.46)	1.51 (0.51)	-0.04 (0.54)	7.58 (1.27)	-0.61 (1.37)
110-Minot, ND	1.34 (1.21)	-1.03 (1.23)	4.43 (4.00)	-0.24 (4.26)	6.88 (3.06)	-3.49 (3.23)	77.17 (2.95)	5.31 (3.76)	1.42 (1.17)	1.13 (1.40)	8.76 (4.90)	-1.68 (5.08)
111-Missoula, MT	–	–	1.00 (1.40)	-0.60 (1.42)	4.11 (2.01)	-0.64 (2.35)	93.69 (4.94)	-1.60 (5.30)	0.57 (0.65)	1.79 (1.55)	0.63 (0.70)	1.02 (1.41)
112-Mobile-Daphne-Fairhope, AL	0.33 (0.55)	1.04 (0.75)	20.55 (4.10)	13.37 (4.56)	2.32 (1.90)	-0.85 (1.99)	62.02 (4.59)	-4.78 (4.92)	4.98 (7.50)	-3.59 (7.58)	9.80 (3.96)	-5.20 (4.08)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
113-Monroe-Bastrop, LA	–	–	20.80 (7.83)	13.07 (8.59)	0.90 (0.82)	-0.19 (0.88)	68.64 (4.84)	-7.36 (5.34)	0.43 (0.61)	0.48 (0.72)	9.23 (5.44)	-6.34 (5.50)
114-Montgomery-Alexander City, AL	0.16 (0.37)	0.28 (0.46)	24.85 (4.38)	20.10 (4.73)	0.27 (0.32)	-0.02 (0.39)	63.04 (6.28)	-14.00 (6.76)	1.24 (0.86)	-0.33 (0.93)	10.44 (3.54)	-6.03 (3.62)
115-Myrtle Beach-Conway-Georgetown, SC	0.58 (0.69)	-0.18 (0.74)	15.12 (3.18)	18.80 (3.75)	2.83 (1.31)	-1.61 (1.35)	59.92 (1.09)	-5.57 (1.89)	0.99 (0.61)	0.11 (0.72)	20.56 (3.72)	-11.54 (3.83)
116-Nashville-Davidson--Murfreesboro--Columbia, TN	0.24 (0.25)	1.33 (0.39)	5.64 (1.22)	7.04 (1.50)	0.19 (0.16)	0.24 (0.22)	66.87 (0.68)	6.67 (0.88)	0.81 (0.34)	0.80 (0.47)	26.24 (2.39)	-16.08 (2.47)
117-New Orleans-Metairie-Bogalusa, LA	0.72 (0.38)	1.11 (0.55)	17.48 (1.83)	9.95 (2.34)	0.88 (0.90)	0.19 (0.98)	48.93 (3.07)	6.23 (3.41)	1.83 (0.78)	-0.44 (0.86)	30.15 (3.38)	-17.04 (3.57)
118-New York-Newark-Bridgeport, NY-NJ-CT-PA	3.46 (0.39)	1.72 (0.44)	8.77 (0.46)	3.80 (0.63)	0.13 (0.08)	0.00 (0.09)	46.13 (0.76)	-4.42 (0.85)	2.29 (0.30)	-0.39 (0.35)	39.22 (1.31)	-0.71 (1.42)
119-Oklahoma City-Shawnee, OK	0.37 (0.35)	1.66 (0.54)	4.37 (1.43)	1.23 (1.63)	3.97 (0.90)	0.40 (1.01)	53.73 (2.49)	3.52 (2.73)	3.58 (0.89)	0.30 (1.02)	33.98 (3.06)	-7.13 (3.15)
120-Omaha-Council Bluffs-Fremont, NE-IA	–	–	2.24 (1.24)	2.40 (1.43)	0.47 (0.31)	0.17 (0.39)	76.76 (1.90)	-0.27 (2.20)	1.15 (0.61)	0.18 (0.71)	19.37 (3.71)	-4.36 (3.87)
121-Orlando-The Villages, FL	0.51 (0.23)	0.71 (0.31)	8.20 (1.18)	4.30 (1.41)	0.30 (0.24)	0.14 (0.29)	48.33 (2.29)	1.50 (2.49)	1.95 (0.67)	-0.30 (0.74)	40.72 (2.66)	-6.35 (2.87)
122-Paducah, KY-IL	–	–	2.50 (1.41)	5.08 (2.26)	–	–	93.50 (4.03)	-5.71 (4.18)	0.31 (0.44)	0.56 (0.57)	3.69 (2.34)	-0.39 (2.49)
