4.   INDUSTRIAL LAND DEMAND

To estimate the projected demand for industrial land in the foreseeable future, the EPS Team analyzed the relationship between employment and industrial space in Anchorage, and used future employment projections to help predict the amount of industrial land which would be required from 2010 to 2030. This chapter estimates the amount of building and land demand likely occur among various industrial categories through 2030.

Employment

Employment projections are the basis for the industrial land demand analysis. Throughout the course of the ILA research period, the EPS Team has analyzed several private data vendors and public agencies which offer employment figures and weighed each according to a set of criteria which allowed us to select the data set(s) that would be most useful for this analysis. The employment projections are long-term in nature, while also accounting for, and building from, actual historical employment figures.

The data also include employment figures that are classified into individual sectors according to North American Industry Classification System (NAICS)-coding. This level of specificity facilitates analysis of each sector's relationship to industrial land separately, since different employment sectors use land in different ways, and similarly, various sectors are projected to grow at different rates as the regional and global economy mature and transform over time.

Moreover, the data offer projections by place of work, rather than place of residence. This is a key distinction since industrial development is more closely linked with employment growth than population growth.

Employment Projection Methodology

The employment projections use a complex statistical algorithm which is based on historical observations and projected growth in output for a range of industries. This methodology is based on long-term forecasts of total personal income, earnings by industry, employment by industry, population, inflation, and other variables.[12]

The employment figures were informed by input from local economists and economic development experts to accurately reflect local conditions.

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[12] For a detailed description of the projection methodology used by Woods & Poole, see **Appendix C**.

Historical Employment

Table 3 shows employment growth in the MOA from 1980 to 2008 by employment sector. Since these figures include all part time and full time workers, the total employment figures shown may be higher than some other sources. Also, please note that the employment figures used in this analysis are for employment by place of *work* (as opposed to place of *residence*), and include all part-time and full-time jobs in the MOA. Furthermore, these figures may be higher than those seen in other analyses because they include proprietors, private household employment, and both full- and part-time workers.

As shown by **Table 3**, total employment in the MOA in 1980 was approximately 115,000 jobs. By 2008, employment had growth to approximately 205,000 jobs, which equates to an overall growth rate of approximately 2.0 percent annually. The largest current segment of non-government employment is in Health Care and Social Assistance, at 23,500 employees. The next largest category is Retail Trade, followed by Accommodation and Foods Services, and then Professional and Technical Services. It is noteworthy that although the Oil & Gas industry (which is classified into the Mining NAICS code) is a large part of the overall Anchorage economy, the number of jobs observed in Anchorage is quite low, since many of these jobs are likely to be classified into other occupational categories.

Projected Employment—Base Scenario

As shown in **Table 4**, employment in the MOA is predicted in this analysis to reach approximately 210,000 jobs in 2010, and then add approximately 57,500 more by 2030. **Figure 9** shows the projected future growth rate in employment, which—at 1.2 percent annually—tends to smooth out the fluctuations related to the "boom-bust cycle." Although lower, this growth rate is similar to the long-term growth rate observed from 1980 through 2008. In fact, the 1.2 percent average annual growth rate used in this analysis is only slightly less than the actual rate observed since 1985 (which is 1.3 percent).

These employment projections offer a reasonable estimate, which is used in our "Base Scenario" estimate of industrial land demand. Although it is not a foregone conclusion that 1.2 percent average annual will be achieved, we believe that it represents a healthy rate of growth for the MOA which is achievable in the long-term. A more aggressive growth scenario is described below.

Table 3
Anchorage Bowl Industrial Land Assessment
Historical Employment in MOA By Category

Item	Applied Category	1980	1990	2000	2008	Nominal Change	Average Annual Growth
Non-Government							
Forestry, Fishing-Related, and Other	n/a	671	1,074	1,285	1,332	661	2.5%
Mining	Mining	3,356	5,836	4,263	2,563	-793	-1.0%
Utilities	TPU	181	260	350	557	376	4.1%
Construction	Construction	7,199	8,472	10,006	13,575	6,376	2.3%
Manufacturing	Manufacturing	1,883	2,566	2,562	2,649	766	1.2%
Wholesale Trade	Wholesale Trade	3,341	4,671	5,270	5,562	2,221	1.8%
Retail Trade	Retail Trade	10,062	16,137	20,276	21,927	11,865	2.8%
Transportation and Warehousing	TPU	6,097	8,757	11,776	12,230	6,133	2.5%
Information	Services	2,478	4,037	5,252	4,988	2,510	2.5%
Financing and Insurance	FIRE	7,189	6,221	6,464	7,404	215	0.1%
Real Estate	FIRE	7,333	6,346	6,594	7,974	641	0.3%
Professional and Technical Services	Services	5,638	9,703	12,698	14,862	9,224	3.5%
Management	Services	719	1,238	1,620	1,127	408	1.6%
Administrative and Waste Services	Services	4,094	6,739	8,875	9,484	5,390	3.0%
Educational Services	Services	945	1,626	2,128	2,747	1,802	3.9%
Health Care and Social Assistance	Services	7,500	12,908	16,891	23,495	15,995	4.2%
Arts, Entertainment, and Recreation	Services	1,619	2,714	3,500	4,170	2,551	3.4%
Accommodation and Food Services	Services	6,052	10,146	13,086	15,111	9,059	3.3%
Other Services, Except Public Admin.	Services	3,663	6,281	8,184	10,018	6,355	3.7%
Total Non-Government		**80,020**	**115,732**	**141,080**	**161,775**	**81,755**	**2.5%**
Government							
Federal Civilian	Government	9,544	10,496	9,844	9,404	-140	-0.1%
Federal Military	Government	12,735	13,320	10,591	13,479	744	0.2%
State and Local	Government	12,041	15,990	18,061	20,197	8,156	1.9%
Total Government		**34,320**	**39,806**	**38,496**	**43,080**	**8,760**	**0.8%**
Total		**114,340**	**155,538**	**179,576**	**204,855**	**90,515**	**2.1%**

