

APPENDIX E.

Entry and Advancement in the Oregon Construction and Engineering Industries

Federal courts have found that Congress “spent decades compiling evidence of race discrimination in government highway contracting, of barriers to the formation of minority-owned construction businesses, and of barriers to entry.”¹ Congress found that discrimination had impeded the formation of qualified minority-owned businesses. In the marketplace appendices (Appendix E through Appendix I), Keen Independent examines whether some of the barriers to business formation that Congress found for minority- and women-owned businesses also appear to occur in Oregon.

Potential barriers to business formation include barriers associated with entry and advancement in the construction and engineering industries. Appendix E examines recent data on education, employment and workplace advancement that may ultimately influence business formation in the Oregon construction and engineering industries.^{2, 3}

A. Introduction

Keen Independent examined whether there were barriers to the formation of minority- and women-owned businesses in Oregon. Business ownership often results from an individual entering an industry as an employee and then advancing within that industry. Within the entry and advancement process, there may be some barriers that limit opportunities for minorities and women. Figure E-1 presents a model of entry and advancement in the construction and engineering industries. Note that in addition to using data from Oregon, Keen Independent also considers Clark and Skamania counties in Washington as part of the Oregon marketplace due to their inclusion in the Portland-Vancouver-Hillsboro, OR-WA Metropolitan Statistical Area. Any discussion of the Oregon marketplace or Oregon construction and engineering industries in the following analysis also includes firms and individuals located in these two Washington counties.

Appendix E uses 2000 Census data and 2008–2012 American Community Survey (ACS) data to analyze education, employment, and workplace advancement — all factors that may influence whether individuals start construction or engineering businesses. Keen Independent studied barriers to entry into construction and engineering separately, because entrance requirements and opportunities for advancement differ for those industries.

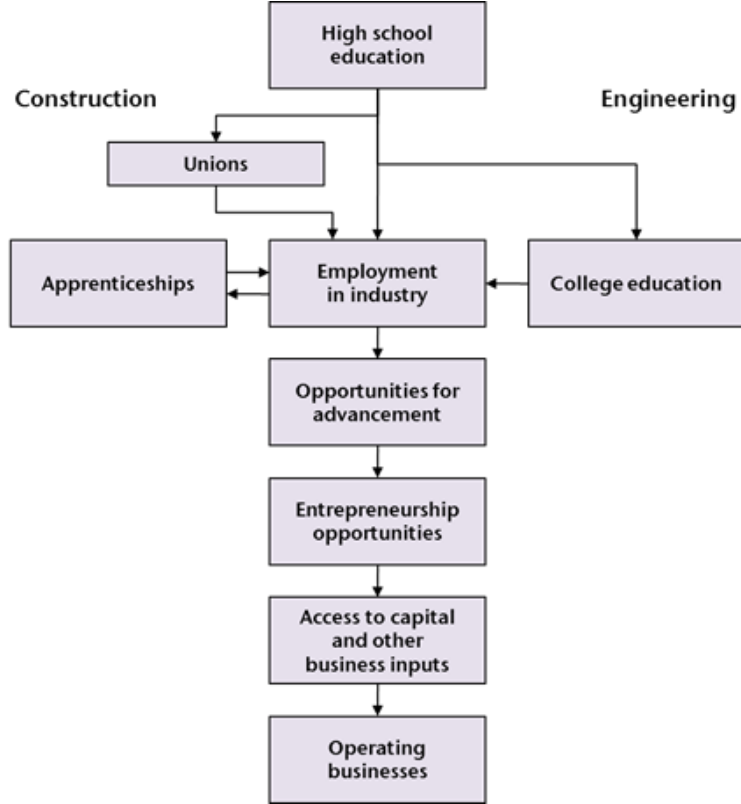
¹ *Sherbrooke Turf, Inc.*, 345 F.3d 964 (8th Cir. 2003) at 970 (citing *Adarand Constructors, Inc.*, 228 F.3d at 1167–76); *Western States Paving Co. v. Washington State DOT*, 407 F.3d 983 (9th Cir. 2005) at 992.

² In Appendix E and other appendices that present information about local marketplace conditions, information for “engineering” refers to architectural, engineering and related services. Each reference to “engineering” work pertains to those types of services. In the 2000 Census industrial classification system, “Architectural, engineering and related services” was coded as 729. In the 2008–2012 ACS, the same industry was coded as 7290.

³ Several other report appendices analyze other quantitative aspects of conditions in the Oregon marketplace. Appendix F explores business ownership. Appendix G presents an examination of access to capital. Appendix H considers the success of businesses. Appendix I presents the data sources that Keen Independent used in those appendices.

Figure E-1.
Model for studying entry
into the construction and
engineering industries

Source:
Keen Independent.



Representation of minorities among workers and business owners in Oregon. Keen

Independent began the analysis by examining the representation of racial/ethnic minorities among business owners and workers in Oregon. Figure E-2 shows the demographic distribution of business owners in construction and engineering, business owners in other industries (excluding construction and engineering) and the labor force, based on 2008–2012 ACS data. (Demographics of the construction and engineering workforce are presented separately later in Appendix E.) Analysis for Oregon in 2008–2012 indicated the following:

- African Americans accounted for less than 1 percent of business owners in construction and engineering, less than 2 percent of business owners in other industries and 2 percent of all workers.
- Asian Americans accounted for less than 2 percent of business owners in construction and engineering compared to 5 percent of business owners in other industries and 5 percent of all workers.
- Hispanic Americans accounted for 5 percent of business owners in construction and engineering, 7 percent of business owners in other industries and more than 10 percent of all workers were Hispanic American.

- Native Americans and other minorities accounted for approximately 2 percent of all business owners in construction and engineering, 2 percent of owners in other industries and 2 percent of all workers.
- Non-Hispanic whites accounted for about 91 percent of business owners in construction and engineering, higher than the 85 percent of business owners in other industries and 80 percent of all workers.

Figure E-2.
Demographic distribution of business owners and the workforce, 2008–2012

Oregon	Business owners in construction and engineering	Business owners in all other industries	Workforce in all industries
Race/ethnicity			
African American	0.8 % **	1.4 %	2.0 %
Asian American	1.6 **	5.1	4.9
Hispanic American	5.1	6.5	10.5
Native American or other minority	1.6	2.0	2.3
Total minority	<u>9.1 %</u>	<u>14.9 %</u>	<u>19.7 %</u>
Non-Hispanic white	90.9 **	85.1	80.3
Total	<u>100.0 %</u>	<u>100.0 %</u>	<u>100.0 %</u>
Gender			
Female	9.1 % **	47.7 %	47.2 %
Male	90.9 **	52.3	52.8
Total	<u>100.0 %</u>	<u>100.0 %</u>	<u>100.0 %</u>

Note: *,** Denote that the difference in proportions between business owners in construction and engineering and business owners in all other industries for the given race/ethnicity/gender group is statistically significant at the 90% or 95% confidence level, respectively. The engineering industry includes “architectural, engineering and related services.”

