

ATTACHMENT 1: NORTHERN VIRGINIA'S FUTURE WORKFORCE

Northern Virginia's Future Workforce

By

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The national and metropolitan area economies are still focused on sustaining their recoveries from the most severe recession since the Great Depression in the Thirties. While unemployment was down to 8.2 percent nationally in March and 5.4 percent for the metropolitan area, these rates remain double their pre-recession levels. Unemployment stands at 4.2 percent in Northern Virginia and has fallen below 4 percent in Arlington and Fairfax Counties. But these, too, are still well above pre-recession levels. Unemployment remains a long-term problem as so many of the unemployed workers are not qualified for the new jobs that the nation and regional economies are generating today. And, this will be a continuing problem into the future.

With so many unemployed workers still seeking work, it may be difficult to believe that there is a labor shortage looming not just in Northern Virginia but also in the Washington metropolitan area and throughout the nation. This labor shortage has not received the attention that it deserves; it will be clearly evident by 2015 and there are no easy solutions.

The U.S. Department of Labor has projected that the U.S. will have 6 million more jobs than workers by 2018. This shortage of workers will result from a dynamic mix of interrelated factors: (1) it is a demographic problem as the number of retiring workers will outnumber the number of new entrants to the workforce, (2) an education and skills level problem reflecting the mismatch between worker preparation and job requirements, and (3) a geographic problem as the location of workers may be different than the location of new jobs. Dr. Robert Templin, president of Northern Virginia Community College, was among the first to recognize the shortage of qualified labor, especially in the STEM fields (scientific, technical, engineering and mathematics), as a critical constraint to Northern Virginia's future economic vitality. In 2009, he supported research to help define these future workforce needs ("Workforce Trends in and Occupational Forecasts for Northern Virginia, 2010-2020", Stephen S. Fuller, GMU Center for Regional Analysis, June 2010).

This research and continuing analyses by the Center have shown just how big a challenge this looming labor shortage will be. First, it is important to understand that the future demand for workers includes, in addition to net new jobs, a generally overlooked source of demand for new workers, replacement positions; that is, workers to backfill jobs vacated through normal turnover and increasingly by retirement as the Baby Boomers bail out of the workforce in ever growing numbers. In the Washington metropolitan area, the number of net new jobs is projected to total 503,100 over the current decade while the number of job openings vacated by turnover and retirements will total 901,400 (see Table 1).

These new openings—both net new and replacement positions—together will mean that the metropolitan area will need 1.4 million new workers, workers not currently in the workforce, to fill these jobs if the regional economy is to achieve its projected growth potential. The magnitude of this requirement for new workers is substantial; 37 percent of the workers in the Washington area workforce in 2020 were not in the work force in 2010. The scale of this challenge is different in different parts of the region. In the District of Columbia, the 252,385 job openings projected for the 2010-2020 period consist of 60,060 net new jobs and 192,325 replacement positions (1 net new job for each 3.2 replacement position). In Northern Virginia, the number of net new jobs and replacement jobs is almost the same (1 net new job for each 1.14 replacement positions). In Suburban Maryland, one net new job is projected was each 2.6 replacement positions.

Table 1

Job Demand in Washington Metropolitan Area and Northern Virginia, 2010-2020
(in thousands)

Type of Job	2010	2020	Change	Percent
Total Jobs*				
Washington MSA	3,788.8	4,292.0	503.1	13.3
Northern Virginia	1,509.1	1,812.4	303.3	20.1
Replacement Positions				
Washington MSA			901.4	23.8
Northern Virginia			346.4	23.0
Total Openings				
Washington MSA			1,404.5	37.1
Northern Virginia			649.7	43.1

Sources: GMU Center for Regional Analysis, EMSI (2011.3)

*includes payroll employment, and self-employed, part-time and contract workers.

This mix of net new and replacement jobs has important implications regarding the types of jobs involved, the educational and skills levels that these positions require, and their respective salary levels and contributions to the local economy's value of output. Higher levels of replacement positions relative to net new jobs points to an economy in which retail and consumer services, leisure and hospitality, and jobs requiring comparatively lower levels of education and skills constitute a larger share of the total workforce and where the faster growing occupations have more universal (interchangeable) skills requirements.

