



INDUSTRY AND OCCUPATIONAL CLUSTER ANALYSIS



**“A Foundation for Virginia’s Future”
Greater Fredericksburg**



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and the Virginia Community College System (VCCS)

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Technical questions regarding the results of this report should be directed to the principal investigators, Dr. Ann Battle and Dr. A. Fletcher Mangum. Inquiries related to policy implications and follow-up activities should be directed to Rob McClintock and Dr. Rose Johnson. All of the regional reports and technical appendices for this project can be accessed through the Virginia Ally Information Exchange website, at the following url:

<http://www.virginiaallies.org/research.asp#cluster>

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Executive Summary

The Workforce Development Services Division (WDS) of the Virginia Community College System (VCCS) has teamed up with the Virginia Economic Development Partnership (VEDP) to conduct a joint analysis of occupation and industry clusters. This analysis provides a methodological linkage between instructional programs, occupations, and industries. It also integrates the VCCS' workforce development activities and VEDP's economic development activities by providing a bridge between the instructional-program-focused world of education and the industry-focused world of economic development. This report presents the principal findings from this analysis for the *Greater Fredericksburg Region*. For purposes of this analysis, the Greater Fredericksburg Region is defined as Caroline County, King George County, Spotsylvania County, Stafford County, and the independent city of Fredericksburg.

Where traditional industry cluster analysis is used to group industries that share a similar customer and supplier network, occupational cluster analysis is used to group industries that draw from the same pool of skilled workers. By using these two methods in combination, we identified industry recruitment targets that are a good fit for the region, both in terms of their connection to the existing regional industry base, and in terms of their compatibility with the region's existing workforce. The findings also provide insight about the knowledge and skills needed by employees of the target industries.

Based on the findings from the industry cluster analysis, four existing industry clusters within the region were identified as having good growth potential. They are:

- Communication & Entertainment
- Information Technology and Professional Services
- Metals and Related Manufacturing
- Wood Products & Furniture Manufacturing

In addition, three industry clusters that are not already fully established within the region were identified as potential emerging clusters with good growth potential. They are:

- Chemicals and Materials
- Finance and Insurance
- Health Care

Finally, by combining the results from the industry cluster analysis with the results from the occupational cluster analysis, it was possible to identify additional industries that both exhibit good growth potential and are compatible with the

skills of the local labor force. This analysis was done using the skills profile of the existing incumbent workforce and the skills profile of displaced workers. With regard to the incumbent workforce, the identified target industries correspond to three existing and emerging industry clusters. They are:

- Information Technology & Professional Services
- Metals and Related Manufacturing
- Health Care (emerging cluster)

With regard to the skills profile of displaced workers, the target industries identified through the occupational cluster analysis correspond to the following three existing and emerging industry clusters:

- Communication & Entertainment
- Information Technology and Professional Services
- Health Care (emerging cluster)

In combination, the industry and occupational cluster analyses identify the following industry clusters as good recruitment targets, based on the region’s customer and supplier network, and the skills of its workforce:

Target Industry Clusters – Summary Results

Chemicals and Materials*
Communication & Entertainment
Finance and Insurance
Health Care
Information Technology & Professional Services
Metals and Related Manufacturing
Wood Products & Furniture Manufacturing

* Cluster as a whole has low growth potential, but individual industries have high growth potential.

Introduction

The Workforce Development Services Division (WDS) of the Virginia Community College System has teamed up with the Virginia Economic Development Partnership (VEDP) to pursue a joint analysis of occupation and industry clusters. This analysis provides a methodological linkage between instructional programs, occupations, and industries. It also integrates WDS' workforce development activities and VEDP's economic development activities by providing a bridge between the instructional-program-focused world of education and the industry-focused world of economic development. This report presents the principal findings from this analysis for the *Greater Fredericksburg Region*. For purposes of this analysis, the Greater Fredericksburg Region is defined as Caroline County, King George County, Spotsylvania County, Stafford County, and the independent city of Fredericksburg.

The remainder of the report is divided into four sections. The Background section provides the reader with a general conceptual understanding of industry and occupation clusters and how they can be used for economic and workforce development. The Regional Summary section details the industry and occupational clusters identified for the region and provides summary statistics on the characteristics of those clusters. It also lists those industries identified as good recruitment targets for the region on the basis of the industry and occupational cluster analysis. The Cluster Detail section provides additional detail on the supplier and customer industries associated with each industry cluster and the skills and training required to support the cluster. This is followed by a Summary section.

Industry site selection encompasses a number of factors, such as transportation, logistics, business operating costs, education, and quality of life. Workforce availability and quality has increasingly become a leading consideration for corporate location. Thus, this analysis serves as an important starting point for a more comprehensive examination of a region's assets to arrive at appropriate regional industry targets for recruitment purposes.

For the value of the cluster analysis to emerge, it must be complemented with the knowledge and experience of regional economic developers, community college professionals, and others to ensure that all of the assets of the region – human, fiscal, physical, quantitative and subjective – are used to market the region fully and to create a vital workforce. In reviewing the analysis presented in this report, it is important for the reader to keep in mind that all data have their limitations and that analytical approaches alone cannot hope to reveal all of the advantages a region has to offer.

Background

What is Cluster Analysis?

Although the term “cluster” is often used somewhat loosely to refer to a group of businesses or other entities that are in close geographic proximity or share some other common characteristic, the term “cluster analysis” has a much more precise meaning. Cluster analysis is an analytic technique that uses data on the characteristics of businesses, occupations, customers, etc. to group them in a way that minimizes the differences between the members of each group, and maximizes the differences between groups.

Traditional industry cluster analysis is used to identify groups of industries that are related through their supply and distribution chains (*i.e.*, who they buy from and who they sell to), and other characteristics (*e.g.*, high power usage, high demand for low skilled labor). This information is often used by economic developers to identify and target regional industry recruitment opportunities.

Occupation cluster analysis is used to identify groups of occupations that are related through the knowledge and skills required for employment in that occupation. This kind of information can be used to identify alternative labor pools for a given industry, alternative industries for a given labor pool, or the range of employment opportunities open to a specific target group.

How do Occupation and Industry Clusters Relate?

Until very recently, most assessments of regional economic activity were industry focused. There were two reasons for this. First, it was generally assumed that labor was much more mobile than industry. As a result, in the chicken and egg question of which comes first, the worker or the job, the answer was obvious – the job. This implied that industries, and the relationships between industries, were the most important element in regional economic activity. Thus, they were also the appropriate focus for any assessment of that activity. The second reason was more pragmatic. Data on industry employment was much easier to get than data on occupational employment, and data on the relationship between occupations and skills was largely unavailable.

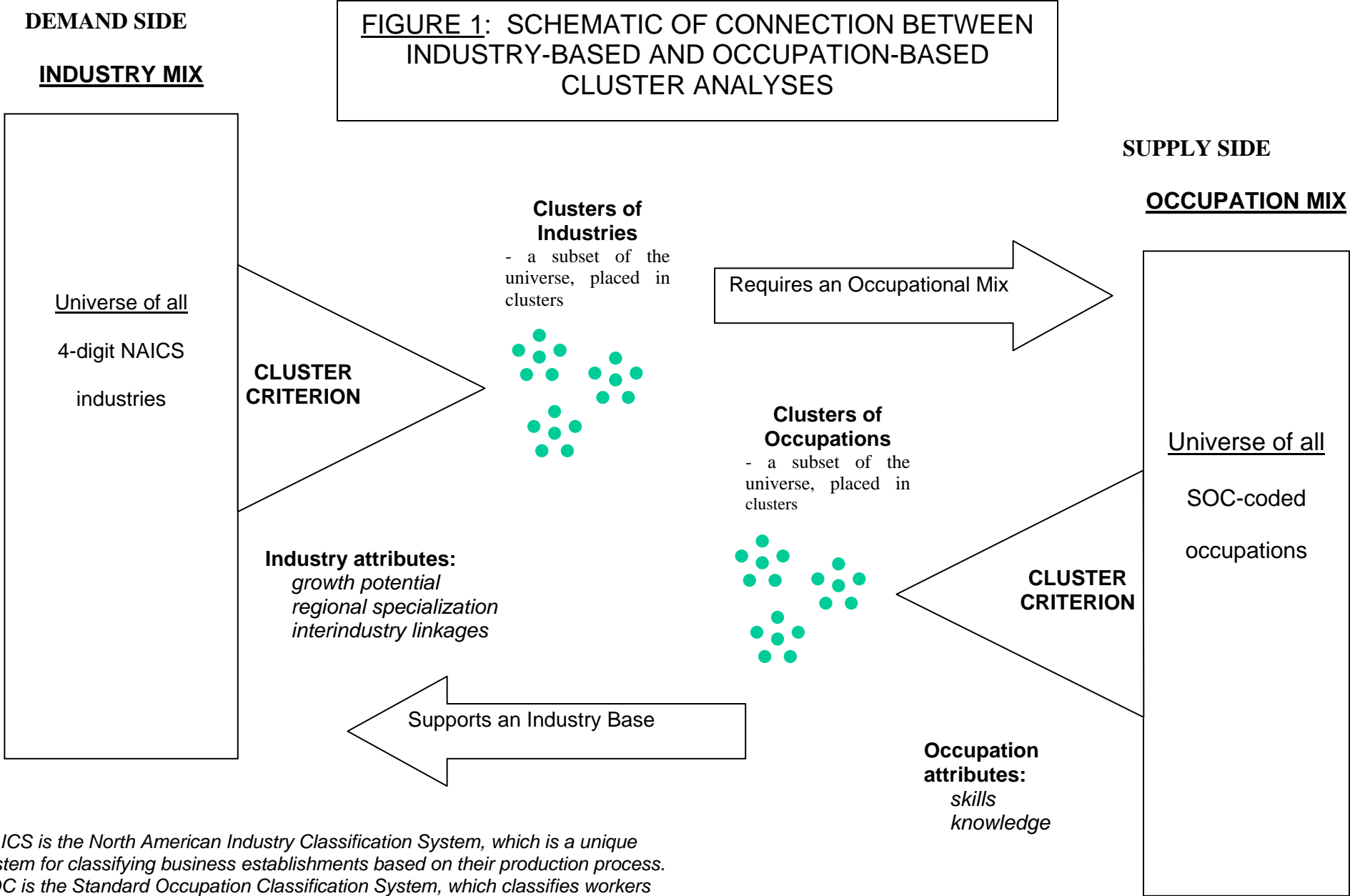
In recent years, researchers and policy makers have adopted a more human-capital-focused, or workforce-focused, view of economic activity. Driving this shift is general recognition of the central role that a skilled workforce plays in

motivating the “knowledge-based” economy and the central role that education institutions play in preparing the “skilled workforce.” Moreover, enhanced occupational employment data from the Bureau of Labor Statistics, occupation-to-training crosswalks from the National Occupation and Information Committee, and the efforts of the National Skills Standard Board have made research in this area much easier.

It is important to realize that industry-focused and workforce-focused approaches to assessing regional economic activity are not mutually exclusive. In today’s knowledge-based economy, firm location decisions are often driven by considerations of geographic proximity to existing concentrations of skilled workers or the educational institutions that produce those workers, in the same way that worker location decisions have traditionally been driven by geographic proximity to the employment opportunities provided by specific industries. By combining industry-focused and workforce-focused analytical approaches, it is possible to gain a better understanding of the complex, and sometimes simultaneous, relationship between industry demand and workforce supply.

Figure 1 provides a schematic that may help to better explain this concept specifically as it relates to occupation and industry clusters. As this figure shows, where industries, measured in terms of industry employment, comprise the demand side of the labor market, workforce, measured in terms of occupational employment, comprises the supply side of the labor market. The connection between the two arises from the fact that any given industry employs a specific mix of occupations, while any given occupation can support a specific, and perhaps otherwise unrelated, mix of industries. Occupation and industry clusters aid in understanding these relationships by identifying potential alternatives to traditional demand and supply relationships.

FIGURE 1: SCHEMATIC OF CONNECTION BETWEEN INDUSTRY-BASED AND OCCUPATION-BASED CLUSTER ANALYSES



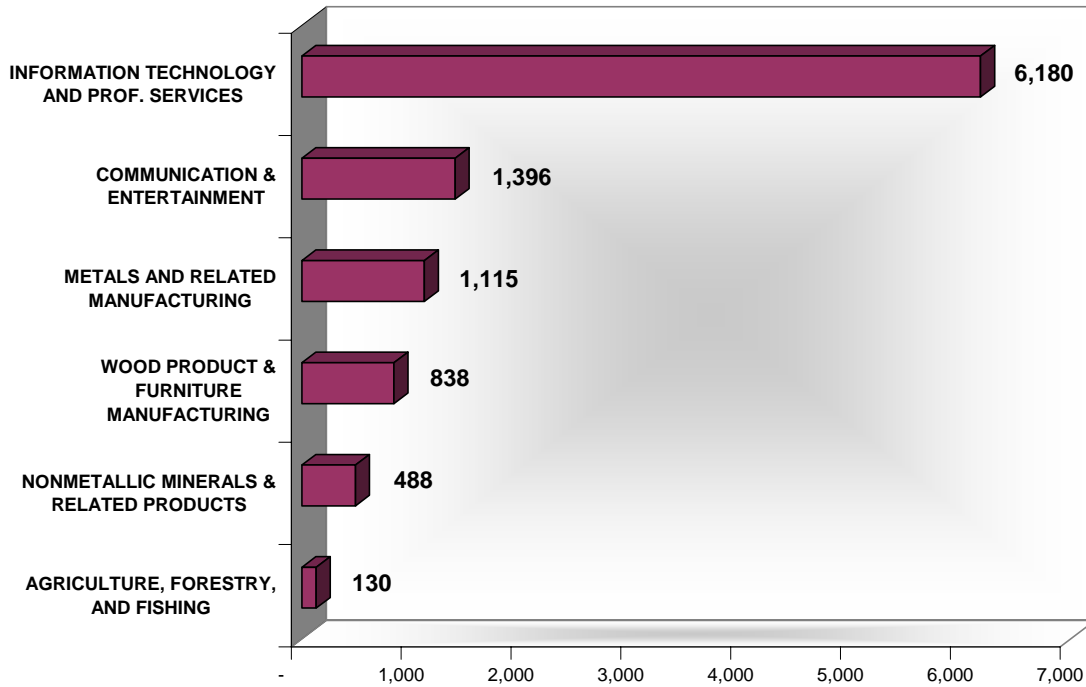
NAICS is the North American Industry Classification System, which is a unique system for classifying business establishments based on their production process. SOC is the Standard Occupation Classification System, which classifies workers into occupational categories based upon work performed, skills, education, training, and credentials.

Regional Summary: Greater Fredericksburg

Industry Cluster Analysis – Overview

In the first stage of the industry-based cluster analysis, industries within the Greater Fredericksburg Region were grouped into the “core” industries for each cluster based on regional industry-by-industry transactions. Top customer industries and top supplier industries for each cluster were also identified by ranking the industries using the same regional purchases data. An important second stage of the analysis identifies additional industries that can “fill out” the regional clusters by comparing the regional industry clusters to their national counterparts. In this way, additional core, customer, and supplier industries are added to the industry cluster definitions. The initial two phases of the industry cluster analysis revealed six potential industry clusters for the Greater Fredericksburg Region. Figure 2, below, indicates the current employment in the core industries for each of the six clusters. A complete description of the method used to derive the industry clusters can be found in Appendix 1.

Figure 2: Core Industry Employment by Cluster – Greater Fredericksburg Region



Source: VEC, Covered Employment and Wages, 2004 annual employment

Summary information on these industry clusters is provided in Tables 1-3.¹ Additional detail on the structure of each cluster is provided in the Cluster Detail section in Figures A-F. The core industries for each cluster are listed in the center box of these figures. In addition, each figure lists the supplier and customer industries associated with these core industries, along with the top occupations in the core industries, and the regional community colleges and other institutions that play an important role in supporting the cluster.

Tables A1 through F1 in the Cluster Detail section provide employment and wage information for the individual core industries within each of the industry clusters. Current (2004) employment, wages, and the number of firms are listed, along with the five-year historical growth trend and performance and projected growth information. Knowing how the cluster is “filled out” with suppliers and customers provides another tool for economic developers to interact with existing companies in the core industries to determine whether a campaign to bring key suppliers or customers to the region would benefit them. To assist in this dialogue, Tables A1-F1 also list the top companies, ranked by employment, for the “core” component of each cluster. Finally, Tables A2 through F2 in the Cluster Detail section provide examples of the skills and training required for the top occupations in each industry cluster.

Core industry employment in Greater Fredericksburg’s industry clusters comprises 13 percent of the region’s private sector employment and 16 percent of private sector firms. If the low-performing Agriculture, Forestry, & Fishing cluster is excluded, the shares are 13 percent of regional employment and 15 percent of regional firms. The average annual salary for the core cluster industries, with the exception of Wood Product & Furniture Manufacturing and Agriculture, Forestry, & Fishing exceeds the \$30,976 average annual wage in the private sector for the region. It appears that the Greater Fredericksburg Region industry clusters make a significant contribution to the income level of the region.

