

**U.S. Labour Supply:
Recruiting U.S. Workers
Engineering Sector**

Alberta Enterprise and
Advanced Education Report

Alberta 

About the Study

Alberta Enterprise and Advanced Education completed a comprehensive research study of the labour supply in select occupations in the United States (U.S.), including a number of engineering and related professions. The objective of the study is to provide labour market intelligence that will inform Alberta employers as they seek to address current and future labour shortages. This recruiting guide identifies the top recommended locations for targeted recruitment of workers in the selected engineering occupations.

The engineering occupations reviewed in the study were identified by Enterprise and Advanced Education as those that are in critical shortage (or “under pressure”) in Alberta. The study analyzed the supply of workers in 283 metropolitan areas, collecting information on the number of workers employed in selected occupations, workers’ wages, demographics, historical mobility patterns, and other factors that influence the probability of migrating in the future. The study is informed by an analysis of data from the American Community Survey (ACS), the largest survey in the United States, as well as other data sources supplied by the U.S. Bureau of Labor Statistics and the U.S. Census Bureau. The use of micro-data from the ACS allows for in-depth analysis of mobility patterns, earnings and demographic characteristics of workers in each occupation at both the national and local levels.

The study makes recommendations on places that can be targeted for worker attraction. These recommendations are based on both the number of workers employed in target occupations and a *recruitment score* of the workers (an index score that indicates how likely workers are to relocate to Alberta, based on multiple factors) in each location. The recruitment score is based upon three factors that influence recruiting success: (1) the historical mobility patterns of workers¹, (2) the median income of workers in the occupation (workers who stand to earn substantially higher wages in Alberta are more likely to migrate²), and (3) the demographic characteristics of the local pool of workers.³

¹ This variable is based on the percentage of workers in an occupation that are leaving a particular local area (i.e. out of all mechanical engineers in Houston, what percentages of workers are leaving the area?) In the study, this measure is referred to as “emigration share.”

² Wage comparisons throughout the report are made using wages reported in the American Community Survey and the Alberta Wage and Salary Survey. The currency conversion rate used is \$1 CAD = \$1.0116 USD (the monthly weighted average for 2011). It should be noted that the wage comparisons in the report highlight differences in income, but do not reflect differences in cost of living between Alberta and U.S. metro locations.

³ Demographic characteristics are a good predictor of an individual’s likelihood to migrate. Our analysis found, for instance, that renters are more likely to emigrate than people who own their homes and single people are more likely to move than those who are married. These and other characteristics are evaluated in the study to identify what might be described as an “ideal migrant profile.” The emigration probability measures how closely the population of workers in a particular city and occupation matches the ‘ideal’ profile. For instance, are the mechanical engineers working in Phoenix the sort of people who are likely to relocate out of the area?

Key Findings

- In 2011, there were over 2.2 million U.S. workers employed in 18 selected engineering occupations.
- Long-distance migration rates for U.S. engineering workers are among the highest of Alberta's occupations under pressure. Industrial instrument technicians and mechanics are the most mobile with approximately 8.3 per cent of U.S. workers making a long distance⁴ move each year between 2005 and 2010. About 5.8 per cent of petroleum and mining engineers and 5.1 per cent of chemical engineers made long distance moves over the same time period.
- U.S. engineering technologist and technician occupations have lower rates of long-distance migration. Between 1.5 per cent and 2.2 per cent of workers made a long distance move between 2005 and 2010. Engineering managers also have comparatively lower rates of migration, at 2.3 per cent.
- In 2011, Alberta workers earned wages that were higher than those of U.S. workers in similar occupations. Engineering technicians and technologists have the greatest difference in wages with Alberta workers earning between 30 and 55 per cent more than their U.S. counterparts.
- Engineers in Alberta generally have slightly higher average annual wages than workers in the U.S., although not by a wide margin. The exception mechanical engineers which earn about 18 per cent higher wages in Alberta.
- There are three occupations for which average annual wages for workers in Alberta are lower than the average for U.S. workers in similar occupations:
 - Engineering managers,
 - Petroleum engineers, and
 - Geoscientists.Alberta employers may find it difficult to recruit U.S. workers for these occupations.
- Based on an analysis of 283 U.S. metropolitan areas, there are 12 cities that are recommended as one of the top three recruiting locations for two or more engineering-related occupations under pressure. The top recommended cities include:
 - Houston-Galveston,
 - Dallas-Fort Worth,
 - Phoenix,
 - Seattle-Tacoma,
 - Miami-Fort Lauderdale,
 - Austin

Each of these areas has a significant critical mass of engineering workers who have historically been comparatively mobile. The drivers and indicators of mobility differ by city and are explored later in this report for each individual engineering occupation.

⁴ A long distance move is defined in the study as an inter-state move between non-contiguous U.S. states.

National Worker Estimates

Table 1

Labour Supply in the U.S. by Occupation (2011)

– Listing by Canadian National Occupation Classification (NOC) Code and Similar U.S. Standard Occupational Classification (SOC) System