As seen in Table 2, Northern Virginia has a concentration of future job requirements in a small number of major sectors. One category of new jobs—professional, scientific and technical, these are the STEM fields—are projected to account for 41 percent of all Northern Virginia's net new jobs this decade and health care occupations will account for 10.6 percent; both sectors are projected to grow 30 percent or more. The five sectors shown in Table 2 will account for 55 percent of all net new jobs in Northern Virginia. However, adding this job demand to the

replacement jobs requirements will show cashiers, salespersons, waiters and waitresses, military occupations, janitors and cleaners, clerical, child care workers, laborers, and security guards as major sources of future workforce demand.

Table 2
Five Major Sources of Net New Job Growth
In Northern Virginia, 2010-2020

Sector	2010 Jobs	2010-2020 Job Change	Percent Change	% All New Jobs
Prof., Scientific, Tech	316,175	124,157	39.2	40.9
Health Care	107,377	32,113	30.0	10.6
Government	243,555	29,454	12.1	9.7
Admin Support	94,639	18,421	19.5	6.4
Real Estate Services	66,022	15,239	23.1	5.0
Total 5 Sector	827,768	219,384	26.5	72.3
% of All Jobs	54.8			
Total All Jobs	1,509,110	1,812,383	20.1	

Source: GMU Center for Regional Analysis, EMSI

This workforce of the future will also span a wide range of occupations from ones with very advanced and specialized educational requirements to many requiring only a high school level education with skills training. The message here is that in order to realize Northern Virginia's economic potentials it will need more workers in every occupation than it can expect to generate from its current population. Of the 303,100 net new jobs projected over this decade, 49 percent will need a bachelor's degree or higher level of education, 4 percent will require only an associate's degree, and the remaining 47 percent will require a high school diploma or equivalent plus some level of experience, training or post-high school certificate. The educational requirements for the replacement positions are not as high: 31 percent will require a bachelor's degree or higher level, 3 percent will require an associate's degree, and 66 percent will require a high school and experience or post-HS training.

Northern Virginia will not be able to satisfy these labor force requirements from within its current adult and school age population. At best, if all high school and college graduates in Northern Virginia today remained in Northern Virginia to work, and adults currently outside of the workforce were enticed back to work, these captive future workers would be sufficient at most to fill 30 percent of the total job requirements (new and replacement positions). Consequently, Northern Virginia will need to attract workers from other regions and countries, as it has done in the past, to fill the remainder of its future jobs.