Source: Keen Independent Research from 2008–2012 ACS Public Use Microdata Sample (PUMS). The 2008–2012 raw data extracts were obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Keen Independent analyzed demographic data to determine if the differences in business ownership in construction and engineering and business ownership in other industries by race and ethnicity were statistically significant and found:

- Relatively fewer African American business owners in construction and engineering compared to African American business owners in other industries;
- Relatively fewer Asian American business owners in construction and engineering compared to Asian American business owners in other industries; and
- Relatively more non-Hispanic white business owners in construction and engineering compared to non-Hispanic white business owners in other industries.

Representation of women among business owners and workers in Oregon. Figure E-2 also examines the percentage of Oregon business owners and workers who are women. In 2008–2012, women accounted for about 9 percent of business owners in construction and engineering, significantly less than their representation among business owners in other industries (48 percent). During this period, women comprised 47 percent of the Oregon labor force.

B. Construction Industry

Keen Independent examined how education, training, employment and advancement may affect the number of businesses that individuals of different races/ethnicities and genders owned in the Oregon construction industry in 2000 and in 2008–2012.

Education. College education is not a prerequisite for most construction jobs. For that reason, the construction industry has traditionally attracted individuals who have relatively less formal education than in other industries. Based on 2008–2012 ACS data, 35 percent of construction workers in Oregon were high school graduates without post-secondary education and 13 percent had not graduated high school. Only 12 percent of construction workers had a four-year college degree or more, less than the 31 percent found for other industries combined.

Race/ethnicity. Due to the educational requirements of entry-level jobs and the limited education beyond high school for many minority groups in Oregon, one would expect a relatively high representation of those groups in the Oregon construction industry, especially in entry-level positions.

- Hispanic Americans represented a large population of Oregon workers without post-secondary education. In 2008–2012, only 11 percent of all Hispanic American workers 25 and older who worked in Oregon held at least a four-year college degree, far below the figure for non-Hispanic whites 25 and older working in the state (32%).
- The percentage of Native American (17%) and African American (24%) workers in Oregon with a four-year college degree was also substantially lower than that of non-Hispanic whites (32%) in 2008–2012.

However, almost one-half (42%) of Asian American workers 25 and older in Oregon had four-year college degrees in 2008–2012. One might expect representation of Asian Americans in the Oregon construction industry to be lower than in other industries given this level of education.

Gender. On average, female workers in Oregon have similar years of education as men. Based on 2008–2012 data, 34 percent of female workers and 32 percent of male workers age 25 and older had at least a four-year college degree.

Apprenticeship and training. Training in the construction industry is largely on-the-job and through trade schools and apprenticeship programs. Entry-level jobs for workers out of high school are often for laborers, helpers or apprentices. More skilled positions in the construction industry may require additional training through a technical or trade school, or through an apprenticeship or other employer-provided training program. Apprenticeship programs can be developed by employers, trade associations, trade unions or other groups.

Workers can enter apprenticeship programs from high school or trade school. Apprenticeships have traditionally been three- to five-year programs that combine on-the-job training with classroom instruction.⁴ In response to limited construction employment opportunities during the Great Recession, apprenticeship programs have limited the number of new apprenticeships⁵ as well as access to knowing when and where apprenticeships are occurring.⁶ Apprenticeship programs often refer to an “out-of-work list” when contacting apprentices; those who have been on the list the longest are given preference.

Furthermore, apprentices in highway construction are often hired and laid off several times throughout the duration of their apprenticeship program. Apprentices were more successful if they were able to maintain steady employment, either by remaining with one company and moving to various work sites, or by finding work quickly after being laid off. Apprentices identified mentoring from senior coworkers, such as journeyworkers, foremen or supervisors, and being assigned tasks that furthered their training as important to their success.⁷

Employment. With educational attainment for minorities and women as context, Keen Independent examined employment in the Oregon construction industry. Figure E-3 presents data from 2000 and 2008–2012 to compare the demographic composition of the construction industry with the total workforce in Oregon.

Race/ethnicity. Based on 2008–2012 ACS data, 17 percent of people working in the Oregon construction industry were minorities, up from 11 percent in 2000. The increase was due to growth in the number of Hispanic American construction workers. Examination of the Oregon construction industry workforce in 2008–2012 shows that:

- About 13 percent were Hispanic Americans;
- 1 percent were African Americans;
- Asian Americans made up about 1 percent; and
- Less than 3 percent were Native Americans and other minorities.

In Oregon, Hispanic Americans were a significantly larger percentage of workers in construction (13%) than in other industries (10%). In contrast, African Americans (1%) and Asian Americans (1%) accounted for a smaller percentage of workers in the construction industry than in other industries (2% and 5%, respectively). Representation of other minorities, including Native Americans, was about the same in construction as all other industries (less than 3%). Figure E-3 provides these results.

⁴ Bureau of Labor Statistics, U.S. Department of Labor. (2013, Summer). Apprenticeship: Earn while you learn. *Occupational Outlook Quarterly*, 3–5.

⁵ Kelly, M., Pisciotto, M., Wilkinson, L., & Williams, L. S. (2015). When Working Hard Is Not Enough For Female and Racial/Ethnic Minority Apprentices in Highway Trades. *Sociological Forum*, 30(2), 415–438.

⁶ Chaudhry, N., Frohlich, L., Goss Graves, F., Hogan, V., Khouri L., Lane, L., & Rao, D. (2014). *Women in Construction: Still Breaking Ground*. Retrieved September 2, 2015, from http://www.nwlc.org/sites/default/files/pdfs/final_nwlc_womeninconstruction_report.pdf

⁷ *Ibid.*

The average educational attainment of African Americans is consistent with requirements for construction jobs, so education does not explain the relatively low number of African American workers in the Oregon construction industry. Several studies throughout the United States have reported that racial discrimination by construction unions has contributed to the low employment of African Americans in construction trades.⁸ The role of unions is discussed more thoroughly later in Appendix E (including research that suggests discrimination has been reduced in unions).

Asian Americans made up 1 percent of the construction workforce and 5 percent of all other workers in Oregon in 2008–2012. The fact that Asian Americans were more likely than other groups to have a college education may explain part of that difference.

Figure E-3 also shows the rapid growth of Hispanic Americans as a share of the construction workforce between 2000 (6.5% of workers) and 2008–2012 (12.5%). This change was greater for construction than for other industries in Oregon.

Figure E-3.
Demographics of workers in construction and all other industries, 2000 and 2008–2012

Oregon	Construction		All other industries	
	2008-2012	2000	2008-2012	2000
Race/ethnicity				
African American	0.9 % **	1.0 % **	2.1 %	1.7 %
Asian American	1.4 **	1.2 **	5.1	3.7
Hispanic American	12.5 **	6.5	10.4	6.8
Native American or other minority	2.5	2.7	2.3	2.6
Total minority	<u>17.3 %</u>	<u>11.4 %</u>	<u>19.9 %</u>	<u>14.8 %</u>
Non-Hispanic white	82.7 **	88.6 **	80.1	85.2
Total	<u>100.0 %</u>	<u>100.0 %</u>	<u>100.0 %</u>	<u>100.0 %</u>
Gender				
Female	10.6 % **	11.6 % **	49.7 %	48.4 %
Male	89.4 **	88.4 **	50.3	51.6
Total	<u>100.0 %</u>	<u>100.0 %</u>	<u>100.0 %</u>	<u>100.0 %</u>

Note: *,** Denote that the difference in proportions between workers in the construction industry and all other industries for the given Census/ACS year is statistically significant at the 90% or 95% confidence level, respectively.

