

Comparing Construction Managers and Civil Engineers Based on the Occupational Outlook Handbook

Richard Burt Ph.D

Auburn University
Auburn, AL

Audrey K. Tinker Ph.D

Sage Signature Homes, Inc.
Lewisville, Texas

Students deciding on a professional career in construction have several degree options, but the primary two are a degree in Civil Engineering or one in Construction Management. When assessing which to choose, one of the most important determinants is the employment outlook for each profession. The Occupational Outlook Handbook published by the Bureau of Labor Statistics is one resource students and parents may use to assist in their decision making. Today, it is a free government electronic publication that describes a myriad of professions and provides degree/training requirements, lists typical salaries and also predicts job outlook. This paper compares employment trends for civil engineers and construction managers and assesses the accuracy of the Occupational Outlook Handbook's employment predictions for the two professions to determine if it is a reliable resource for students and parents. Results suggest that the employment of Construction Managers grew at a significantly faster rate than Civil Engineers from 1988 through 2008, but due to significant changes in the national economy, the number of Construction Managers employed has significantly declined since 2008. The Occupational Outlook Handbook has done a much better job at predicting employment of Civil Engineers than Construction Managers who's employment numbers have been consistently underestimated.

Keywords: civil engineering job outlook, construction manager job outlook, Occupational Outlook Handbook

Introduction

Both civil engineers and construction managers are professional fields involved in the construction process. Many universities offer civil engineering programs and construction management programs with names such as construction science, building science, or construction engineering. Sometimes more than one construction-related degree is offered in the same college, and it is not uncommon for students to switch between these majors during their academic career. One of the factors influencing a student's decision to study a particular major is the employment outlook for the profession or career the major serves. The objective of this paper is to compare the major measures of employment and the employment outlook for civil engineers and construction managers as reported by the United States Department of Labor's Bureau of Labor Statistics Occupational Outlook Handbook. The *Occupational Outlook Handbook* (OOH) is a nationally recognized source of career and job information, designed to provide valuable assistance to individuals making decisions about their future work lives." It is revised every two years and includes such information as working conditions, what workers in each field do, what education or training is required, earnings potential and expected job prospects (Heathfield, 2015).

The OOH is a publication of the United States government and is therefore not copyrighted. Other publishers can thus use its information and features and add their own additional information. That being said, it is still referenced as a primary source of locating job data although many professional and trade associations and educational institutions produce career materials. These include such resources as The Guide to American Directories, The Directory of Directories, and the Encyclopedia of Associations (JIST Publishing, 2012).

In 1949, the Bureau of Labor and Statistics, with financial assistance from the Veterans Administration, published the first Occupational Outlook Handbook (OOH) (Goldstein, 1999). Its initial intent was to serve as a sourcebook of potential careers for post-World War II veterans (Pilot, 1999). Subsequent handbooks gradually changed to assist school guidance counselors and students in selecting career paths and to aid schools in their course offering selections, so they would not offer courses in outdated fields (Goldstein, 1999). Two-hundred eighty-eight occupations were included in the first edition. By 1951, almost 150 more had been added and the number continued to increase until budget cuts resulted in a reduction to only 185 detailed occupational reports in the eighties (Pilot, 1999). Since then, the number has again increased significantly. The 2016–17 OOH includes 329 occupational profiles (U.S. Department of Labor, 2016).

To accurately predict the outlook for such a large number of professions, research was conducted that included population trends, technological changes, national income, changes in consumer tastes and trends within each job category (Goldstein, 1999). Research methods have not always been consistent between categories, making comparisons sometimes difficult. For example, earlier versions reported income for some professions in terms of yearly salary, while others were given as an hourly wage (Pilot, 1999). However, in recent years, the format has been revised so reporting methods are consistent between careers.

Despite some inconsistencies, the OOH proved to be tremendously popular, growing from a first printing of 40,000 copies to a number that eventually exceeded the country's total number of high schools, colleges and public libraries (Goldstein, 1999). In recent years, private companies have started publishing their own career comparisons and thus, sales for the OOH dropped. In 2012, the Bureau of Labor Statistics released the redesigned 2012-2013 edition of the handbook in a free, on-line format.

Professions in the Handbook have changed significantly over the years. Examples of careers in the first publication included riveters, typewriter servicemen, blacksmiths and railroad brakemen (Pilot, 1999). Today, those have been replaced with jobs such as computer security managers, deep tissue massage therapists and electrocardiogram technicians (U.S. Department of Labor, 2016).