NOC Code	NOC Description	SOC Code	SOC Description	U.S. Employment 2011
211	Engineering Managers	11-9041	Architectural and Engineering Managers	184,530
2113	Geoscientists and Oceanographers	19-2042	Geoscientists, except Hydrologists and Geographers	32,490
2131	Civil Engineers	17-2051	Civil Engineers	254,130
2132	Mechanical Engineers	17-2141	Mechanical Engineers	238,260
2133	Electrical and Electronics Engineers	17-2071, 17-2072	Electrical Engineers, Electronics Engineers, except Computer	290,560
2134	Chemical Engineers	17-2041	Chemical Engineers	27,860
2141	Industrial and Manufacturing Engineers	17-2112	Industrial Engineers	211,490
2142	Metallurgical and Materials Engineers	17-2131	Materials Engineers	22,160
2143	Mining Engineers	17-2151	Mining and Geological Engineers, including Mining Safety Engineers	6,630
2145	Petroleum Engineers	17-2171	Petroleum Engineers	30,880
2212	Geological and Mineral Technologists and Technicians	19-4041	Geological and Petroleum Technicians	14,680
2231	Civil Engineering Technologists and Technicians	17-3022	Civil Engineering Technicians	71,890
2232	Mechanical Engineering Technologists and Technicians	17-3027	Mechanical Engineering Technicians	44,760
2233	Industrial Engineering and Manufacturing Technologists and Technicians	17-3026	Industrial Engineering Technicians	63,030
2241	Electrical and Electronics Engineering Technologists and Technicians	17-3023	Electrical and Electronics Engineering Technicians	150,020
2243	Industrial Instrument Technicians and Mechanics	49-2094, 49-9041, 49-9043	Electrical and Electronics Repairers, Commercial and Industrial Equipment, Industrial Machinery Mechanics, Maintenance Workers, Machinery	437,670
2251	Architectural Technologists and Technicians	17-3011	Architectural and Civil Drafters	85,740
2253	Drafting Technologists and Technicians	17-3011, 17-3012, 17-3013, 17-3019	Architectural and Civil Drafters, Electrical and Electronics Drafters, Mechanical Drafters, Drafters, All Other	193,910

Source: U.S. Bureau of Labor Statistics' Occupational Employment Statistics Database; analysis by RDA Global.

Note: Some U.S. SOC occupation categories are associated with more than one Canadian NOC occupation. For instance, U.S. SOC statistics classify "Architectural and Civil Drafters". Some workers in this SOC category are aligned with the NOC category "Architectural Technologists and Technicians" while others are aligned with the NOC category "Drafting Technologists and Technicians." The reported total number of workers in the target occupations does not match the sum of workers in individual occupations because duplicates have been removed.

United States Mobility Levels by Occupation

Table 2

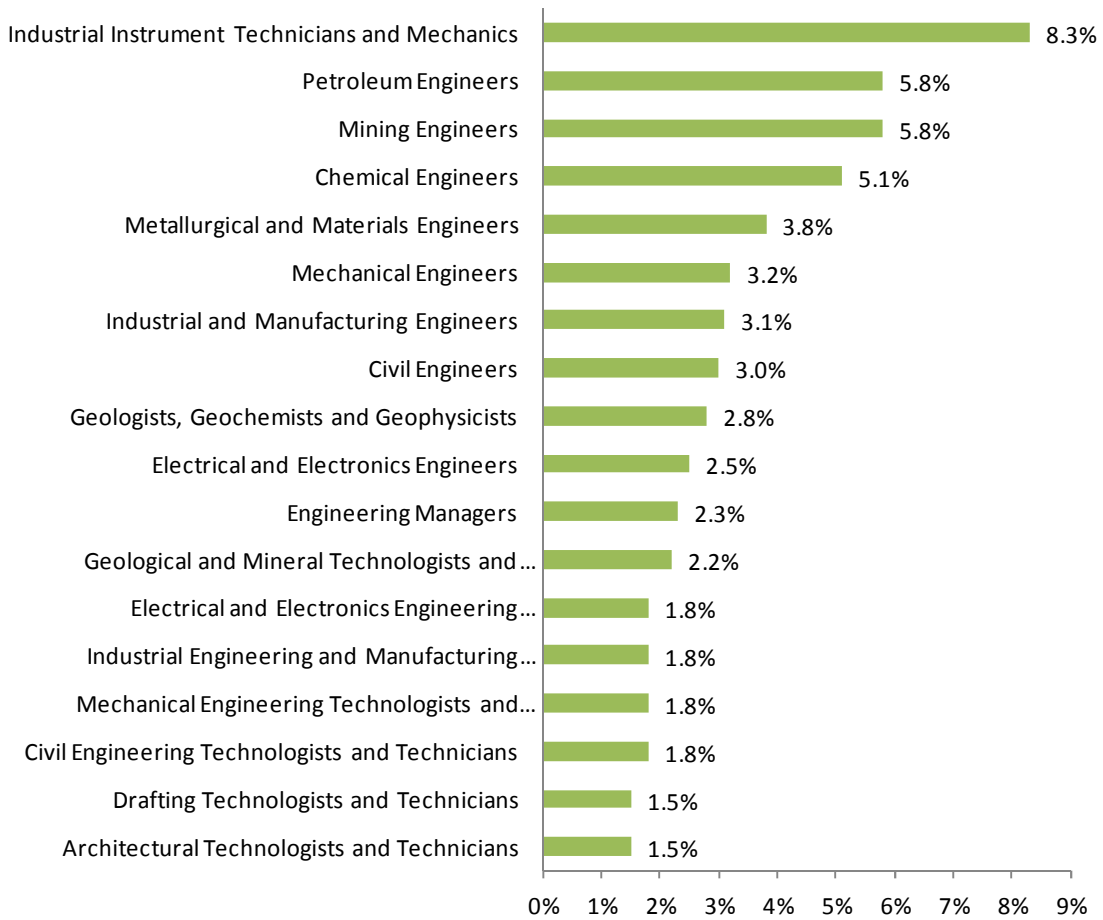
2011 Labour Force and Average Annual Number of Workers who are Movers and Long-Distance Movers, 2005-2010