Source: Keen Independent Research from 2000 U.S. Census 5% sample and 2008–2012 ACS Public Use Microdata samples. The 2000 Census and 2008–2012 ACS raw data extracts were obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Gender. There are large differences in the representation of women in construction compared with women in all industries. For 2008–2012, women represented 11 percent of all construction workers and 50 percent of workers in all other industries in Oregon.

⁸ Thomas B., & Waldinger, R. (1991). The Continuing Significance of Race: Racial Conflict and Racial Discrimination in Construction. *Politics & Society*, 19(3).

Academic research concerning any effect of race- and gender-based discrimination. There is substantial academic literature that has examined whether race- or gender-based discrimination affects opportunities for minorities and women to enter construction trades in the United States. Many studies indicate that race- and gender-based discrimination affects opportunities for minorities and women in the construction industry. For example, literature concerning women in construction trades has identified substantial barriers to entry and advancement due to gender discrimination and sexual harassment.⁹ Research concerning highway construction projects in three major U.S. cities (Boston, Los Angeles, and Oakland) identified evidence of prevailing attitudes that women do not belong in construction, and that such discrimination was worse for women of color than for white women.¹⁰ More recently, Kelly et al. found that white men were the least likely to report challenges related to being assigned low-skill or repetitive tasks that did not enable them to learn new skills. Women and people of color felt that they were disproportionately performing low-skill tasks that negatively impacted the quality of their training experience.¹¹

Multiple studies report that race and gender inequalities are visible in a workplace often evidenced through the acceptance of the “good old boys’ club” culture.¹² There may also be an attachment to the idea that “working hard” will bring success. However, the quantitative and qualitative evidence indicates that “hard work” alone does not ensure success for women and people of color.¹³ In 2014, the National Women’s Law Center found low representation of women, and especially women of color, in construction jobs and apprenticeships. Women experience many barriers to success in this career path, including experiencing outright gender discrimination and harassment.¹⁴

Research has well documented the idea that managers often hire individuals who are similar to themselves which creates a culture of similarity¹⁵ or homologous reproduction.¹⁶ In the construction industry, Kelly et al. found that, in Oregon, women and people of color had a more difficult time establishing personal relationships and building professional networks with their white male journeyman, supervisors and foremen in the highway trades. Thirty-five percent of women of color,

⁹ See for example, Erickson, J. A., & Palladino, D. E. (2009). Women Pursuing Careers in Trades and Construction. *Journal of Career Development, 36*(1), 68–89.

¹⁰ Note that those interviews took place between 1996 and 1999. Price, V. (2002). Race, Affirmative Action and Women’s Participation in U.S. Highway Construction. *Feminist Economics, 8*(2), 87–113.

¹¹ Kelly, M., Pisciotto, M., Wilkinson, L., & Williams, L. S. (2015). When Working Hard Is Not Enough For Female and Racial/Ethnic Minority Apprentices in Highway Trades. *Sociological Forum, 30*(2), 415–438.

¹² Lapchick, R. E. (2014, September). Numbers Unacceptable For Women in Decision-Making Roles. *Sports Business Journal, 13*. Retrieved August 17, 2015, from <http://www.sportsbusinessdaily.com/Journal/Issues/2014/09/15/Opinion/Richard-Lapchick.aspx>; Kanter, R. M. (1977). *Men and Women of the Corporation*. New York: Basic Books.

¹³ Kelly, M., Pisciotto, M., Wilkinson, L., & Williams, L. S. (2015). When Working Hard Is Not Enough For Female and Racial/Ethnic Minority Apprentices in Highway Trades. *Sociological Forum, 30*(2), 415–438.

¹⁴ Chaudhry, N., Frohlich, L., Goss Graves, F., Hogan, V., Khouri L., Lane, L., & Rao, D. (2014). *Women in Construction: Still Breaking Ground*. Retrieved September 2, 2015, from http://www.nwlc.org/sites/default/files/pdfs/final_nwlc_womeninconstruction_report.pdf

¹⁵ Chelladurai, P., & Doherty, A. (1999). Managing Cultural Diversity in Sport Organizations: A Theoretical Perspective. *Journal of Sport Management, 19*(3), 280–297.

¹⁶ Kanter, R. M. (1977). *Men and Women of the Corporation*. New York: Basic Books.

32 percent of white women and 21 percent of men of color reported problems with journeyworkers, compared to only 13 percent of white men.¹⁷

Research on the Oregon highway construction industry reports an underrepresentation of minorities and women in apprenticeship programs.¹⁸ Kelly et al. identified informal hiring practices that relied on personal relationships and networking. While 76 percent of white men agreed that jobs were fairly assigned during their most recent apprenticeship, only 57 percent of women of color, 58 percent of white women, and 55 percent of men of color agreed. In addition, both construction company staff and apprentices indicated that they believed that women and men of color were more likely to be laid off even if there were other apprentices who were newer to the project or were less effective. Burd-Sharps et al. found that almost 68 percent of female apprentices in Oregon's highway trades experienced workplace discrimination or harassment in comparison to 28 percent of men, and women of color reported more discrimination than white female apprentices (66 and 52, respectively).¹⁹

Importance of unions to entry in the construction industry. Labor researchers characterize construction as a historically volatile industry that is sensitive to business cycles, making the presence of labor unions important for stability and job security within the industry.²⁰ The temporary nature of construction work results in uncertain job prospects, and the relatively high turnover of laborers presents a disincentive for construction firms to invest in training. Some researchers have concluded that constant turnover has lent itself to informal recruitment practices and nepotism, compelling laborers to tap social networks for training and work. They credit the importance of social networks with the high degree of ethnic segmentation in the construction industry.²¹ Unable to integrate themselves into traditionally white social networks, African Americans and other minorities faced long-standing historical barriers to entering into the industry.²²

Construction unions aim to provide a reliable source of labor for employers and preserve job opportunities for workers by formalizing the recruitment process, coordinating training and apprenticeships, enforcing standards of work, and mitigating wage competition. The unionized sector of construction would seemingly be the best road for African Americans and other underrepresented groups into the industry.

¹⁷ Kelly, M., Pisciotta, M., Wilkinson, L., & Williams, L. S. (2015). When Working Hard Is Not Enough For Female and Racial/Ethnic Minority Apprentices in Highway Trades. *Sociological Forum*, 30(2), 415–438.

¹⁸ Hegewisch, A., Henrici, J., Hooper, T., & Shaw, E. (2014). *Untapped Resources, Untapped Labor Pool: Using Federal Highway Funds to Prepare Women for Careers in Construction*. Washington, DC: Jobs for the Future.