123-Panama City-Lynn Haven, FL	0.22 (0.28)	0.50 (0.63)	11.00 (5.46)	2.96 (5.90)	0.18 (0.21)	0.37 (0.53)	74.14 (2.48)	1.19 (3.63)	1.92 (1.84)	-0.46 (2.01)	12.54 (4.81)	-4.56 (5.05)
124-Pendleton-Hermiston, OR	–	–	0.46 (0.62)	-0.14 (0.69)	6.17 (5.02)	-2.21 (5.21)	79.82 (5.06)	-11.71 (6.02)	1.45 (1.28)	0.11 (1.75)	12.10 (5.87)	13.60 (6.60)
125-Pensacola-Ferry Pass-Brent, FL	0.33 (0.39)	1.22 (0.75)	10.54 (3.97)	2.54 (4.28)	0.30 (0.40)	0.16 (0.50)	72.06 (4.20)	1.52 (4.45)	1.13 (0.77)	1.25 (1.02)	15.64 (4.33)	-6.70 (4.56)
126-Peoria-Canton, IL	0.51 (0.51)	0.46 (0.59)	1.79 (0.98)	2.03 (1.27)	0.03 (0.09)	0.17 (0.19)	92.41 (2.35)	-3.41 (2.47)	0.53 (0.35)	0.19 (0.46)	4.73 (1.28)	0.57 (1.49)
127-Philadelphia-Camden-Vineland, PA-NJ-DE-MD	1.22 (0.40)	2.60 (0.54)	8.41 (1.28)	6.36 (1.55)	0.21 (0.15)	-0.04 (0.16)	71.72 (1.22)	-9.00 (1.40)	1.82 (0.64)	-0.01 (0.71)	16.62 (2.54)	0.09 (2.67)
128-Phoenix-Mesa-Scottsdale, AZ	0.34 (0.16)	1.23 (0.30)	1.59 (0.53)	2.54 (0.64)	5.82 (0.78)	-1.02 (0.87)	32.79 (1.57)	7.00 (1.81)	1.14 (0.62)	0.32 (0.71)	58.33 (2.30)	-10.06 (2.62)
129-Pittsburgh-New Castle, PA	0.15 (0.12)	0.43 (0.22)	3.66 (1.39)	0.71 (1.55)	0.09 (0.11)	0.06 (0.14)	93.56 (1.29)	-1.25 (1.31)	0.98 (0.52)	0.14 (0.60)	1.56 (0.67)	-0.09 (0.72)
130-Portland-Lewiston-South Portland, ME	0.54 (0.55)	0.85 (0.88)	0.20 (0.23)	0.83 (0.45)	0.49 (0.48)	-0.03 (0.60)	97.08 (2.32)	-2.50 (2.37)	1.10 (0.82)	0.29 (0.94)	0.59 (0.51)	0.56 (0.72)
131-Portland-Vancouver-Beaverton, OR-WA	1.12 (0.53)	3.01 (0.83)	1.13 (0.41)	0.29 (0.50)	0.87 (0.33)	0.42 (0.39)	70.31 (2.32)	-1.08 (2.36)	2.91 (0.79)	-0.19 (0.89)	23.65 (2.19)	-2.46 (2.38)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
132-Pueblo, CO	–	–	1.37 (1.56)	0.85 (1.84)	0.04 (0.09)	1.46 (0.87)	59.14 (2.83)	-2.17 (2.90)	0.35 (0.33)	1.11 (0.86)	39.11 (6.15)	-1.34 (6.74)
133-Raleigh-Durham-Cary, NC	0.48 (0.32)	0.77 (0.39)	13.97 (1.89)	18.60 (2.21)	4.93 (0.81)	-1.95 (0.85)	41.98 (1.97)	1.48 (2.21)	0.86 (0.38)	0.63 (0.49)	37.78 (2.01)	-19.53 (2.14)
134-Rapid City, SD	0.04 (0.10)	0.07 (0.19)	2.39 (2.39)	0.72 (2.61)	4.80 (1.98)	0.15 (2.30)	78.69 (5.66)	0.65 (5.98)	2.44 (2.19)	-1.03 (2.28)	11.64 (5.83)	-0.55 (6.15)
135-Redding, CA	0.36 (0.48)	1.00 (0.86)	–	–	3.52 (2.12)	-1.31 (2.23)	80.60 (3.96)	-11.75 (4.89)	0.89 (0.66)	0.47 (0.83)	14.63 (4.26)	10.96 (4.57)
136-Reno-Sparks, NV	0.63 (0.50)	0.93 (0.73)	0.13 (0.19)	1.31 (0.50)	1.39 (0.54)	1.10 (0.71)	61.49 (4.06)	2.34 (4.55)	0.48 (0.32)	1.23 (0.67)	35.87 (4.89)	-6.91 (5.35)
