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This report organizes and compares facilities benchmarking information gathered during the development of The National Academies of Science, Engineering and Medicine (NASEM) consensus report, *Facilities Staffing Requirements for Veterans Health Administration (VHA) – Resource Planning and Methodology for the Future*, and other publicly available facilities staffing benchmarks. This summary of facilities staffing benchmark information will be considered as a point of reference by VHA for future facility staff modeling implementation.

Executive Summary

Compared to publicly available facilities staffing benchmarks, the Veterans Health Administration's (VHA) current facilities staffing levels appear slightly higher than industry averages (FTE / 100,000 GSF):

- Table 2 – Washington State Department of Health Benchmark
 - Benchmark: 6.7
 - VHA Current State: 7.3

- Table 4 – IFMA/Call et al. Benchmark
 - Benchmark: 4.1
 - VHA Current State: 4.6

- Table 6 – IFMA/IBM Benchmark
 - Benchmark: *3.3 – 2.0
 - VHA Current State: 3.7

*Table 9 provides a breakout of these totals by job type

Caution should be used when referencing these public benchmarks for future facility staffing model implementation at the VHA. A fair comparison of work units, between the VHA and publicly available facilities staffing benchmarks, is difficult to assure as there can be large differences even between the public benchmarks claiming to assess similar work units. Average facilities sizes, age, department structures, and other qualifiers can also be very different, making it problematic to assume that these benchmarks encompass the unique facility conditions at the VHA. For example, VHA medical center facilities, on average, are older and larger than private medical center facilities (Tables 2, 4, 6). VHA medical centers also have a trade focused facilities workforce structure compared to a generalist structure at private medical centers (Table 9), a

potentially unfavorable comparison for the VHA when simply considering staffing levels as private medical centers may employ fewer facilities staff by outsourcing trade work.

The few available facilities staffing benchmarks that are publicly available are based primarily on a single metric of gross square feet (GSF). Although GSF is a commonly used metric within facilities management, there may be other factors with stronger associations to staffing levels within healthcare and the VHA. The Committee on Facilities Staffing Requirements for VHA addressed this issue by proposing several parameters beyond GSF to consider in a facilities staffing methodology for overall staffing levels and job type breakout, although no statistical evaluations were performed. This study did not evaluate how critical factors such as facility costs or staff training impact VHA facilities staffing models, nor did it include all Facilities Management work units (Transportation, Housekeeping, Laundry, etc.).

Data Collection and Literature Review

Past presentations and transcripts were reviewed to identify pertinent facilities staffing benchmark information from committee meetings and workshops held by the Committee on Facilities Staffing Requirements for VHA for the development of the NASEM consensus report:

- First Committee Meeting, September 26-27, 2018
- Second Committee Meeting, December 13-14, 2018
- Type B Workshop: Resourcing, Workforce Modeling, and Staffing, January 29-30, 2019
- Small Workshop 1: Operations and Maintenance of the Physical Plant and Equipment, February 5-6, 2019

- Small Workshop 2: Capital Asset Inventory Database Management, Strategic Capital, February 19-20, 2019
- Small Workshop 3: Engineering Administration, March 5-6, 2019
- Third Committee Meeting, March 12-13, 2019
- Small Workshop 4: Performance Management and Finance, May 8-9, 2019

In addition to reviewing past committee presentations and transcripts, other sources not primarily evaluated in the NASEM consensus report were reviewed for publicly available healthcare facilities staffing benchmark information. This included a review of professional organizations, private corporations, and academic/trade journals. Identified resources include:

- The International Facilities Management Association (IFMA), in collaboration with the American Society for Healthcare Engineering (ASHE) and the Canadian Healthcare Engineering Society (CHES), produced a facilities benchmark report in 2010 and 2013 from survey results of over 200 hospitals across North America. The most recent report included benchmarks for facility expenses (utilities, maintenance), age, size, and acres managed. It also included benchmarks for facility staff expense, FTE levels, and job type mix.
- IBM ActionOI, a database comparing healthcare operational and financial information, produced a June 2019 report showing facility staffing averages from 298 hospitals.