¹⁹ Burd-Sharps, S., Kelly, M., & Lewis, K. (2014). *Building a More Diverse Skilled Workforce in the Highway Trades: Are Oregon's Current Efforts Working?* Portland, OR: Portland State University.

²⁰ Applebaum, H. (1999). *Construction Workers, U.S.A.* Westport, CT: Greenwood Press.

²¹ Bailey, T., & Waldinger, R. (1991). The Continuing Significance of Race: Racial Conflict and Racial Discrimination in Construction. *Politics & Society*, 19(3).

²² Feagin, J. R., & Imani, N. (1994). Racial Barriers to African American Entrepreneurship: An Exploratory Study. *Social Problems*, 41(4), 562–584.

However, some researchers have identified racial discrimination by trade unions that has historically prevented minorities from obtaining employment in skilled trades.²³ Some researchers argue that union discrimination has taken place in a variety of forms, including the following examples:

- Unions have used admissions criteria that adversely affect minorities. In the 1970s, federal courts ruled that standardized testing requirements for unions unfairly disadvantaged minority applicants who had less exposure to testing. In addition, the policies that required new union members to have relatives who were already in the union perpetuated the effects of past discrimination.²⁴
- Of those minority individuals who are admitted to unions, a disproportionately low number are admitted into union-coordinated apprenticeship programs. Apprenticeship programs are an important means of producing skilled construction laborers, and the reported exclusion of African Americans from those programs has severely limited their access to skilled occupations in the construction industry.²⁵
- Although formal training and apprenticeship programs exist within unions, most training of union members takes place informally through social networking. Nepotism characterizes the unionized sector of construction as it does the non-unionized sector, and that practice favors a white-dominated status quo.²⁶
- Traditionally, unions have been successful in resisting policies designed to increase African American participation in training programs. The political strength of unions in resisting affirmative action in construction has hindered the advancement of African Americans in the industry.²⁷
- Discriminatory practices in employee referral procedures, including apportioning work based on seniority, have precluded minority union members from having the same access to construction work as their white counterparts.²⁸
- According to testimony from African American union members, even when unions implement meritocratic mechanisms of apportioning employment to laborers, white workers are often allowed to circumvent procedures and receive preference for construction jobs.²⁹

More recent research suggests that the relationship between minorities and unions has been changing. As a result, historical observations may not be indicative of current dynamics in construction unions. Recent studies focusing on the role of unions in apprenticeship programs have

²³ U.S. Department of Justice. (1996). Proposed Reforms to Affirmative Action in Federal Procurement. *Federal Register*, 61(101), 26042.

²⁴ *Ibid.* See *United States v. Iron Workers Local 86* (1971), *Sims v. Sheet Metal Workers International Association* (1973) and *United States v. International Association of Bridge, Structural and Ornamental Iron Workers* (1971).

²⁵ Applebaum, H. (1999). *Construction Workers, U.S.A.* Westport, CT: Greenwood Press.

²⁶ *Ibid.* 299. A high percentage of skilled workers reported having a father or relative in the same trade. However, the author suggests this may not be indicative of current trends.

²⁷ Bailey, T., & Waldinger, R. (1991). The Continuing Significance of Race: Racial Conflict and Racial Discrimination in Construction. *Politics & Society*, 19(3).

²⁸ U.S. Department of Justice. (1996). Proposed Reforms to Affirmative Action in Federal Procurement. *Federal Register*, 61(101), 26042. See *United Steelworkers of America v. Weber* (1979) and *Taylor v. United States Department of Labor* (1982).

²⁹ Feagin, J. R., & Imani, N. (1994). Racial Barriers to African American Entrepreneurship: An Exploratory Study. *Social Problems*, 41(4), 562–584.

compared minority and female participation and graduation rates for apprenticeships in joint programs (that unions and employers organize together) with rates in employer-only programs. Many of those studies conclude that the impact of union involvement is generally positive or neutral for minorities and women, compared to non-Hispanic white males, as summarized below.

- Glover and Bilginsoy analyzed apprenticeship programs in the U.S. construction industry during 1996 through 2003. Their dataset covered about 65 percent of apprenticeships during that time. The authors found that joint programs had “much higher enrollments and participation of women and ethnic/racial minorities” and exhibited “markedly better performance for all groups on rates of attrition and completion” compared to employer-run programs.³⁰
- In a similar analysis focusing on female apprentices, Bilginsoy and Berik found that women were most likely to work in highly-skilled construction professions as a result of enrollment in joint programs as opposed to employer-run programs. Moreover, the effect of union involvement in apprenticeship training was higher for African American women than for white women.³¹
- Additional research on the presence of African Americans and Hispanic Americans in apprenticeship programs found that African Americans were 8 percent more likely to be enrolled in a joint program than in an employer-run program. However, Hispanic Americans were less likely to be in a joint program than in an employer-run program.³² Those data suggest that Hispanic Americans may be more likely than African Americans to enter the construction industry without the support of a union.

Other research focusing on specific states also indicates a more productive relationship between unions and minority workers than that which may have prevailed in the past. A study by Berik, Bilginsoy and Williams found minority and white women were overrepresented in union apprenticeship programs in Oregon. Although white women and minorities were less likely to graduate compared to white men, graduation rates for those groups in the union apprenticeship programs were higher than for nonunion programs.³³ Similar research conducted over a ten-year period in Massachusetts found women and minorities were recruited at a higher rate for union apprenticeship programs compared to nonunion programs and that the completion rates for these groups in union programs were consistently higher than those of nonunion programs.³⁴

Recent union membership data support those findings as well. For example, 2012 Current Population Survey (CPS) data indicate that union membership rates for African Americans is slightly higher than for non-Hispanic whites and union membership rates for Hispanic Americans are similar

³⁰ Bilginsoy, C., & Glover, R. (2005). Registered Apprenticeship Training in the U.S. Construction Industry. *Education & Training*, 47(4/5), 337.

³¹ Berik, G., & Bilginsoy, C. (2006). Still a wedge in the door: women training for the construction trades in the USA. *International Journal of Manpower*, 27(4), 321–341.

³² Bilginsoy, C. (2005). How Unions Affect Minority Representation in Building Trades Apprenticeship Programs. *Journal of Labor Research*, 57(1).

³³ Berik, G., Bilginsoy, C., & Williams, L. S. (2011). Gender and Racial Training Gaps in Oregon Apprenticeship Programs. *Labor Studies Journal*, 36(2), 221–244.

³⁴ Argyres, A., & Moir, S. (2008). Building Trades Apprentice Training in Massachusetts: An Analysis of Union and Non-Union Programs, 1997–2007. *Labor Resource Center Publications*. Boston, MA: University of Massachusetts Boston.

to those of non-Hispanic whites.³⁵ The CPS asked participants, “Are you a member of a labor union or of an employee association similar to a union?” CPS data showed union membership to be 13 percent for African American workers, 10 percent for Hispanic American workers and 11 percent for non-Hispanic white workers. In the construction industry, the union membership rates for both African American workers and non-Hispanic white workers is 17 percent but the rate for Hispanic American construction workers is only 8 percent.

