

APPENDIX F

LMI's WORK FORCE ANALYSIS MODEL

Appendix F. LMI's Work Force Analysis Model

Two separate analyses were conducted to understand the gaps in USACE's future work force needs:

- ◆ Requirements analysis
- ◆ Supply analysis.

REQUIREMENTS ANALYSIS

Introduction

The goal of the requirements analysis was two-fold:

- ◆ To determine our future work force needs in terms of overall position requirements
- ◆ To determine future skill needs.

To make sure we have the right people with the right skills available at the right time, we needed to project our future work-force requirements, and then compare that "demand" to the projected work force "supply." In addition, to comply with the President's Management Agenda (PMA) requirement to increase competitive sourcing, we needed to analyze our current workload and functions. Then, taking into account business trends, location, occupational series, and other factors, we needed to determine which functions could be competitively reviewed.

To quantify our future requirements LMI used their work force planning model. We assembled a project team composed of subject-matter experts from Headquarters, representatives from the major subordinate commands, and outside consultants. This team worked together to populate the work force planning model and project the future work force requirements, incorporating the competitive sourcing strategies. We then linked those workload requirements to occupational series, so that we would know the kinds of skills required in the future work force. We compared the future work-force requirements to the projected future supply.

Work Force Planning Model Method

The workload model projects future work-force requirements on the basis of

- ◆ current USACE functional activities,
- ◆ current workload percentage distribution,
- ◆ governmental and commercial split of functions,
- ◆ anticipated business trends in functional workload (increase, decrease, or no change),
- ◆ identification of possible functions for competitive sourcing and roll-out of competitive sourcing, and
- ◆ likely win rates, reduction rates, and government oversight ratios (oversight of outsourced functions).

For this effort, we looked at USACE in two groups—civil works-funded activities and military programs-funded activities. We used separate versions of the work force planning model to develop the future requirements separately for these two groups, but then added them together to analyze the gaps.

USACE FUNCTIONAL ACTIVITIES AND WORKLOAD DISTRIBUTION

We populated the work force planning model with the current USACE functions in a three-tier work breakdown structure. We used the current number of position requirements¹ for each function (by commercial activity function code) from the FAIR Act inventory database to calculate the current percentage workload distribution across functions. Then, for each third-level activity or function code, we entered the percentage of that activity that is governmental versus commercial or reviewable. Figure F-1 below shows an example of the three-tier work breakdown structure for Real Property Project Management, Maintenance, Repair and Construction.

¹ Position requirements do not equal FTEs; position requirements include seasonal and part-time personnel.

Figure F-1. Example of Three-Tier Work Breakdown Structure

Activity Number, Name, and Hierarchy Level		Functional Percentage Workload				Activity Workload As % Of Total
		1	2	3	4	
WBS						
9	Real Property Project Management, Maintenance, Repair and Construction (Program & Project Management, Real Estate, Architect-Engineering Services, & Lab Maintenance and Repair)	29.3%				
9.1	Real Property Program and Project Management		34.5%			
9.1.1	US Army Corps of Engineers Program and Project Management (Z101)			29.0%		
9.1.1.1	Governmental				63.4%	1.86%
9.1.1.2	Reviewable				36.6%	1.07%
9.1.2	Management of Major Construction of Real Property (Z110)			59.2%		
9.1.2.1	Governmental				82.4%	4.93%
9.1.2.2	Reviewable				17.6%	1.05%
9.1.3	Real Estate / Real Property Acquisition (Z120)			11.8%		
9.1.3.1	Governmental				78.9%	0.94%
9.1.3.2	Reviewable				21.1%	0.25%
9.2	Title, Outgranting and Disposal of Real Estate/ Real Property		2.3%			
9.2.1	Title, Outgranting and disposal of Real Estate/ Real Property - National Programs Projects(Z135)			100.0%		
9.2.1.1	Governmental				81.1%	0.54%
9.2.2.2	Reviewable				18.9%	0.13%