Growth has been strong in many of the clusters identified for the Greater Fredericksburg Region. Agriculture, Forestry, & Fishing, and Metals and Related Manufacturing are the only clusters that experienced declining employment over the past five years, when each cluster is viewed as a whole. As seen in Tables A1-F1, there are specific industries even within some of the historically slow growth clusters that have experienced growth in the past and have potential for future growth. A good example of this is the Agriculture, Construction, and Mining Machinery Manufacturing industry, which is part of the historically low growth Metals Related Manufacturing cluster (Table D1). The Agriculture, Construction,

¹ Where regional totals are provided for the clusters, this represents industries that were identified by regional data alone. Comparison of the regional clusters to national clusters provides additional industries that are included in Tables A1-F1 for completeness.

and Mining Machinery Manufacturing industry has experienced 49.5 percent average annual employment growth over the past five years, although the regional cluster has experienced 7.2 percent contraction in employment for the same period.

Table 1: Cluster Growth Trend and Projections

CLUSTER NAME	Trend, 1999-2004 Average Annual Growth			National Projections, Average Annual Growth, 2002-2012	
	Employment	Avg. Annual Wage	Number of Firms	Employment	Real Industry Output
AGRICULTURE, FORESTRY, AND FISHING	-7.8%	1.1%	-2.0%	-1.7%	1.6%
COMMUNICATION & ENTERTAINMENT	5.2%	5.0%	3.5%	1.8%	4.0%
INFORMATION TECHNOLOGY AND PROF. SERVICES	6.7%	5.4%	7.0%	2.3%	5.2%
METALS AND RELATED MANUFACTURING	-7.2%	2.1%	1.9%	0.8%	3.4%
NONMETALLIC MINERALS & RELATED PRODUCTS	4.5%	3.9%	-3.0%	n.a.	n.a.
WOOD PRODUCT & FURNITURE MANUFACTURING	0.4%	1.4%	-1.3%	1.1%	3.0%
REGIONAL TOTAL	3.6%	4.4%	3.5%	n.a.	n.a.

Source: VEC, Covered Employment and Wages, 2004 annual average

Table 2: Cluster Summary – Regional Cluster Statistics

CLUSTER NAME	Employment 2004	Average Annual Wage, 2004	Number of Firms, 2004
AGRICULTURE, FORESTRY, AND FISHING	130	\$25,475	30
COMMUNICATION & ENTERTAINMENT	1,396	\$45,403	53
INFORMATION TECHNOLOGY AND PROF. SERVICES	6,180	\$52,319	642
METALS AND RELATED MANUFACTURING	1,115	\$43,253	32
NONMETALLIC MINERALS & RELATED PRODUCTS	488	\$38,485	17
WOOD PRODUCT & FURNITURE MANUFACTURING	838	\$27,538	44
REGIONAL TOTAL	76,171	\$30,976	5,272

Source: VEC, Covered Employment and Wages, 2004 annual average

Table 3: Cluster Comparison to Regional Totals

CLUSTER NAME	Employment Share	Relative Wage	Share of Firms
AGRICULTURE, FORESTRY, AND FISHING	0.2%	82.2%	0.6%
COMMUNICATION & ENTERTAINMENT	1.8%	146.6%	1.0%
INFORMATION TECHNOLOGY AND PROF. SERVICES	8.1%	168.9%	12.2%
METALS AND RELATED MANUFACTURING	1.5%	139.6%	0.6%
NONMETALLIC MINERALS & RELATED PRODUCTS	0.6%	124.2%	0.3%
WOOD PRODUCT & FURNITURE MANUFACTURING	1.1%	88.9%	0.8%
REGIONAL TOTAL	100.0%	100.0%	100.0%

Source: VEC, Covered Employment and Wages, 2004 annual average

Industry Cluster Analysis – Industry Recruitment Targets

Ultimately, the goal of our analysis is to suggest industry clusters that represent viable economic development targets. The Performance Index and a specific component of that index, the Growth Index, help to make that judgment. Details on the derivation of these indices can be found in Appendix 1. The Performance Index was calculated for each individual industry and measures the contribution of the industry to the local economy based on measures of historical growth, contribution to the wage base, and regional concentration of the industry. The Growth Index, which is also a component of the overall Performance Index, was calculated at the individual industry level as well as the cluster level and measures growth potential based on the national outlook for specific industries. For simplicity, Tables A1-F1 do not list the value of the index, but instead refer to the relevant quartile resulting from ranking all of the industries on the index. The “highest” range applies to industries that qualified in the top 25 percent of all index values; the “high” range applies to the values above the median, but below the top 25 percent range; the “low” range applies to values below the median, but not as low as the bottom 25 percent; and the “lowest” range applies to the bottom 25 percent. Since the Performance Index includes some measure of the regional concentration of industries in Greater Fredericksburg, it is no surprise that an individual industry can score in the higher ranges on the Performance Index, yet score in the lower ranges for the Growth Index.²

The Growth Index combines ten-year national projections for industry employment and real industry output and is the most forward-looking information that we can use for the cluster selection decision. Based on that information, the following industry clusters have the greatest growth potential for the Greater Fredericksburg Region:

- **Communication & Entertainment**
- **Information Technology and Professional Services**
- **Metals and Related Manufacturing**
- **Wood Products & Furniture Manufacturing**

In addition to these clusters, there are several additional clusters that were identified as potential emerging clusters for the region. Many industries have experienced high growth in the Greater Fredericksburg Region over the past year, but have not established sufficient buyer-supplier relationships within the region to have been identified by the traditional cluster analysis approach in the earlier stages of our analysis. To the extent that the high-growth regional industries are

² For Greater Fredericksburg, *Sawmills and Wood Preservation* provides an example of an industry that scores in the highest quartile for the Performance Index and in the lowest quartile for the Growth Index (see Table I1).

members of nationally-identified clusters, it seems plausible to expect that a cluster may yet form, with these industries as part of the core. The emerging industry clusters for the Greater Fredericksburg Region are:

- **Chemicals and Materials**
- **Finance and Insurance**
- **Health Care**

Further information on these emerging clusters is provided in Figures G through I in the Cluster Detail section.

Table 4, below, lists the national cluster names and the individual industries in the Greater Fredericksburg Region that had *above average* regional employment growth and might be considered as part of an emerging cluster in the region. A full description of the national clusters can be found in Appendix 2.

Table 4: Emerging Clusters for Greater Fredericksburg		National Projections, Average Annual Growth 2002-2012	
		Employment	Real Industry Output
CHEMICALS & MATERIALS		0.1%	1.5%
3261	Plastics Product Manufacturing	1.8%	4.1%
3271	Clay Product and Refractory Manufacturing	0.4%	3.2%
3279	Other Nonmetallic Mineral Product Manufacturing	0.6%	2.3%
FINANCE AND INSURANCE		1.3%	3.4%
5231	Securities and Commodity Contracts Intermediation and Brokerage	1.5%	4.2%
5239	Other Financial Investment Activities	1.5%	4.2%
5241	Insurance Carriers	0.3%	2.0%
5242	Agencies, Brokerages, and Other Insurance Related Activities	1.4%	1.7%
5259	Other Investment Pools and Funds	1.7%	3.2%
HEALTH CARE		2.3%	3.1%
6215	Medical and Diagnostic Laboratories	3.5%	4.6%
6219	Other Ambulatory Health Care Services	3.5%	4.6%
6221	General Medical and Surgical Hospitals	1.4%	2.4%
6222	Psychiatric and Substance Abuse Hospitals	1.4%	2.4%
6233	Community Care Facilities for the Elderly	4.5%	3.4%
6239	Other Residential Care Facilities	4.5%	3.4%

Occupation Cluster Analysis – Overview

In identifying appropriate industry targets for a region, the availability of a strong buyer-supplier network, as illuminated through the industry-cluster analysis, is only one dimension of regional advantage. For many firms, the skills of the local workforce also figure prominently in their location decision. To better quantify this dimension of regional advantage, we use an alternative methodological approach – occupational cluster analysis.

Based on an analysis of national occupational skills profiles, we identified 25 occupational clusters (detail on these national skills profiles is provided in Appendix 4 and a full description of the cluster method is provided in Appendix 3). Each cluster consists of occupations that require similar skills. By determining the proportion of a region’s workforce that falls into each of these clusters, we are able to categorize the skills inherent to the region’s workforce and illuminate the region’s comparative advantage with regard to specific skill specializations. This assessment is performed for two categories of workers – incumbent workers, or the existing employment base within the region, and displaced workers, workers who have lost their job.

Incumbent Workers

Using this approach to categorize the skills of the Greater Fredericksburg Region’s incumbent workforce shows that 51 percent of the region’s 2004 occupational employment³ fell within three occupation clusters – *Retail Sales* (24 percent), *Operations Oriented Operators* (17 percent), and *Socially Oriented Managers* (10 percent). The skills profile for each of these clusters is provided in Figures 3 through 5 that follow. In addition, a full listing of the skills profiles and associated occupations for all clusters is provided in Appendix 5.

Displaced Workers

With regard to the Greater Fredericksburg Region’s displaced workforce,⁴ the analysis indicates that 84 percent of the region’s displaced workers fell within

³ Regional occupation employment was derived from Virginia Employment Commission ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations.

⁴ Data on displaced workers were derived by assessing recent employment losses within the region by occupational category. The most recent year-over-year change in industry employment, based on ES-202 data, was used to generate estimates of employment displaced at the occupation level. As of the release of this report, the change in employment occurred from 3rd quarter 2003 to 3rd quarter 2004.

three occupation cluster – *Retail Sales* (42 percent), *Socially Oriented Managers* (35 percent), and *Service Oriented Instructors and Clerks* (7 percent). The skills profile for the *Service Oriented Instructors and Clerks* occupational cluster is provided in Figure 6 that follows. Again, a full listing of the skills profiles and associated occupations for all clusters is provided in Appendix 5.