"hist_emp"

Source: Woods and Poole Economics, 2008.

Table 4
Anchorage Bowl Industrial Land Assessment
**Projected Employment in MOA By Category**

Base Scenario

Item	Applied Category	2010	2020	2030	Nominal Change	Average Annual Growth
Non-Government						
Forestry, Fishing-Related, and Other	n/a	1,334	1,337	1,330	-4	0.0%
Mining [1]	Mining	2,506	2,506	2,506	0	0.0%
Utilities	TPU	581	715	865	284	2.0%
Construction	Construction	13,868	15,359	16,874	3,006	1.0%
Manufacturing	Manufacturing	2,707	2,998	3,295	588	1.0%
Wholesale Trade	Wholesale Trade	5,658	6,139	6,622	964	0.8%
Retail Trade	Retail Trade	22,388	24,714	27,053	4,665	1.0%
Transportation and Warehousing	TPU	12,506	13,889	15,250	2,744	1.0%
Information	Services	5,070	5,471	5,858	788	0.7%
Financing and Insurance	FIRE	7,540	8,208	8,844	1,304	0.8%
Real Estate	FIRE	8,128	8,909	9,695	1,567	0.9%
Professional and Technical Services	Services	15,394	18,227	21,333	5,939	1.6%
Management	Services	1,147	1,245	1,340	193	0.8%
Administrative and Waste Services	Services	9,679	10,656	11,618	1,939	0.9%
Educational Services	Services	2,895	3,731	4,752	1,857	2.5%
Health Care and Social Assistance	Services	24,864	32,821	42,929	18,065	2.8%
Arts, Entertainment, and Recreation	Services	4,321	5,134	6,040	1,719	1.7%
Accommodation and Food Services	Services	15,480	17,365	19,288	3,808	1.1%
Other Services, Except Public Admin.	Services	10,304	11,777	13,300	2,996	1.3%
Total Non-Government		**166,370**	**191,201**	**218,792**	**52,422**	**1.4%**
Government						
Federal Civilian	Government	9,439	9,578	9,654	215	0.1%
Federal Military	Government	13,511	13,642	13,725	214	0.1%
State and Local	Government	20,649	22,963	25,347	4,698	1.0%
Total Government		**43,599**	**46,183**	**48,726**	**5,127**	**0.6%**
Total		**209,969**	**237,384**	**267,518**	**57,549**	**1.2%**

"employment"

Source: Woods and Poole Economics, 2008.

[1] Assumes growth in Mining employment in Anchorage is flat from from 2010 to 2030. Note that most Oil & Gas employment is captured in the "Services" category. The "Mining" category is for actual mining jobs which are physically located within the Municipality of Anchorage.

**Figure 9 - Total Employment**
Base Scenario
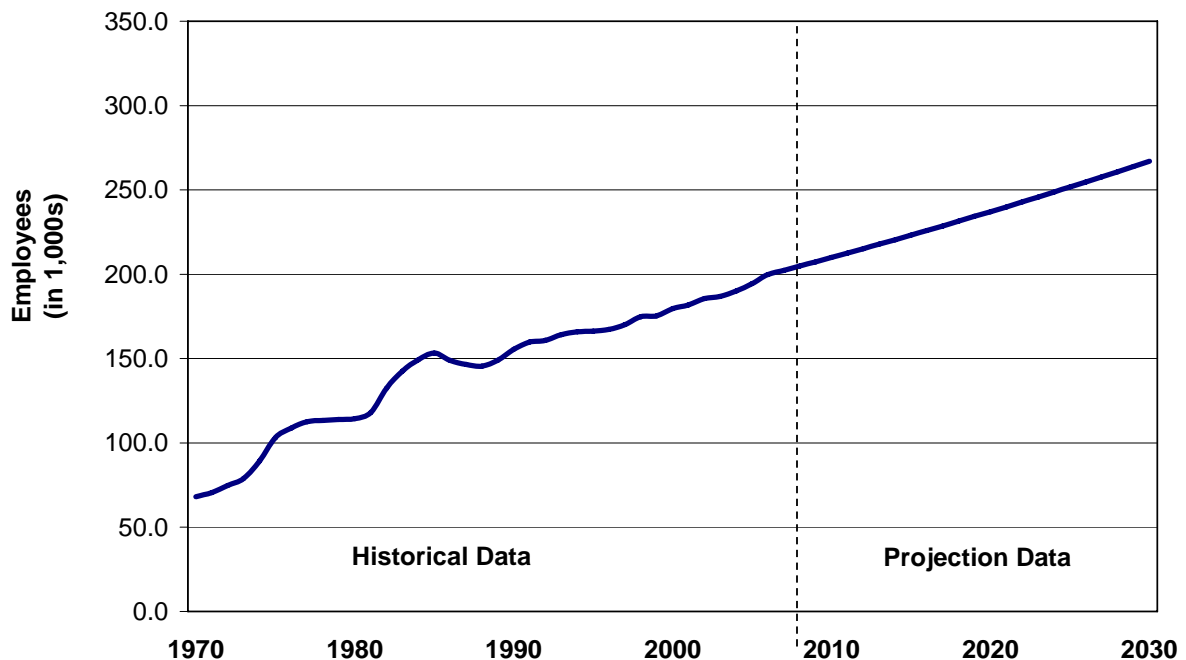
Source: Woods and Poole Economics, Inc. and EPS.