137-Richmond, VA	0.55 (0.29)	0.92 (0.48)	15.47 (3.03)	16.54 (3.40)	0.54 (0.55)	-0.20 (0.58)	60.76 (2.63)	-6.32 (2.91)	1.05 (0.54)	0.43 (0.72)	21.64 (2.27)	-11.39 (2.46)
138-Roanoke, VA	0.71 (0.79)	-0.04 (0.85)	5.81 (2.00)	4.36 (2.40)	0.16 (0.19)	0.03 (0.23)	85.52 (2.74)	-1.11 (2.82)	0.97 (0.99)	0.12 (1.11)	6.84 (2.46)	-3.36 (2.56)
139-Rochester-Batavia-Seneca Falls, NY	0.80 (0.72)	0.82 (0.80)	3.34 (1.16)	1.78 (1.55)	0.12 (0.16)	0.06 (0.22)	89.02 (1.48)	-2.62 (1.59)	1.57 (1.22)	-0.20 (1.30)	5.16 (1.70)	0.16 (1.87)
140-Sacramento--Arden-Arcade--Truckee, CA-NV	2.43 (0.72)	4.82 (1.03)	2.49 (1.15)	1.31 (1.37)	1.54 (0.69)	0.25 (0.76)	55.68 (2.46)	-3.26 (2.79)	2.24 (0.58)	0.66 (0.78)	35.61 (2.54)	-3.78 (2.77)
141-Salina, KS	–	–	2.98 (2.33)	-0.59 (2.82)	–	–	87.44 (3.81)	0.25 (3.98)	0.44 (0.79)	0.86 (1.07)	9.14 (6.32)	-1.39 (6.58)
142-Salt Lake City-Ogden-Clearfield, UT	0.35 (0.22)	1.79 (0.41)	0.49 (0.34)	0.49 (0.43)	2.87 (0.70)	-0.31 (0.79)	63.10 (2.02)	4.66 (2.46)	1.22 (0.51)	0.58 (0.63)	31.98 (3.12)	-7.21 (3.27)
143-San Angelo, TX	–	–	0.55 (0.79)	1.16 (1.07)	0.41 (0.66)	-0.22 (0.69)	44.75 (3.55)	6.16 (4.53)	0.28 (0.32)	0.27 (0.45)	54.02 (8.32)	-7.58 (8.85)
144-San Antonio, TX	0.15 (0.22)	0.50 (0.33)	0.90 (0.34)	3.39 (0.62)	0.07 (0.08)	0.10 (0.12)	19.27 (1.41)	6.31 (1.78)	0.46 (0.23)	0.53 (0.33)	79.15 (3.03)	-10.84 (3.29)
145-San Diego-Carlsbad-San Marcos, CA	2.08 (0.61)	5.18 (1.00)	2.96 (0.93)	1.21 (1.21)	1.04 (0.64)	0.20 (0.74)	33.88 (2.31)	-1.46 (2.78)	1.16 (0.42)	0.85 (0.60)	58.88 (3.52)	-5.98 (3.65)
146-San Jose-San Francisco-Oakland, CA	5.18 (0.63)	7.05 (0.80)	1.78 (0.35)	2.02 (0.47)	0.97 (0.20)	0.10 (0.24)	33.17 (1.14)	-2.37 (1.31)	2.00 (0.39)	0.26 (0.45)	56.90 (1.76)	-7.06 (1.83)
147-Santa Fe-Espanola, NM	–	–	1.31 (1.44)	0.73 (2.06)	2.58 (1.49)	1.53 (2.55)	22.57 (4.04)	6.18 (5.36)	0.26 (0.34)	1.73 (1.69)	73.28 (8.46)	-10.26 (9.18)
148-Sarasota-Bradenton-Venice, FL	0.17 (0.21)	0.41 (0.31)	3.82 (0.88)	3.13 (1.15)	0.08 (0.12)	0.07 (0.15)	48.37 (3.59)	4.30 (4.13)	1.28 (0.77)	-0.42 (0.82)	46.29 (3.46)	-7.49 (3.78)
149-Savannah-Hinesville-Fort Stewart, GA	0.28 (0.34)	0.25 (0.42)	24.35 (3.99)	15.98 (4.33)	0.07 (0.11)	0.36 (0.22)	54.06 (3.39)	-5.59 (3.74)	0.90 (0.63)	0.07 (0.70)	20.34 (3.24)	-11.09 (3.35)