The career of Construction Manager (CM) was not introduced in the OOH until its 1990 publication. Its description was included under the heading of "Executive, Administrative and Managerial Occupations" along with such professions as accountants, underwriters and hotel managers. Unlike some professions with only a few paragraphs of explanation, the CM description included multiple paragraphs for each of the headings: "What Construction Managers Do, Work Environment, How to Become a Construction Manager, Pay, Job Outlook and Similar Occupations".

Civil Engineers (CE) have been included in the OOH since the first publication in 1949. Civil Engineers were included in a section titled "Engineering and Other Technical Fields. No distinct entry was identified for Civil Engineers. However, the supervision of the construction of buildings was included in the nature of the work a CE does. It was also noted in this first entry that the private construction industry was a large employer of Civil Engineers (U.S. Department of Labor, 1949). In the seventies, the profession had its own heading and description. In the mid 2000's, all engineers were combined in one section with tables and brief descriptions for each subcategory of engineering. Today, the online version has each area of engineering again separated with a comparable description for each and every specialty.

Method

To make a comparison between the employment outlook of both professions, data that evaluates past employment and employment outlook was identified. In the 1990/91 OOH, the total number of jobs was reported as being

186,000 and 187,000 for civil engineers and construction managers respectively, based on data from 1988. The 2016/17 OOH reports the total number of jobs as 281,400 and 373,200 for civil engineers and construction managers respectively, based on data from 2014. Therefore, there is a continuous set of employment data from 1988 to 2014.

In addition to simply comparing the two industries, we wanted to assess if the OOH accurately predicted trends in job growth for Construction Managers and Civil Engineers and thus if it is an accurate indicator of future job opportunities, as designed? Until the 2008 edition of the OOH, employment projections in the Handbook had been presented as qualitative statements, such as “Opportunities for civil engineers should increase rapidly through the mid-1980's.” (U.S. Department of Labor) The reason given for this was that most high school students could not easily understand percentage changes and projections are often not precise enough to warrant exact percentages (Pilot, 1999). However, starting with the 1974–75 Handbook, the Bureau provided a key for interpreting the qualitative phrases in a numerical form. This was revised in the 1976-1977 Handbook and again in the 1998-99 Handbook. Below, Table 1 provides the interpretations given by the Bureau for each prediction prior to 2008 when the OOH started giving predictions as a percentage (Pilot, 1999).

Table 1
Interpreting the OOH Qualitative Predictions for Job Growth

If the statement reads. . .	Employment is projected to. . .
Grow much faster than the average	Increase 36 percent or more
Grow faster than the average	Increase 21 percent to 35 percent
Grow about as fast as the average	Increase 10 percent to 20 percent
Grow more slowly than the average, or little or no change	Increase 0 percent to 9 percent
Decline	Decrease 1 percent or more

The phrase used to describe the job outlook for construction managers in the 1998/99 handbook is “Employment of construction managers is expected to increase as fast as the average for all occupations through the year 2006”. The phrase “as fast as the average” represented that year an increase of between 10% and 20%. The number of construction managers employed in 1996 and reported in the 1998/99 OOH was about 249,000. It would therefore be expected, based on this employment outlook, that the number of construction managers in 2006 would be between 273,900 and 298,000. By analyzing the data contained in the OOH we can not only follow the projected job growth, but the projections can be verified by looking at the employment data in future editions. Taking the previous example, we can review the 2008/9 OOH which contains employment data from 2006. It shows that employment of construction managers was 487,000 which represents a 96% growth in employment, way in excess of what was predicted back in 1998.

Data for numbers employed as civil engineers and construction managers and the corresponding job outlook phrases were collected from the OOH between 1990/91 and 2016/17. The data was used to evaluate the following research objectives:

1. Compare the total number employed as civil engineers and construction managers from 1988 through 2014
2. Compare the job outlook projections of civil engineers and construction managers from 1990 through 2016
3. Evaluate the job outlook projections against actual employment numbers from 1990 through 2014.