ANTICIPATED TRENDS IN FUNCTIONAL WORKLOAD

To predict work force requirements in the upcoming fiscal years, we must use estimates of the business trends in workload for each activity. The project team estimated, for each function, whether we thought the workload in that function would increase, decrease, or stay the same. Because USACE doesn't anticipate major workload changes over the next few years, we projected the workload to primarily remain at the current state, with only modest increases or decreases in a couple of functions. For example, because of increased security following September 11, 2001, the project team projected a slight increase in the "installation or facility management and physical security" (of 2% each year for the next four years), and "environmental security and natural resources services" (of 5% each year for the next four years) functions in the civil works activities.

Table F-1 shows the projected workload trends for the civil works activities.

Table F-1. Civil Works Projected Workload Trends by Fiscal Year

Function	FY03	FY04	FY05	FY06	FY07
Force management and general support	-1%	-2%	-3%	-4%	-5%
Communications, computing, and other information services	-1%	-2%	-3%	-4%	-5%
Science and technology and research & development	0%	0%	0%	0%	0%
Systems acquisitions, test and evaluations, engineering, and contracting	1%	2%	3%	4%	5%
Logistics	0%	0%	0%	0%	0%
Installation/facility management & physical security	2%	4%	6%	8%	8%
Environmental security and natural resources services	5%	10%	15%	20%	20%
Real property project management, maintenance, repair and construction	0%	0%	0%	0%	0%
Civil works	0%	0%	0%	0%	0%
Personnel and social services	0%	0%	0%	0%	0%
Education and training	0%	0%	0%	0%	0%

Table F-2 shows the projected workload trends for the military programs-funded activities.

Table F-2. Military Programs Projected Workload Trends by Fiscal Year

Function	FY03	FY04	FY05	FY06	FY07
Force management and general support	5%	6%	7%	8%	9%
Communications, computing, and other information services	0%	0%	0%	0%	0%
Science and technology and research & development	0%	0%	0%	0%	0%
Systems acquisitions, test and evaluations, engineering, and contracting	0%	0%	0%	0%	0%
Logistics	0%	0%	0%	0%	0%
Installation/facility management & physical security	0%	0%	0%	0%	0%
Environmental security and natural resources services	2%	4%	6%	8%	10%
Real property project management, maintenance, repair and construction	5%	6%	7%	8%	9%
Civil works	0%	0%	0%	0%	0%
Personnel and social services	0%	0%	0%	0%	0%
Education and training	5%	6%	7%	8%	9%
Command and intelligence	5%	6%	7%	8%	9%

FUNCTIONS FOR COMPETITIVE SOURCING

To comply with the PMA goal to increase competitive sourcing, the project team reviewed all the functions in the model to identify possible candidates for competitive review. The team identified possible USACE functions for competitive sourcing, and a schedule by which to review those functions and positions during the next 5 fiscal years. Then, once those functions were selected and the rollout plan prioritized, the model allocated those positions that were reviewed according to the variables described below.

WIN RATES, REDUCTION RATES, AND OVERSIGHT RATIOS

To incorporate competitive sourcing into the work force model projections, we used the following variables—rates for wins, reductions, and government oversight.

The win rate identifies a percentage of the reviews in a particular function that USACE expects to win. For example, a win rate of 75 percent indicates that USACE generally wins three-quarters of the reviews of that particular function. The other fourth of the time, USACE loses and the function goes to a contractor. We assigned the win rate separately for each function that we plan to review, which allowed flexibility to assign a higher win rate in areas where USACE is stronger or more competitive than the private sector, and a lower win rate in areas in which the USACE is weaker. In general, we used a win rate of 60 percent; however, for functions where we believed we are stronger, we used a win rate of 85 percent.

The work force model applies the reduction rate when USACE wins the competitive review, and refers to the percentage by which USACE would have to reduce the positions in that function to become the most efficient organization (MEO), or the savings achieved by implementing the MEO.