Occupation	Workers 2011	Movers		Share of Workers	
		Total Movers	Long Distance Movers*	Movers	Long Distance Movers
Engineering Managers	184,530	15,369	4,239	8%	2.3%
Geoscientists and Oceanographers	32,490	4,816	922	15%	2.8%
Civil Engineers	254,130	36,349	7,717	14%	3.0%
Mechanical Engineers	238,260	33,502	7,628	14%	3.2%
Electrical and Electronics Engineers	290,560	35,452	7,190	12%	2.5%
Chemical Engineers	27,860	4,411	1,414	16%	5.1%
Industrial and Manufacturing Engineers	211,490	27,455	6,576	13%	3.1%
Metallurgical and Materials Engineers	22,160	3,165	852	14%	3.8%
Mining Engineers	6,630	1,406	385	21%	5.8%
Petroleum Engineers	30,880	6,547	1,793	21%	5.8%
Geological and Mineral Technologists and Technicians	14,680	1,793	316	12%	2.2%
Civil Engineering Technologists and Technicians	71,890	8,909	1,318	12%	1.8%
Mechanical Engineering Technologists and Technicians	44,760	5,547	820	12%	1.8%
Industrial Engineering and Manufacturing Technologists and Technicians	63,030	7,811	1,155	12%	1.8%
Electrical and Electronics Engineering Technologists and Technicians	150,020	18,592	2,749	12%	1.8%
Industrial Instrument Technicians and Mechanics	437,670	106,517	36,260	24%	8.3%
Architectural Technologists and Technicians	85,740	11,264	1,304	13%	1.5%
Drafting Technologists and Technicians	193,910	25,474	2,948	13%	1.5%
Total †	2,274,950	341,023	82,360	15%	3.6%

† Worker totals are less than the sum of workers for individual occupations. U.S. workers in some occupations are counted for in more than one NOC occupation. Duplicates have been removed in the totals. *Long-Distance Movers are defined as workers who make an inter-state move to a non-contiguous U.S. State. Source: U.S. Bureau of Labor Statistics' Occupational Employment Statistics Database; analysis by RDA Global.

Figure 1

Percentage of Engineering Related Workers Making a Long-Distance Move 2005-2010



Source: American Community Survey.

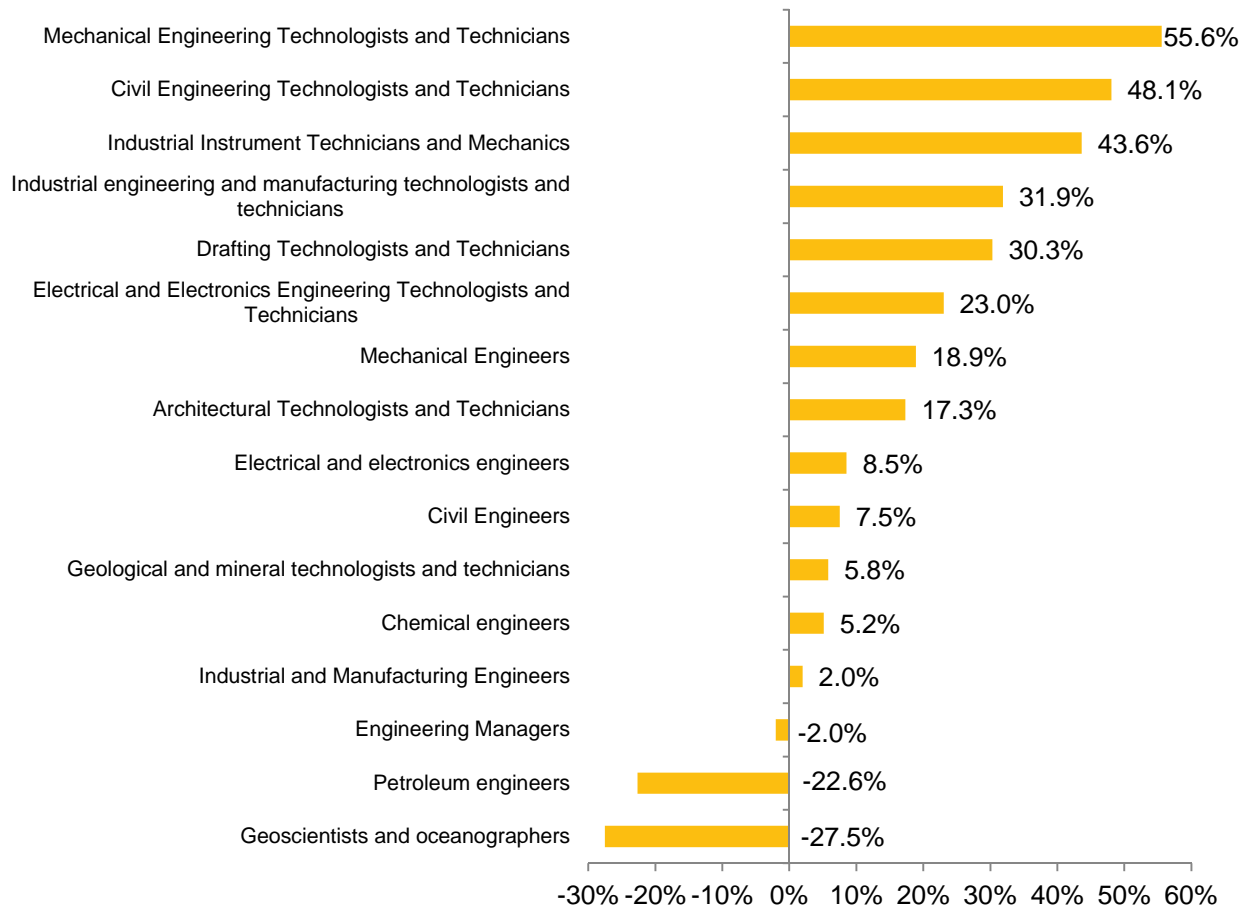
Note: Long-Distance moves are defined as inter-state moves between non-contiguous U.S. states. Figures reflect 18 construction sector occupations.

Wages

Figure 2

Average Annual Salary of Alberta Workers

(Expressed as percentage of the average salary for U.S. workers in similar occupations), 2011



Source: U.S. Bureau of Labor Statistics, OES database; 2011 Alberta Wage and Salary Survey; Analysis by RDA Global.