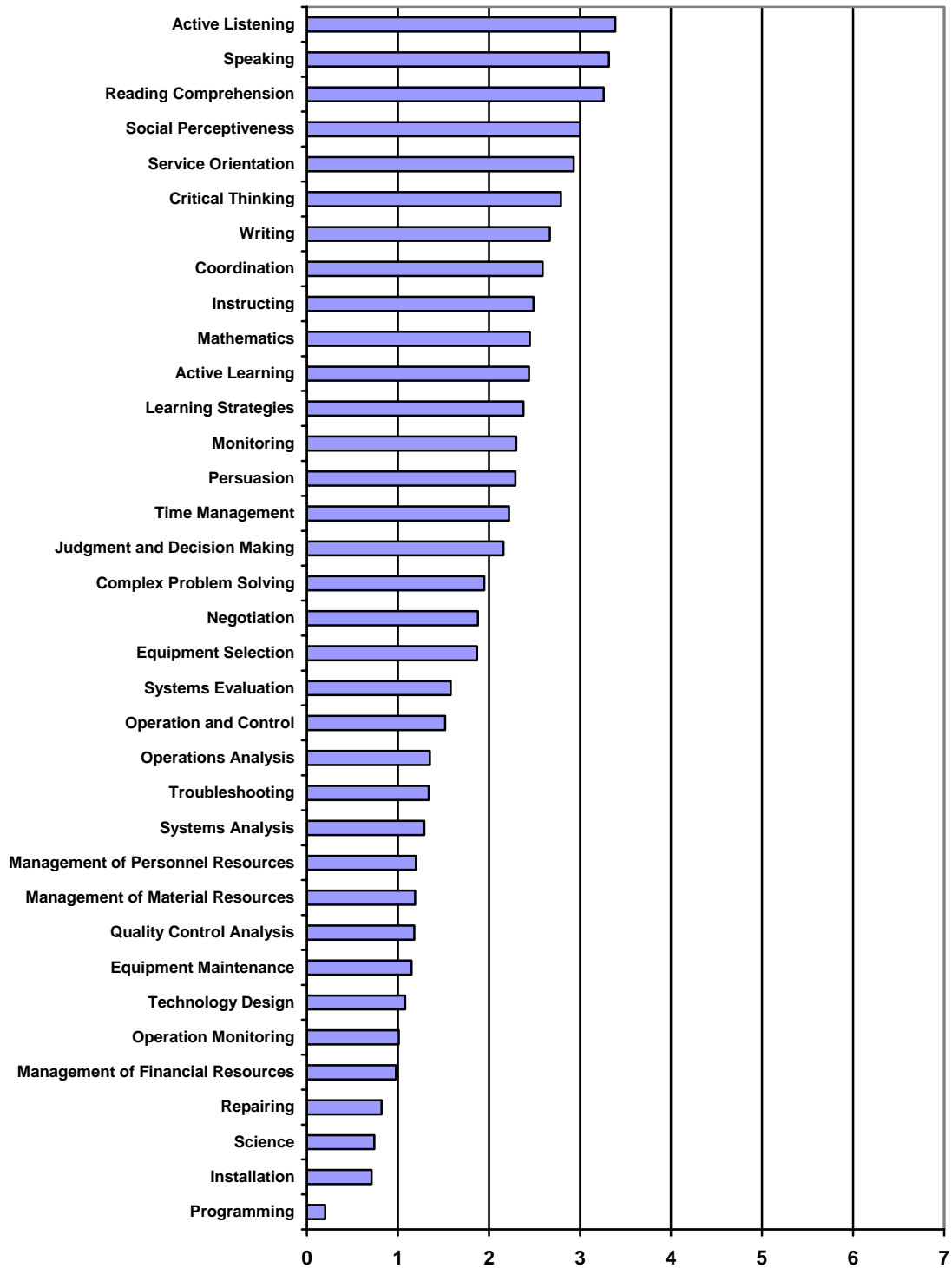


Figure 3: Skills Profile for Retail Sales

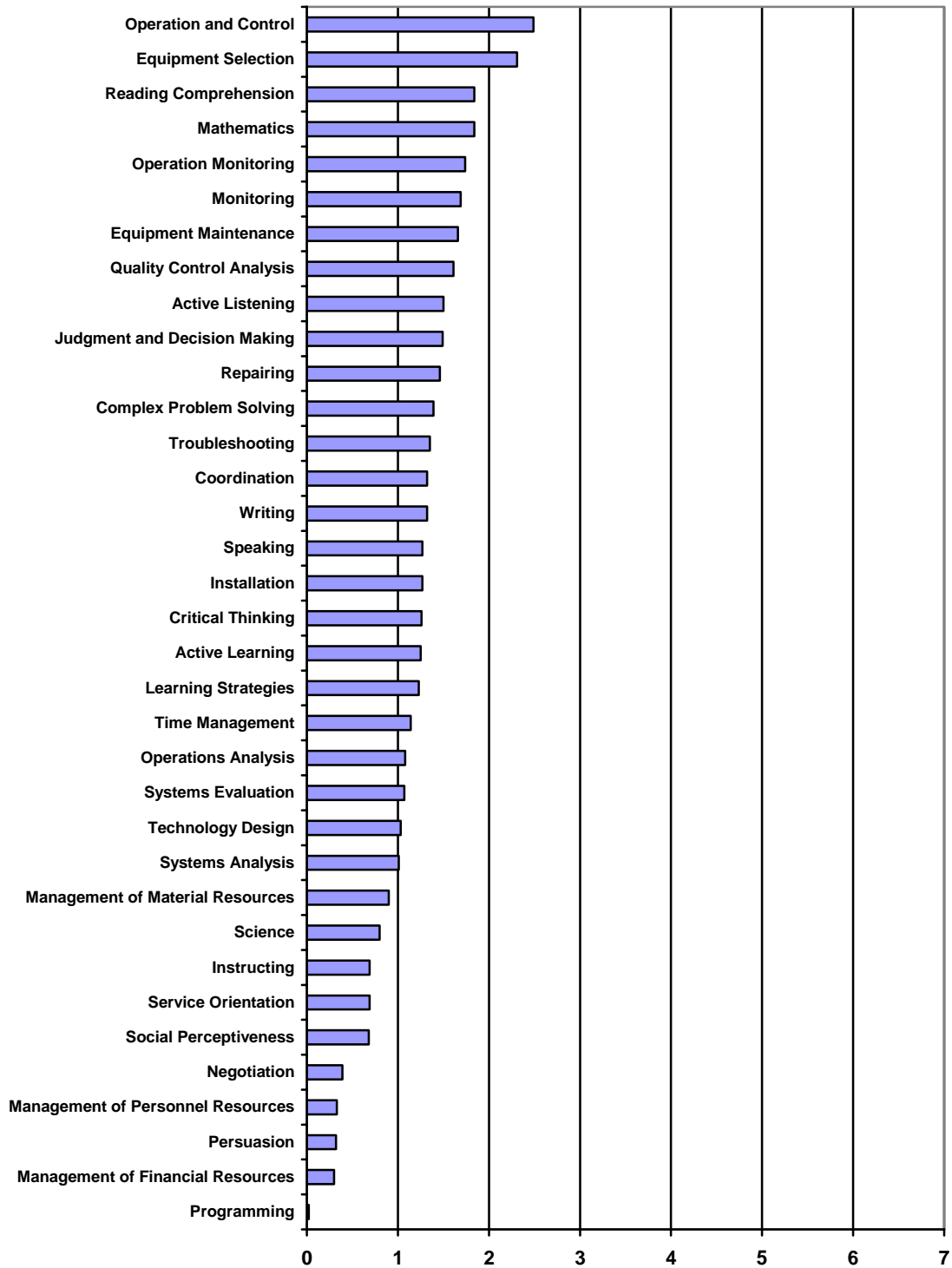


Figure 4: Skills Profile for Operations Oriented Operators

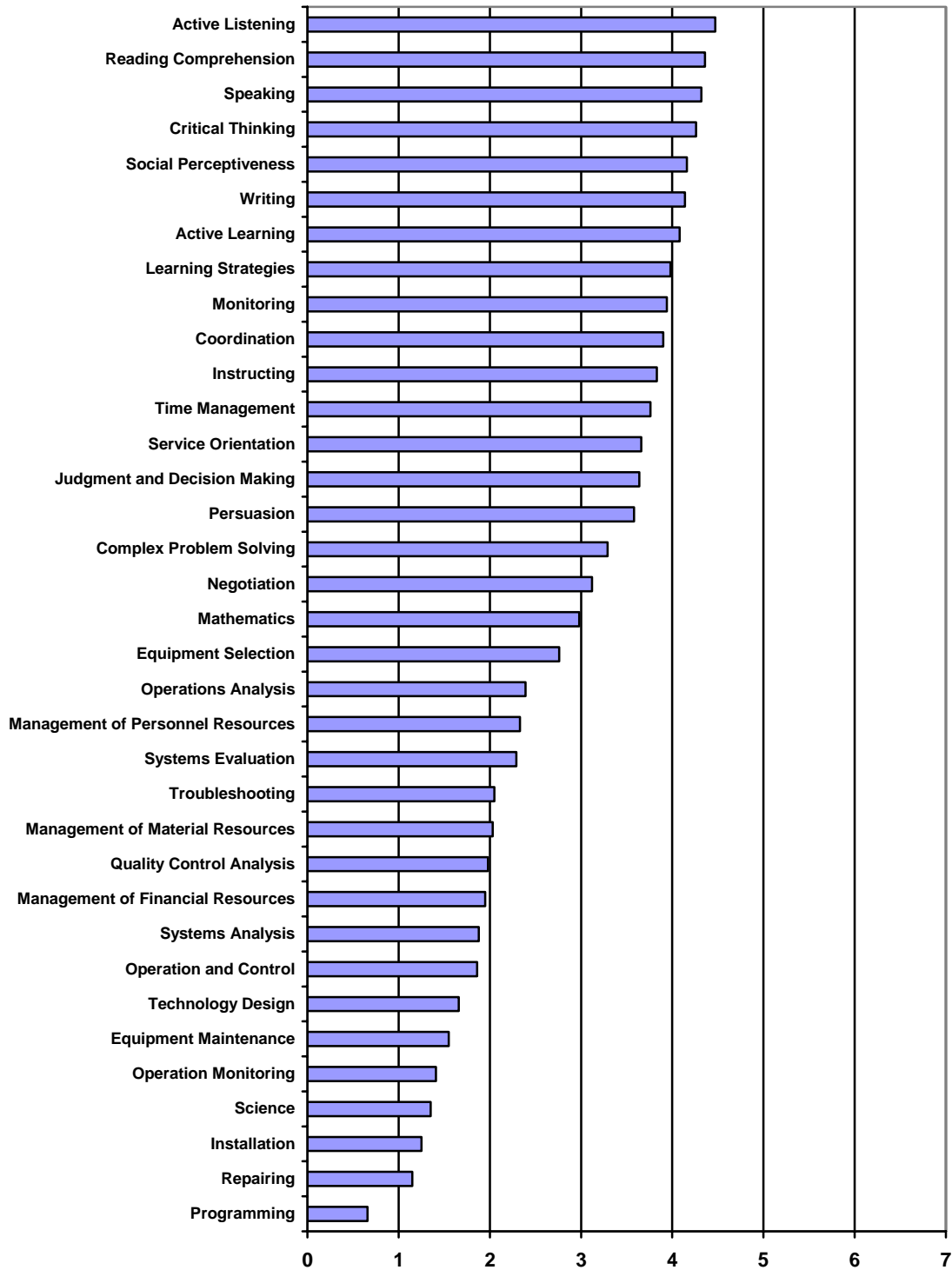


Figure 5: Skills Profile for Socially Oriented Managers

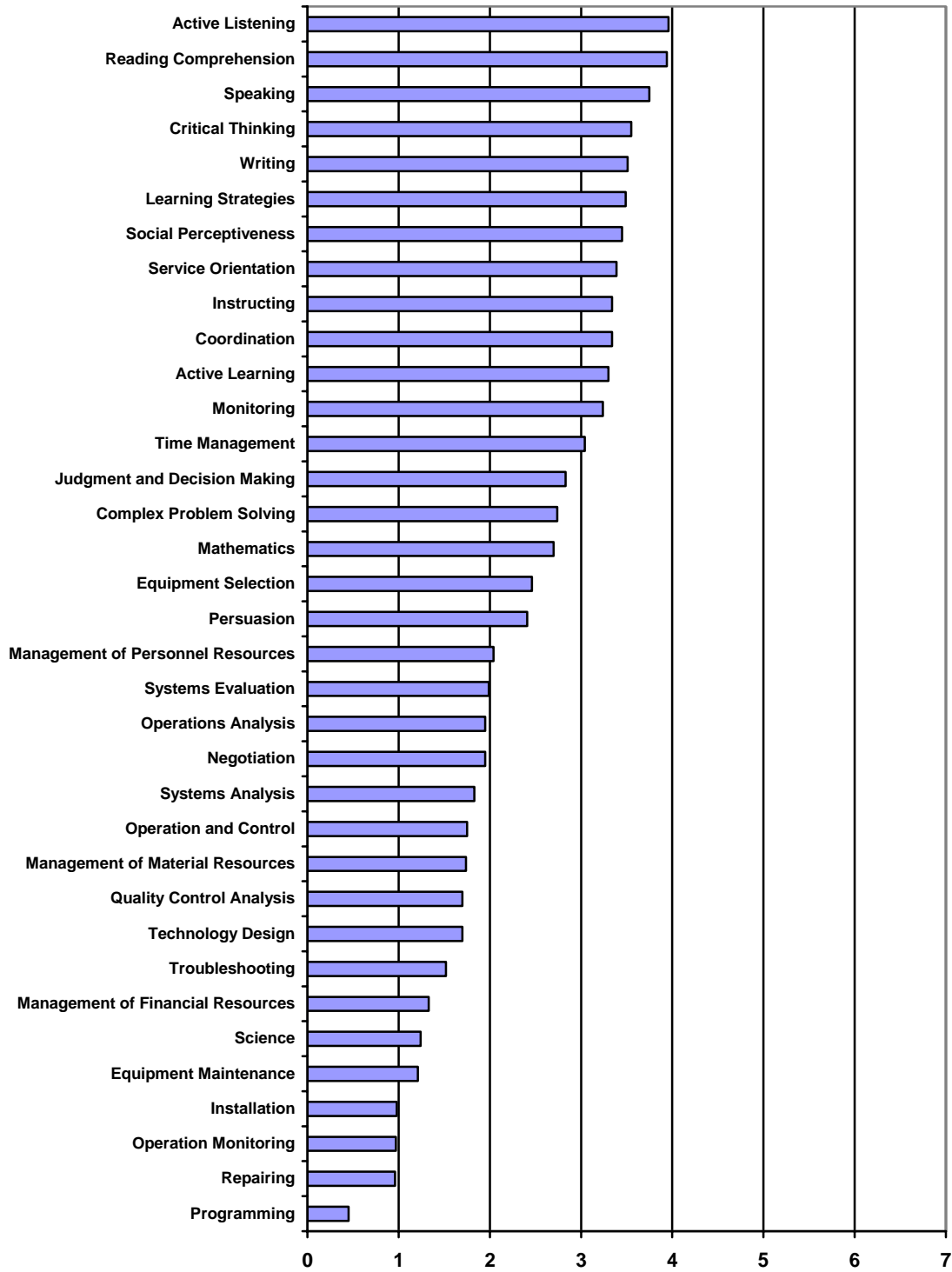


Figure 6: Skills Profile for Service Oriented Instructors and Clerks

Occupation Cluster Analysis – Industry Recruitment Targets

By quantifying the Greater Fredericksburg Region’s comparative advantage with respect to specific work skills, we are able to identify target industries whose demand for work skills most closely match the workforce the region has to offer (for a full description of the method used to accomplish this task, see Appendix 3).

Incumbent Workers

Table 5 displays the top 25 skill-based industry recruitment targets⁵ for the Greater Fredericksburg Region, based on a comparison of the skills inherent to the region’s existing employment base, and the skill requirements of individual industries. By using the information developed through the industry cluster analysis, however, it is possible to further refine this analysis. Table 6 lists those industries that were identified as good matches for the region on the basis of their skill needs, and were also identified as good matches on the basis of their growth potential and relationship to existing industry clusters within the region. Table 7 provides the results of a similar analysis for industries that are identified as good recruitment targets on the basis of their skills needs, and on the basis of their relationship to potential emerging clusters.

⁵ A total of 295 industries were ranked.

**Table 5: Skills-Based Industry Targets – Greater Fredericksburg Region
(employment base)**

Rank	NAICS Code	Industry Title
1	7121	Museums, Historical Sites, and Similar Institutions
2	5619	Other Support Services
3	4543	Direct Selling Establishments
4	7139	Other Amusement and Recreation Industries
5	4246	Chemical and Allied Products Merchant Wholesalers
6	4249	Miscellaneous Nondurable Goods Merchant Wholesalers
7	4243	Apparel, Piece Goods, and Notions Merchant Wholesalers
8	4242	Drugs and Druggists' Sundries Merchant Wholesalers
9	4231	Motor Vehicle and Motor Vehicle Parts and Supplies Merchant Wholesalers
10	4244	Grocery and Related Product Wholesalers
11	4442	Lawn and Garden Equipment and Supplies Stores
12	4247	Petroleum and Petroleum Products Merchant Wholesalers
13	6243	Vocational Rehabilitation Services
14	7212	RV (Recreational Vehicle) Parks and Recreational Camps
15	4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers
16	7112	Spectator Sports
17	4236	Electrical and Electronic Goods Merchant Wholesalers
18	4239	Miscellaneous Durable Goods Merchant Wholesalers
19	4234	Professional and Commercial Equipment and Supplies Merchant Wholesalers
20	4232	Furniture and Home Furnishing Merchant Wholesalers
21	7213	Rooming and Boarding Houses
22	8134	Civic and Social Organizations
23	7113	Promoters of Performing Arts, Sports, and Similar Events
24	4541	Electronic Shopping and Mail-Order Houses
25	5613	Employment Services

Table 6: Existing Industry Clusters – Matches for Skills-Based Targets for Regional Employment Base

Industry Cluster Name		National Projections, Average Annual Growth, 2002-2012	
naics code	Industry Description	Employment	Real Industry Output
INFORMATION TECHNOLOGY AND PROFESSIONAL SERVICES			
5614	Business Support Services	2.4%	3.7%
5419	Other Professional, Scientific, and Technical Services	1.9%	5.5%
5416	Management, Scientific, and Technical Consulting Services	3.2%	4.1%
5182	Data Processing, Hosting, and Related Services	3.9%	10.3%
METALS AND RELATED MANUFACTURING			
3339	Other General Purpose Machinery Manufacturing	1.6%	5.2%

Table 7: Emerging Industry Clusters – Matches for Skills-Based Targets for Regional Employment Base

Industry Cluster Name		National Projections, Average Annual Growth, 2002-2012	
naics code	Industry Description	Employment	Real Industry Output
HEALTH CARE			
6233	Community Care Facilities for the Elderly	4.5%	3.4%

Displaced Workers

Table 8 provides similar information to Table 5. In this instance, however, the top 25 skill-based industry recruitment targets⁶ for the Greater Fredericksburg Region are based on a comparison of the skills inherent to the region’s displaced workers, and the skill requirements of individual industries. Tables 9 and 10 follow the same format as Tables 6 and 7, and detail those industries that were identified as good recruitment targets in both the occupation and industry cluster analyses for existing and emerging industry clusters respectively.

Table 8: Skills-Based Industry Targets – Greater Fredericksburg Region (*displaced workers*)

Rank	NAICS Code	Industry Title
1	5614	Business Support Services
2	4242	Drugs and Druggists' Sundries Merchant Wholesalers
3	6233	Community Care Facilities for the Elderly
4	4431	Electronics and Appliance Stores
5	4531	Florists
6	6232	Residential Mental Retardation, Mental Health and Substance Abuse Facilities
7	4251	Wholesale Electronic Markets and Agents and Brokers
8	4441	Building Material and Supplies Dealers
9	6216	Home Health Care Services
10	5615	Travel Arrangement and Reservation Services
11	4539	Other Miscellaneous Store Retailers
12	4422	Home Furnishings Stores
13	4541	Electronic Shopping and Mail-Order Houses
14	5172	Wireless Telecommunications Carriers (except Satellite)
15	7121	Museums, Historical Sites, and Similar Institutions
16	4421	Furniture Stores
17	4532	Office Supplies, Stationery, and Gift Stores
18	4236	Electrical and Electronic Goods Merchant Wholesalers
19	4237	Hardware, and Plumbing and Heating Equipment and Supplies Merchant Wholesalers
20	4243	Apparel, Piece Goods, and Notions Merchant Wholesalers
21	4853	Taxi and Limousine Service
22	4241	Paper and Paper Product Merchant Wholesalers
23	4859	Other Transit and Ground Passenger Transportation
24	4461	Health and Personal Care Stores
25	7223	Special Food Services

⁶ A total of 295 industries were ranked.

Table 9: Existing Industry Clusters – Matches for Skills-Based Targets for Displaced Workers

Industry Cluster Name		National Projections, Average Annual Growth, 2002-2012	
naics code	Industry Description	Employment	Real Industry Output
COMMUNICATION & ENTERTAINMENT			
5152	Cable and Other Subscription Programming	2.8%	1.9%
INFORMATION TECHNOLOGY AND PROFESSIONAL SERVICES			
5614	Business Support Services	2.4%	3.7%
5419	Other Professional, Scientific, and Technical Services	1.9%	5.5%

Table 10: Emerging Industry Clusters – Matches for Skills-Based Targets for Displaced Workers

Industry Cluster Name		National Projections, Average Annual Growth, 2002-2012	
naics code	Industry Description	Employment	Real Industry Output
HEALTH CARE			
6233	Community Care Facilities for the Elderly	4.5%	3.4%
6239	Other Residential Care Facilities	4.5%	3.4%

Summary

This report has presented the findings from a joint effort of the Workforce Development Services Division of the Virginia Community College System and the Virginia Economic Development Partnership to use industry and occupational cluster analysis to identify promising industry recruitment targets for the Greater Fredericksburg Region, along with the skills and training necessary to support those industries. Where traditional industry cluster analysis is used to group industries that share a similar customer and supplier network, occupational cluster analysis is used to group industries that draw from the same pool of skilled workers. By using these two methods in combination, we are able to identify industry recruitment targets that are a good fit for the region, both in terms of their connection to the existing regional industry base, and in terms of their compatibility with the region's existing workforce.

Based on the findings from the industry cluster analysis, four existing industry clusters within the region were identified as having good growth potential. They are:

- Communication & Entertainment
- Information Technology and Professional Services
- Metals and Related Manufacturing
- Wood Products & Furniture Manufacturing

In addition, three industry clusters that are not already fully established within the region were identified as potential emerging clusters with good growth potential. They are:

- Chemicals and Materials
- Finance and Insurance
- Health Care

Finally, by combining the results from the industry cluster analysis with the results from the occupational cluster analysis, it was possible to identify additional industries that both exhibit good growth potential and are compatible with the skills of the local labor force. This analysis was done using the skills profile of the existing incumbent workforce and the skills profile of displaced workers. With regard to the incumbent workforce, the identified target industries correspond to three existing and emerging industry clusters. They are:

- Information Technology & Professional Services
- Metals and Related Manufacturing
- Health Care (emerging cluster)

With regard to the skills profile of displaced workers, the target industries identified through the occupational cluster analysis correspond to the following three existing and emerging industry clusters:

- Communication & Entertainment
- Information Technology and Professional Services
- Health Care (emerging cluster)

In combination, the industry and occupational cluster analyses identify the following industry clusters as good recruitment targets, based on the region’s customer and supplier network, and the skills of its workforce:

Table 11: Target Industry Clusters – Summary Results – All methods

INDUSTRY CLUSTER	IDENTIFICATION METHOD
Chemicals and Materials*	Emerging Industry Cluster*
Communication & Entertainment	Existing Industry Cluster Skills-based, Displaced Workers
Finance and Insurance	Emerging Industry Cluster
Health Care	Emerging Industry Cluster Skills-based, Incumbent Workers Skills-based, Displaced Workers
Information Technology & Professional Services	Existing Industry Cluster Skills-based, Incumbent Workers Skills-based, Displaced Workers
Metals and Related Manufacturing	Existing Industry Cluster Skills-based, Incumbent Workers
Wood Products & Furniture Manufacturing	Existing Industry Cluster

* Cluster as a whole has low growth potential, but individual industries included in Tables 6 and 9 have high growth potential

Cluster Detail

Existing Industry Clusters

In the following pages, we present detail on each of the six existing industry clusters identified for the Greater Fredericksburg Region.