150-Scotts Bluff, NE	0.21 (0.28)	-0.11 (0.33)	2.27 (3.55)	-0.88 (3.69)	3.85 (5.17)	-2.22 (5.36)	78.18 (1.68)	7.89 (3.30)	0.20 (0.35)	0.89 (1.11)	15.30 (8.50)	-5.56 (8.86)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
151-Scranton--Wilkes-Barre, PA	0.09 (0.17)	1.05 (0.49)	1.96 (1.93)	0.33 (2.03)	0.13 (0.34)	-0.05 (0.35)	91.85 (1.77)	-9.35 (2.24)	0.41 (0.47)	0.67 (0.66)	5.55 (3.13)	7.34 (3.56)
152-Seattle-Tacoma-Olympia, WA	2.92 (0.73)	3.60 (0.90)	2.21 (0.60)	2.13 (0.74)	1.10 (0.35)	1.09 (0.47)	66.82 (1.67)	-0.93 (1.88)	3.82 (0.63)	0.48 (0.77)	23.12 (1.93)	-6.37 (2.06)
153-Shreveport-Bossier City-Minden, LA	–	–	26.59 (5.51)	8.04 (5.83)	0.43 (0.41)	0.55 (0.57)	60.41 (4.89)	-2.01 (5.40)	1.84 (1.75)	-0.37 (1.86)	10.73 (2.35)	-6.69 (2.44)
154-Sioux City-Vermillion, IA-NE-SD	0.28 (0.40)	1.80 (0.62)	1.11 (1.15)	0.84 (1.28)	0.90 (0.50)	0.01 (0.57)	80.27 (3.17)	-3.25 (3.37)	0.74 (0.52)	0.58 (0.68)	16.71 (4.03)	0.02 (4.21)
155-Sioux Falls, SD	0.27 (0.49)	2.12 (0.93)	1.20 (0.85)	2.64 (1.25)	3.13 (1.33)	0.19 (1.56)	86.24 (1.49)	-4.58 (2.20)	0.78 (0.64)	0.39 (0.79)	8.38 (3.56)	-0.76 (3.79)
156-South Bend-Mishawaka, IN-MI	0.30 (0.30)	0.23 (0.36)	2.84 (1.36)	2.08 (1.57)	0.52 (0.32)	-0.22 (0.35)	85.03 (2.61)	-4.36 (2.68)	1.05 (0.66)	0.69 (0.80)	10.25 (2.52)	1.58 (2.68)
157-Spokane, WA	0.48 (0.36)	1.11 (0.70)	0.50 (0.51)	-0.02 (0.59)	1.67 (0.99)	0.48 (1.18)	89.10 (2.89)	-4.14 (3.04)	1.58 (0.76)	1.18 (1.04)	6.66 (2.62)	1.39 (2.86)
158-Springfield, IL	0.17 (0.28)	0.21 (0.36)	1.66 (1.03)	1.89 (1.26)	0.04 (0.13)	0.13 (0.20)	95.72 (1.64)	-3.19 (1.92)	0.73 (0.47)	0.45 (0.65)	1.66 (0.99)	0.52 (1.08)
159-Springfield, MO	0.13 (0.27)	1.07 (0.57)	0.63 (0.80)	0.74 (0.96)	0.73 (0.73)	0.31 (0.84)	90.40 (2.06)	-1.58 (2.09)	1.12 (0.76)	0.22 (0.86)	7.00 (1.69)	-0.76 (1.94)
160-St. Louis-St. Charles-Farmington, MO-IL	0.45 (0.41)	0.35 (0.46)	6.26 (1.72)	5.31 (1.98)	0.04 (0.05)	0.11 (0.09)	88.18 (1.22)	-5.66 (1.33)	0.83 (0.43)	0.60 (0.50)	4.25 (1.24)	-0.72 (1.31)
161-State College, PA	–	–	0.79 (0.71)	-0.02 (0.81)	–	–	97.91 (0.94)	-0.85 (1.02)	0.37 (0.37)	0.11 (0.43)	0.93 (0.81)	0.30 (0.89)
162-Syracuse-Auburn, NY	0.55 (0.41)	0.95 (0.54)	2.36 (0.78)	0.52 (0.91)	0.20 (0.17)	0.47 (0.32)	93.28 (1.34)	-1.65 (1.39)	1.28 (0.52)	-0.03 (0.60)	2.32 (0.79)	-0.25 (0.88)
163-Tallahassee, FL	0.34 (0.51)	0.13 (0.64)	22.50 (3.71)	7.95 (4.68)	0.22 (0.30)	0.06 (0.43)	63.60 (4.29)	-5.52 (4.34)	1.57 (1.38)	-0.59 (1.47)	11.76 (2.64)	-2.04 (2.88)