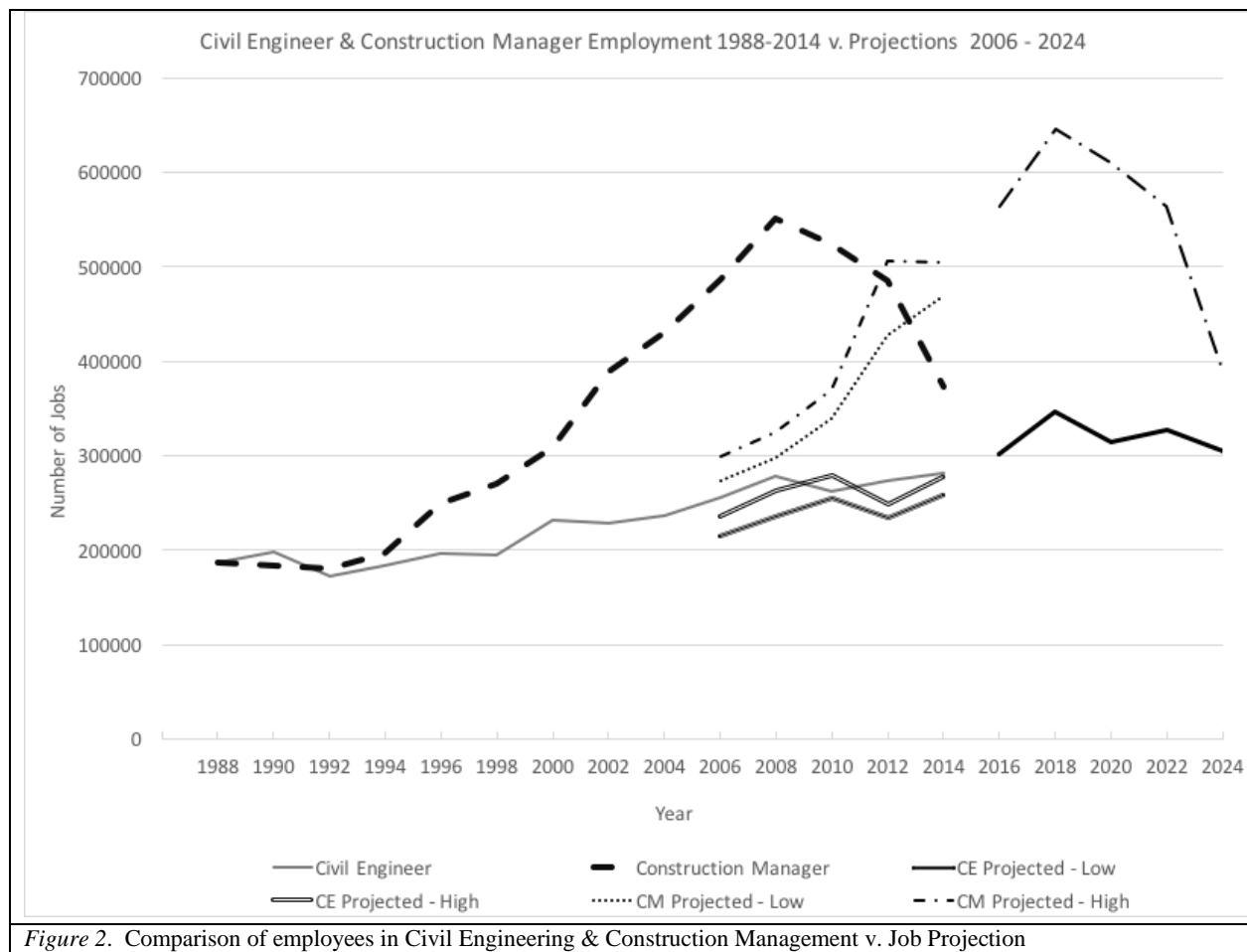
Results



Figure 1. Comparison of employees in Civil Engineering vs. Construction Management

Figure 1 shows a comparison of the number of civil engineers and construction managers employed from 1988-2014. Both professions started at almost the same level of employees (186,000 for CEs and 187,000 for CMs) and both experienced primarily growth in employment through 2008. From 1988 to 2012, the number of people employed as civil engineers increased by approximately 47%. In the same time period, the number of construction managers increased by approximately 159%. At CM's highest level, in 2008, employment had almost tripled in ten years. However, the number of construction managers employed has declined significantly since 2008.