For each cluster, the following information has been provided:

- Structure diagram:
 - Core industries for each cluster are listed in the center box
 - Supplier and customer industries associated with the core industries
 - Top occupations in the core industries
 - Regional community colleges and other supporting institutions
- Industry-specific information:
 - Top companies for the core industries, ranked by employment
 - Employment and wage information for the individual core industries within each of the industry clusters
- Examples of the skills and training required for the top occupations in each industry cluster

Data Notes:

- Company names were compiled from the VEC's Quarterly Census of Employment and Wages (QCEW) database and every effort has been made to remove companies that have closed since the latest release of the data, as well as companies that are pending closure.
- The VEC's QCEW database contains a legal name and a trade name for each company. In most cases, the legal name was used in the lists for this section. In some cases, the company is more commonly known by the trade name or by another name altogether.
- The industry detail tables contain data on employment and wages for each industry, but in many instances the data has been suppressed to protect company confidentiality. Data must be suppressed if an industry contains fewer than three employers or if an individual employer accounts for 80% or more of the industry employment in the region. All of the data was used in the analysis for this report.

Figure A: Agriculture, Forestry, Fishing Cluster Summary

Greater Fredericksburg

Industry and occupational listings are based on regional presence, except for industries in italics, which pertain to the national industry cluster.

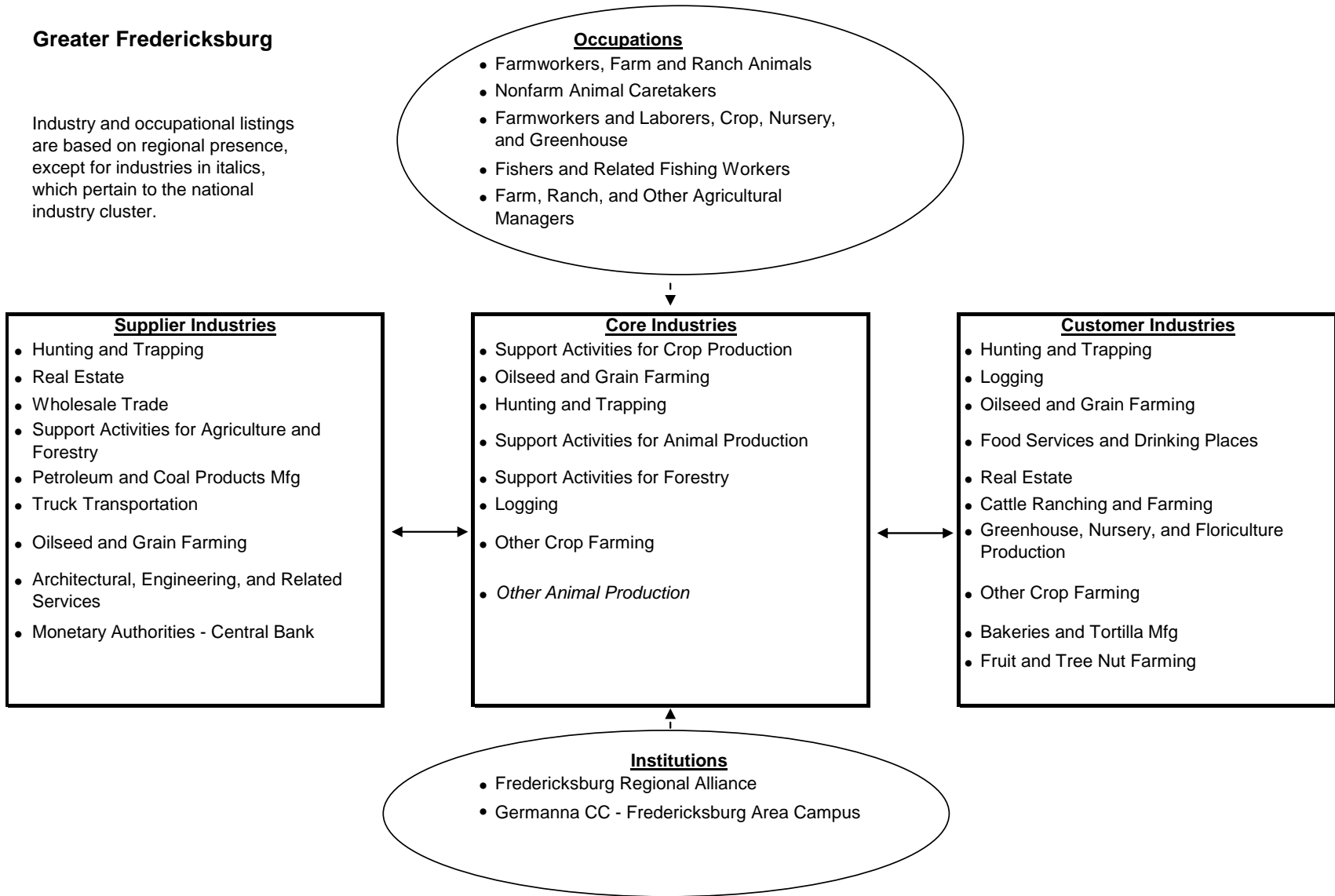


Table A1: Agriculture, Forestry, Fishing Cluster Summary

Greater Fredericksburg

Top Ten Companies-Core Industries
BELVEDERE PLANTATION INC
GOODMAN LUMBER COMPANY
H L WILLIAMS & SON INC
EMMETT CHAPMAN SNEAD III
KILBERT MAJORS
ACHILLE M GUEST POLO INC
SOUTHERN RESOURCES MANAGE INC
CAPITAL CRITTERS CORP INC
BROADDUS FARMS
C & I THINNING INC

CORE INDUSTRIES: REGIONAL DATA Agriculture, Forestry, Fishing Cluster Summary		CURRENT CLUSTER			CLUSTER 5-YEAR GROWTH TREND, 1999-2004			PERFORMANCE MEASURES	
naics	Core Cluster Industries (national industries in italics)	Employment 2004	Average Ann. Wage 2004	Number of Firms 2004	Employment	Avg. Annual Wage	Number of Firms	Overall Performance Index	Growth Index
1111	Oilseed and Grain Farming	14	\$26,757	4	7.0%	-1.1%	12.2%	high	lowest
1119	<i>Other Crop Farming</i>	23	\$17,835	4	-9.4%	4.3%	-7.8%	low	lowest
1129	<i>Other Animal Production</i>	d.s	d.s	d.s	d.s	d.s	d.s	lowest	lowest
1133	<i>Logging</i>	59	\$28,349	11	-12.5%	1.1%	-8.9%	low	lowest
1142	Hunting and Trapping	d.s	d.s	d.s	d.s	d.s	d.s	high	lowest
1151	Support Activities for Crop Production	d.s	d.s	d.s	d.s	d.s	d.s	high	low
1152	Support Activities for Animal Production	d.s	d.s	d.s	d.s	d.s	d.s	high	low
1153	Support Activities for Forestry	12	\$32,107	3	0.0%	-2.9%	d.s	high	low
CORE CLUSTER TOTAL		130	\$25,475	30	-7.8%	1.1%	-2.0%	n.a.	lowest

Source: Virginia Employment Commission, Covered Employment and Wages, annualized data for 2004, based on data through 3rd quarter.

Note: ds=data suppressed to protect company confidentiality (See Appendix 1 for detailed explanation); na=data not available.

"Lowest" quartile represents the bottom 25% for the index ranking; "Low" quartile represents above 25% and up to 50% and up to 50% ranking in the index; "High" quartile represents above 50% and up to 75% ranking in the index; "Highest" quartile represents a ranking in excess of 75% for the index.

Table A2: Greater Fredericksburg – Agriculture, Forestry, Fishing Cluster Skills Profiles

Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training
Lawyers	0	5.0	5.2	4.9	3.7	5.8	0.3	0.8	0.3	4.8	5.2	4.3	3.3	1.7	2.0	3.0	4.7	4.5	1.0	0.3	0.8	6.0	0.0	1.1	6.0	0.3	0.8	2.7	4.0	5.8	4.5	4.2	0.7	3.8	0.3	5.5	First Prof.
Educational, Vocational, and School Counselors	0	4.5	5.3	4.3	3.7	4.3	0.2	2.2	0.3	4.2	4.2	4.2	0.8	1.7	2.5	2.0	4.3	2.7	1.0	0.5	1.8	3.5	0.2	1.6	5.0	0.3	2.2	4.8	5.0	4.8	3.1	3.9	0.5	2.8	0.7	4.2	Master's
Nursery and Greenhouse Managers	3	3.3	4.0	3.5	4.2	3.2	1.3	3.2	0.8	3.3	3.8	3.2	3.7	3.7	4.3	3.7	3.8	3.7	1.8	1.5	3.3	2.0	0.2	2.3	4.0	1.3	2.7	2.2	3.0	4.0	3.1	3.3	1.7	3.8	1.3	3.3	Degree plus exp
Accountants	0	4.7	4.8	4.3	4.8	4.4	1.8	3.4	0.8	4.1	5.4	4.3	4.7	2.3	2.2	4.8	5.0	3.8	2.6	2.5	4.8	3.8	2.5	3.5	4.2	0.2	0.6	3.8	3.9	3.9	4.8	4.9	0.7	5.0	3.3	3.6	Bachelor's
Agricultural Technicians	0	1.8	2.3	1.8	1.7	1.5	1.8	2.2	0.8	0.8	1.0	1.5	0.5	1.0	0.5	2.8	1.3	0.5	2.0	1.8	1.3	0.7	0.0	1.3	2.8	0.8	2.7	0.8	0.8	1.7	0.9	0.9	1.7	1.3	1.2	2.2	Associate's
Mobile Heavy Equipment Mechanics, Except Engines	0	3.7	3.2	4.1	3.6	4.1	5.4	5.0	5.8	3.9	4.2	4.2	1.8	2.1	1.0	3.4	3.0	3.0	4.4	5.0	2.2	4.1	0.6	3.1	3.4	5.1	2.6	3.6	2.8	2.9	3.3	3.4	3.5	3.3	5.2	2.7	Certificate
First-Line Supervisors/Managers of Helpers, Laborers, and Material Movers, Hand	0	2.5	3.5	2.8	3.5	3.7	1.5	2.7	0.7	3.8	3.0	3.5	2.2	2.3	3.5	3.5	2.5	1.5	2.7	0.8	2.7	1.7	0.0	1.3	3.3	0.8	0.5	1.5	3.8	3.5	3.1	3.2	1.0	3.3	1.8	3.5	Related exp
Maintenance and Repair Workers, General	1	4.0	3.7	3.4	3.7	4.3	4.9	4.3	4.4	3.3	3.3	3.8	1.8	2.6	2.3	3.1	3.7	2.6	3.7	3.7	2.9	2.8	1.5	3.2	4.2	4.3	2.2	3.0	2.8	3.2	2.5	2.9	2.8	3.5	4.4	2.8	Long-term OJT
Truck Drivers, Heavy	1	1.0	2.2	1.4	1.5	1.2	2.7	2.2	1.3	0.8	1.5	1.0	1.5	1.2	0.8	2.0	1.3	0.8	2.7	2.5	0.7	0.5	0.0	1.3	2.5	2.3	0.3	1.8	1.3	2.0	1.2	1.3	0.8	1.8	2.0	2.3	Mod-term OJT
Nonfarm Animal Caretakers	7	1.4	2.6	1.8	1.2	1.6	2.4	2.4	2.4	1.8	2.0	1.4	0.8	1.4	0.2	2.6	1.6	0.4	2.2	1.2	1.2	0.6	0.0	1.7	2.4	2.4	1.8	2.6	1.2	2.6	1.3	1.6	1.8	1.2	2.2	2.4	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4.

Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations.

U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (*i.e.*, first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).

Figure B: Communication & Entertainment Cluster Summary

Greater Fredericksburg

Industry and occupational listings are based on regional presence, except for industries in italics, which pertain to the national industry cluster.

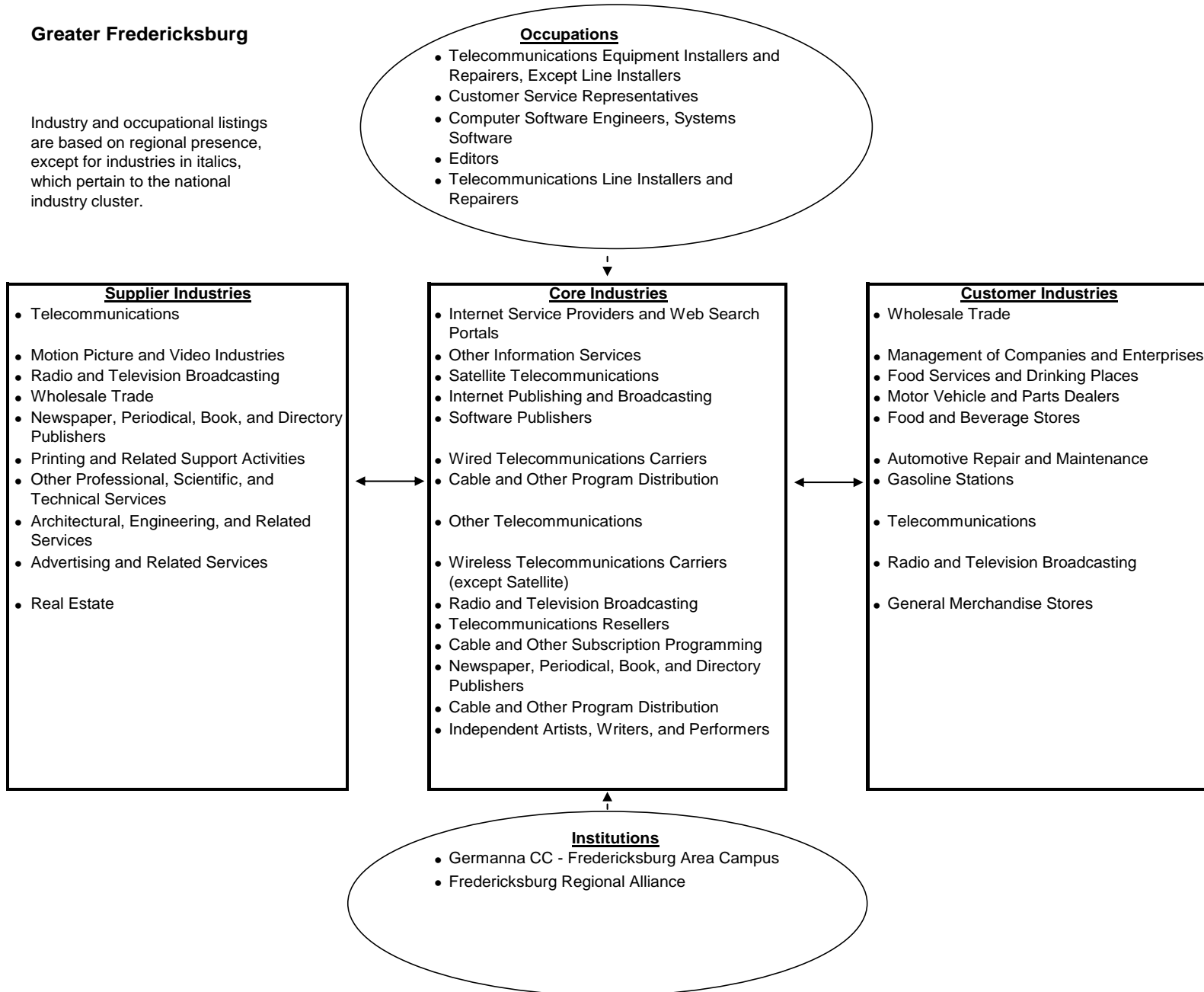


Table B1: Communication & Entertainment Cluster Summary

Greater Fredericksburg

Top Ten Companies-Core Industries
FREE LANCE STAR PUBL INC CHUGACH MCKINLEY INC VERIZON VIRGINIA INC. CINGULAR WIRELESS LLC ACC OPERATIONS INC VERIZON SOUTH INC. CHUGACH TELECOMMUNICATION INC MID ATLANTIC NET WORK INC PERSONAL SELLING POWER INC VIRGINIA WEB PROPERTIES

CORE INDUSTRIES: REGIONAL DATA Communication & Entertainment Cluster		CURRENT CLUSTER			CLUSTER 5-YEAR GROWTH TREND, 1999-2004			PERFORMANCE MEASURES	
naics	Core Cluster Industries (national industries in italics)	Employment 2004	Average Ann. Wage 2004	Number of Firms 2004	Employment	Avg. Annual Wage	Number of Firms	Overall Performance Index	Growth Index
5111	Newspaper, Periodical, Book, and Directory Publishers	d.s	d.s	d.s	d.s	d.s	d.s	highest	lowest
5112	Software Publishers	d.s	d.s	d.s	d.s	d.s	d.s	highest	highest
5151	Radio and Television Broadcasting	69	\$38,571	3	3.1%	5.3%	-5.6%	high	lowest
5152	Cable and Other Subscription Programming	d.s	d.s	d.s	d.s	d.s	d.s	high	high
5161	Internet Publishing and Broadcasting	d.s	d.s	d.s	d.s	d.s	d.s	highest	highest
5171	Wired Telecommunications Carriers	217	\$66,168	9	3.4%	4.5%	8.4%	low	high
5172	Wireless Telecommunications Carriers (except Satellite)	d.s	d.s	d.s	d.s	d.s	d.s	low	high
5173	Telecommunications Resellers	d.s	d.s	d.s	d.s	d.s	d.s	high	high
5174	Satellite Telecommunications	d.s	d.s	d.s	d.s	d.s	d.s	n.a.	low
5175	Cable and Other Program Distribution	100	\$47,397	4	-0.3%	8.9%	2.7%	low	high
5179	Other Telecommunications	d.s	d.s	d.s	d.s	d.s	d.s	high	high
5181	Internet Service Providers and Web Search Portals	19	\$62,119	5	14.1%	11.6%	3.1%	highest	highest
5191	Other Information Services	d.s	d.s	d.s	d.s	d.s	d.s	highest	highest
7115	Independent Artists, Writers, and Performers	9	\$13,989	6	12.6%	-5.8%	4.7%	lowest	low
	CORE CLUSTER TOTAL	1,296	\$45,249	49	5.7%	4.6%	3.5%	n.a.	highest

Source: Virginia Employment Commission, Covered Employment and Wages, annualized data for 2004, based on data through 3rd quarter.