164-Tampa-St. Petersburg-Clearwater, FL	0.60 (0.29)	1.17 (0.43)	7.87 (1.65)	4.15 (1.96)	0.47 (0.47)	-0.16 (0.49)	49.82 (1.77)	3.20 (2.01)	1.52 (0.57)	-0.13 (0.63)	39.71 (3.38)	-8.21 (3.66)
165-Texarkana, TX-Texarkana, AR	0.91 (1.19)	-0.25 (1.23)	2.83 (1.49)	7.73 (2.24)	3.14 (1.44)	0.37 (1.59)	76.57 (4.41)	-5.18 (5.21)	6.08 (2.37)	-2.13 (2.45)	10.48 (2.41)	-0.54 (2.69)
166-Toledo-Fremont, OH	0.23 (0.44)	0.37 (0.53)	3.39 (2.09)	5.31 (2.50)	0.04 (0.09)	0.12 (0.16)	86.37 (1.75)	-3.94 (1.81)	2.28 (2.62)	-0.93 (2.66)	7.68 (1.95)	-0.93 (2.07)
167-Topeka, KS	–	–	2.47 (1.22)	1.83 (1.52)	2.18 (1.28)	-1.07 (1.34)	80.54 (1.56)	-0.93 (1.86)	1.75 (1.22)	-0.16 (1.34)	13.06 (4.99)	-0.54 (5.27)
168-Traverse City, MI	–	–	0.35 (0.62)	0.46 (0.76)	1.69 (0.99)	-0.87 (1.07)	93.93 (0.77)	-2.16 (1.39)	1.44 (1.05)	0.50 (1.18)	2.59 (1.66)	1.75 (1.81)
169-Tucson, AZ	0.40 (0.52)	1.36 (0.83)	1.93 (1.96)	0.38 (2.10)	1.61 (0.69)	0.14 (0.82)	29.67 (3.80)	7.76 (4.33)	1.03 (0.53)	0.20 (0.69)	65.36 (3.81)	-9.83 (4.21)

Economic Area	Asian		Black/African American		Indigenous		White		Multiracial/ Another Race		Hispanic/Latino	
	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)	Constr. (MOE)	Gap (MOE)
170-Tulsa-Bartlesville, OK	0.07 (0.09)	1.49 (0.38)	3.29 (1.38)	1.88 (1.52)	9.95 (1.77)	1.19 (1.93)	53.35 (2.98)	9.02 (3.28)	7.31 (2.29)	-0.45 (2.41)	26.04 (2.97)	-13.12 (3.08)
171-Tupelo, MS	0.12 (0.23)	-0.01 (0.25)	20.33 (5.71)	13.80 (6.01)	0.16 (0.27)	-0.06 (0.28)	73.69 (2.37)	-12.73 (2.65)	0.63 (0.55)	0.01 (0.69)	5.08 (2.37)	-1.01 (2.47)
172-Twin Falls, ID	–	–	0.42 (1.07)	0.23 (1.23)	0.11 (0.27)	0.40 (0.42)	75.09 (7.01)	-10.09 (7.63)	2.84 (3.27)	-1.82 (3.37)	21.54 (6.06)	10.37 (6.79)
173-Virginia Beach-Norfolk-Newport News, VA-NC	1.19 (0.43)	1.13 (0.63)	24.31 (2.85)	10.82 (3.22)	0.43 (0.28)	0.08 (0.34)	56.66 (2.17)	-5.34 (2.47)	1.84 (0.65)	0.24 (0.78)	15.57 (2.74)	-6.93 (2.84)
174-Washington-Baltimore-Northern Virginia, DC-MD-VA-WV	1.60 (0.27)	1.38 (0.38)	11.05 (1.10)	9.72 (1.30)	0.28 (0.13)	-0.01 (0.16)	41.78 (1.20)	8.70 (1.31)	1.24 (0.32)	0.43 (0.40)	44.05 (1.75)	-20.21 (1.84)
175-Waterloo-Cedar Falls, IA	0.21 (0.53)	0.62 (0.71)	1.97 (1.73)	1.88 (2.05)	0.18 (0.14)	0.39 (0.30)	89.93 (3.24)	0.15 (3.91)	0.18 (0.19)	0.33 (0.45)	7.53 (3.03)	-3.37 (3.11)
176-Wausau-Merrill, WI	0.02 (0.06)	1.38 (0.47)	0.43 (0.47)	0.38 (0.56)	2.48 (1.36)	-1.49 (1.39)	94.15 (1.10)	-0.89 (1.13)	0.98 (0.84)	0.13 (0.91)	1.94 (0.81)	0.48 (0.94)