Projected Employment—High Growth Rate Scenario

The projected growth rates described above are the most accurate estimates that are available today, but are admittedly prone to deviation—especially in an economy such as that in Anchorage which is known to experience sizeable variations in economic activity. The employment projections used in this analysis do not account for the potential investment in several major construction projects which have been proposed for Alaska, including the ANS Natural Gas Pipeline, the Knik Arm Bridge, the Pebble Mine, Kensington Mine, etc. In addition to new resource extraction projects, most of the existing support infrastructure in Alaska will need to be updated to endure long-term activity, including: roads, bridges, ports, airports, rail extensions, pipelines and other support and transportation-related infrastructure. As an example, the State of Alaska recently projected that more than $2.0 billion of infrastructure improvements will be needed before the beginning of construction of the natural gas pipeline project.

Figure 10 below was furnished by the AEDC and shows the employment levels that would be associated with each major construction project which is envisioned for the future. Although the employment figures displayed in this figure do not use the same employment projection data, geography, or time horizon as those in the ILA, it properly illustrates that moving forward with any one of these projects could have a significant impact on employment in Anchorage, and therefore, on the results of this report.

Figure 10

**Potential Annual Workforce Requirements
Over the Next Decade**
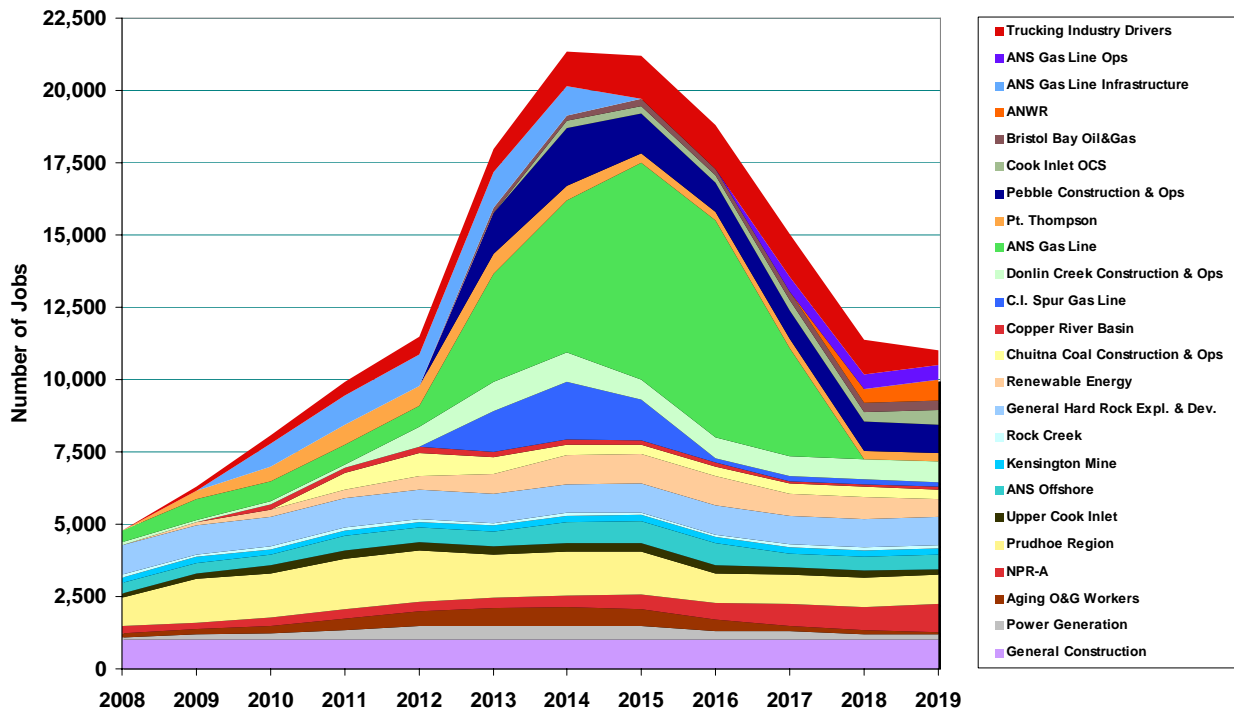
To capture a spectrum of plausible outcomes, a range has been devised to test industrial land demand based on varying levels of economic expansion in Anchorage. The University of Alaska's Institute of Social and Economic Research (ISER) has studied various employment growth scenarios for Anchorage and the State of Alaska in great detail. In a 2005 study, ISER had predicted that the base growth in employment in Anchorage would be approximately 0.5 percent, absent any changes in federal spending, expansions in mining or tourism, major infrastructure projects, oil price fluctuations, or other factors which are known to have significant impacts on the local and regional economy.[13] Any one of these factors could cause this growth rate to increase up to an additional 0.5 percent. Although the ISER researchers tend to use different data sources and methodologies and the base growth rate is lower than that used by the EPS Team in this analysis, we have assumed that the variation among high and low growth scenarios will be similar.