Analysis of job projections for both Civil Engineers and Construction Managers was more complex, as reporting methodologies have changed at points during the life of the OOH. When Construction Manager first appeared as a distinct entry in the OOH in 1990, all projections for employment outlook sought to predict the minimum and maximum levels of employment in 2005. Subsequent editions in 1992, 1994 and 1996 also projected employment out to 2005. Only in 1998 did the prediction year change from 2005 to 2006. From the four editions of the OOH that predicted employment to 2005, it is interesting to note that the employment projections for Civil Engineers ranged from a low of 197,220 to a high of 265,320, while for Construction Managers the numbers were 238,370 and 256,100 respectively.



For the five editions of the OOH that appeared from 1998 until 2004 the employment projections were given as a percentage range which allows us to predict the job growth in the next 8 years. For example, projection rates in the 1998 OOH, allow us to predict the projected employment in 2006. From the 2008 edition onwards the projected job growth was given as a single percentage instead of a percentage range.

When comparing the job outlook predictions from the 1990-1996 OOH for 2005 with the employment numbers for the same year, it is evident that the projected employment for Civil Engineers is consistent with the numbers employed in 2004 and 2006. However, for Construction Managers, even the highest projected employment for 2005 of 256,100 falls below the actual employment of 431,000 and 487,000 for 2004 and 2006 respectively. Figure 2 shows the employment of Civil Engineers and Construction Managers from 1988 to 2014 compared with the projected employment from 2006 to 2024. For Civil Engineers the predicted employment has been much closer to the actual employment than for Construction Managers. From 2006 to 2010 the predictions made eight years earlier significantly underestimated the employment levels for Construction Managers. Only in 2012 was the actual employment in line with what was predicted back in 2004.

Discussion

From the comparison of job growth between construction managers and civil engineers, it is apparent that employment of Construction Managers was growing at a much higher rate until numbers started to decline from 2008 onwards following the recession. The current OOH (U.S Department of Labor, 2016) contains the following

statement “Employment of construction managers, like that of many other construction workers, is sensitive to fluctuations in the economy” and it is apparent that the number of construction managers grew significantly from 1994 to 2008 when the average annual gross domestic product change in current dollars was 5.2% compared with 2.9% for the period from 2009-2014 (United States. Department of Commerce, 2016). Recent editions of the OOH have also reported that “a substantial number of construction managers are expected to retire over the next decade”. It would appear that the economic downturn together with higher than average retirement rates would account for the significant drop in employment of construction managers since 2008.

In comparing the job outlook projections of construction managers and civil engineers, it is apparent that the OOH has historically predicted a higher rate of job growth for construction managers than civil engineers through 2018. Job projections show a reduction in employment from 2018 onwards. The projected reduction in employment of construction managers from 2018 to 2024 is almost 40%. However, past job predictions made by the OOH for construction managers have not been accurate. Of the five occasions when a comparison could be made between the projected employment and the actual employment of construction managers, only on one occasion in 2012 did the employment number fit within the range predicted.

The question of which profession to choose based on OOH job predictions is not a clear-cut one for students. While the field of Construction Management experienced much higher growth rates than Civil Engineers, a large portion of these gains has been erased. On the other hand, Civil Engineers have had fairly consistent job growth without the major fluctuations of CMs. It will be interesting to see if these trends continue with an upturn in the economy. With either profession, it does appear that over time, job creation will increase.

Conclusion

From the comparison of job growth between construction managers and civil engineers, it is apparent that the field of construction management is growing at a much higher rate. It may be because construction projects are increasing in size and complexity (OOH 1990), necessitating a more educated managerial workforce than in the past. Another reason could be that two-thirds of construction managers are self-employed which provides freedom many enjoy (U.S. Department of Labor, 2013-2014). Another reason might be that computer-aided design has helped the civil engineering field to be more productive and thus require fewer employees. It is of interest that the year that the heading “Construction Manager” was added to the OOH, the number of employees in Civil Engineering dropped 7%. Therefore, it could also be that construction managers are now doing much of the work civil engineers did in the past and have merely taken on a different job title.

We can also conclude that users of the OOH cannot not confidently rely on its accuracy for predicting job growth. In most instances, it was on the low side based on this study. Therefore, it should not be referenced by Construction Management Programs as a reliable source of job growth in the recruitment of students. Administrators could however, use the actual employment numbers of CM’s vs. CE’s to show students that the field of Construction Management is growing at a higher rate. Subsequent studies should be conducted, however, to determine if this is the case for other industries and over a greater time period.

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