Note: ds=data suppressed to protect company confidentiality (See Appendix 1 for detailed explanation); na=data not available.

"Lowest" quartile represents the bottom 25% for the index ranking; "Low" quartile represents above 25% and up to 50% and up to 50% ranking in the index; "High" quartile represents above 50% and up to 75% ranking in the index; "Highest" quartile represents a ranking in excess of 75% for the index.

Table B2: Greater Fredericksburg – Communication & Entertainment Cluster Skills Profiles

Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training
Lawyers	4	5.0	5.2	4.9	3.7	5.8	0.3	0.8	0.3	4.8	5.2	4.3	3.3	1.7	2.0	3.0	4.7	4.5	1.0	0.3	0.8	6.0	0.0	1.1	6.0	0.3	0.8	2.7	4.0	5.8	4.5	4.2	0.7	3.8	0.3	5.5	First Prof.
Statisticians	3	5.5	4.2	5.1	2.8	5.7	0.0	3.2	0.0	1.0	4.8	4.5	0.7	1.3	0.7	6.3	4.5	1.0	1.8	1.3	3.5	1.7	2.0	3.8	5.2	0.0	4.8	0.0	2.3	4.2	4.1	4.9	1.7	2.5	0.7	4.7	Master's
General and Operations Managers	31	4.8	4.8	3.9	5.2	4.7	1.8	3.8	1.2	4.1	4.5	4.0	4.9	4.7	5.0	4.0	5.5	4.3	2.1	1.0	3.4	4.5	0.8	3.3	4.6	1.4	2.3	3.8	4.4	4.7	3.1	2.3	2.2	4.3	3.1	4.5	Degree plus exp
Computer Software Engineers, Systems Software	86	5.8	4.5	4.7	4.2	4.8	2.7	5.0	5.5	4.0	4.8	4.0	3.0	4.8	3.0	5.7	3.7	1.8	3.5	3.5	5.5	2.7	6.0	4.8	5.2	2.3	5.3	2.7	2.3	4.7	4.1	3.8	4.8	2.5	6.0	4.5	Bachelor's
Computer Support Specialists	20	4.4	4.7	4.1	4.6	4.5	3.9	4.2	3.6	4.4	3.1	4.2	1.4	1.6	2.2	3.3	4.1	2.9	2.4	1.6	2.8	4.2	0.4	2.1	5.0	4.0	1.8	3.9	4.5	4.3	2.5	3.4	2.5	3.5	4.4	4.8	Associate's
Central Office and PBX Installers and Repairers	111	2.2	2.2	2.5	2.3	2.5	2.8	3.2	4.0	1.0	2.2	2.3	0.7	1.2	0.5	3.3	2.3	0.7	3.0	3.0	2.0	0.5	0.8	3.0	3.0	4.2	2.8	1.2	1.5	1.7	1.3	1.7	2.8	1.5	3.5	1.7	Certificate
First-Line Supervisors, Customer Service	33	3.3	3.8	3.3	4.3	4.2	0.2	1.3	0.2	3.7	3.3	4.0	3.8	2.8	4.3	3.0	4.2	2.3	1.2	0.5	2.0	3.0	0.0	1.3	4.0	0.3	0.2	4.0	4.0	4.2	3.2	3.6	0.7	4.0	0.5	4.0	Related exp
Telecommunications Line Installers and Repairers	59	1.7	3.2	2.2	2.0	2.2	3.2	2.8	4.0	2.2	2.2	1.7	0.7	1.0	0.5	3.2	2.2	0.3	2.7	2.5	1.8	0.3	0.3	2.3	2.7	3.7	1.5	1.7	1.7	3.0	1.6	2.4	1.7	1.3	3.5	2.0	Long-term OJT
Customer Service Representatives	90	4.2	4.5	2.9	4.1	4.2	1.9	2.1	0.9	3.8	3.2	4.0	1.6	1.8	1.7	3.2	4.6	2.8	2.7	1.7	2.3	3.3	0.9	2.3	4.7	1.9	0.6	4.6	3.9	3.9	2.1	2.4	2.1	4.0	2.9	3.9	Mod-term OJT
Office Clerks, General	47	2.7	4.1	1.5	2.7	2.9	0.7	2.0	0.7	2.5	2.0	2.9	1.3	1.0	1.3	2.8	2.2	1.6	1.7	0.6	1.5	2.1	0.1	1.1	4.1	0.5	0.3	2.8	3.1	3.3	0.8	0.9	0.8	2.7	1.4	3.6	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4. Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations. U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (*i.e.*, first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).

Figure C: Information Technology Professional Services Cluster Summary

Greater Fredericksburg

Industry and occupational listings are based on regional presence, except for industries in italics, which pertain to the national industry cluster.

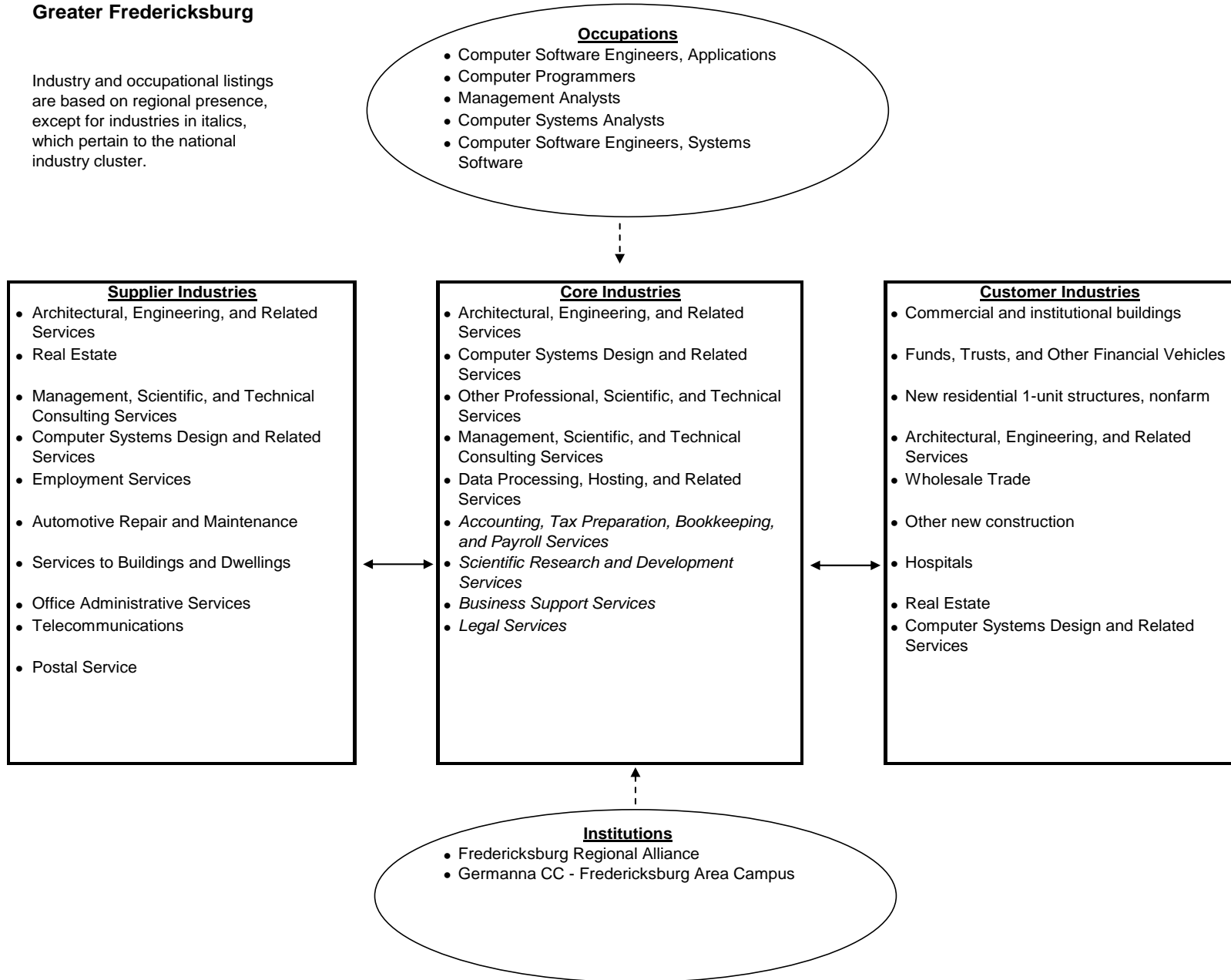


Table C1: Information Technology Professional Services Cluster Summary

Greater Fredericksburg

Top Ten Companies-Core Industries
BAE SYSTEMS APPLIED TECH INC
EG & G WASH INC
LOGICON INC
COMPUTER SCIENCES CORP
EOIR TECHNOLOGIES INC
BOWHEAD TRANSPORTATION CO INC
ANTEON CORPORATION
NEW PDS LLC
SYNETICS INCORPORATED
BATTELLE MEMORIAL INSTITUTE

CORE INDUSTRIES: REGIONAL DATA Information Technology Professional Services		CURRENT CLUSTER			CLUSTER 5-YEAR GROWTH TREND, 1999-2004			PERFORMANCE MEASURES	
naics	Core Cluster Industries (national industries in italics)	Employment 2004	Average Ann. Wage 2004	Number of Firms 2004	Employment	Avg. Annual Wage	Number of Firms	Overall Performance Index	Growth Index
5182	Data Processing, Hosting, and Related Services	171	\$39,735	7	4.9%	-2.4%	7.0%	highest	highest
5411	<i>Legal Services</i>	377	\$30,447	104	4.9%	1.3%	2.9%	lowest	lowest
5412	<i>Accounting, Tax Preparation, Bookkeeping, and Payroll Services</i>	376	\$25,676	72	4.9%	2.8%	4.1%	lowest	low
5413	Architectural, Engineering, and Related Services	1,600	\$56,441	117	11.2%	4.7%	7.4%	highest	low
5415	Computer Systems Design and Related Services	2,221	\$66,370	157	6.0%	5.4%	9.7%	highest	highest
5416	Management, Scientific, and Technical Consulting Services	444	\$60,795	100	15.2%	12.1%	8.3%	high	highest
5417	<i>Scientific Research and Development Services</i>	229	\$60,554	16	9.0%	3.8%	8.9%	low	highest
5419	Other Professional, Scientific, and Technical Services	545	\$20,121	45	14.4%	1.1%	8.3%	high	highest
5614	<i>Business Support Services</i>	218	\$27,051	25	-15.2%	2.4%	8.0%	highest	highest
CORE CLUSTER TOTAL		6,180	\$52,319	642	6.7%	5.4%	7.0%	n.a.	n.a.

Source: Virginia Employment Commission, Covered Employment and Wages, annualized data for 2004, based on data through 3rd quarter.

Note: ds=data suppressed to protect company confidentiality (See Appendix 1 for detailed explanation); na=data not available.

"Lowest" quartile represents the bottom 25% for the index ranking; "Low" quartile represents above 25% and up to 50% and up to 50% ranking in the index; "High" quartile represents above 50% and up to 75% ranking in the index; "Highest" quartile represents a ranking in excess of 75% for the index.

Table C2: Greater Fredericksburg – Information Technology Professional Services Cluster Skills Profiles

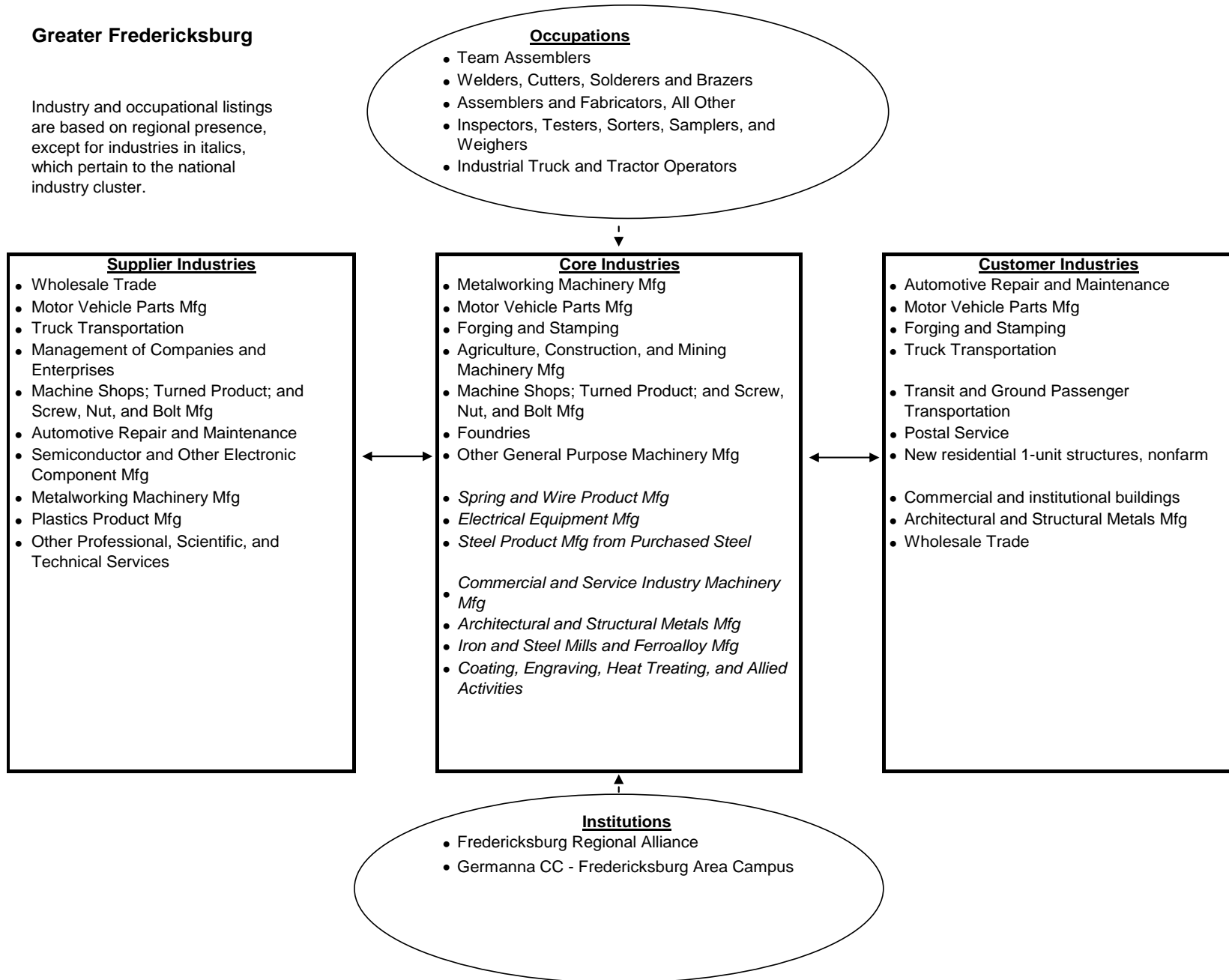
Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training
Veterinarians	66	5.7	4.5	5.2	3.8	5.3	0.3	3.8	0.2	5.2	5.2	5.2	1.0	3.0	3.7	4.5	5.2	2.3	2.2	1.0	3.2	3.0	0.0	3.8	6.0	0.0	5.5	1.8	3.7	5.0	3.9	4.6	0.5	3.5	0.2	4.8	First Prof.
Operations Research Analysts	30	5.3	4.8	5.2	4.5	5.5	0.5	3.3	0.7	1.3	5.5	4.0	3.3	2.5	1.8	5.8	5.5	2.2	1.8	1.2	4.7	3.2	2.8	1.8	5.3	0.5	4.5	1.0	2.5	4.5	5.3	5.7	1.2	3.3	0.7	4.7	Master's
Management Analysts	298	4.4	4.5	4.7	4.4	4.6	0.6	4.2	0.9	4.0	4.8	4.3	2.1	4.2	4.5	3.5	4.8	2.7	1.3	0.7	4.5	3.3	0.6	2.8	4.7	0.2	1.3	2.5	3.6	4.6	4.6	5.1	2.3	3.8	1.5	4.8	Degree plus exp
Computer Software Engineers, Applications	390	5.8	4.5	4.7	4.2	4.8	2.7	5.0	5.5	4.0	4.8	4.0	3.0	4.8	3.0	5.7	3.7	1.8	3.5	3.5	5.5	2.7	6.0	4.8	5.2	2.3	5.3	2.7	2.3	4.7	4.1	3.8	4.8	2.5	6.0	4.5	Bachelor's
Computer Support Specialists	214	4.4	4.7	4.1	4.6	4.5	3.9	4.2	3.6	4.4	3.1	4.2	1.4	1.6	2.2	3.3	4.1	2.9	2.4	1.6	2.8	4.2	0.4	2.1	5.0	4.0	1.8	3.9	4.5	4.3	2.5	3.4	2.5	3.5	4.4	4.8	Associate's
Architectural Drafters	54	5.6	5.0	4.7	5.6	5.0	1.0	3.5	1.9	4.4	3.2	4.3	2.2	2.0	2.2	4.8	4.8	3.3	1.8	1.3	4.7	4.2	1.9	3.4	5.1	0.7	3.2	4.1	3.9	4.7	2.5	2.8	3.7	4.1	2.2	4.1	Certificate
First-Line Supervisors, Customer Service	61	3.3	3.8	3.3	4.3	4.2	0.2	1.3	0.2	3.7	3.3	4.0	3.8	2.8	4.3	3.0	4.2	2.3	1.2	0.5	2.0	3.0	0.0	1.3	4.0	0.3	0.2	4.0	4.0	4.2	3.2	3.6	0.7	4.0	0.5	4.0	Related exp
Professional Photographers	47	2.7	2.7	2.5	2.8	2.7	2.0	3.8	1.7	2.0	2.5	1.8	0.8	2.7	2.0	2.8	3.0	1.3	2.8	2.0	2.2	1.7	0.0	2.3	2.5	1.2	2.0	1.8	2.7	2.7	2.1	2.2	2.3	2.5	1.7	1.3	Long-term OJT
Customer Service Representatives	90	4.2	4.5	2.9	4.1	4.2	1.9	2.1	0.9	3.8	3.2	4.0	1.6	1.8	1.7	3.2	4.6	2.8	2.7	1.7	2.3	3.3	0.9	2.3	4.7	1.9	0.6	4.6	3.9	3.9	2.1	2.4	2.1	4.0	2.9	3.9	Mod-term OJT
Office Clerks, General	169	2.7	4.1	1.5	2.7	2.9	0.7	2.0	0.7	2.5	2.0	2.9	1.3	1.0	1.3	2.8	2.2	1.6	1.7	0.6	1.5	2.1	0.1	1.1	4.1	0.5	0.3	2.8	3.1	3.3	0.8	0.9	0.8	2.7	1.4	3.6	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4. Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations. U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (*i.e.*, first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).