Accordingly, EPS has developed "High Growth Scenario" which assumes an employment growth rate that is 0.5 percent greater than the "Base Scenario" described above. The impact on projected future employment under this "High Growth Scenario" is shown in **Table 5**.

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[13] See ISER's Economic Projections for Alaska and the Southern Railbelt 2005 – 2030 (September 30, 2005).

Table 5
Anchorage Bowl Industrial Land Assessment
**Modified Employment in MOA By Category**

High Growth Scenario

Item	Applied Category	2010	Modified Annual Growth	Modified Employment 2030	Nominal Change
Non-Government					
Forestry, Fishing-Related, and Other	n/a	1,334	0.5%	1,470	136
Mining	Mining	2,506	0.5%	2,769	263
Utilities	TPU	581	2.5%	954	373
Construction	Construction	13,868	1.5%	18,626	4,758
Manufacturing	Manufacturing	2,707	1.5%	3,637	930
Wholesale Trade	Wholesale Trade	5,658	1.3%	7,311	1,653
Retail Trade	Retail Trade	22,388	1.5%	29,863	7,475
Transportation and Warehousing	TPU	12,506	1.5%	16,833	4,327
Information	Services	5,070	1.2%	6,468	1,398
Financing and Insurance	FIRE	7,540	1.3%	9,764	2,224
Real Estate	FIRE	8,128	1.4%	10,703	2,575
Professional and Technical Services	Services	15,394	2.1%	23,533	8,139
Management	Services	1,147	1.3%	1,479	332
Administrative and Waste Services	Services	9,679	1.4%	12,825	3,146
Educational Services	Services	2,895	3.0%	5,238	2,343
Health Care and Social Assistance	Services	24,864	3.3%	47,305	22,441
Arts, Entertainment, and Recreation	Services	4,321	2.2%	6,663	2,342
Accommodation and Food Services	Services	15,480	1.6%	21,288	5,808
Other Services, Except Public Admin.	Services	10,304	1.8%	14,677	4,373
Total Non-Government		**166,370**	**1.9%**	**241,404**	**75,034**
Government					
Federal Civilian	Government	9,439	0.6%	10,665	1,226
Federal Military	Government	13,511	0.6%	15,164	1,653
State and Local	Government	20,649	1.5%	27,977	7,328
Total Government		**43,599**	**1.1%**	**53,806**	**10,207**
Total		**209,969**	**1.7%**	**295,210**	**85,241**

"emp_mod"

Figure 11 shows projected employment by industry for both the Base and High Growth Scenarios.

Figure 11 - Total Employment
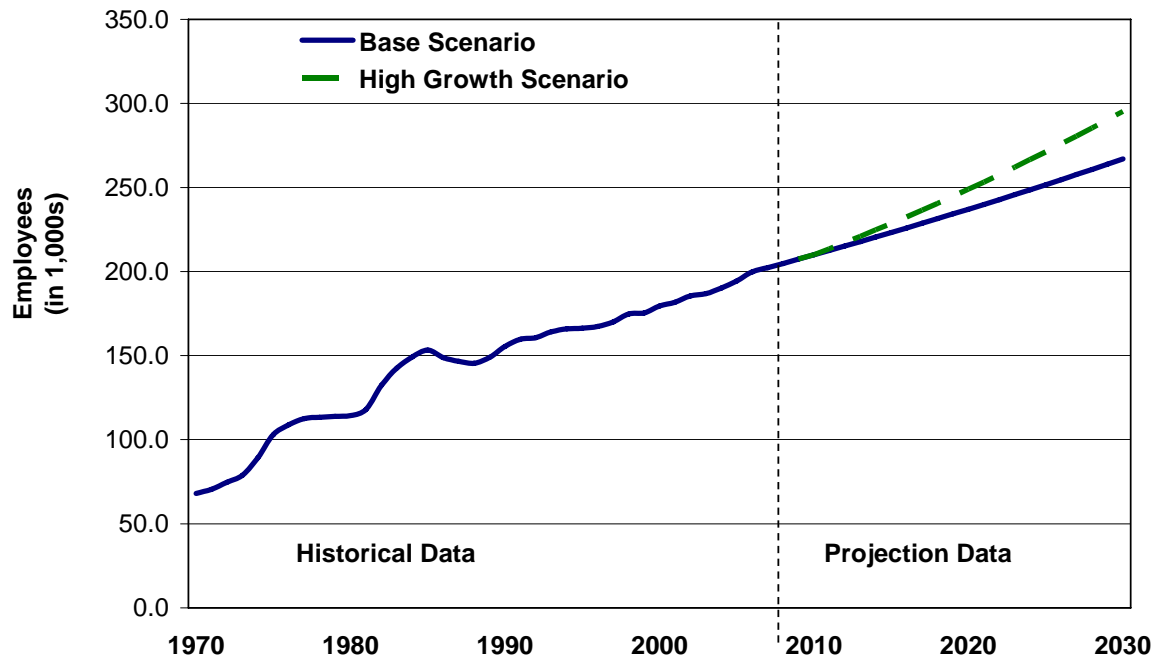
Industrial Building Space Projections