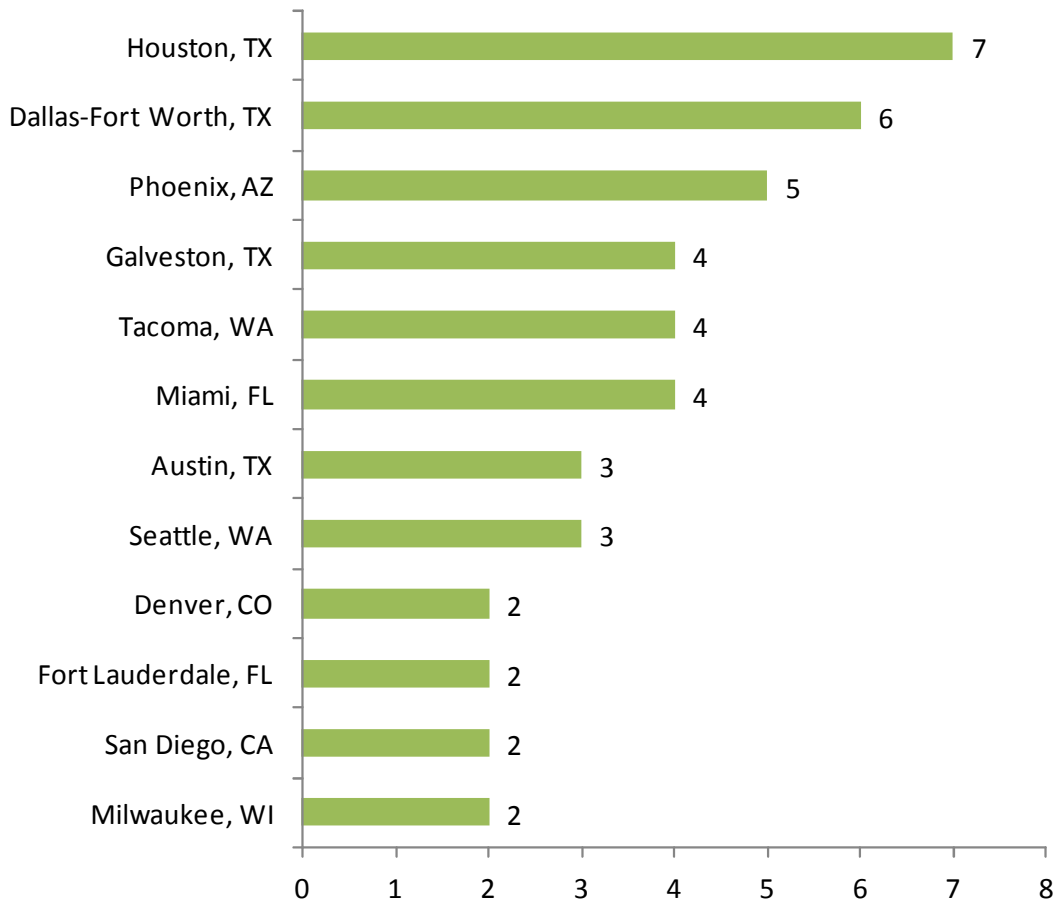
Top Locations for Recruiting

This guide reviews the top few recommended cities for each engineering-related occupation. There are 12 cities that are recommended as one of the top three recruiting locations for two or more engineering-related occupations under pressure (see Figure 3). The Houston-Galveston area, Dallas-Fort Worth, and Phoenix offer some of the best recruiting potential for engineering workers. The area around Seattle-Tacoma as well as the Miami-Fort Lauderdale area and Austin would also be good locations for recruiting workers.

Figure 3

Best Locations for Recruiting in Engineering Related Occupations

(Number of occupations for which each city is in the top three recommended locations to recruit)



Source: U.S. Bureau of Labor Statistics' Occupational Employment Statistics Database; analysis by RDA Global.

Engineering Managers

Recruiting of engineering managers is recommended in several broad areas of the U.S. Three of the top five recommended cities are located in Florida: Miami, West Palm Beach and Tampa-St. Petersburg. Miami and West Palm Beach both have a relatively large labour force, with just over 1,500 workers in each location and relatively high levels of unemployment with over nine per cent, a factor that could push some workers to seek opportunities in other locations. In addition, mean annual salary of workers in these Florida cities is generally lower than the average income for workers in Alberta.

Another good area for recruiting may be in the Ohio/Kentucky/Indiana area around Cincinnati. Columbus, OH, Hamilton, OH (located just outside of Cincinnati) and Louisville, KY are all in the top 20

recommended U.S. cities. These locations generally have a relatively young labour force, with 22 per cent, 22 per cent and 19 per cent, respectively, of the labour force under age 35, a characteristic that indicates a better chance of migrating. About 13 per cent of workers in Columbus are non U.S. citizens. There are nearly 2,600 workers in these three cities.

The third area of the U.S. that may be considered a good recruiting location for engineering managers is in Western South Carolina. Three of the top 20 recommended cities, Augusta, Georgia, Greenville and Columbia, SC, are located within approximately a 50 mile (80 km) radius from one another. There are over 1,500 workers in the area. About 18 per cent of the labour force in Augusta consists of long distance migrants, while nearly 20 per cent are renters, both characteristics that may indicate likely migration. Average annual salaries of workers in each of these cities are below that of Alberta as well, a factor that may entice workers to relocate. RDA Global recommends a recruiting strategy that focuses on these three groups of cities in order to access a large pool of workers and to find workers who may be likely to migrate to Alberta.

Geoscientists and Oceanographers

In an occupation with a small labour force and an even smaller group of mobile workers, San Diego has the best combination of number of workers (660) and recruitment score. The Seattle-Tacoma area is also highly ranked with 640 workers. Pittsburgh has the second-highest recruitment score among top ranked U.S. cities (at 1.05) and a moderately large labour force with 350 workers.