Figure D: Metals Related Manufacturing Cluster Summary

Greater Fredericksburg

Industry and occupational listings are based on regional presence, except for industries in italics, which pertain to the national industry cluster.



Regional Cluster Analysis – Greater Fredericksburg

Table D1: Metals Related Manufacturing Cluster Summary

Greater Fredericksburg

Top Ten Companies-Core Industries
GENERAL MOTORS CORPORATION MOTION CONTROL INDUSTRIES INC THERMA TRU VIRGINIA LIMIT SMI REBAR VIRGINIA INSTEEL WIRE PRODUCTS WALTER GRINDERS INC HARKNESS HALL LIMITED CHESAPEAKE MATERIALS INC FREDERICKSBURG MACHINE & CARICO INC

CORE INDUSTRIES: REGIONAL DATA Metals Related Manufacturing Cluster Summary		CURRENT CLUSTER			CLUSTER 5-YEAR GROWTH TREND, 1999-2004			PERFORMANCE MEASURES	
naics	Core Cluster Industries (national industries in italics)	Employment 2004	Average Ann. Wage 2004	Number of Firms 2004	Employment	Avg. Annual Wage	Number of Firms	Overall Performance Index	Growth Index
3311	<i>Iron and Steel Mills and Ferroalloy Mfg</i>	d.s	d.s	d.s	d.s	d.s	d.s	n.a.	lowest
3312	<i>Steel Product Mfg from Purchased Steel</i>	d.s	d.s	d.s	d.s	d.s	d.s	n.a.	lowest
3315	Foundries	d.s	d.s	d.s	d.s	d.s	d.s	high	high
3321	Forging and Stamping	d.s	d.s	d.s	d.s	d.s	d.s	highest	high
3323	<i>Architectural and Structural Metals Mfg</i>	352	\$32,781	7	-7.2%	3.9%	5.9%	highest	high
3326	<i>Spring and Wire Product Mfg</i>	d.s	d.s	d.s	d.s	d.s	d.s	high	lowest
3327	Machine Shops; Turned Product; and Screw, Nut, and Bolt Mfg	27	\$24,763	5	-8.6%	-0.8%	-9.0%	lowest	high
3328	<i>Coating, Engraving, Heat Treating, and Allied Activities</i>	d.s	d.s	d.s	d.s	d.s	d.s	low	high
3331	Agriculture, Construction, and Mining Machinery Mfg	28	\$33,689	4	49.5%	-7.3%	18.0%	highest	low
3333	<i>Commercial and Service Industry Machinery Mfg</i>	d.s	d.s	d.s	d.s	d.s	d.s	low	low
3335	Metalworking Machinery Mfg	d.s	d.s	d.s	d.s	d.s	d.s	high	highest
3339	Other General Purpose Machinery Mfg	d.s	d.s	d.s	d.s	d.s	d.s	highest	highest
3353	Electrical Equipment Mfg	d.s	d.s	d.s	d.s	d.s	d.s	low	high
3363	Motor Vehicle Parts Mfg	496	\$53,766	5	-7.1%	1.5%	4.6%	highest	low
CORE CLUSTER TOTAL		1,115	\$43,253	32	-7.2%	2.1%	1.9%	n.a.	high

Source: Virginia Employment Commission, Covered Employment and Wages, annualized data for 2004, based on data through 3rd quarter.

Note: ds=data suppressed to protect company confidentiality (See Appendix 1 for detailed explanation); na=data not available.

"Lowest" quartile represents the bottom 25% for the index ranking; "Low" quartile represents above 25% and up to 50% and up to 50% ranking in the index; "High" quartile represents above 50% and up to 75% ranking in the index; "Highest" quartile represents a ranking in excess of 75% for the index.

Table D2: Greater Fredericksburg – Metals Related Manufacturing Cluster Skills Profiles

Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training		
General and Operations Managers	9	4.8	4.8	3.9	5.2	4.7	1.8	3.8	1.2	4.1	4.5	4.0	4.9	4.7	5.0	4.0	5.5	4.3	2.1	1.0	3.4	4.5	0.8	3.3	4.6	1.4	2.3	3.8	4.4	4.7	3.1	2.3	2.2	4.3	3.1	4.5	Degree plus exp		
Industrial Engineers	11	4.9	4.9	4.5	4.4	4.4	1.3	5.3	3.4	4.2	4.9	4.3	3.2	3.0	3.1	4.7	3.3	4.0	2.6	2.0	3.2	4.1	2.5	3.4	5.0	1.3	3.0	3.5	3.4	4.4	3.7	3.4	4.0	4.0	4.2	4.5	Bachelor's		
Mechanical Engineering Technicians	3	4.7	4.5	4.0	5.0	3.8	2.4	4.5	3.8	4.2	4.5	4.0	2.2	2.9	3.0	4.5	3.5	3.1	2.9	3.4	3.9	3.1	1.6	3.4	4.5	2.9	3.2	3.9	2.7	3.9	2.7	3.5	3.7	4.3	4.4	4.4	Associate's		
Welders, Production	72	2.4	1.8	1.7	1.8	2.4	2.6	2.8	1.8	1.0	2.4	1.6	0.2	0.6	0.2	2.6	1.6	0.4	3.0	2.8	1.2	0.4	0.0	2.4	1.8	2.0	1.6	0.2	0.2	1.6	1.5	1.3	1.4	1.0	2.4	1.4	1.4	Certificate	
First-Line Supervisors/Managers of Mechanics, Installers, and Repairers	10	4.3	4.4	4.5	5.1	4.5	4.5	4.5	4.8	4.6	4.6	4.5	4.2	4.5	4.9	4.5	4.6	4.3	3.8	3.8	4.2	4.3	2.0	4.0	4.7	4.6	3.0	4.1	4.4	4.4	3.7	3.9	3.8	4.9	4.5	4.2	4.2	Related exp	
Maintenance and Repair Workers, General	17	4.0	3.7	3.4	3.7	4.3	4.9	4.3	4.4	3.3	3.3	3.8	1.8	2.6	2.3	3.1	3.7	2.6	3.7	3.7	2.9	2.8	1.5	3.2	4.2	4.3	2.2	3.0	2.8	3.2	2.5	2.9	2.8	3.5	4.4	2.8	2.8	Long-term OJT	
Materials Inspectors	35	3.2	2.8	2.8	2.7	2.8	2.7	3.2	3.0	2.3	2.7	2.5	0.8	2.3	2.7	4.0	3.0	1.2	3.8	3.8	3.2	1.5	0.0	4.3	3.5	2.7	3.2	1.0	1.5	3.0	2.1	2.6	3.0	1.8	3.7	3.3	3.3	3.3	Mod-term OJT
Industrial Truck and Tractor Operators	18	3.5	3.7	2.9	3.6	3.8	4.0	3.6	2.5	4.1	3.2	3.7	2.2	1.8	2.3	3.3	2.7	2.6	3.6	4.1	2.1	2.8	1.4	2.8	4.1	3.0	1.9	3.0	3.2	2.9	3.1	2.6	2.3	3.5	3.3	3.2	3.2	3.2	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4. Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations. U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (i.e., first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).

Figure E: Nonmetallic Minerals & Related Products Cluster Summary

Greater Fredericksburg

Industry and occupational listings are based on regional presence, except for industries in italics, which pertain to the national industry cluster.

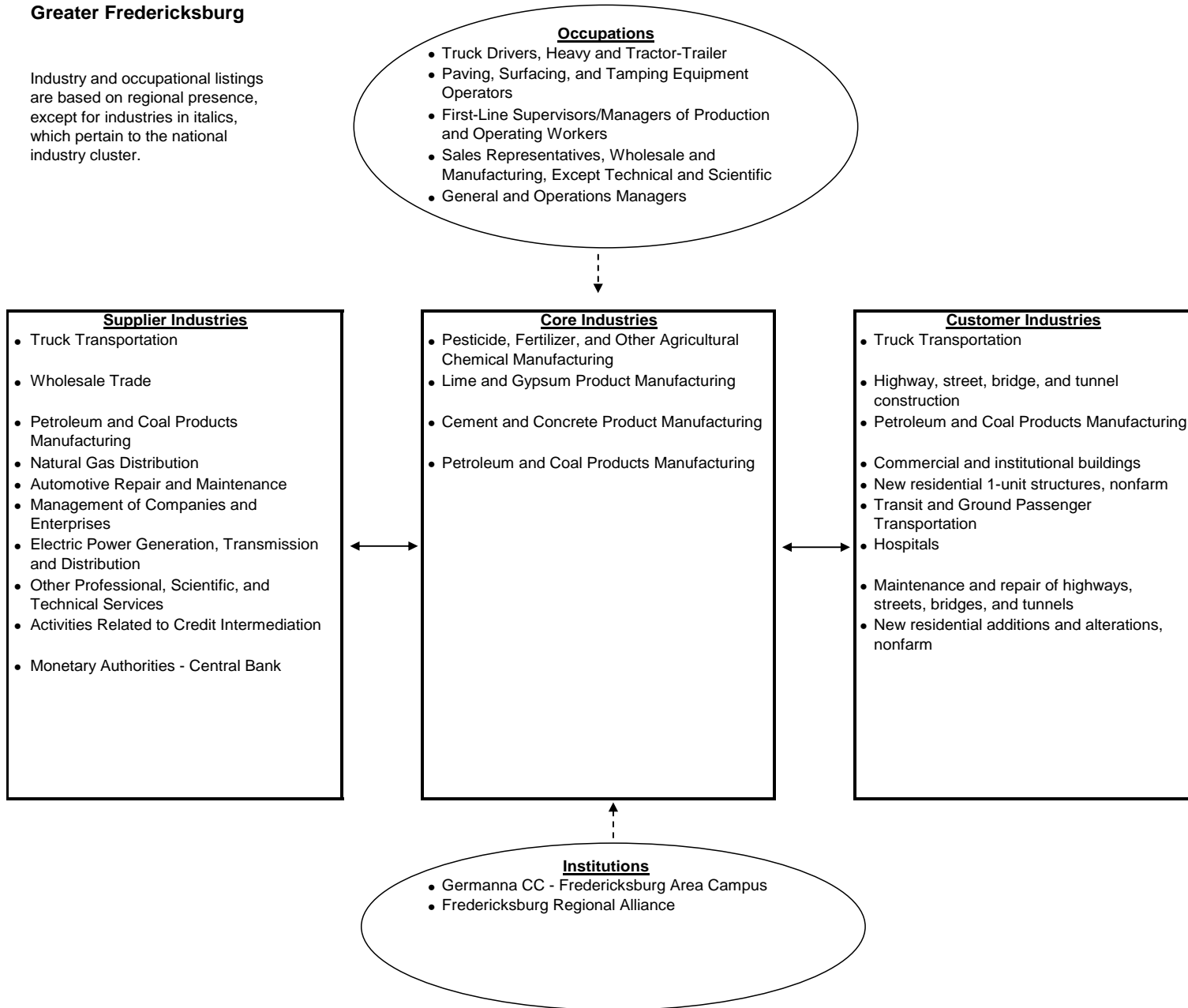


Table E1: Nonmetallic Minerals & Related Products Cluster Summary

Greater Fredericksburg

Top Ten Companies-Core Industries
TALLANT INDUSTRIES INC ENNSTONE INC OLDCASTLE PRECAST INC ROWE CONCRETE LLC STAFFORD STONE WORKS INC TITAN VIRGINIA READY MIX BEASLEY CONCRETE INC FREDERICKSBURG CONCRET CO FRACKELTON BLOCK CO LP G P GYPSUM CORPORATION

CORE INDUSTRIES: REGIONAL DATA Nonmetallic Minerals & Related Products Cluster		CURRENT CLUSTER			CLUSTER 5-YEAR GROWTH TREND, 1999-2004			PERFORMANCE MEASURES	
naics	Core Cluster Industries (national industries in italics)	Employment 2004	Average Ann. Wage 2004	Number of Firms 2004	Employment	Avg. Annual Wage	Number of Firms	Overall Performance Index	Growth Index
3241	Petroleum and Coal Products Manufacturing	d.s	d.s	d.s	d.s	d.s	d.s	lowest	lowest
3253	Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing	d.s	d.s	d.s	d.s	d.s	d.s	highest	lowest
3273	Cement and Concrete Product Manufacturing	346	\$40,981	14	3.1%	4.5%	-2.0%	highest	high
3274	Lime and Gypsum Product Manufacturing	d.s	d.s	d.s	d.s	d.s	d.s	highest	low
CORE CLUSTER TOTAL		488	\$38,485	17	4.5%	3.9%	-3.0%	n.a.	n.a.

Source: Virginia Employment Commission, Covered Employment and Wages, annualized data for 2004, based on data through 3rd quarter.

Note: ds=data suppressed to protect company confidentiality (See Appendix 1 for detailed explanation); na=data not available.

"Lowest" quartile represents the bottom 25% for the index ranking; "Low" quartile represents above 25% and up to 50% and up to 50% ranking in the index; "High" quartile represents above 50% and up to 75% ranking in the index;"Highest" quartile represents a ranking in excess of 75% for the index.

Table E2: Greater Fredericksburg – Nonmetallic Minerals & Related Products Cluster Skills Profiles

Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training
General and Operations Managers	31	4.8	4.8	3.9	5.2	4.7	1.8	3.8	1.2	4.1	4.5	4.0	4.9	4.7	5.0	4.0	5.5	4.3	2.1	1.0	3.4	4.5	0.8	3.3	4.6	1.4	2.3	3.8	4.4	4.7	3.1	2.3	2.2	4.3	3.1	4.5	Degree plus exp
Industrial Production Managers	3	4.5	4.8	4.6	5.4	4.7	2.2	4.7	2.2	4.2	4.8	4.1	3.4	4.4	4.3	4.4	5.4	3.9	2.6	2.9	4.3	4.7	1.1	4.3	4.7	1.9	2.6	3.6	4.4	4.5	4.0	4.5	3.4	4.9	3.1	3.9	Bachelor's
Bus and Truck Mechanics and Diesel Engine Specialists	5	3.2	3.0	3.0	3.8	3.1	5.1	3.6	3.8	3.4	2.9	3.7	1.9	2.0	2.1	2.5	2.9	2.6	2.3	2.2	1.8	2.5	0.8	2.3	3.3	4.7	2.9	2.5	3.3	2.9	2.3	2.2	2.6	3.3	5.0	2.9	Certificate
First-Line Supervisors/Managers of Production and Operating Workers	35	2.8	3.7	3.4	4.2	3.5	2.0	2.3	1.2	3.5	3.7	3.2	2.7	3.8	4.2	3.8	3.5	3.0	3.2	3.2	3.0	3.0	0.0	2.4	3.8	2.0	2.7	0.7	3.5	3.7	3.6	3.2	1.5	3.5	2.7	3.8	Related exp
Maintenance and Repair Workers, General	12	4.0	3.7	3.4	3.7	4.3	4.9	4.3	4.4	3.3	3.3	3.8	1.8	2.6	2.3	3.1	3.7	2.6	3.7	3.7	2.9	2.8	1.5	3.2	4.2	4.3	2.2	3.0	2.8	3.2	2.5	2.9	2.8	3.5	4.4	2.8	Long-term OJT
Truck Drivers, Heavy Stevedores, Except Equipment Operators	62	1.0	2.2	1.4	1.5	1.2	2.7	2.2	1.3	0.8	1.5	1.0	1.5	1.2	0.8	2.0	1.3	0.8	2.7	2.5	0.7	0.5	0.0	1.3	2.5	2.3	0.3	1.8	1.3	2.0	1.2	1.3	0.8	1.8	2.0	2.3	Mod-term OJT
Equipment Operators	21	0.3	2.0	0.9	1.5	0.8	0.3	1.3	0.0	0.8	0.8	0.8	0.0	0.5	0.2	0.8	0.8	0.3	1.2	0.2	0.0	0.0	0.0	0.2	1.2	0.0	0.0	0.0	0.3	1.8	0.6	0.8	0.0	1.0	0.3	1.0	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4. Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations. U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (i.e., first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).