The government oversight ratio is applied when USACE loses the competition and the function is awarded to the contractor—USACE personnel will be required to oversee the contractors and the function. In this work force model, we had three options for oversight ratios depending on the complexity of the function and the desired control or supervision: high = 12 percent (approximately a 1:8 ratio, or 1 USACE FTE overseeing 8 contractors), medium = 4 percent (a 1:25 ratio), and low = 1.5 percent (approximately a 1:67 ratio). The project team assigned a low, medium, or high oversight percentage to each activity that we plan to competitively review.

Populating the Work force Model

The work group provided their input during multiple sessions to populate the model. Together, we projected the future workload trends for each function, identified the core competency activities, decided which activities to competitively

review and at what percent, and assigned oversight ratios and win rates. On the basis of that information and the competitive sourcing rollout schedule, the model applied the win rates and reduction rates to the reviewed activities, and distributed FTEs among Corps and contractors accordingly. Because of the length of time it takes to complete an A-76 review, the model applies the FTE savings from A-76 reviews during the second year *after* those positions are reviewed. For the activities that we can review more expeditiously, the model applies the FTE savings during the same year they are reviewed.

Functions for Competitive Review

CIVIL WORKS

Table F-3 shows the total number, and percentage, of positions we plan to review in civil works for the next 6 fiscal years (we show 6 years instead of 5 because positions for which we initiate an A-76 review in FY06 won't actually be reviewed, and savings realized, until FY08). We show the number of positions reviewed in each year, the percentage reviewed in each year (percentage of all commercial activities), and then the cumulative percentage.

Table F-3. Civil Works Competitive Sourcing by Fiscal Year

Positions	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Number--	1,022	356	1,137	1,790	1,035	371
Percentage of commercial	7	2	7	12	7	2
Cumulative percentage	7	9	16	28	35	37

As the table indicates, by the end of FY08, we will have reviewed a total of 37 percent of the civil works' reviewable positions.

MILITARY PROGRAMS

Table E-4 shows the same competitive sourcing numbers and percentages for the military programs' functions.

Table F-4. Military Programs Competitive Sourcing by Fiscal Year

Positions	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Number—	282	70	172	16	621	621
Percentage of commercial	5	1	3	0	12	12
Cumulative percentage	5	6	9	9	21	33

As indicated, by the end of FY08, we will have reviewed a total of 33 percent of the military programs' reviewable positions.

Results of the Work Force Model

CIVIL WORKS

On the basis of the variables we entered, the projections we made, and the rollout of the competitive sourcing strategy, our inputs generated the results shown in Table F-5 for the civil works-funded activities.

Table F-5. Summary of Total Civil Works Requirements—Corps and Contractor by Fiscal Year

	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Corps performing governmental	12,437	12,450	12,453	12,475	12,531	12,563	12,569
Corps performing reviewable	15,413	14,914	14,745	14,146	13,130	12,524	12,318
Total Corps positions	27,850	27,365	27,198	26,621	25,661	25,087	24,887
Total contractor positions		418	551	998	1,689	2,089	2,231
Total positions	27,850	27,783	27,748	27,620	27,350	27,176	27,118

Note: numbers are rounded.

Table F-6 shows the total civil works-funded work-force requirement by summary-level functional activity.

Table F-6. Civil Works Requirements by Function and Fiscal Year

Function	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Force management and general support	2,553	2,518	2,490	2,465	2,439	2,414	2,414
Communications, computing, and other information services	864	837	817	788	780	772	772
Science and technology & research and development management & support	732	732	732	732	732	732	732
Systems acquisitions, test and evaluations, engineering, and contracting	724	728	736	740	747	754	754
Logistics	365	349	349	349	349	349	349
Installation and facility management & physical security	184	188	191	195	199	199	199
Environmental security and natural resources services	157	165	173	181	188	188	188

Table F-6. Civil Works Requirements by Function and Fiscal Year (Continued)

Function	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Real property project management, maintenance, repair and construction	8,151	8,149	8,149	8,145	8,143	8,141	8,140
Civil works	13,758	13,754	13,750	13,663	13,410	13,264	13,207
Personnel and social services	338	338	338	338	338	338	338
Education and training	24	24	24	24	24	24	24
Total	27,850	27,783	27,748	27,620	27,350	27,176	27,118

Note: numbers are rounded.