- Call et al. (2018) estimated average healthcare facility size (gross square feet and licensed beds), average plant operations and maintenance department size (FTE), and entry-level manager mix based on a national survey of more than 290 healthcare facility directors.
- The Washington State Department of Health publishes licensed hospital data from utilization and audited financial reports annually per Washington State Legislature RCW 43.70.052(2). The most recent data includes hospital balance sheets with plant, property, and equipment and construction in progress values, income statements with plants expenses (utilities, maintenance), plant staff expense (salary, wages, and benefits) and FTE levels. Utilization reports were also available showing admissions, patient days, available beds, and facility size.

Leadership in educational Facilities (APPA) did not respond to requests to access facilities staffing benchmark information. Building Owners and Managers Association International (BOMA), per Joan Arnold – Director of Research, does not hold any facilities staffing benchmark information. BenchCore, a provider of corporate real estate benchmarks, was not contacted for facilities staffing information as the database lacks any data specific to healthcare.

Data Analysis

The three main functions of VHA Facilities Management comprise Engineering Administration (EA), Operations and Maintenance (OM), and Capital Projects (CP). A breakout of these functions by work units, job types examples (VHA, 2018, pp. 135-138), and number of FTEs are shown in Table 1 (CAPRES, 2019).

Table 1: VHA Engineering Work Units by Function and Job Type Examples

Work Unit	Function	Job Type Examples	Number of FTEs
Office of the Chief Energy Engineers	Engineering Administration	Chief Assistant chief Program specialist Budget analyst/clerk Administrative assistant Secretary Procurement agent Engineers (degreed)	1,390
Project Administration Capital Planning Interior Design	Capital Projects	Project engineer Architect Engineers (degreed) Construction manager CAD operator Administrative engineer Interior designer	1,204
Maintenance & Repair	Operations & Maintenance	Electrician Plumber Pipefitter HVAC mechanic Carpenter Locksmith Painter Maintenance mechanic Machinist Welder	4,767
Plant Operations	Operations & Maintenance	Boiler operators Utility systems operator HVAC operator	1,109
Biomedical	Operations & Maintenance	Biomedical engineer Biomedical technician	1,560
Grounds	Operations & Maintenance	Gardener Laborer	601
Transportation	Operations & Maintenance	Vehicle driver	1,358
Housekeeping	Operations & Maintenance	EPS Supervisor Administrative officer Housekeeper	10,983
Laundry	Operations & Maintenance		997
Safety / Industrial Hygiene / GEMS / Emergency Management	Operations & Maintenance	Safety technician Industrial hygienist Compliance officer	744
Fire Protection	Operations & Maintenance	Fire chief Firemen	305
Police	Operations & Maintenance	Police officer	4,637

Facilities staffing models are generally classified as an extrapolation of current staffing levels or a summation of task frequency and duration; after examining these two staffing model classifications, the committee recommended an extrapolation of current staffing data as the basis in guiding facilities staffing levels for VHA Facilities Management (NASEM, 2019, p. 4 & 56). The committee believed that a useful facilities staffing model, in addition to a baseline staffing level, should consider the effect of different infrastructure complexities between medical centers on work functions and staffing levels; although a myriad of parameters may impact facilities staffing methodology (NASEM, 2019, p. 64-66), too many parameters can create a model that is overly complex and difficult to use (NASEM, 2019, pp. 53). Following the concept that key complexity parameters should trigger variances beyond the staffing baseline, based on a blend of expert judgement and understanding of relationship between existing staffing levels and key performance indicators (NASEM, 2019, pp. 68), the committee selected the following parameters to be assessed as part of facilities staffing methodology:

- Department size by space usage
- Facility condition index
- Average facility age
- Managed acres
- Planned construction
- Unique requirements (presence of water purification and water treatment plant, fire station, non-contiguous campus)

Although the committee proposed a facilities staffing methodology using a baseline staff level by work function with complexity parameters to trigger variances, other publicly available facilities benchmarks generally only use a ratio to calculate staffing benchmarks based on facility size (GSF). Utilization data (admissions, discharges, beds) and financial data (plant, property, and equipment values) may also be used as parameters for benchmarking but are not included in this study as comparative data is limited.