EPS used the employment growth projections described above as a basis for predicting industrial land demand in Anchorage. The next step in our analysis was to link employment with industrial development. The methodology used to model this linkage is described below.

Description of Methodology

This report uses empirical research which assigns employment growth among various sectors to specific types of industrial space (see **Table A-1** in **Appendix A** of this report).[14] EPS has reduced these ratios by 25 percent to reflect an employment pattern that is more closely attuned to the employment densities and development trends that are prevalent in Anchorage.

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[14] See the "Employment Density Study Summary Report," prepared for the Southern California Association of Governments (SCAG) by the Natelson Company, 2001.

EPS analyzed four major types of industrial development in this analysis. These industrial categories are shown in **Table 6**, and are described in additional detail below.

- **Industrial Service/Assembly/Manufacturing**: This is the most common category of industrial development. This type of development typically includes "sales-service" style of light industrial, and may include businesses such as auto repair, storage, cabinet manufacturing, etc. This type can occur in either the I-1 or I-2 zones. For the purposes of this analysis, EPS has assumed that 50 percent of the Industrial Service/Assembly/ Manufacturing land occurs in I-1, and 50 percent in I-2.[15]

- **Miscellaneous Industrial**: This is generally considered to be the most "heavy" type of industrial development of the four analyzed in this report. This can include metal processing, petroleum refining and processing, mineral extraction, heavy manufacturing, and open storage. Although this type of development is most likely to occur in I-2 zoned land, the open storage category is allowed n I-1-zoned land. For this reason, the EPS Team has assumed that 50 percent of Miscellaneous Industrial will occur in I.2, and 50 percent in I-2.

- **Warehouse Distribution**: This category of industrial development is associated with large storage facilities which generally feature open floor plans, high ceilings, and roll-up doors for loading and unloading freight. Warehouse Distribution space is typically used for storage and is characterized by docks or grade doors, minimal tenant improvements, and adequate access to rail or roadway transportation networks. EPS has analyzed the incidence of Warehouse Distribution buildings in Anchorage and has found that approximately 65 percent of the land which accommodates this use is in I-1 land, and 35 percent in I-2. EPS has assumed that these ratios will continue in the future, and has allocated 65 percent of the projected growth in Warehouse Distribution to I-1 land, and the remaining 35 percent to I-2.

- **Industrial Flex**: Industrial Flex is the least intensive type of industrial development and often includes office space. This use type includes Research and Development (R & D) buildings and Mixed Commercial and Industrial. This type of development is most likely to occur in I-1 zoned land.

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[15] An analysis of historical development patterns in Anchorage has indicated that the distribution among I-1 and I-2 land development has been approximately 55 percent–45 percent, respectively, from 1970 to 2008.

Table 6
Anchorage Bowl Industrial Land Assessment
General Assumptions and Definitions

Land Use	MOA Zoning Category	FAR	Sq. Ft./ Employee
Industrial Services, Assembly, Manufacturing	I-1 and I-2	0.25	1,000
Miscellaneous Industrial [1]	I-1 and I-2	0.15	1,800
Warehouse/Distribution	I-1 and I-2	0.30	2,800
Industrial Flex Space	I-1	0.30	500

"LU_def"

[1] Miscellaneous Industrial includes Open Storage, Processing, Heavy Manufacturing, Utilities, Trades, and Transportation.

Employment Density Assumptions

Demand for buildings and land was estimated by assigning employment densities by industrial use type and the use of Floor Area Ratios. The ratios used and a listing of the MOA's zoning classifications that are applicable to each industrial land use category are shown in **Table 6**. These ratios are based on EPS's professional judgment and experience, which is supplemented by actual land utilization rates observed in Anchorage.

The final major assumption used in the land demand analysis pertains to employment density. **Table 6** also shows the assumed square feet required—on average—for each employee under each industrial category. As shown, warehouse/distribution space is generally associated with the lowest employment density, at one employee per 2,800 square feet of building space. The highest employment density occurs in Industrial Flex development, at one employee per 500 square feet of space. While square footage per employee varies widely in the Industrial Service/ Assembly/Manufacturing and Miscellaneous Industrial categories, the estimated means are 1,000 and 1,800 square feet per employee, respectively.