Although union membership and union program participation varies based on race and ethnicity, there is no clear picture from the research about the causes of those differences and their effects on construction industry employment. Research is especially limited concerning the impact of unions on Asian American employment. It is unclear from past studies whether unions presently help or hinder equal opportunity in construction and whether effects in Oregon are different from other parts of the country. In addition, the current research indicates that the effects of unions on entry into the construction industry may be different for different minority groups. Some unions are actively trying to provide a more inclusive environment for racial minorities and women through “insourcing.”³⁶

Overall, union membership is relatively stable in Oregon. Keen Independent researched union membership in Oregon and found about 16 percent of all employed wage and salary workers were members of a labor union or an employee association similar to a union in 2014. Membership had been at 17 percent of employed persons in 2009. Union membership among private sector construction workers in Oregon has increased, however, from less than 12 percent in 2009 to 19 percent in 2014.³⁷ Oregon construction workers’ membership in unions is consistent with national averages of about 19 percent of individuals either being members of unions or working on jobs that are covered by unions.³⁸

Advancement. To research opportunities for advancement in the Oregon construction industry, Keen Independent examined the representation of minorities and women in construction occupations defined by the U.S. Bureau of Labor Statistics.³⁹ Appendix I provides full descriptions of construction trades with large enough sample sizes in the 2000 Census and 2008–2012 ACS for analysis.

³⁵ 2012 Current Population Survey (CPS), Merged Outgoing Rotation Groups, U.S. Census Bureau and Bureau of Labor Statistics.

³⁶ Judd, R. (2015, June 25). Seattle’s Building Boom is Good News for a New Generation of Workers. *The Seattle Times, Pacific NW Magazine*. Retrieved September 2, 2015, from <http://www.seattletimes.com/pacific-nw-magazine/seattles-building-boom-is-good-for-a-new-generation-of-workers>

³⁷ Hirsch, B. T., & Macpherson, D. A. (2015). *Union Membership and Coverage Database from the CPS*. Retrieved August 4, 2015, from <http://unionstats.com>

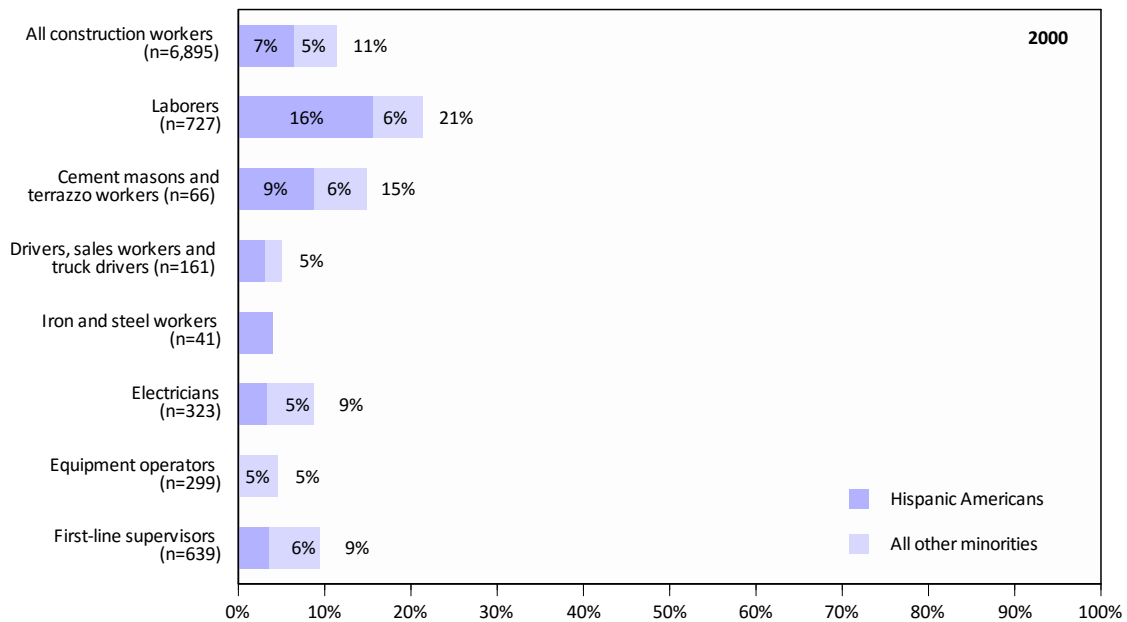
³⁸ Hirsch, B. T., & Macpherson, D. A. (2003). Union Membership and Coverage Database from the Current Population Survey: Note. *Industrial and Labor Relations Review*, 56(2), 349–354; Hirsch, B. T., & Macpherson, D. A. (2014). *U.S. Historical Tables: Union Membership, Coverage, Density, and Employment: Private Construction, 1973–2014*. Retrieved August 18, 2015, from <http://www.unionstats.com>; Hirsch, B. T., & Macpherson, D. A. (2014). *State: Union Membership, Coverage, Density, and Employment: Private Construction, 1973–2014*. Retrieved August 18, 2015, from <http://www.unionstats.com>

³⁹ Bureau of Labor Statistics, U.S. Department of Labor. *SOC Major Groups*. Retrieved February 15, 2007, from http://www.bls.gov/soc/major_groups.htm

Racial/ethnic composition of construction occupations. Figures E-4 and E-5 present the race/ethnicity of workers in select construction-related occupations in Oregon, including low-skill occupations (e.g., construction laborers), higher-skill construction trades (e.g., electricians), and supervisory roles. The trades correspond to types of construction labor often involved in transportation contracting. Figure E-4 and E-5 present those data for 2000 and 2008–2012, respectively.

Based on 2000 Census and 2008–2012 ACS data, there are large differences in the racial/ethnic makeup of workers in various trades related to construction in Oregon. Overall, minorities comprised 11 percent of construction workers in 2000 and 17 percent in 2008–2012, as shown in Figures E-4 and E-5.