Finally, looking only at Corps requirements and not contractors, Table F-7 shows the Corps position requirement in future years.

Table F-7. Civil Works Corps-Only Requirements by Fiscal Year

Function	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Force management and general support	2,553	2,479	2,441	2,416	2,391	2,366	2,366
Communications, computing, and other information services	864	678	555	349	345	341	341
Science and technology & research and development management & support	732	732	732	732	732	732	732
Systems acquisitions, test and evaluations, engineering, and contracting	724	711	718	705	712	719	719
Logistics	365	171	171	171	171	171	171
Installation and facility management & physical security	184	188	191	195	199	199	199
Environmental security and natural resources services	157	165	173	181	188	188	188
Real property project management, maintenance, repair & construction	8,151	8,142	8,139	8,121	8,106	8,099	8,094
Civil works	13,758	13,737	13,716	13,390	12,455	11,909	11,715
Personnel and social services	338	338	338	338	338	338	338
Education and training	24	24	24	24	24	24	24
Total	27,850	27,365	27,198	26,621	25,661	25,087	24,887

Note: numbers are rounded.

MILITARY PROGRAMS

On the basis of the variables entered, the projections made, and the rollout of the competitive sourcing strategy, our inputs generated the requirements for the military programs-funded activities shown in Table F-8.

*Table F-8. Summary of the Total Military Programs Requirements—
Corps and Contractor by Fiscal Year*

	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Corps performing governmental	4,921	5,098	5,134	5,170	5,205	5,245	5,285
Corps performing reviewable	5,246	5,337	5,370	5,378	5,429	5,295	5,138
Total Corps positions	10,167	10,435	10,503	10,548	10,634	10,540	10,423
Total contractor positions		84	101	139	141	280	422
Total positions	10,167	10,519	10,605	10,687	10,775	10,820	10,845

Note: numbers are rounded.

Table F-9 shows the total military programs-funded work-force requirement by summary-level functional activity.

Table F-9. Military Programs Requirements by Function and Fiscal Year

Function	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Force management and general support	871	912	919	928	936	945	954
Communications, computing, and other information services	155	154	154	152	152	152	152
Science and technology & research and development management & support	1,008	1,008	1,008	1,008	1,008	1,008	1,008
Systems acquisitions, test and evaluations, engineering, & contracting	622	617	617	613	613	613	613
Logistics	96	92	92	92	92	92	92
Installation & facility management & physical security	85	85	85	85	85	85	85
Environmental security and natural resources services	1,004	1,024	1,044	1,064	1,084	1,104	1,104

*Table F-10. Military Programs Corps-Only Requirements by Fiscal Year
(Continued)*

Function	FY 02	FY 03	FY 04	FY 05	FY 06	FY 07	FY 08
Personnel and social services	64	64	64	64	64	64	64
Education and training	632	664	670	676	683	605	527
Command & intelligence	10	11	11	11	11	11	11
Total	10,167	10,435	10,503	10,548	10,634	10,540	10,423

Change in Corps Requirements

As indicated in the tables above, the requirements model projects a change in the Corps position requirements from year to year. For civil works, the difference is consistently negative—i.e., a loss in Corps positions each year. However, for military programs, the requirement for Corps positions increases in the first 4 years, and then decreases in the later years. Because personnel can shift between civil works- and military programs-funded activities, we examined their combined change to understand the overall change in requirements (see Table F-11).

Table F-11. Year to Year Overall Change in Position Requirements

Changes	FY02- FY03	FY03- FY04	FY04- FY05	FY05- FY06	FY06- FY07	FY07- FY08
Civil works	-485	-167	-577	-960	-574	-200
Military programs	268	69	45	85	-94	-117
Combined	-217	-98	-532	-875	-668	-317
Combined %	-0.6%	-0.3%	-1.4%	-2.3%	-1.8%	-0.8%

As indicated in the table, the overall requirement for positions—when position requirements for the civil works and military programs are combined—decreases slightly each year.