Denver and Dallas-Fort Worth may be good locations to recruit in this occupation. The two metro areas have the largest labour forces with 1,390 and 1,460 workers, respectively. Mean annual salaries for workers in these locations are significantly higher than the mean salary in Alberta, which could prevent some workers from relocating. In 2011, workers in Dallas earned the equivalent of \$124,000 CAD, while workers in Denver earned approximately \$111,000 CAD, compared with an Alberta mean salary of \$70,000. In general, employers may face difficulty recruiting workers in this occupation due to overall higher mean salaries in the U.S., which are 38% higher in the U.S.

RDA Global recommends recruiting in Pittsburgh, Baltimore and Portland based on the relatively high recruitment scores in those cities, and the fact that wages are lower than average compared to Alberta. Cities where there are more workers that have higher average salaries, but may also be likely to relocate, include San Diego and the Seattle-Tacoma area.

Civil Engineers

Civil Engineers have the largest U.S. labour force in this occupational group. Employers are advised to consider recruiting in the Seattle-Tacoma area where there is a large labour force of nearly 7,000 civil engineers. Tacoma has a relatively young and mobile group of civil engineers, with approximately 39 per cent of workers under age 35 and 10 per cent who are long-distance movers. In addition, while Seattle-Tacoma has a mean income that is above the U.S. average (\$85,000 CAD), it is lower than the Alberta mean annual salary (\$88,000 CAD). The prospect of higher wages may encourage some workers to emigrate. The Ft. Lauderdale-West Palm Beach area is another location that may be good for recruiting civil engineers. With approximately 4,000 workers, and relatively high unemployment, some workers in the area may consider relocating to Alberta.

Recruitment scores are generally low for civil engineers, so RDA Global recommends recruiting in the larger markets of Seattle-Tacoma and Fort Lauderdale-West Palm Beach in order to find workers who may be facing extended periods of unemployment, or who earn below-average wages and are more willing to relocate to find work or earn higher wages.

Mechanical Engineers

The top three U.S. cities for recruiting mechanical engineers are Washington, DC, Dallas-Fort Worth and Houston. Dallas-Fort Worth and Houston do not share a worker pool since they are separated by 250 miles (400 km) but each has a relatively large labour force. The Dallas-Fort Worth area has 5,410 workers and unemployment over 7 per cent, as well as average wages (\$89,000 CAD) that are lower than Alberta (\$98,000 CAD). Houston also has 7 per cent unemployment and 6,730 workers however with average annual salaries of over \$101,000 CAD per year, workers earn more than the average in Alberta.

Washington, DC has over 5,000 mechanical engineers and a recruitment score of 0.87 however average salaries are higher than Alberta, near \$102,000 CAD and unemployment is relatively low. Minneapolis has a relatively large labour force with over 4,000 workers, and there is also a bigger salary difference between Minneapolis and Alberta. The mean salary in Minneapolis is \$81,000 CAD, approximately 21 per cent less than the mean salary in Alberta. The salary difference may be an incentive for emigration.

RDA Global recommends recruiting in Washington DC, Dallas-Fort Worth and Houston, provided employers are able to meet the salary expectations of workers. Minneapolis is a viable alternative recruiting location as well.

Electrical and Electronics Engineers

Electrical and electronics engineers are classified in to two job codes in the U.S.: Electrical Engineers and Electronics Engineers (except Computers). Workers in both U.S. occupations have average salaries that are lower than the Alberta mean salary of \$95,754 CAD.

The largest number of electrical and electronics engineers are found in Houston, where there are 5,060 workers. Houston also has a moderately favourable recruitment score of 0.64, and 31 per cent of workers are under age 35, while 19 per cent rent their homes, indicating they may be more likely to move. Miami-Ft. Lauderdale may be a good location for recruiting, with 2,400 workers in the area, high unemployment (9.3 per cent) and a relatively high recruitment score of 1.24 and 1.00, respectively. The mean annual salary in the area is \$83,000 CAD, which is 14% lower than the average in Alberta. Another good location for recruiting is in the Kansas City MO-KS, area. This city has a moderate recruitment score (0.61), and approximately 40 per cent of workers are under age 35, and nine per cent have made a long-distance move in recent years. The labour force is relatively large with almost 4,000 workers and average salaries (\$82,000 CAD) are below that of Alberta. RDA Global recommends recruiting in these three areas based on the large pool of workers in each area, as well as labour force characteristics that are similar to those of migrants.

Chemical Engineers

The U.S. labour force for chemical engineers is a small population of workers who are not generally likely to migrate. One of the best recruiting locations for this profession in the U.S. would be the Boston metro area (encompassing both the Boston and Brockton areas). This area has over 1,600 workers, many of whom are young workers, renters and non-U.S. citizen workers. In addition average salaries are slightly lower in the Boston-Brockton area (\$100,000 CAD and \$97,000 CAD, respectively) than in Alberta (\$103,000 CAD). Other good locations may be the San Francisco-Oakland area and Denver. Each of these cities has a relatively high recruitment score indicating that workers there may be likely to move however both cities have a small labour force with only 300 workers. The Houston-Galveston area has a large labour force (over 3,000 workers) but average salaries are 23 per cent higher than in Alberta, which could be a barrier to recruiting.

RDA Global recommends recruiting for chemical engineers in the Boston-Brockton area because of the combination of relatively low wages and favourable recruiting demographics. We also recommend

recruiting in locations where the recruitment potential is high (San Francisco-Oakland and Denver) or wages are low compared to Alberta (Chicago, New York, Dallas-Fort Worth or San Diego).

Industrial and Manufacturing Engineers

This occupation has over 211,000 workers in the U.S. Of those workers nearly 7,000 are likely to be long-distance movers. The recruitment scores are generally not high for this occupation, but there are several sizeable labour markets in the U.S. that may be good recruiting locations.