Figure E-4.
Minorities as a percentage of selected construction occupations in Oregon, 2000



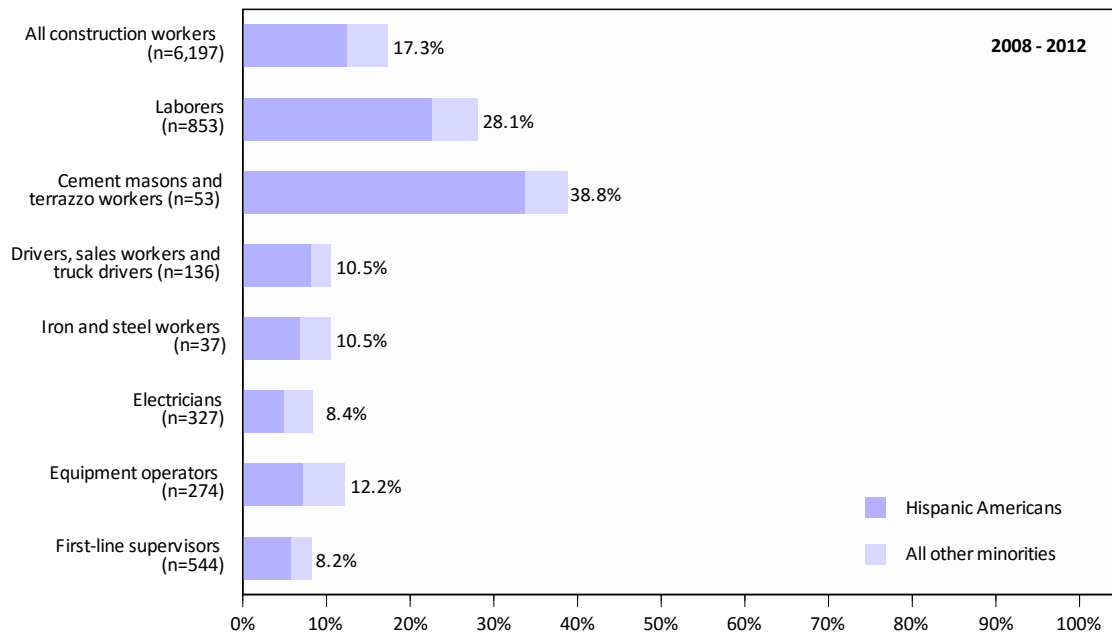
Note: Crane and tower operators, dredge, excavating and loading machine and dragline operators, paving, surfacing and tamping equipment operators and miscellaneous construction equipment operators were combined into the single category of equipment operators.

Source: Keen Independent Research from 2000 U.S. Census 5% sample Public Use Microdata samples. The 2000 Census raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

About 9 percent of first-line supervisors were minorities in 2000, less than the total percentage of Oregon construction workers that were minorities (11%). Minorities made up a smaller percentage of first-line supervisors (8%) in 2008–2012, despite an increase in the total percentage of construction workers who were minorities during those years (17%).

Most minorities working in the Oregon construction industry in 2008–2012 were Hispanic Americans (see Figure E-5). The representation of Hispanic Americans was substantially greater among cement masons (34%) and laborers (23%) than among all construction workers (13%). Those occupations tend to be lower-skill occupations. Only 6 percent of first-line supervisors in 2008–2012 were Hispanic Americans.

Figure E-5.
 Minorities as a percentage of selected construction occupations in Oregon, 2008–2012



Note: Crane and tower operators, dredge, excavating and loading machine and dragline operators, paving, surfacing and tamping equipment operators and miscellaneous construction equipment operators were combined into the single category of equipment operators.

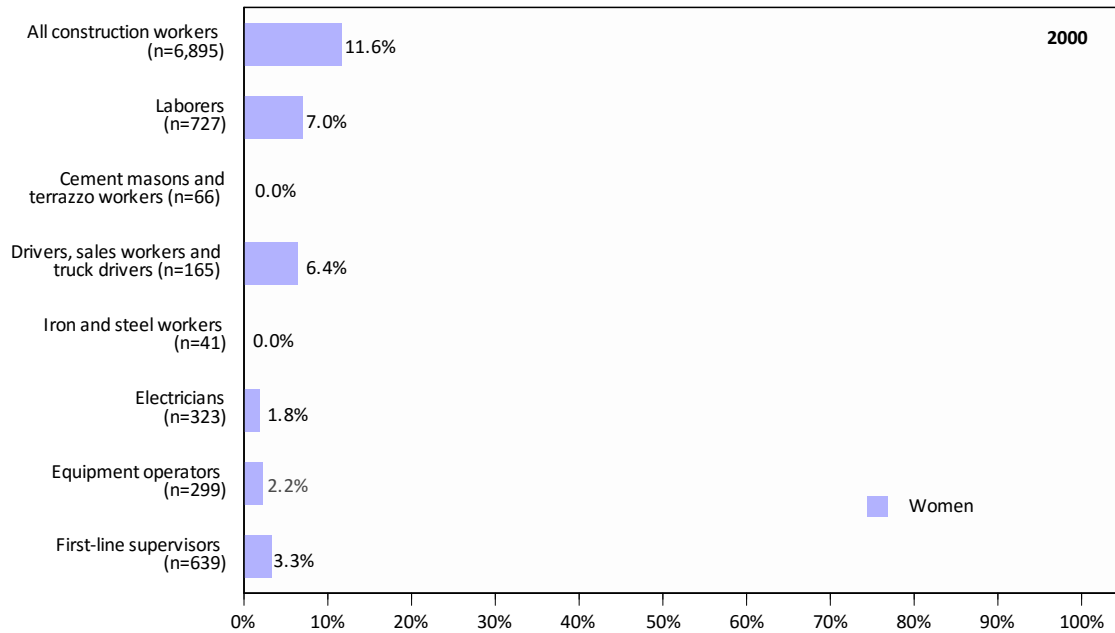
Source: Keen Independent Research from 2008–2012 ACS Public Use Microdata samples. The 2008–2012 ACS raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Gender composition of construction occupations. Keen Independent also analyzed the proportion of women in construction-related occupations. Figures E-6 and E-7 summarize the representation of women in select construction-related occupations for 2000 and 2008–2012, respectively. Overall, women made up only 12 percent of workers in the industry in 2000 and 11 percent in 2008–2012. Representation of women in all trades either declined during this period or remained relatively unchanged.

In both 2000 and 2008–2012, women comprised no more than 4 percent of workers in the following trades:

- Cement masons and terrazzo workers;
- Iron and steel workers;
- Electricians; and
- Equipment operators.

Figure E-6.
Women as a percentage of construction workers in selected occupations in Oregon, 2000