Skills and Occupational Series

To project possible skill imbalances and determine which key skills we may need to recruit and hire for, we linked the functional activities in the work force planning model to the occupational series of the personnel who perform those functions. We then were able to compare the future requirements of occupational series against the projected inventory of occupational series and analyze the gap.

To project the occupational series requirements in the future years, we assumed that the current percentage distribution of occupational series for a function is the desired distribution. We determined the current number of occupational series in each functional activity from the FAIR Act requirements database. We then translated the current numerical breakdown of occupational series in a function into a percentage breakdown so that we had the percentage distribution of occupational series in each summary level functional activity. Then, because the model already generates future requirements in terms of positions (based on workload projections, competitive sourcing, etc.), we multiplied the current occupational series percentage distribution by the number of future requirements in each year to determine the number of people required in each occupational series each fiscal year.

For example, Table F-12 lists the occupational series percentage composition of the summary-level functional activity of Civil Works 12—Education and Training, and shows how that was applied against the FY08 position requirement for functional activity 12 to determine the FY08 requirement for these series in education and training.

Table F-12. Civil Works—Education and Training

Occupational series	Functional activity 12 (%)	FY08 Total requirement for functional activity 12	FY08 Occupational series requirement
0303—Miscellaneous clerk and assistant	4.17	24	1
0801—General engineering	8.33	24	2
1702—Education & training technician	37.5	24	9
1712—Training Instruction	4.17	24	1
1750—Instructional systems	45.83	24	11
Total	100.00		24

For example, the model tells us we will need 24 Corps positions in education and training in FY03. Because we know that 45.83 percent of education and training positions should be instructional systems series, we know we should have 11 instructional systems series personnel in FY03.

Following the above process, we determined the future requirements in terms of occupational series, which we could then compare against the projected inventory. However, to make sure we were comparing similar data to the inventory projections, we then subtracted part-time, temporary, and seasonal employees to look only at full-time permanent (FTP) personnel. To calculate the future occupational series requirements in terms of full-time permanent personnel, we determined the

current percentage of each occupational series composed of FTP personnel, and multiplied that percentage against each future requirement. For example, Table F-13 shows just the first six occupational series in our total list, and displays the total requirement for that occupational series for FY02 and FY08, the percentage of that occupational series that is FTP, and then the revised FTP requirement.

Table F-13. Full-time Permanent Occupational Series Requirements

Series No.	Series Title	FY02 req't	FY08 req't	FTP (%)	FY02 revised req't	FY08 revised req't
0018	Safety & occupational health management	68	81	100	68	81
0019	Safety technician	10	12	100	10	12
0020	Community planning	61	54	95	58	5
0023	Outdoor recreation planning	72	62	100	72	62
0025	Park ranger	1,907	1624	79	1,506	1,283
0028	Environmental protection specialist	194	171	97	188	166

We compared the FTP occupational series requirements to the projected inventory of personnel to determine the gap.

SUPPLY ANALYSIS

Introduction

To analyze the future work-force supply, we developed an aging model. The aging model examines the current Corps work force and projects what the work force will look like in the next 5 years. We then can compare the projected work force in the out years to the projected work force requirements in the out years to determine the gaps in the projected work force. A comparison of these gaps against current hiring trends provides the necessary facts for adjusting our hiring, recruiting, and retention practices to minimize gaps in the out years.

This section describes the algorithm on which the aging model is based.

Process

The aging model is based on a personnel inventory file provided by the Corps on September 21, 2001. This file had 34,688 records, of which 31,760 represented

full-time non-seasonal employees. We aged the work force only for full-time non-seasonal employees.

We identified the top 10 occupational groups for each year by examining the inventory for each occupational group from *Fedscope* for the past 5 years. Combining these 10 occupational groups for the past 5 years resulted in 11 key occupational groups. Table F-14 list these occupational groups.