Houston is the top-ranked recruiting location, with more than 4,000 workers, and a relatively high recruitment score (0.58) however the mean salary for workers in Houston (\$103,000 CAD) is higher than the mean salary in Alberta (\$81,000 CAD) for this occupation. Hamilton, Ohio is highly ranked, but there are very few workers that have made long-distance moves in recent years. Alberta mean salaries are three per cent higher than Hamilton which could encourage some workers to relocate, and unemployment is moderately high at 7.8 per cent. Phoenix is home to 3,300 engineers in this occupation and a relatively large percentage of young and renting workers. Memphis has the highest recruitment score among the top-ranked cities for this occupation, and there are nearly 1,000 workers.

RDA Global recommends recruiting in Houston, Hamilton and Phoenix due to the relatively large sized labour forces in those areas, and the moderate recruitment scores. Employers are advised they may need to offer higher than average wages to workers in some of the recommended U.S. locations for this occupation.

Metallurgical and Materials Engineers

Metallurgical and Materials Engineers are one of the smaller occupational populations in this study, with just 22,000 workers. Top recruiting locations include Phoenix, Dallas-Fort Worth and Houston. Each of these locations has 550-650 workers and the highest recruitment scores among top recommended cities (all three are above 1.10). Washington DC has a similar recruitment score with a slightly smaller labour force of 480 workers. The largest labour force for this occupation is in Los Angeles (LA), where there are over 1,600 workers however salaries are relatively high (\$101,000 CAD), and the recruitment score is lower than other top-recommended cities at 0.77. Average salaries for this occupation were not reported in the 2011 Alberta Wage and Salary Survey.

RDA Global recommends recruiting in Phoenix, Dallas-Fort Worth and Houston for this occupation due to favourable recruitment scores and moderate salary levels.

Mining Engineers

The total U.S. population of mining engineers is less than 7,000 workers. The only two recruiting locations with a labour force larger than 250 workers in this occupation are the Houston-Galveston area and Denver. Note: locations with fewer than 250 workers have been excluded from our analysis throughout all occupations, but were included for mining engineers because of the limited labour force size in virtually all U.S. metro areas. The Houston-Galveston area provides a combined target labour force of 350 workers, while there are about 310 workers in Denver. Recruitment scores for workers in both locations do not indicate workers are highly likely to relocate however these are the only two metro areas that are recommended for recruiting.

Los Angeles (LA) and Tucson both have nearly 200 workers, and may be good recruiting locations for employers who have existing connections in these areas. The recruitment score for workers in LA is slightly higher (0.92) than Tucson (0.39), indicating LA may be a better place to recruit.

The mean U.S. salary for mining engineers is \$89,000 CAD, while the salary in the three recommended cities with a sizeable population of mining engineers is above \$101,000 CAD. Wage data for mining engineers was not provided in the 2011 Alberta Wage and Salary Survey.

Petroleum Engineers

The population of U.S. petroleum engineers is heavily concentrated in the Houston-Galveston area, with more than 11,000 workers. Recruitment scores indicate that workers in Houston may be somewhat likely to migrate, while workers in Galveston are not as likely. Dallas-Fort Worth, with nearly 2,600 workers, provides a relatively large population of petroleum engineers who may be fairly good candidates for relocation, with a recruitment score of 0.92. Petroleum engineers in Anchorage have the highest recruitment score (1.25) among recommended cities, however the labour force is very small with only 430 workers. Employers are advised that recruiting petroleum engineers in the U.S. could be difficult, based on average wage information: the mean annual salary in Alberta is \$106,000 CAD, while in the U.S. petroleum engineers are paid an average of over \$137,000 CAD.

RDA Global recommends recruiting in the Houston-Galveston area, Dallas-Fort Worth, and New Orleans based on their comparatively large labour forces and moderately high recruitment scores.

Geological and Mineral Technologists and Technicians

The U.S. labour force for geological and mineral technologists and technicians is about 15,000 workers. Houston-Galveston is the primary area to recruit for workers in this field, with nearly 3,000 workers and high recruitment scores (0.57 in Houston and 1.74 in Galveston) indicating workers may be willing to migrate. Another good location for recruiting is 200 miles (320 km) away in Austin. Workers in Austin have high recruitment scores of 3.04 however the labour force is small with fewer than 300 workers. Average salaries are much lower in Austin (\$39,000 CAD) than in Alberta, where workers earn nearly \$61,000 CAD per year. Dallas-Fort Worth has a slightly larger labour force with 650 workers in the metro area, and a recruitment score of 1.13.

RDA Global recommends recruiting in these areas of Texas based on the size of the labour force in these cities, and the relatively high recruitment scores.

Civil Engineering Technologists and Technicians

In the U.S., there are nearly 72,000 civil engineering technologists and technicians. The top recommended locations for recruiting workers are Austin, Miami-Ft. Lauderdale, Seattle and Dallas-Fort Worth. Austin leads the top-ranked cities with over 1,200 workers and a favourable recruitment score of 0.63. More than a quarter of workers there are under age 35, and slightly more than that are renters. In addition, wages are about 34 per cent lower in Austin than for workers in Alberta. Miami-Ft. Lauderdale has more than 1,000 workers, and a may be a good possibility for recruitment, due to currently high unemployment in the area (9.3 per cent). Seattle has slightly fewer than 1,000 workers and 28 per cent young workers who are renters, indicating it may have good potential for recruiting. Dallas-Fort Worth has the most workers among the top-four recommended locations for this occupation and average salaries are 38% lower than Alberta.

The mean salary in this field is \$71,000 CAD in Alberta and \$48,000 CAD in the U.S. Of the recommended cities, Dallas has the lowest salary, followed by Austin, Miami and Seattle. RDA Global recommends recruiting in these locations.

Mechanical Engineering Technologists and Technicians

Boise City, Idaho is the top recommended city for this occupation in the U.S. The city is home to over 500 mechanical engineering technologists and technicians and almost 40 per cent of its workers are under 35, and 20 per cent of workers in the area are renters. The average annual salary in Boise City is less than

the U.S. average of \$52,000 CAD. Milwaukee also has a favourable recruitment score (1.18) and nearly 600 workers. Seven per cent of workers in Milwaukee are non-U.S. citizens and the city has more than 30 per cent of workers that are under age 35 and who are renters. Dallas-Ft. Worth has a much larger labour force, with over 1,200 workers, but a lower recruitment score of 0.57.