The employment density assumptions used in this analysis are based on EPS experience and professional judgment, and have been supplemented by significant research of employment density trends specific to the MOA. Although the FAR and square-feet-per-employee factors will differ for individual parcels and properties analyzed, our team feels that these ratios express the most accurate overall depiction of employment density in Anchorage.

Also, it is crucial to note that the future land demand analysis presented in this report is based on the existing land use pattern which is prevalent in Anchorage. In other words, the estimated number of industrial acres required by 2030 assumes that the current industrial development paradigm continues into the future, in which low employment densities and Floor-Area-Ratios are prevalent.

Industrial Land Demand Analysis Results

The results of the industrial land demand analysis under the Base Scenario are shown in
Table 7. As shown, the EPS Team estimates that by 2030, Anchorage will see approximately
5,700 new jobs which will require some form of industrial space. This will require approximately
6,500,000 square feet of new industrial space, which translates to a total of 600 acres of various
types of industrial land by 2030. This implies an average annual absorption rate of
approximately 30 acres per year.

Table 7
Anchorage Bowl Industrial Land Assessment
Estimated Supportable Industrial Space (2010-2030)

	Base Scenario:
	1.2% Avg Annual Growth

Item	Industrial Services/ Assembly/ Manuf.	Warehouse Distribution	Misc. Industrial	Industrial Flex	Total Industrial
New Jobs Using Space	4,780	370	260	310	**5,720**
Estimated Building Sq. Ft.	4,780,000	1,040,000	480,000	150,000	**6,450,000**
Estimated Net Developable Acres	440.0	80.0	70.0	10.0	**600.0**
Average Annual Absorption	*22.0*	*4.0*	*3.5*	*0.5*	*30.0*

"indspace_summary"

Table 8 shows the breakdown of predicted industrial land demand by 2030 as it pertains to I-1
and I-2 zoning categories. As shown, assuming that 50 percent of the Industrial
Service/Assembly/Manufacturing land demand is developed in I-1 and the other 50 percent in I-
2, EPS estimated that approximately 310 acres of I-1 land and 290 acres of I-2 land will be
demanded by 2030.

Table 8
Anchorage Bowl Industrial Land Assessment
Estimated Acreage Requirements by Industrial Zoning Category

Base Scenario:
1.2% Avg Annual Growth

Land Use	Estimated Acreage Required: 2010 - 2030		
	Total	I-1 Zone	I-2 Zone
Industrial Services/ Assembly/ Manufacturing [1]	**440.0**	220.0	220.0
Warehouse/ Distribution [2]	**80.0**	52.0	28.0
Miscellaneous Industrial [3]	**70.0**	35.0	35.0
Industrial Flex	**10.0**	10.0	0.0
Total	**600.0**	**317.0**	**283.0**

"zoning_summ"

[1] Assumes 50% of Industrial Services/ Assembly/ Manufacturing occurs in I-1, and 50% occurs in I-2. On average historically, I-1 and I-2 land has been distributed approximately equally in the MOA.

[2] Assumes 65% of Warehouse/ Distribution occurs in I-1, and 35% in I-2, based on a review of historical development patterns in the MOA.

[3] Assumes 50% of Miscellaneous Industrial occurs in I-1, and 50% in I-2.

Tables 9 and **10** show a similar breakdown of predicted industrial land demand under the High Growth Scenario. As shown, the EPS Team predicts that by 2030, Anchorage could see as much as 8,500 new jobs which will require some form of industrial space under the High Growth Scenario. This would require approximately 9,600,000 square feet of new industrial space, translating to a total of approximately 900 acres of various types of industrial land by 2030. This implies an average annual absorption rate of approximately 45 acres per year.

Table 9
Anchorage Bowl Industrial Land Assessment
Estimated Supportable Industrial Space (2010-2030)

| High Growth Scenario: |
| 1.7% Avg Annual Growth |

Item	Industrial Services/ Assembly/ Manuf.	Warehouse Distribution	Misc. Industrial	Industrial Flex	Total Industrial
New Jobs Using Space	7,100	570	410	450	**8,530**
Estimated Building Sq. Ft.	7,100,000	1,580,000	740,000	220,000	**9,640,000**
Estimated Net Developable Acres	650.0	120.0	110.0	20.0	**900.0**
Average Annual Absorption	*32.5*	*6.0*	*5.5*	*1.0*	*45.0*

"indspace_summary"

Table 10
Anchorage Bowl Industrial Land Assessment
**Estimated Acreage Requirements by Industrial Zoning Category**

| High Growth Scenario: |
| 1.7% Avg Annual Growth |

| | Estimated Acreage Required: 2010 - 2030 | | |
Land Use	Total	I-1 Zone	I-2 Zone
Industrial Services/ Assembly/ Manufacturing [1]	**650.0**	325.0	325.0
Warehouse/ Distribution [2]	**120.0**	78.0	42.0
Miscellaneous Industrial [3]	**110.0**	55.0	55.0
Industrial Flex	**20.0**	20.0	0.0
Total	**900.0**	**478.0**	**422.0**

"zoning_summ"

[1] Assumes 50% of Industrial Services/ Assembly/ Manufacturing occurs in I-1, and 50% occurs in I-2. On average historically, I-1 and I-2 land has been distributed approximately equally in the MOA.