Figure F: Wood Product & Furniture Manufacturing Cluster Summary

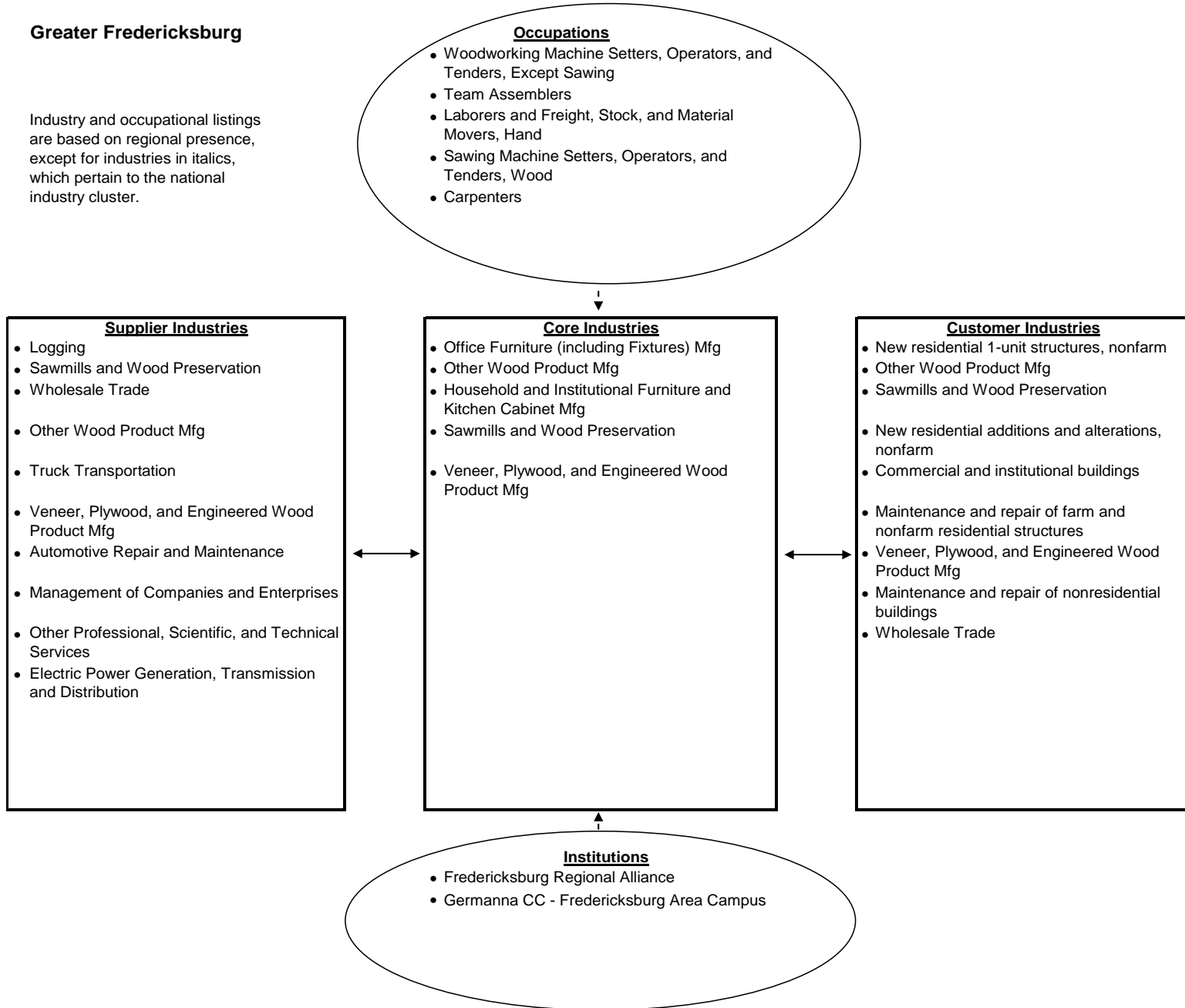


Table F1: Wood Product & Furniture Manufacturing Cluster Summary

Greater Fredericksburg

Top Ten Companies-Core Industries
TRUSSWAY LTD WILLIAMSBURG MILLWORK CORP CALVERT LUMBER CO INC HOOVER TREATED WOOD PRODU CREATIVE DIMENSIONS GROUP CULPEPER WOOD PRESERVERS INC J H KNIGHTON LUMBER CO JOHNSON & SON LUMBER INC DBC AND BLC INC W T JONES & SONS INC

CORE INDUSTRIES: REGIONAL DATA Wood Product & Furniture Manufacturing Cluster		CURRENT CLUSTER			CLUSTER 5-YEAR GROWTH TREND, 1999-2004			PERFORMANCE MEASURES	
naics	Core Cluster Industries (national industries in italics)	Employment 2004	Average Ann. Wage 2004	Number of Firms 2004	Employment	Avg. Annual Wage	Number of Firms	Overall Performance Index	Growth Index
3211	Sawmills and Wood Preservation	313	\$29,136	15	-0.7%	1.6%	-0.3%	highest	lowest
3212	Veneer, Plywood, and Engineered Wood Product Manufacturing	d.s	d.s	d.s	d.s	d.s	d.s	high	low
3219	Other Wood Product Manufacturing	185	\$27,897	13	-8.1%	2.4%	-2.0%	highest	high
3371	Household and Institutional Furniture and Kitchen Cabinet Manufacturing	75	\$25,562	11	12.9%	4.2%	-0.7%	lowest	low
3372	Office Furniture (including Fixtures) Manufacturing	d.s	d.s	d.s	d.s	d.s	d.s	lowest	low
CORE CLUSTER TOTAL		838	\$27,538	44	0.4%	1.4%	-1.3%	n.a.	high

Source: Virginia Employment Commission, Covered Employment and Wages, annualized data for 2004, based on data through 3rd quarter.

Note: ds=data suppressed to protect company confidentiality (See Appendix 1 for detailed explanation); na=data not available.

"Lowest" quartile represents the bottom 25% for the index ranking; "Low" quartile represents above 25% and up to 50% and up to 50% ranking in the index; "High" quartile represents above 50% and up to 75% ranking in the index; "Highest" quartile represents a ranking in excess of 75% for the index.

Table F2: Greater Fredericksburg – Wood Products & Furniture Manufacturing Cluster Skills Profiles

Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training
General and Operations Managers	19	4.8	4.8	3.9	5.2	4.7	1.8	3.8	1.2	4.1	4.5	4.0	4.9	4.7	5.0	4.0	5.5	4.3	2.1	1.0	3.4	4.5	0.8	3.3	4.6	1.4	2.3	3.8	4.4	4.7	3.1	2.3	2.2	4.3	3.1	4.5	Degree plus exp
Industrial Production Managers	10	4.5	4.8	4.6	5.4	4.7	2.2	4.7	2.2	4.2	4.8	4.1	3.4	4.4	4.3	4.4	5.4	3.9	2.6	2.9	4.3	4.7	1.1	4.3	4.7	1.9	2.6	3.6	4.4	4.5	4.0	4.5	3.4	4.9	3.1	3.9	Bachelor's
Industrial Engineering Technicians	1	4.3	3.8	4.4	3.2	4.7	0.5	4.3	0.8	2.0	4.3	3.3	0.2	1.3	0.8	4.8	4.7	1.8	1.7	3.0	4.5	3.3	1.3	4.8	4.8	0.0	4.2	0.3	2.7	4.0	4.3	4.7	2.8	2.5	2.5	4.7	Associate's
Automotive Master Mechanics	2	5.2	3.8	4.7	4.2	4.6	4.7	4.5	4.3	4.3	3.3	3.8	2.0	2.4	1.3	3.6	3.6	2.1	3.3	3.6	2.2	2.5	1.8	3.3	5.0	4.7	2.7	2.5	2.6	3.6	2.8	2.6	3.4	3.3	5.2	3.5	Certificate
First-Line Supervisors/Managers of Production and Operating Workers	31	2.8	3.7	3.4	4.2	3.5	2.0	2.3	1.2	3.5	3.7	3.2	2.7	3.8	4.2	3.8	3.5	3.0	3.2	3.2	3.0	3.0	0.0	2.4	3.8	2.0	2.7	0.7	3.5	3.7	3.6	3.2	1.5	3.5	2.7	3.8	Related exp
Construction Carpenters	51	4.9	4.4	3.7	5.1	5.1	4.8	4.7	3.8	4.4	4.7	4.9	4.7	4.8	5.4	5.1	4.5	2.9	3.2	2.8	3.8	3.7	1.5	4.7	2.8	4.4	3.8	4.5	4.4	5.3	2.0	2.6	3.7	4.9	3.9	3.6	Long-term OJT
Woodworking Machine Setters and Set-Up Operators, Except Sawing	96	1.0	1.4	1.5	0.6	1.0	2.4	3.2	2.8	0.2	2.0	0.8	0.0	0.6	0.0	1.6	1.8	0.2	3.6	3.6	1.4	0.2	0.0	2.0	2.4	2.2	0.6	0.6	0.4	1.2	0.9	1.5	1.6	1.0	2.6	1.4	Mod-term OJT
Stevedores, Except Equipment Operators	73	0.3	2.0	0.9	1.5	0.8	0.3	1.3	0.0	0.8	0.8	0.8	0.0	0.5	0.2	0.8	0.8	0.3	1.2	0.2	0.0	0.0	0.0	0.2	1.2	0.0	0.0	0.0	0.3	1.8	0.6	0.8	0.0	1.0	0.3	1.0	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4. Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations. U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (*i.e.*, first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).

Cluster Detail

Emerging Industry Clusters

In the following pages, we present detail on each of the three emerging industry clusters identified for the Greater Fredericksburg Region.

Figure G:
National Template – Chemicals & Materials Cluster Summary

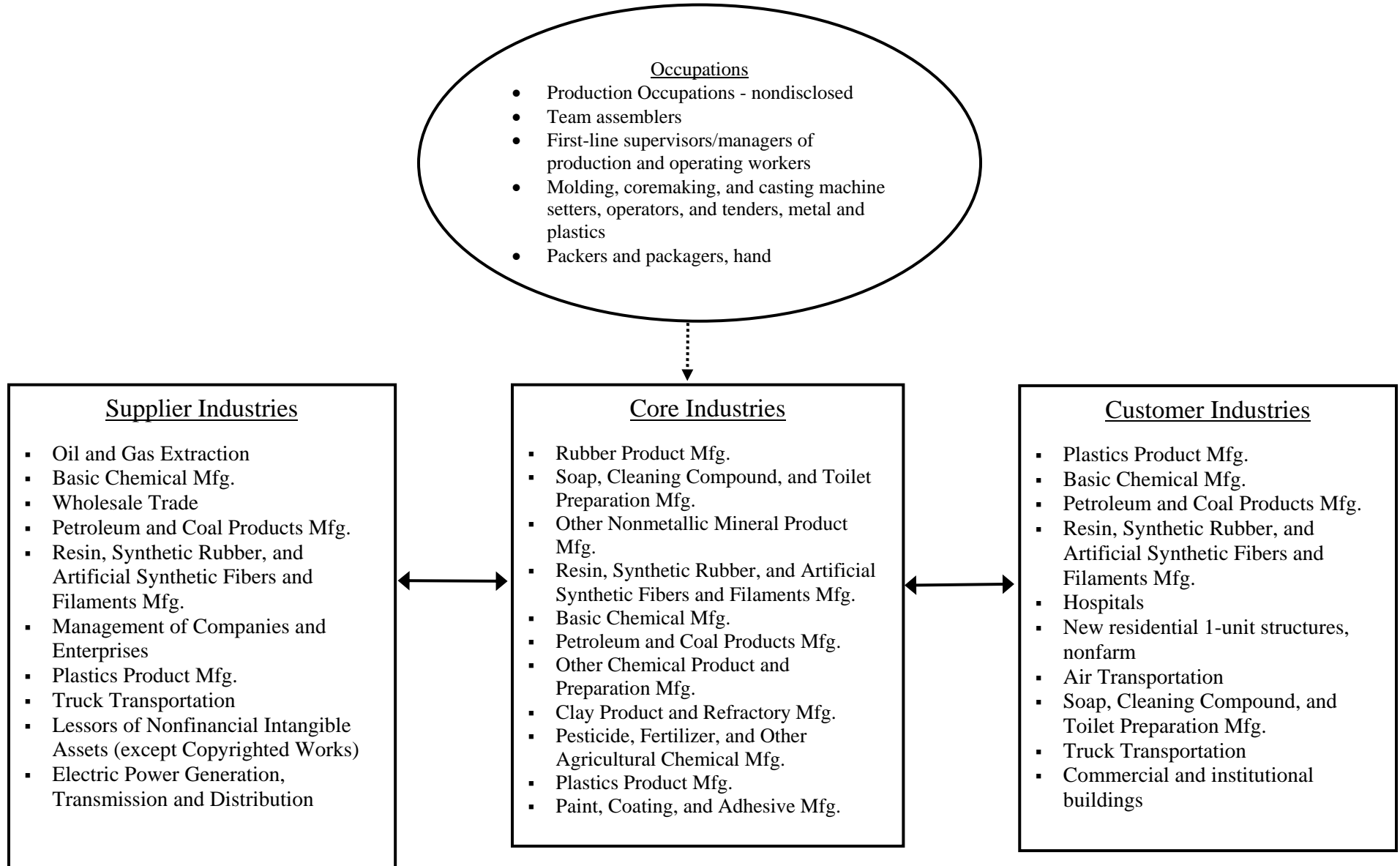


Table G: Greater Fredericksburg – Chemicals & Materials Cluster Skills Profiles

Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training
General and Operations Managers	2	4.8	4.8	3.9	5.2	4.7	1.8	3.8	1.2	4.1	4.5	4.0	4.9	4.7	5.0	4.0	5.5	4.3	2.1	1.0	3.4	4.5	0.8	3.3	4.6	1.4	2.3	3.8	4.4	4.7	3.1	2.3	2.2	4.3	3.1	4.5	Degree plus exp
Industrial Production Managers	2	4.5	4.8	4.6	5.4	4.7	2.2	4.7	2.2	4.2	4.8	4.1	3.4	4.4	4.3	4.4	5.4	3.9	2.6	2.9	4.3	4.7	1.1	4.3	4.7	1.9	2.6	3.6	4.4	4.5	4.0	4.5	3.4	4.9	3.1	3.9	Bachelor's
Chemical Technicians	1	4.7	4.1	3.9	3.9	4.5	4.3	4.2	3.0	3.8	3.5	4.0	1.2	2.2	1.9	4.7	3.9	2.3	4.1	4.9	3.5	3.0	1.0	4.6	4.8	3.5	4.7	2.5	3.0	3.4	3.3	3.6	3.0	4.3	4.0	4.5	Associate's
Bus and Truck Mechanics and Diesel Engine Specialists	1	3.2	3.0	3.0	3.8	3.1	5.1	3.6	3.8	3.4	2.9	3.7	1.9	2.0	2.1	2.5	2.9	2.6	2.3	2.2	1.8	2.5	0.8	2.3	3.3	4.7	2.9	2.5	3.3	2.9	2.3	2.2	2.6	3.3	5.0	2.9	Certificate
First-Line Supervisors/Managers of Production and Operating Workers	10	2.8	3.7	3.4	4.2	3.5	2.0	2.3	1.2	3.5	3.7	3.2	2.7	3.8	4.2	3.8	3.5	3.0	3.2	3.2	3.0	3.0	0.0	2.4	3.8	2.0	2.7	0.7	3.5	3.7	3.6	3.2	1.5	3.5	2.7	3.8	Related exp
Maintenance and Repair Workers, General	7	4.0	3.7	3.4	3.7	4.3	4.9	4.3	4.4	3.3	3.3	3.8	1.8	2.6	2.3	3.1	3.7	2.6	3.7	3.7	2.9	2.8	1.5	3.2	4.2	4.3	2.2	3.0	2.8	3.2	2.5	2.9	2.8	3.5	4.4	2.8	Long-term OJT
Plastic Molding and Casting Machine Setters and Set-Up Operators	11	1.4	1.0	1.5	0.4	1.2	3.4	2.2	2.0	0.2	1.4	0.8	0.0	0.4	0.0	2.6	1.6	0.2	3.4	3.4	1.6	0.2	0.0	2.6	2.6	3.0	1.2	0.6	1.0	1.0	0.8	1.2	1.6	0.8	2.6	1.6	Mod-term OJT
Stevedores, Except Equipment Operators	8	0.3	2.0	0.9	1.5	0.8	0.3	1.3	0.0	0.8	0.8	0.8	0.0	0.5	0.2	0.8	0.8	0.3	1.2	0.2	0.0	0.0	0.0	0.2	1.2	0.0	0.0	0.0	0.3	1.8	0.6	0.8	0.0	1.0	0.3	1.0	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4.

Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations.

U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (i.e., first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).

Figure H:
National Template – Finance and Insurance Cluster Summary

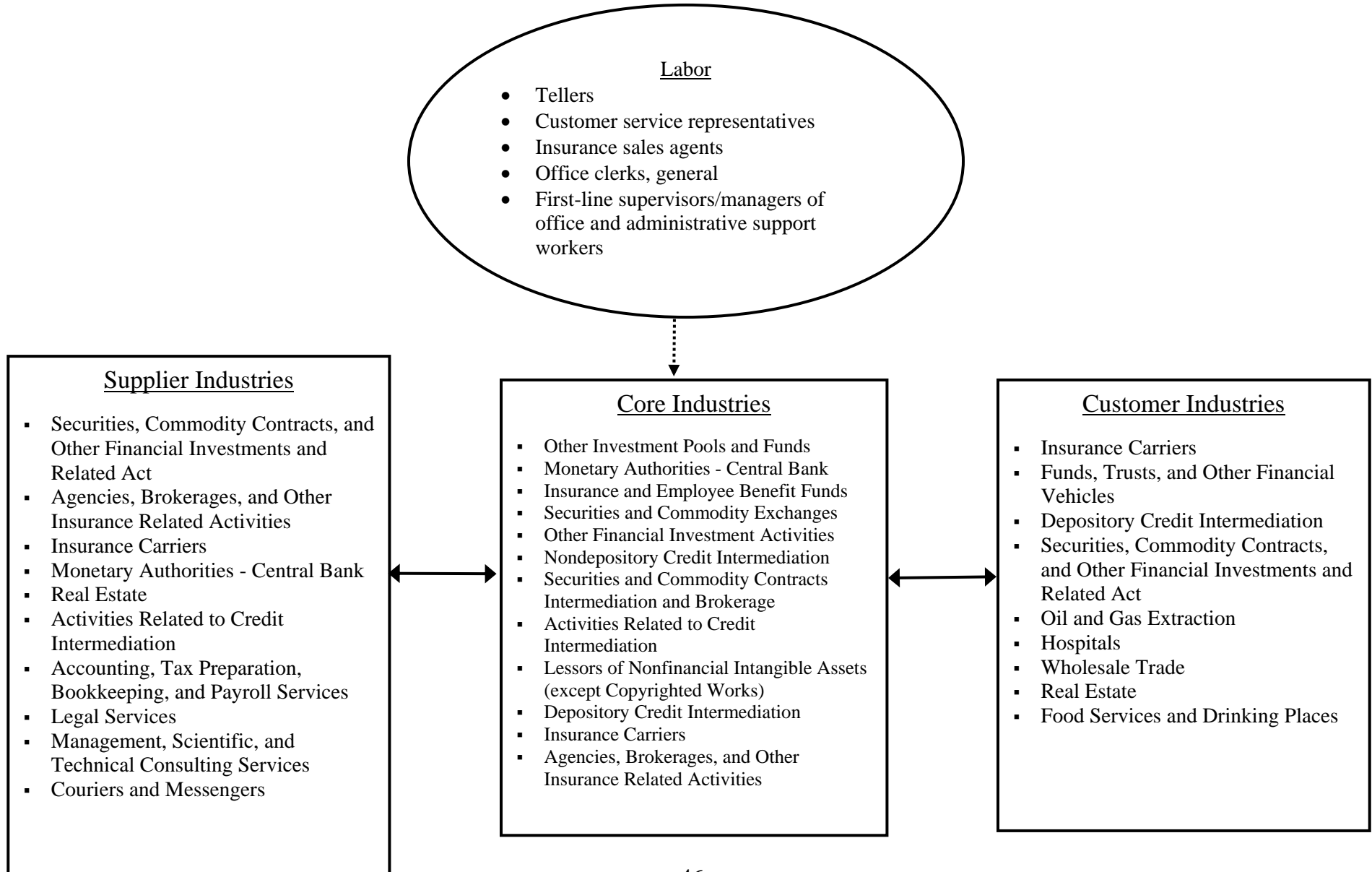


Table H: Greater Fredericksburg – Finance & Insurance Cluster Skills Profiles

Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training
Lawyers	3	5.0	5.2	4.9	3.7	5.8	0.3	0.8	0.3	4.8	5.2	4.3	3.3	1.7	2.0	3.0	4.7	4.5	1.0	0.3	0.8	6.0	0.0	1.1	6.0	0.3	0.8	2.7	4.0	5.8	4.5	4.2	0.7	3.8	0.3	5.5	First Prof.
Operations Research Analysts	1	5.3	4.8	5.2	4.5	5.5	0.5	3.3	0.7	1.3	5.5	4.0	3.3	2.5	1.8	5.8	5.5	2.2	1.8	1.2	4.7	3.2	2.8	1.8	5.3	0.5	4.5	1.0	2.5	4.5	5.3	5.7	1.2	3.3	0.7	4.7	Master's
General and Operations Managers	11	4.8	4.8	3.9	5.2	4.7	1.8	3.8	1.2	4.1	4.5	4.0	4.9	4.7	5.0	4.0	5.5	4.3	2.1	1.0	3.4	4.5	0.8	3.3	4.6	1.4	2.3	3.8	4.4	4.7	3.1	2.3	2.2	4.3	3.1	4.5	Degree plus exp
Insurance Sales Agents	130	4.5	5.0	4.1	3.9	4.6	1.5	2.2	1.4	3.8	4.8	4.2	3.0	2.4	3.2	4.1	4.4	4.1	1.6	1.4	3.2	5.2	1.1	1.8	4.8	0.9	0.8	4.3	4.5	4.9	1.1	2.0	1.7	5.0	2.6	4.4	Bachelor's
Registered Nurses	6	5.1	5.1	4.2	5.1	5.2	1.8	3.7	0.9	5.0	4.6	5.0	1.0	1.8	3.3	4.0	5.1	3.9	2.3	3.3	2.6	4.1	0.5	2.4	5.4	0.7	3.9	5.0	5.5	4.9	2.2	2.6	2.5	5.1	2.8	4.7	Associate's
Legal Secretaries	0	4.3	4.7	3.2	4.1	3.6	1.6	2.8	1.4	3.8	4.2	4.3	2.2	1.9	2.0	3.3	3.5	3.2	3.1	1.4	2.0	3.6	0.6	2.0	5.0	0.8	0.2	2.8	4.2	4.4	1.2	1.8	1.9	4.6	1.5	5.0	Certificate
First-Line Supervisors, Customer Service	17	3.3	3.8	3.3	4.3	4.2	0.2	1.3	0.2	3.7	3.3	4.0	3.8	2.8	4.3	3.0	4.2	2.3	1.2	0.5	2.0	3.0	0.0	1.3	4.0	0.3	0.2	4.0	4.0	4.2	3.2	3.6	0.7	4.0	0.5	4.0	Related exp
Claims Examiners, Property and Casualty Insurance	42	3.2	3.8	3.0	2.2	3.8	0.0	0.5	0.0	0.8	3.8	2.0	1.2	1.0	0.5	4.5	3.8	1.8	0.7	0.3	0.7	1.5	0.0	1.7	4.5	0.3	1.0	0.7	1.7	3.7	2.3	2.9	0.2	2.0	0.5	4.0	Long-term OJT
Customer Service Representatives	71	4.2	4.5	2.9	4.1	4.2	1.9	2.1	0.9	3.8	3.2	4.0	1.6	1.8	1.7	3.2	4.6	2.8	2.7	1.7	2.3	3.3	0.9	2.3	4.7	1.9	0.6	4.6	3.9	3.9	2.1	2.4	2.1	4.0	2.9	3.9	Med-term OJT
Office Clerks, General	35	2.7	4.1	1.5	2.7	2.9	0.7	2.0	0.7	2.5	2.0	2.9	1.3	1.0	1.3	2.8	2.2	1.6	1.7	0.6	1.5	2.1	0.1	1.1	4.1	0.5	0.3	2.8	3.1	3.3	0.8	0.9	0.8	2.7	1.4	3.6	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4.

Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations.

U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (i.e., first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).

Figure I:
National Template – Health Care Cluster Summary

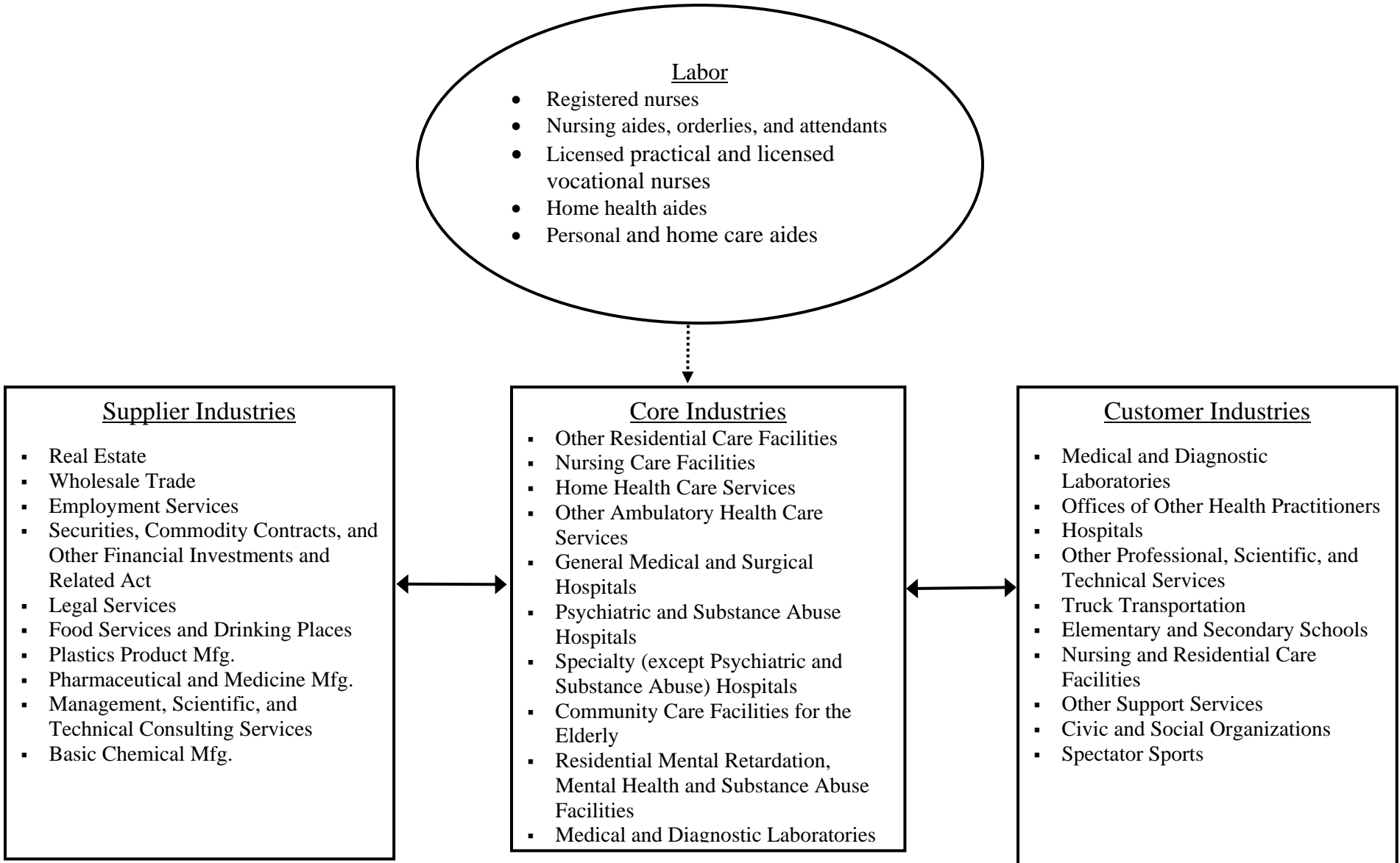


Table I: Greater Fredericksburg – Health Care Cluster Skills Profiles

Top Occupation	Employment	Active Learning	Active Listening	Complex Problem Solving	Coordination	Critical Thinking	Equipment Maintenance	Equipment Selection	Installation	Instructing	Judgment and Decision Making	Learning Strategies	Management of Financial Resources	Management of Material Resources	Management of Personnel Resources	Mathematics	Monitoring	Negotiation	Operation and Control	Operation Monitoring	Operations Analysis	Persuasion	Programming	Quality Control Analysis	Reading Comprehension	Repairing	Science	Service Orientation	Social Perceptiveness	Speaking	Systems Analysis	Systems Evaluation	Technology Design	Time Management	Troubleshooting	Writing	Education or Training
Pharmacists	26	4.6	5.4	3.3	3.3	5.0	1.4	1.8	1.5	5.0	3.0	4.0	2.5	1.2	2.7	4.4	4.3	2.9	2.5	1.5	2.0	3.7	0.6	2.1	5.7	1.7	3.9	3.0	4.8	4.7	1.0	1.2	0.9	3.2	2.3	4.4	First Prof.
Physical Therapists	28	5.1	5.1	4.7	5.0	5.2	2.0	4.3	0.8	5.3	4.0	5.3	2.2	2.0	2.7	2.5	5.2	3.5	2.8	2.5	2.9	4.2	0.2	3.1	6.0	1.3	4.5	4.7	5.1	4.6	1.2	1.7	3.0	4.9	2.7	5.0	Master's
Medical and Health Services Managers	35	5.5	5.4	4.5	5.3	5.8	2.2	4.2	1.8	5.1	5.1	5.6	4.3	4.6	4.9	4.3	5.8	3.9	3.3	3.6	4.3	5.2	2.2	4.5	5.7	2.0	3.8	5.3	5.2	5.3	3.5	4.6	3.2	5.1	3.6	5.0	Degree plus exp
Medical and Clinical Laboratory Technologists	74	4.8	4.5	4.1	3.8	4.9	5.6	4.4	2.2	4.8	4.2	4.0	1.0	2.0	2.8	3.9	4.4	2.3	4.6	4.9	2.8	2.4	0.3	5.1	4.9	3.9	4.6	3.6	3.2	4.1	2.7	2.6	2.1	4.0	4.6	4.0	Bachelor's
Registered Nurses	824	5.1	5.1	4.2	5.1	5.2	1.8	3.7	0.9	5.0	4.6	5.0	1.0	1.8	3.3	4.0	5.1	3.9	2.3	3.3	2.6	4.1	0.5	2.4	5.4	0.7	3.9	5.0	5.5	4.9	2.2	2.6	2.5	5.1	2.8	4.7	Associate's
Licensed Practical and Licensed Vocational Nurses	151	5.8	6.4	5.1	5.2	5.3	4.5	4.8	3.4	5.5	6.0	5.6	2.7	3.9	4.7	4.3	5.8	3.9	4.3	5.0	4.0	4.5	1.9	3.9	5.7	4.0	5.2	5.9	5.3	5.6	3.8	4.4	3.5	5.7	4.6	5.9	Certificate
First-Line Supervisors, Customer Service	29	3.3	3.8	3.3	4.3	4.2	0.2	1.3	0.2	3.7	3.3	4.0	3.8	2.8	4.3	3.0	4.2	2.3	1.2	0.5	2.0	3.0	0.0	1.3	4.0	0.3	0.2	4.0	4.0	4.2	3.2	3.6	0.7	4.0	0.5	4.0	Related exp
Cooks, Institution and Cafeteria	27	3.2	2.2	2.2	2.8	3.0	1.7	2.2	0.7	1.7	2.2	2.0	2.5	2.5	2.8	2.7	2.3	1.3	2.3	2.0	1.8	1.0	0.0	1.9	2.5	0.7	1.3	2.2	1.8	2.2	2.0	2.1	1.0	2.3	1.3	2.5	Long-term OJT
Secretaries, Except Legal, Medical, and Executive	54	3.6	4.3	2.2	3.5	3.8	1.6	2.3	1.0	3.6	2.4	3.7	2.4	1.9	2.3	3.2	3.6	2.3	2.2	0.9	2.1	2.9	0.6	1.9	4.2	0.9	0.4	2.9	3.6	3.9	1.2	1.3	1.3	3.6	1.7	4.3	Mod-term OJT
Nursing Aides, Orderlies, and Attendants	277	3.7	3.7	2.6	4.2	4.2	1.5	3.5	1.8	4.3	3.6	3.7	1.9	2.2	2.6	2.6	4.4	2.5	2.7	3.4	1.9	3.2	0.7	2.2	4.0	1.1	2.5	3.9	5.0	4.1	2.3	2.8	2.6	4.5	2.9	3.2	Short-term OJT

The skills levels listed here are taken from the U.S. Department of Labor's O-NET database. Skill levels in the O-NET database are assessed according to a seven point scale, where 1 is the lowest skill level ranking and 7 is the highest. For a fuller explanation of this scale see Appendix 4. Regional occupation employment (the first data column) was derived from Virginia Employment Commission's ES202 industry employment data using a Virginia-specific staffing matrix that details the distribution of industry employment across specific occupations. U.S. Department of Labor's Bureau of Labor Statistics classifies occupations according to eleven education and training categories. Four of these involve on-the-job training (OJT) or experience in a related occupation only. The remaining seven require some level of postsecondary education (i.e., first-professional degree, doctoral degree, master's degree, bachelor's degree, associate's degree, or postsecondary vocational training).