Table F-14. Key Occupational Groups

00xx-Miscellaneous occupations
03xx-General admin, clerical, & office services
04xx-Biological sciences
05xx-Accounting and budget
08xx-Engineering and architecture
11xx-Business and industry
13xx-Physical sciences
47xx-General maintenance and operations work
53xx-Industrial equipment maintenance
54xx-Industrial equipment operation
57xx-Transport/mobile equipment operation

For the Corps overall, and each key occupation group, we determined separation rates by defined categories of years of service. Table F-15 shows how we grouped the years of service data into categories.

Table F-15. Years of Service Categories

Less than 1 year
1–2 years
3–4 years
5–9 years
10–14 years
15–19 years
20–4 years
25–29 years
30–34 years
35 years or more

We used both inventory and separation data for the Corps *Fedscope* to calculate the separation rates.

Given an occupation group or the Corps overall and the years of service category, we determined the separation rate as follows:

1. For years 1997 through 2001, we calculated the separation rate by determining the number of separations in year N and dividing this number by the inventory in year N - 1. This results in five separation rates.
2. We calculated the median of the five separation rates. The median is the separation rate that is used in the aging model.

When determining the separation rates, we restricted the data from *Fedscope* to the Corps. We also restricted the counts to full-time nonseasonal employees who were members of the permanent work force.

Once we calculated the separation rates, we used the following algorithm to estimate attrition for the out years and project the base work force. We repeated this algorithm for each employee.

1. We calculated the years of service for the base year.
2. We determined the years of service category.
3. From the employee occupational series, we determined the employee's occupation group. If the occupation group was one of the identified key occupation groups, we determined the separation rate according to the key occupation group and years of service category. If the occupation group was not one of the identified key occupation groups, we determined the separation rate according to the overall Corps separation rate for the years of service category.
4. We calculated a random number between 0 and 1. If the random number was less than the separation rate, we marked the employee as separated; otherwise, we marked the employee as not separated and continued the process.
5. We worked in increments of a year and repeated steps 2 through 4 until we had projected the inventory for FY08.

Separation Rates

Table F-16 indicates the separation rates we used in the aging model.

Table F-16. Separation Rates for Service Categories

OccGroup	Years									
	<1	1-2	3-4	5-9	10-14	15-19	20-24	25-29	30-34	>34
00xx	0.2692	0.2561	0.1250	0.0649	0.0396	0.0245	0.0307	0.0264	0.1579	0.3333
03xx	0.2903	0.1818	0.1327	0.0892	0.0769	0.0527	0.0580	0.0525	0.1301	0.2162
04xx	0.1000	0.1867	0.1053	0.0725	0.0512	0.0231	0.0172	0.0291	0.1923	0.2857
05xx	0.0357	0.2727	0.1579	0.0774	0.0648	0.0550	0.0601	0.0496	0.1348	0.2800
08xx	0.1639	0.1713	0.0985	0.0631	0.0416	0.0299	0.0288	0.0303	0.1174	0.2568
11xx	0.2500	0.1538	0.0526	0.0620	0.0619	0.0580	0.0513	0.0470	0.1180	0.2500
13xx	0.1000	0.1692	0.1207	0.0688	0.0309	0.0240	0.0239	0.0327	0.1099	0.2083
47xx	0.5000	0.0000	0.0000	0.0485	0.0461	0.0283	0.0565	0.0452	0.1774	0.2857
53xx	0.0000	0.0000	0.0000	0.0135	0.0404	0.0227	0.0341	0.0269	0.1231	0.3636
54xx	0.1111	0.0370	0.0333	0.0286	0.0270	0.0359	0.0377	0.0436	0.1183	0.2821
57xx	0.1667	0.1111	0.0270	0.0391	0.0506	0.0432	0.0667	0.0556	0.1311	0.2381
All	0.2179	0.1647	0.0970	0.0683	0.0525	0.0398	0.0405	0.0421	0.1344	0.2521