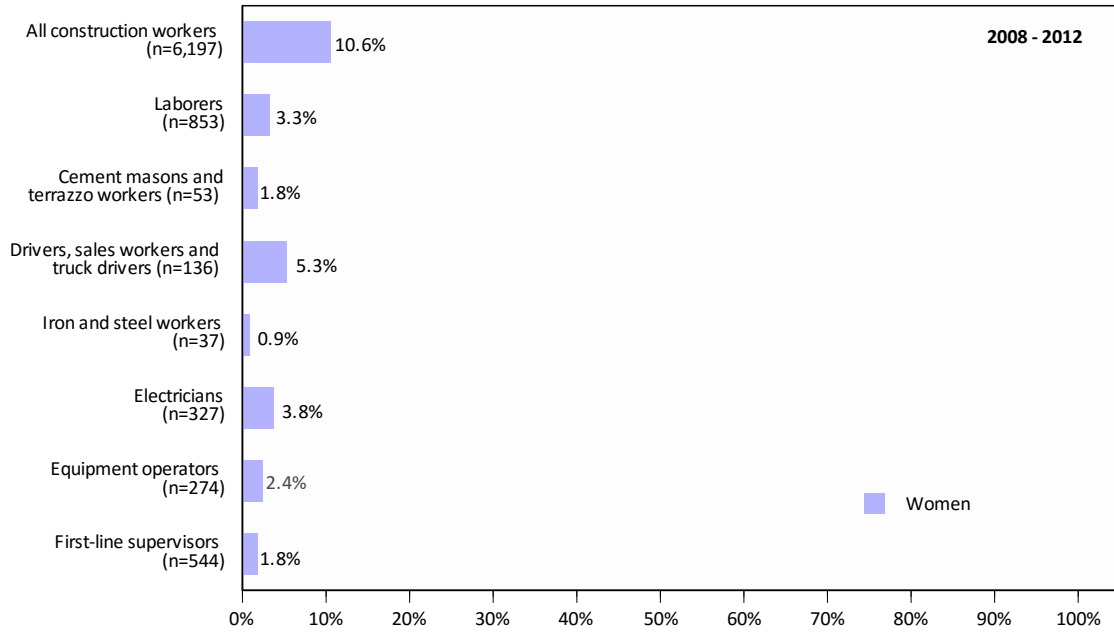


Note: Crane and tower operators, dredge, excavating and loading machine and dragline operators, paving, surfacing and tamping equipment operators and miscellaneous construction equipment operators were combined into the single category of equipment operators.

Source: Keen Independent Research from 2000 U.S. Census 5% sample Public Use Microdata samples. The 2000 Census raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

As shown in Figures E-6 and E-7, women comprised just 3 percent of first-line supervisors in 2000 and about 2 percent in 2008–2012.

Figure E-7.
Women as a percentage of construction workers in selected occupations in Oregon, 2008–2012



Note: Crane and tower operators, dredge, excavating and loading machine and dragline operators, paving, surfacing and tamping equipment operators and miscellaneous construction equipment operators were combined into the single category of equipment operators.

Source: Keen Independent Research from 2008–2012 ACS Public Use Microdata samples. The 2008–2012 ACS raw data extract was obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Percentage of minorities and women who are managers. To further assess advancement opportunities for minorities and women in the Oregon construction industry, Keen Independent examined the proportion of construction workers who reported being managers. Figure E-8 presents the percentage of construction employees who reported working as managers in 2000 and 2008–2012 for Oregon and the nation, by racial, ethnic and gender group.

Figure E-8.
Percentage of construction workers who worked as a manager
in 2000 and 2008–2012

Oregon	2008-2012	2000
Race/ethnicity		
African American	9.2 %	1.7 % **
Asian American	9.1	8.8
Hispanic American	3.6 **	4.8 **
Native American or other minority	6.1	5.0
Non-Hispanic white	9.3 %	8.8 %
Gender		
Female	6.6 %	4.0 % **
Male	8.7	8.9
All individuals	<u>8.5 %</u>	<u>8.3 %</u>

Note: *, ** Denote that the difference in proportions between the minority group and non-Hispanic whites (or between females and males) for the given Census/ACS year is statistically significant at the 90% or 95% confidence level, respectively.

Source: Keen Independent Research from 2000 U.S. Census 5% sample and 2008–2012 ACS Public Use Microdata samples. The 2000 Census and 2008–2012 ACS raw data extracts were obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

In 2008–2012, about 9 percent of non-Hispanic whites in the Oregon construction industry were managers. A similar percentage of African American and Asian American workers were managers. However, less than 4 percent of Hispanic American workers were managers, a statistically significant different from non-Hispanic whites.

The percentage of construction workers working as managers increased from 2000 to the 2008–2012 time period for African Americans, but appeared to decrease for Hispanic Americans.

Gender composition of managers. In the Oregon construction industry in 2008–2012, there was not a statistically significant difference in the percentage of women and men who were managers (see Figure E-8). About 9 percent of male construction workers were managers in 2008–2012. Approximately 7 percent of female construction workers were managers during the same time period. The proportion of female construction workers who were managers increased from 2000 to 2008–2012.

C. Engineering Industry

Keen Independent also examined how education and employment may influence the number of potential minority and female entrepreneurs working in the Oregon engineering industry.

Education. In contrast to the construction industry, lack of educational attainment may preclude workers' entry into the engineering industry. Many occupations require at least a four-year college degree and some require licensure. According to the 2008–2012 ACS, 68 percent of individuals working in the Oregon engineering industry had at least a four-year college degree. Approximately 25 percent had an associate's degree. Focusing on civil engineering, about 87 percent of civil engineers had at least a four-year college degree in 2008–2012.

Therefore, any barriers to college education can restrict employment opportunities, advancement opportunities, and, consequently, business ownership in the engineering industry. Any disparities in business ownership rates in engineering-related work may in part reflect the lack of higher education for particular racial, ethnic and gender groups.⁴⁰ Keen Independent explores this issue below.

Race/ethnicity. Figure E-9 presents the percentage of workers age 25 and older with at least a four-year college degree in Oregon. In Oregon, about 35 percent of all non-Hispanic white workers age 25 and older had at least a four-year degree in 2008–2012. For other racial/ethnic groups, the data for Oregon indicated the following percentage of workers age 25 and older with at least a four-year college degree:

- 84 percent for Subcontinent Asian Americans;
- 42 percent for Asian-Pacific Americans;
- 29 percent for African Americans that had at least a four-year college degree;
- 19 percent for Native Americans; and
- 13 percent for Hispanic Americans.

The level of education necessary to work in the engineering industry may affect employment opportunities for groups for which college education lags that of non-Hispanic whites. In Oregon, Native American and Hispanic American workers were far less likely to have at least a four-year college degree than non-minority workers.

All minority groups showed an increase between 2000 and 2008–2012 in the proportion of workers with a bachelor's (four-year) degree.

⁴⁰ Feagin, J. R., & Imani, N. (1994). Racial Barriers to African American Entrepreneurship: An Exploratory Study. *Social Problems*, 41(4), 562–584; Macionis, J. J. (2014). *Sociology, Fifteenth Edition*. Saddle River, NJ: Pearson.

Gender. Since 2000, the proportion of women in Oregon with at least a four-year college degree has surpassed that of men; in 2008–2012, about 34 percent of women and 32 percent of men had a bachelor’s degree.

Figure E-9.
Percentage of all workers 25 and older with at least a four-year degree, 2000 and 2008–2012

Oregon	2008-2012	2000
Race/ethnicity		
African American	28.5 % **	23.2 % **
Asian-Pacific American	42.1 **	36.7 **
Subcontinent Asian American	84.4 **	71.9 **
Hispanic American	12.7 **	11.2 **
Native American	19.2 **	15.3 **
Other minority group	29.7	25.2
Non-Hispanic white	34.9 %	29.9 %
Gender		
Female	33.7 % **	28.4 %
Male	32.1	29.0
All workers	32.9 %	28.7 %

Note: **, ** Denote that the difference in proportions between the minority and non-Hispanic white groups (or female and male gender groups) for the given Census/ACS year is statistically significant at the 90% or 95% confidence level, respectively.