The average salary in Alberta in this field is \$81,000 CAD, while in the U.S. the average salary is 34 per cent lower at \$52,000 CAD. Employers are likely to find workers willing to relocate for higher wages in many U.S. cities. RDA Global recommends recruiting in any of the top five ranked locations, all of which have a high recruitment score or a large labour force.

Industrial Engineering and Manufacturing Technologists and Technicians

Phoenix has by far the largest recommended U.S. labour force with 2,370 workers however the recruitment scores are lower than some other recommended cities for this occupation, at just .34, indicating a relatively low likelihood of migration. Milwaukee is a recommended location, based on positive factors that indicate workers are likely to migrate. The pool of workers is smaller with just over 600 workers, 34 per cent of which are young and 32 per cent of them are renters. Dallas-Ft. Worth is another recommended location for this field with almost 1,500 workers in the metro area however the recruitment score is similar to that of Phoenix.

The mean annual salary for workers in Alberta is \$67,000 CAD and is higher than the average salary for workers in each of the top recommended U.S. cities. In this occupation, the U.S. average salary is \$51,000 CAD. We recommend recruiting in the top three recommended cities – Phoenix, Milwaukee and Dallas-Fort Worth.

Electrical and Electronics Engineering Technologists and Technicians

In this occupation, there are over 150,000 workers in the U.S., with 2,500 or more workers in each of the top five locations for recruiting. Austin is the top recommendation for this occupation with 3,250 workers and a recruitment score of 0.63, indicating a moderate potential for migration. Workers in Austin are young (25 per cent under age 35) and many are renters (27 per cent). The average wage in Austin is also lower than both the U.S. average and the Alberta average. Dallas-Ft Worth has a large labour force with over 5,000 workers in the area although with a low recruitment score (0.30) many workers there may be unwilling to consider relocation. San Diego, Portland and Phoenix all have around 3,000 workers and moderate to low recruitment scores. The primary attraction for these cities lies in the sizeable labour force present in each location.

The average salary for this occupation in Alberta is \$70,000 CAD while workers in the U.S. have an average salary of \$56,600 CAD. Recruiting in the top five ranked locations is recommended in order to locate the greatest number of qualified workers. Some workers will likely be attracted by the opportunity to earn higher wages.

Industrial Instrument Technicians and Mechanics

Industrial instrument technicians and mechanics is the largest occupation within this occupational group, with 438,000 workers. Recruitment potential seems favourable in the U.S. for this occupation. Many cities have a sizeable labour force as well as recruitment scores over 1.0. As a group, workers in this field are young (35 per cent are under age 35) and many are also renters. The top recommended location for this occupation is Galveston, located near Houston. The labour force is by far the largest in the U.S., with nearly 16,000 workers in Galveston and they also have the highest recruiting score of any recommended U.S. city as well at 2.84. Miami-Ft. Lauderdale may also be a good location for recruiting. There are over 5,000 workers in the area, and the area has a good recruitment score of 1.01. Norfolk has nearly 3,000 workers, a recruitment score of 1.70 and is the third ranked recruiting location for this occupation.

The average U.S. salary for workers is approximately \$47,000 CAD, while in Alberta the average salary for workers is \$74,471 CAD. Employers may locate workers interested in earning higher wages in most U.S. cities, but we recommend recruiting in Galveston, the Miami-Fort Lauderdale area and Norfolk.

Architectural Technologists and Technicians

The U.S. labour force for architectural technologists and technicians includes more than 85,000 workers, and approximately 30 per cent of these are young workers, and a large share of them rent their homes, both characteristics that are common to migrants.

The Seattle-Tacoma area and Phoenix are very similar in the demographic profile that may indicate possible migrant workers. Both cities have over 1,000 workers and relatively high recruitment scores (1.07 in Tacoma and Phoenix, and 0.64 in Seattle) indicating workers there may be potential migrants. The Yolo County area in California (adjacent to Sacramento) is the top-ranked area with a recruitment score of 1.68, indicating that workers may be willing to relocate, and there are 850 workers in this occupation in the area. Los Angeles also has a large number of workers, but workers there are less likely to relocate with a 0.18 recruitment score.

Architectural technologists and technicians in the U.S. have average annual salaries of almost \$50,000 CAD, while the average for workers in Alberta is \$58,000 CAD. Salaries in the top-recommended areas are similar to those of workers in Alberta. Recruiting is recommended in the Seattle-Tacoma area, Phoenix and Sacramento-Yolo area, provided employers are able to meet workers' salary expectations.

Drafting Technologists and Technicians

There are just under 194,000 drafting technologists and technicians in the U.S. Many of these workers are young, with approximately 30 per cent under age 35 and a large share of them rent their homes, both characteristics that are common to migrants.

Seattle-Tacoma is the top-ranked recruiting location for this occupation with over 11,000 workers that have relatively high recruitment scores of 0.64 and 1.07, respectively. Phoenix has almost 7,000 workers, and is the second ranked city. In addition, workers in Phoenix have lower average salaries (\$56,000 CAD) than workers in the Seattle-Tacoma area (\$64,000 CAD). Yolo County, California, near Sacramento has fewer workers (approximately 3,600) but the recruitment score is higher (1.68) and a large share of workers are renters (39 per cent).

The average salary for drafting technologists and technicians in the recommended U.S. cities is between \$47,000 CAD in Fayetteville and \$64,000 CAD in the Seattle-Tacoma area, while workers in Alberta have average salaries near \$65,000. U.S. workers may be attracted by higher wages in Alberta, depending on their current salary level. Recruiting is recommended in Phoenix and Sacramento (Yolo County) as a primary option, as well as the Seattle-Tacoma area.