Data from the Capital Resource Survey (2019) was used to calculate the VHA facilities staffing current state and complexity parameter averages. Average medical center size is 1,206,858 GSF, calculated by averaging Total Gross Square Footage for each medical center. Average managed acres for the VHA is 112, calculated by averaging Total Acreage of Owned Property for each medical center. The average planned construction per facility is \$13,460,715, calculated by totaling averages for Minor Construction, Major Construction, and Total Lease Improvements at each medical center. Facility age was input per VHA (2018, pp. 46), stating that “54% of VHA owned square footage is over 50 years old”. The most significant complexity parameter differences between private organization and the VHA medical centers appears to be facility age and managed acres.

Table 2. Comparative Facilities Staffing (Publicly Available Benchmarks to VHA Current State) – Includes Engineering Administration, Capital Projects, Operations & Maintenance (Maintenance & Repair, Plant Operations, Biomedical, Grounds, and Safety/Industrial Hygiene/GEMS/Emergency Management Units)

Source	Avg Facilities Staffing (FTE/GSF per 100,000)	Parameter(s)	Parameter(s) Average
WA DOH, 2018	6.7	Facility Size (GSF) Planned Construction (\$)	366,000 9,215,794
VHA	7.3	Facility Size (GSF) Facility Age (years) Managed Acres Planned Construction (\$)	1,206,858 50 112 13,460,715

Table 3. VHA Facilities FTE Levels by Complexity – Includes Engineering Administration, Capital Projects, Operations & Maintenance (Maintenance & Repair, Plant Operations, Biomedical, Grounds, and Safety/Industrial Hygiene/GEMS/Emergency Management Units)

Complexity	# of Medical Centers	Avg FTE/100,000 GSF	Avg FTE/100,000 GSF
1a	36	7.14	7.34
1b	22	6.60	
1c	28	7.50	
2	20	8.22	
3	28	7.68	

Table 4. Comparative Facilities Staffing (Publicly Available Benchmarks to VHA Current State): Includes Engineering Administration and Operations & Maintenance (Maintenance & Repair, Plant Operations Units)

Source	Facilities Staffing (FTE/GSF per 100,000)	Parameter(s)	Parameter(s) Average
IFMA, 2013	4.1	Facility Size (GSF) Usage (GSF) -Operating Suites -Parking structure(s) Facility Age (years) Managed Acres	565,801 23,773 379,105 25 21
Call et al., 2018	4.1	Facility Size (GSF)	1,657,000
VHA	4.6	Facility Size (GSF) Facility Age (years) Managed Acres Planned Construction (\$)	1,206,858 50 112 13,460,715

Table 5. VHA Facilities FTE levels by Complexity – includes Engineering Administration and Operations & Maintenance (Maintenance & Repair, Plant Operations Units)

Complexity	# of Medical Centers	Avg FTE/100,000 GSF	Avg FTE/100,000 GSF
1a	36	4.48	4.61
1b	22	4.26	
1c	28	4.53	
2	20	5.11	
3	28	4.75	

Table 6. Comparative Facilities Staffing (Publicly Available Benchmarks to VHA Current State): Includes Operations & Maintenance (Maintenance & Repair, Plant Operations Units)

Source	Facilities Staffing (FTE/GSF per 100,000)	Parameter(s)	Parameter(s) Average
IBM, 20202	2.0	-	-
IFMA, 2013	3.30	Facility Size (GSF) Usage (GSF) -Operating Suites -Parking structure(s) Facility Age (years) Managed Acres	565,801 23,773 379,105 25 21
VHA	3.7	Facility Size (GSF) Facility Age (years) Managed Acres Planned Construction (\$)	1,206,858 50 112 13,460,715

Table 7. VHA Facilities FTE levels by Complexity – includes Operations & Maintenance (Maintenance & Repair, Plant Operations Units)

Complexity	# of Medical Centers	Avg FTE/100,000 GSF	Avg FTE/100,000 GSF
1a	36	3.58	3.72
1b	22	3.50	
1c	28	3.74	
2	20	4.08	
3	28	3.80	

Publicly available facilities staffing benchmarks do not include all facility management work functions and units. Therefore, to ensure an accurate comparison between publicly available facilities staffing benchmarks and the current state of VHA facilities staffing levels, comparisons identified the applicable work functions and units being compared (Tables 2, 4, 6). Although no publicly available facilities staffing benchmarks utilized complexity parameters for staffing variances, complexity parameters applicable to the VHA Engineering Staffing Methodology are

shown, with calculated averages where data was available, to provide comparative context.