Source: Keen Independent Research from 2000 U.S. Census 5% sample and 2008–2012 ACS Public Use Microdata samples. The 2000 Census and 2008–2012 ACS raw data extracts were obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

Additional indices of educational attainment. Other data sources showcase trends in post-secondary education among different racial/ethnic groups:

College participation. The U.S. Department of Labor Bureau of Labor Statistics reported that nearly 3 million students ages 16 to 24 graduated high school in 2013 and about two-thirds enrolled in college, a rate unchanged from 2012.⁴¹ The enrollment rate was highest for Asian American students (79%), followed by non-Hispanic whites (67%), African Americans (59%) and Hispanic Americans (60%).

⁴¹ College enrollment rates have remained relatively unchanged over the past 10 years, ranging from 66 to 70 percent.

- **Engineering-related degrees.** Recent data from the National Science Foundation show approximately 12 percent of all bachelor's degrees in engineering fields in the United States in 2012 were awarded to Asian American students. Hispanic Americans were awarded 9 percent of bachelor's degrees in engineering and African Americans were awarded 4 percent of the engineering degrees. Native Americans were awarded less than 1 percent of engineering degrees in 2012.⁴²

Employment. Figure E-10 compares the demographic composition of workers in the Oregon engineering industry to that of all workers in Oregon who are 25 years or older and have a college degree.

Race/ethnicity. In 2008–2012, about 10 percent of the workforce in the Oregon engineering industry was represented by minorities. Of that workforce:

- About 1 percent was made up of African Americans;
- About 4 percent was made up of Asian Americans;
- About 3 percent was made up of Hispanic Americans; and
- About 1 percent was made up of Native Americans or other minorities.

In 2008–2012, all minorities considered together comprised a smaller percentage of workers in engineering-related industries (10%) than minority workers 25 and older with a four-year college degree in other industries (14%). This was primarily due to a smaller representation of Asian Americans in the Oregon engineering workforce than in other industries.

Gender. Compared to their representation among workers 25 and older with a college degree in all industries, relatively fewer women work in the engineering industry. According to the Society for Women Engineers, the number of undergraduate degrees awarded to women in engineering disciplines steadily increased from 1966 to 2000. Between 2000 and 2005, the proportion of undergraduate engineering degrees awarded to women leveled off at about 20 percent, and dropped to about 18 percent by 2010.⁴³ The number of graduate degrees awarded to women has consistently increased since the 1960s; in 2004 22 percent of Master of Engineering degrees awarded to women and 18 percent of Doctorates in Engineering were awarded to women.⁴⁴ In 2008–2012, women represented about 26 percent of engineering-related workers in Oregon with a four-year degree, and 49 percent of workers with a four-year college degree in other industries.

⁴² The percentage of bachelor degrees in engineering awarded to non-Hispanic white students has remained relatively unchanged over the last decade of data (71% in 2002 and 68% in 2012).

⁴³ Education Statistics on Women in Engineering in the USA. (2012, February 8). Retrieved August 17, 2015, from <http://societyofwomenengineers.swe.org/trends-stats/3294-education>

⁴⁴ *Ibid.*

Figure E-10.
Demographic distribution of workers age 25 and older with a four-year college degree in engineering and all other industries, 2008–2012

Oregon	Engineering	All other industries
Race/ethnicity		
African American	1.1 %	1.6 %
Asian American	4.4 **	7.0
Hispanic American	3.3	3.8
Native American or other minority	1.2	1.4
Total minority	<u>10.0 %</u> **	<u>13.8 %</u>
Non-Hispanic white	90.0 **	86.2
Total	<u>100.0 %</u>	<u>100.0 %</u>
Gender		
Female	25.7 % **	48.6 %
Male	74.3 **	51.4
Total	<u>100.0 %</u>	<u>100.0 %</u>

Note: *,** Denote that the difference in proportions between engineers and workers in all other industries for the given Census/ACS year is statistically significant at the 90% or 95% confidence level, respectively. The engineering industry includes “architectural, engineering and related services.”

Source: Keen Independent Research from 2000 U.S. Census 5% sample and 2008–2012 ACS Public Use Microdata samples. The 2000 Census and 2008–2012 ACS raw data extracts were obtained through the IPUMS program of the MN Population Center:
<http://usa.ipums.org/usa/>.

Civil engineers. Keen Independent also examined the number of minorities and women among civil engineers in Oregon in 2008–2012 (see Figure E-11). Overall, in 2008–2012, the percentage of civil engineers who were minorities (8%) was below the percentage of all Oregon workers with college degrees in other industries who were minorities (14%).

Only 11 percent of civil engineers in Oregon were women in 2008–2012, substantially less than the percentage of workers with college degrees working in other industries who were women (49%).

Figure E-11.
Demographics of workers age 25 and older with a college degree in civil engineering and all other industries, 2008–2012

Oregon	Civil engineering	All other industries
Race/ethnicity		
African American	1.1 %	1.6 %
Asian American	4.0 **	7.0
Hispanic American	1.8	3.8
Native American or other minority	1.4	1.4
Total minority	<u>8.4 %</u>	<u>13.8 %</u>
Non-Hispanic white	<u>91.6 **</u>	<u>86.2</u>
Total	100.0 %	100.0 %
Gender		
Female	11.2 % **	48.6 %
Male	<u>88.8 **</u>	<u>51.4</u>
Total	100.0 %	100.0 %

Note: *,** Denote that the difference in proportions between civil engineers and workers in all other industries for the given Census/ACS year is statistically significant at the 90% or 95% confidence level, respectively.

Source: Keen Independent Research from 2000 U.S. Census 5% sample and 2008–2012 ACS Public Use Microdata samples. The 2000 Census and 2008–2012 ACS raw data extracts were obtained through the IPUMS program of the MN Population Center: <http://usa.ipums.org/usa/>.

D. Summary

Keen Independent's analyses suggest that there are barriers to entry for certain minority groups and for women in the construction and engineering industries in Oregon, as summarized below.

Although racial and ethnic minorities comprise 20 percent of the Oregon workforce, only 9 percent of business owners in construction and engineering are minority. Women are 47 percent of the Oregon workforce and 9 percent of construction and engineering business owners. Keen Independent explored whether barriers to entry and advancement might partly explain these overall differences.

- Fewer African Americans work in the Oregon construction industry than what might be expected based on representation in the overall workforce and analysis of educational requirements in the industry.
- Fewer Asian Americans work in the Oregon engineering industry than what might be expected based on analyses of workers 25 and older with a four-year college degree.
- Women account for a very small portion of the Oregon construction and engineering workforce compared with other industries.

Any barriers to entry in construction and engineering might affect the relative number of minority and female business owners in these industries in Oregon.

Keen Independent also examined advancement in the Oregon construction industry.

- Representation of minorities and women is much lower in certain construction trades (including first-line supervisors) compared with other trades.
- Compared to non-Hispanic whites working in the construction industry, Hispanic Americans are less likely to be managers.

Any barriers to advancement in the Oregon construction industry may also affect the number of business owners among those groups.

Appendix F, which follows, examines rates of business ownership among individuals working in the Oregon construction and engineering industries.