Table 3
Top-Recommended locations for Recruiting in the U.S., by Occupation

NOC Code	NOC Description	Number of Workers 2011	U.S. Annual Mean Salary (CAD, 2011)	Alberta Annual Mean Salary (CAD, 2011)	Recruitment Score ⁵
	Name of City		Average Salary (CAD)		
	Name of City				
	Name of City				
211	Engineering Managers		\$127,934	\$125,335	
	Chattanooga, TN	280	\$105,644		2.10
	Miami, FL	1,510	\$122,781		0.44
	Tacoma, WA	3,970	\$133,798		0.11
2113	Geoscientists and Oceanographers		\$96,630	\$70,018	
	San Diego, CA	660	\$76,752		1.12
	Sacramento, CA	910	\$82,711		0.66
	Denver, CO	1,460	\$110,753		0.39
2131	Civil Engineers		\$81,805	\$87,978	
	Tacoma, WA	6,780	\$85,361		0.82
	Fort Lauderdale, FL	3,970	\$89,134		0.80
	Seattle, WA	6,780	\$85,361		0.35
2132	Mechanical Engineers		\$82,635	\$98,238	
	Washington, DC	5,120	\$101,820		0.87
	Dallas-Fort Worth, TX	5,410	\$88,882		0.58
	Houston, TX	6,730	\$101,163		0.36
2133	Electrical and Electronics Engineers		\$88,223	\$95,754	
	Miami, FL	2,400	\$82,693		1.24
	Fort Lauderdale, FL	2,400	\$82,693		1.00
	Houston, TX	5,060	\$93,370		0.64
2134	Chemical Engineers		\$98,351	\$103,425	
	Brockton, MA	1,040	\$97,440		1.23
	Houston, TX	3,040	\$130,500		0.48
	Galveston, TX	3,040	\$130,500		0.27
2141	Industrial and Manufacturing Engineers		\$78,966	\$80,547	
	Hamilton, OH	2,130	\$77,835		0.79

⁵ Recruitment score is a standardized index score that indicates the overall recruiting potential based on a combination of economic and demographic indicators as well as historical migration trends. Scores above zero indicate a higher than average probability of migration. Scores above 1 are considered very attractive.

NOC Code	NOC Description	Number of Workers 2011	U.S. Annual Mean Salary (CAD, 2011)	Alberta Annual Mean Salary (CAD, 2011)	Recruitment Score ⁵
	Name of City		Average Salary (CAD)		
	Name of City				
	Name of City				
	Houston, TX	4,160	\$102,923		0.58
	Phoenix, AZ	3,280	\$93,151		0.49
2142	Metallurgical and Materials Engineers		\$85,840	n.a.	
	Phoenix, AZ	630	\$94,142		1.33
	Dallas-Fort Worth, TX	540	\$76,226		1.31
	Los Angeles, CA	1,650	\$100,738		0.77
2143	Mining Engineers		\$89,084	n.a.	
	Houston, TX	350	\$138,026		0.63
	Denver, CO	310	\$101,689		0.44
	Galveston, TX	350	\$138,026		0.01
2145	Petroleum Engineers		\$137,458	\$106,330	
	Dallas-Fort Worth, TX	2,590	\$163,135		0.92
	Houston, TX	11,300	\$147,283		0.63
	New Orleans, LA	1,110	\$130,915		0.58
2212	Geological and Mineral Technologists and Technicians		\$57,207	\$60,534	
	Austin, TX	290	\$39,342		3.04
	Galveston, TX	2,760	\$57,127		1.74
	Houston, TX	2,760	\$57,127		0.57
2231	Civil Engineering Technologists and Technicians		\$47,949	\$71,000	
	Austin, TX	1,230	\$48,062		0.63
	Seattle, WA	960	\$57,693		0.55
	Miami, FL	1,080	\$54,769		0.52
2232	Mechanical Engineering Technologists and Technicians		\$52,232	\$81,257	
	Boise City, ID	530	n.a.		1.64
	Milwaukee, WI	570	\$51,816		1.18
	Dallas-Fort Worth, TX	1,210	\$48,295		0.57
2233	Industrial Engineering and Manufacturing Technologists and Technicians		\$51,282	\$67,637	
	Milwaukee, WI	620	\$50,389		0.92
	Phoenix, AZ	2,370	\$55,407		0.34

NOC Code	NOC Description	Number of Workers 2011	U.S. Annual Mean Salary (CAD, 2011)	Alberta Annual Mean Salary (CAD, 2011)	Recruitment Score ⁵
	Name of City		Average Salary (CAD)		
	Name of City				
	Name of City				
	Dallas-Fort Worth, TX	1,490	\$54,972		0.31
2241	Electrical and Electronics Engineering Technologists and Technicians		\$56,613	\$69,660	
	Austin, TX	3,250	\$51,826		0.63
	San Diego, CA	3,120	\$62,660		0.45
	Dallas-Fort Worth, TX	5,220	\$54,506		0.30
2243	Industrial Instrument Technicians and Mechanics		\$51,846	\$74,471	
	Galveston, TX	15,680	\$51,541		2.84
	Norfolk, VA	2,860	\$44,328		1.70
	Miami, FL	5,320	\$46,511		1.01
2251	Architectural Technologists and Technicians		\$49,611	\$58,209	
	Yolo, CA	850	\$57,288		1.68
	Phoenix, AZ	1,040	\$57,673		1.07
	Tacoma, WA	1,110	\$56,843		1.07
2253	Drafting Technologists and Technicians		\$49,611	\$64,653	
	Phoenix, AZ	6,970	\$56,009		1.07
	Tacoma, WA	11,230	\$63,847		1.07
	Seattle, WA	11,230	\$63,847		0.64

Note: U.S. wages are expressed in CAD for ease of comparison. Exchange rate used: \$1 CAD = \$1.0116 USD (the monthly weighted average for 2011).