Unique requirements (presence of water purification plant, waste-water plant, fire station, non-contiguous campus) are not included for comparison as no other publicly available facilities staffing benchmarks appears to measure this information.

According to the comparison with Washington State hospitals, overall VHA current facilities staffing levels are 9 percent higher per this benchmark, or 0.6 more FTE per 100,000 GSF (Table 2). The Washington State Department of Health benchmark from 2018 is 6.7 FTE per 100,000 GSF and the VHA current state of facilities staffing was 7.3 FTE per 100,000 GSF, calculated by averaging FTE per GSF for each facility (CAPRES, 2019). The current state of facilities staff at VHA medical centers, with complexity 1a – 1c and 2 – 3 was, 7.1 FTE and 7.9 FTE per 100,000 GSF, respectively. VHA facilities staffing levels at medical centers with complexity 1a – 1c and 2 – 3 are 6 percent and 17 percent higher per this benchmark (Table 3), suggesting a disproportionate level of overstaffing occurs in less complex medical centers. Work functions included in this benchmark are Engineering Administration, Capital Projects, and Operations & Maintenance (Maintenance & Repair, Plant Operations, Biomedical, Grounds, and Safety/Industrial Hygiene/GEMS/Emergency Management units); Housekeeping, Laundry, Transportation, Fire Protection, and Police work units are not included. It should be noted that planned construction average at \$9,215,794 is based on hospital “construction in progress” amounts, so it may not be a fair comparison if VHA parameter is based on internal budget rather than financial statement information.

In comparing with IFMA (2013) and Call et al. (2018), overall VHA current facilities staffing levels are 12 percent higher than benchmark, or 0.5 more FTE per 100,000 GSF (Table 4). IFMA and Call et al. benchmarks are both 4.1 FTE per 100,000 GSF and the VHA current state of facilities staffing is 4.6 FTE per 100,000 GSF, calculated by averaging FTE per GSF for each facility. VHA facilities staffing levels at medical centers with complexity 1a – 1c and 2 – 3 are 4 percent and 18 percent higher per this benchmark (Table 5), again suggesting a disproportionate level of overstaffing occurs in less complex medical centers. Included in this benchmark are the Engineering Administration function and the Maintenance & Repair and Plant Operations work units within the Operations & Maintenance function.

According to the comparison with IFMA (2013) and IBM (2020), overall VHA current facilities staffing is almost two times higher than private medical centers tracked by IBM but only 11 percent higher than IFMA (Table 6). IBM and IFMA benchmarks for facilities staff is 2.0 FTE and 3.3 per 100,000 GSF, respectively; the VHA current state of facilities staffing is 3.7 FTE per 100,000 GSF, calculated by averaging FTE per GSF for each facility. VHA facilities staffing levels at medical centers with complexity 1a – 1c compared to 2 – 3 again show unequal staffing levels when considering FTE per 100,000 GSF (Table 7), with 3.61 and 3.92 respectively. Included in this benchmark are the Maintenance & Repair and Plant Operations work units.

In various presentations to the committee, several healthcare organizations shared facilities staffing rules of thumb. These metrics are listed in Table 8 but are not used for comparison as it is *unclear what specific work functions are included in the calculations*:

Table 8. Facilities staffing rules of thumb from committee meetings and workshops held by the Committee on Facilities Staffing Requirements for VHA

Source	Facilities Staffing (FTE/GSF per 100,000)	Facilities Staffing (FTE/200-beds)
University of Maryland Medical Center (Stever, 2019, pp.11)	1.92	-
Mayo Clinic Rochester (Larson, 2019)	2.35	-
CBRE Healthcare (Poulos, 2019, pp. 80)	2.50	-
University of Maryland Downtown (Stever, 2019, pp. 11)	3.14	-
Jones Land LaSalle Healthcare (Mills, 2018, pp. 138)	-	12

Table 9. Job Type Comparative Between IFMA Benchmark and VHA Current State Including Administration and Operations & Maintenance (Maintenance & Repair, Plant Operations Units)