[2] Assumes 65% of Warehouse/ Distribution occurs in I-1, and 35% in I-2, based on a review of historical development patterns in the MOA.

[3] Assumes 50% of Miscellaneous Industrial occurs in I-1, and 50% in I-2.

Figure 12 is a graphical depiction of the historical industrial land absorption and the predicted industrial land demand under the Base Scenario and the High Growth Scenario. The results for each industrial land use category evaluated under each scenario are described below. The backup calculations are shown in **Tables A-2** through **A-9** are included in **Appendix A** of this report.

Figure 12 - Cumulative Industrial Development
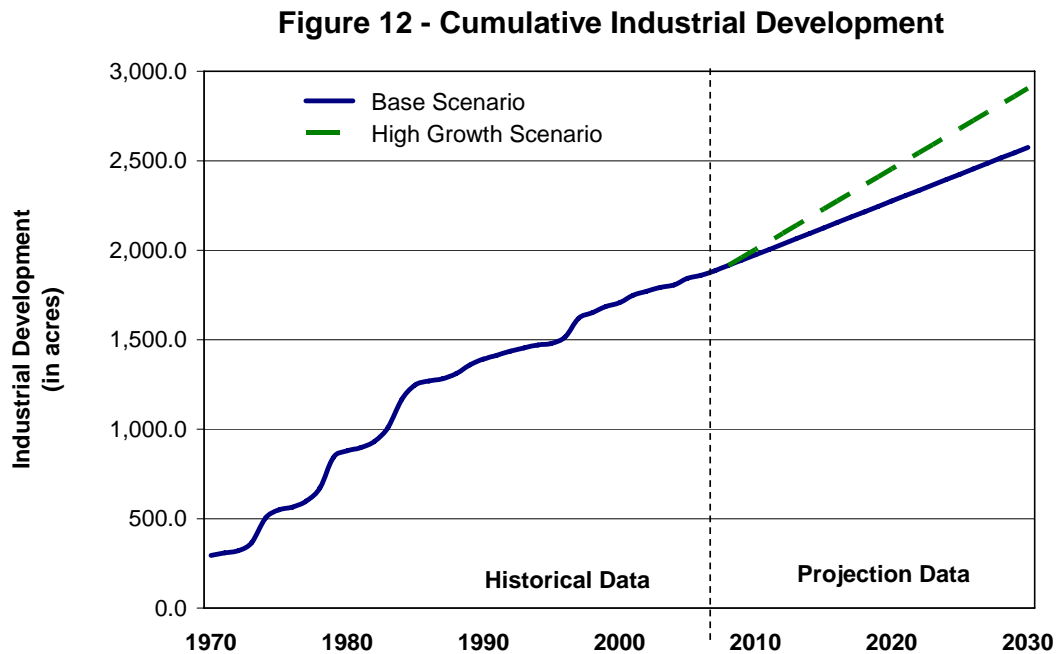
Source: Woods and Poole Economics, Inc. and EPS.

Industrial Service/Assembly/Manufacturing

As shown in **Table A-2**, approximately 4,800 of the new jobs added by 2030 are estimated to require Industrial Service/Assembly/Manufacturing space under the Base Scenario. By using assumptions of 1,000 square feet per employee and a 25-percent floor area ratio, EPS estimates that approximately 4,800,000 square feet of Industrial Service/Assembly/Manufacturing space on approximately 440 acres will be required by 2030.

Under the High Growth Scenario, the EPS Team predicts that approximately 7,100,000 square feet of Industrial Service/Assembly/Manufacturing space on 650 acres would be demanded by 2030, as shown in **Table A-3**.

Miscellaneous Industrial

As shown in **Table A-4**, approximately 260 of the new jobs added by 2030 under the Base Scenario are estimated to require Miscellaneous Industrial. Using assumptions of 1,800 square feet per employee and a 15-percent floor area ratio, EPS estimates that approximately 480,000 square feet of Miscellaneous Industrial space on approximately 70 acres will be required by year 2030.

Under the High Growth Scenario, the EPS Team predicts that approximately 740,000 square feet of Miscellaneous Industrial space on 110 acres would be demanded by 2030, as shown in **Table A-5**.

Warehouse Distribution

As shown in **Table A-6**, approximately 370 of the new jobs added by 2030 under the Base Scenario are estimated to require Warehouse/Distribution space. Using assumptions of 2,800 square feet per employee and a 30-percent floor area ratio, EPS estimates that approximately 1,000,000 square feet of Warehouse Distribution space on approximately 80 acres will be required by 2030.

Under the High Growth Scenario, the EPS Team predicts that approximately 1,500,000 million square feet of Warehouse/Distribution space on 120 acres will be demanded by 2030, as shown in **Table A-7**.