177-Wenatchee, WA	0.17 (0.21)	0.60 (0.61)	0.02 (0.05)	0.30 (0.35)	2.68 (2.11)	-0.88 (2.20)	77.69 (1.04)	-12.79 (2.37)	1.44 (1.07)	0.10 (1.24)	18.00 (6.41)	12.67 (6.82)
178-Wichita Falls, TX	0.13 (0.23)	0.67 (0.42)	1.81 (1.16)	0.58 (1.33)	0.89 (0.75)	-0.16 (0.80)	51.78 (5.63)	-1.58 (5.96)	0.81 (0.66)	-0.10 (0.79)	44.58 (4.67)	0.59 (4.86)
179-Wichita-Winfield, KS	0.50 (0.38)	2.61 (0.76)	2.57 (1.13)	1.70 (1.32)	0.85 (0.36)	0.43 (0.47)	67.53 (1.93)	-0.25 (2.40)	1.34 (0.61)	0.57 (0.74)	27.21 (3.98)	-5.06 (4.20)

Note: The six race and ethnicity categories were constructed based on self-reported race and ethnicity information in the American Community Survey (ACS) Public Use Microdata Sample data and are mutually exclusive. The Asian category includes all individuals who self-identified as Chinese, Japanese, or other Asian in the ACS. The Indigenous category includes all individuals who self-identified as American Indian or Alaska Native; Native Hawaiian; Polynesian; Micronesian; Melanesian; or Pacific Islander, not specified, in the ACS. The multiracial or another race category includes all individuals who self-identified as other race, two major races, or three or more major races in the ACS.

Utilization gaps represent the percentage point difference between the share of workers in similar occupations and the share of workers in onsite construction.

Onsite construction occupations represent a subset of the Standard Occupation Classification (SOC) major category 47, Construction and Extraction, that excludes management-related occupations. This subset includes 44 SOC occupations. A complete list of the occupations included is available in appendix Est-2.

Similar occupations include 133 SOC occupations determined to be similar to onsite construction occupations according to job requirements reported in the O*NET data. A complete list of the similar occupations is available in appendix Est-2. Some onsite construction occupations are also included in the set of similar occupations because of similarity between individual onsite construction occupations.

The – symbol indicates groups for which the survey team could not estimate the share of workers in construction and the gap.

Constr. = construction; MOE = margin of error; O*NET = Occupational Information Network

Source: IPUMS-USA