IFMA, 2013		VHA, 2018;	
Job Type	Benchmark: Facilities Staffing (FTE per 100,000 GSF)	Job Type	Current State: Facilities Staffing (FTE per 100,000 GSF)
Electrician	0.29	Electrical shop	0.54
Plumber	0.13	Plumbing shop	0.44
Controls & Low voltage	0.05	-	-
HVAC & Plant operator	0.27	HVAC shop	0.53
		Boiler plant	0.43
		Chiller Plant	0.09
Stationary engineer	0.30	Central control	0.24
Carpenter	0.12	Carpentry shop	0.65
Locksmith	0.03	-	-
Painter	0.09	-	-
Generalist	2.02	Other	0.80
<i>Subtotal</i>	<i>3.30</i>	<i>Subtotal</i>	<i>3.72</i>
<i>"Generalist" as percent of plant operations & maintenance staff</i>	<i>61%</i>	<i>"Generalist" as percent of plant operations & maintenance staff</i>	<i>22%</i>
<i>Engineering Administration</i>		<i>Engineering Administration</i>	
Administrative support	0.33	-	-
Group supervisor	0.16	-	-
O&M manager	0.34	-	-
<i>Subtotal</i>	<i>0.83</i>	<i>Subtotal</i>	<i>0.89</i>
Total	4.13	Total	4.61

Table 10. VHA Maintenance & Repair and Plant Operations Work Units: FTE per 100,000 GSF by Job Type and Complexity

Job Type	Average FTE per 100,000 GSF by Complexity				
	1a	1b	1c	2	3
Maintenance & Repair					
Electric Shop	0.56	0.59	0.56	0.53	0.47
HVAC Shop	0.52	0.60	0.51	0.58	0.49
Carpentry Shop	0.73	0.73	0.78	0.42	0.50
Plumbing Shop	0.47	0.48	0.47	0.43	0.40
Other	0.66	0.44	0.73	1.15	1.07
Plant Operations					
Boiler Plant	0.24	0.23	0.35	0.55	0.82
Chiller Plant	0.12	0.20	0.12	0.06	0.01
Central Control	0.28	0.35	0.22	0.38	0.04
Administration	0.90	0.76	0.79	1.04	0.95

IFMA (2013) and CAPRES (2019) information on job types are summarized and compared (Table 9). IFMA provides staffing benchmarks (FTE per GSF) by the following Plant Operations and Maintenance & Repair (POM) job types: electrician, plumber, controls & low voltage, HVAC & central plant operator, stationary engineer, carpenter, locksmith, painter, and generalist. IFMA also provides facilities staffing benchmarks for jobs in the Administration function: administrative support, group supervisor, and O&M manager. It should be noted that the FTE per GSF total equals 4.13, the same total found in Table 4. CAPRES provides the total number of positions by the following POM job types: electrical shop, HVAC shop, carpentry shop, plumbing shop, boiler plant, chiller plant, and central control. The number of employees in the Administration function is also provided but is not broken out by job type. The current state of VHA facilities staffing by job types was calculated by averaging FTE per GSF for each facility, with a POM subtotal of 3.72 per 100,000 GSF: 0.46 FTE per GSF higher than the IFMA POM benchmark subtotal of 3.30 (Tables 6, 9). The Administration facilities staffing levels per GSF is slightly higher than the IFMA

benchmark, although they are the same as a percent of total facilities staff at approximately 20 percent (Table 9). Interestingly, the VHA Engineering Staffing Methodology (VHA, 2019, p. 70) has Administration as 21 percent of baseline facilities staff when Capital Projects staff is included.

Although VHA POM staffing levels are higher than the IFMA benchmark, the organizational structure of this workforce appears to be very different from private healthcare organization, as private medical centers employ almost 3 times more generalists than does the VHA (Table 9). This suggests that the trade focused facilities workforce structure at the VHA does not compare fairly to private healthcare organizations. This “generalist” to “trade”, or apples to oranges, comparison may favor private medical centers when simply looking at staffing levels. However, understanding the cost to support this structure is imperative for a fair comparisons as private medical centers can more easily keep facilities staffing levels low by outsourcing trade work; even a quick analysis of the facilities staffing structure and costs within the VHA can reinforce this idea: low complexity medical centers generally have a more generalist facilities structure (Table 10) with higher staffing levels compared to high complexity medical centers (Tables 3,5,7). Nevertheless, even with these higher staffing levels, low complexity medical centers generally have lower facilities costs, \$6.47 per GSF, than high complexity medical centers, \$6.52 per GSF, calculated by averaging inhouse labor and material, contracts, and service costs per medical center (CAPRES, 2019).

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