Industrial Flex

As shown in **Table A-8**, approximately 310 of the new jobs added by 2030 under the Base Scenario are estimated to require Industrial Flex space. Using assumptions of 500 square feet per employee and a 30-percent floor area ratio, EPS estimates that approximately 150,000 square feet of Industrial Flex space on approximately 10 acres will be required by 2030.

Under the High Growth Scenario, the EPS Team predicts that approximately 220,000 square feet of Industrial Flex space on 20 acres would be demanded by 2030, as shown in **Table A-9**.

Historical Industrial Development Analysis

To test the validity of our results and ensure that they are compatible with previous development patterns in Anchorage, the EPS Team evaluated industrial land and building absorption over the long term. **Figure 12** above shows the rate of development of industrial land from 1970 through 2008, and projected to 2030 under each scenario as described above.[16] As indicated, the MOA has absorbed an average of approximately 300,000 square feet of industrial building space per year, on approximately 33 acres on average over the long-term. The EPS Team's Base Scenario projection of 30 acres per year and up to 45 acres per year under the High Growth Scenario, are generally consistent with historical development patterns, and indicate a potential shift of employment and land use sectors that are more reliant on industrial development in the future (see **Table 12** in **Chapter 5**).

The analysis of historical building and land development also allowed the EPS Team to evaluate historical land utilization rates by calculating reality-based FAR. The overall industrial development has been developed utilizing an average FAR of 21 percent. I-1 industrial land and buildings have historically been constructed with a 28 percent FAR on average, and 13 percent

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[16] Please note that these figures are based on the MOA's building permit database, and the industrial classifications presented therein may not match those presented elsewhere in this report.

on average for I-2 (see **Table 13** in **Chapter 5**). These ratios, when averaged, are consistent with those used to project industrial land demand in this analysis.

Historical and Projected Employment Density

Employment density is a key factor in the land demand analysis, and one that has been analyzed thoroughly by the EPS Team. Because of the abundance of laydown yard space and staging/ prepping areas in Alaska, industrial land is often underutilized, and overall employment densities can be extremely low in some instances. A 1996 Industrial Lands Assessment prepared by HDR used a different approach to calculate employment density than is used in this analysis. The HDR Study grouped employees across various employment categories into an "industrial" category, and then divided this by the number of developed industrial acres to arrive at an employment density ratio. This approach yielded an average of 6.4 industrial employees per industrial acre. By using a more nuanced methodology as described in this report, which evaluates industrial land demand based on employment growth by sector and corresponding development trends, the EPS Team has predicted a ratio of approximately 9.5 employees per industrial acre on average.

The employment densities used in this analysis have also been generally corroborated by several of the industrial land users that we have interviewed as part of this analysis. For example, one manufacturing company located in Anchorage has reported approximately 6 employees per acre, while another similar company has reported up to 18 per acre. These appear to be two extremes in the spectrum of industrial employment density in Anchorage, and represent the structural inefficiency that causes the irregular pattern of industrial development in the MOA. Other industrial businesses analyzed have reported employment densities that generally fall within this range.

National Review of Industrial Employment Density

To further vet the employment densities used in this analysis, EPS has conducted a review of industrial employment densities in several metropolitan areas throughout the U.S. The results of our evaluation are summarized in **Table 11**. As shown, the MOA is at or near the low end of the spectrum with respect to industrial land employment density, which is not unexpected given the difficulties posed by inclement weather, workforce issues, soil issues, etc.

Table 11
Anchorage Bowl Industrial Land Assessment
Industrial Land Employment Densities

Area	Industrial Use Type	Employment Density			Data Source
		Jobs/Acre	Sq. Ft./Job	FAR	
Pierce County, WA	Manufacturing/Warehousing	13.8			Pierce County Employment Density Survey, November 2006
City of Hillsboro, OR	Industrial	9.0			Hillsboro Comprehensive Plan
City of Silverton, OR	Industrial	8.9			Industrial Economic Opportunities Analysis, November 2006
Town of Caledon, Ontario, Canada	Manufacturing	17.0			Employment Land Needs Study, November 2007
	Warehouse/Distribution	9.0			
Peel Region, Ontario, Canada [1]		15.8			ReNew Canada newsletter, July/August 2007 (page 28)
Grand Traverse County, MI	Intensive Industry	30.0			Blair Township Master Plan
	Intermediate Intensive	14.0			
	Extensive	8.0			
Clark County, WA	Industrial - Comm.Plan std.	9.0			Current Industrial Land Inventory, November 2000
	Actual observed (1994-97)	4.4			
Portland-Vancouver MSA	Warehouse/Distribution	10.0	1,350	0.31	Regional Industrial Lands Study, October 2001
	General Industrial	24.5	533	0.30	
	Tech/Flex	24.3	467	0.26	
City of Wilsonville, OR	Efficient Land Need	16.3	750	0.28	Economic Opportunities Analysis Report, January 2008
	Medium Land Need	14.2	800	0.26	
	High Land Need	12.3	850	0.24	
City of Minneapolis, MN	Manufacturing	27.0			Industrial Land Use Study and Employment Policy Plan, June 2006
	Transportation & Warehousing	14.0			

"densities"

[1] Converted from "jobs per hectare" to "jobs per acre" at 2.47105381 acres/ha.

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