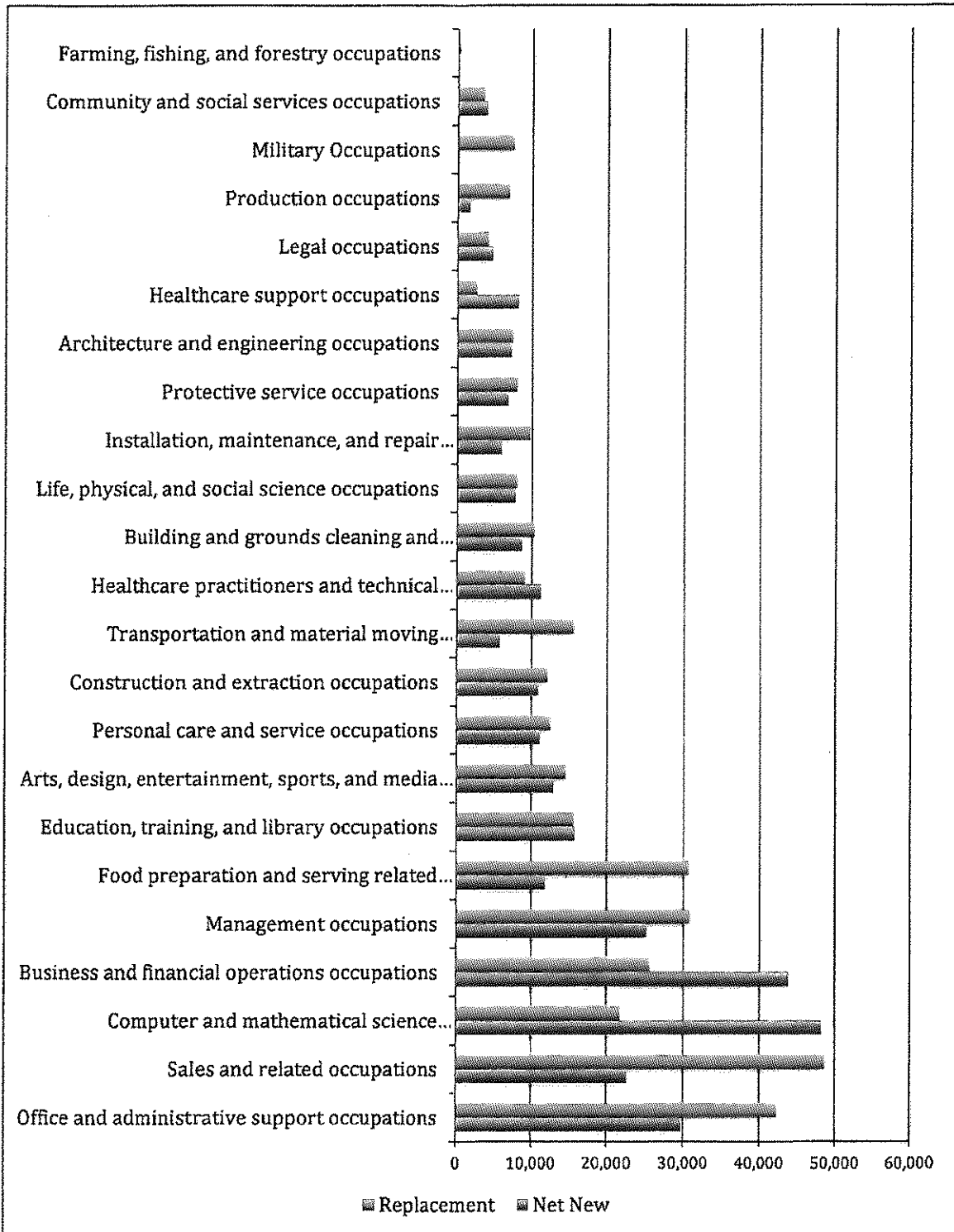
These in-migrating workers will need to be housed in Northern Virginia to maximize their accessibility to Northern Virginia's job base while limiting the resultant need to increase transportation services. To accomplish this would require a significant increase in planned housing construction from the numbers currently anticipated by local jurisdictions.

Alternatively, these new workers will have to be willing to commute into Northern Virginia on highways and transit facilities that are already operating at levels exceeding their design capacities. However, in the future, the ability to rely on workers residing in neighboring jurisdictions to commute into Northern Virginia to work will decline as the demands for workers in their home jurisdictions increase and these long-distance commuters opt to work closer to home in order to reduce the time lost to growing traffic congestion and offset rising transportation costs.

This looming shortage of workers will impact the Northern Virginia economy's ability to grow. The jurisdictions able to supply sufficient numbers and qualities of new workers to meet their economies' demands for new and replacement workers will have a clear competitive advantage over places unable to supply these workers. As a result, having a resident workforce of sufficient number and quality will become the key economic development driver in the future. And, as having this supply of workers becomes critical, being able to accommodate this future workforce will determine Northern Virginia's future economic direction. Being able or unable to house the future workforce and supply the supporting qualities of living and infrastructure will divide local economies into (1) those that are growing and generating higher standards of living and (2) those jurisdictions that are experiencing an outmigration of workers, a loss of population, and a declining quality of living.

While Northern Virginia's economy has been shown to possess significant economic growth potential, the challenge of realizing this economic future will require much greater attention to workforce development—K-12, college, adult education and upskilling of the current workforce, re-deploying older workers and re-employing retired workers. Beyond education and training, however, accommodating the future workers who will be moving into Northern Virginia will be the greatest challenge and also the greatest need as these workers will account for the largest source of new labor resources and will determine Northern Virginia's competitive position and capacity for future economic growth.

Figure 1.
 Job Openings by Net New versus Replacement Jobs in the NVCC Service Area,
 2010-2020



Source: EMSI and GMU Center for Regional Analysis

ATTACHMENT 2: MASON OVERALL, STEM AND HEALTH SCIENCE DEGREES AWARDED 2006-2012

Degree Awards by Category

	2006	2007	2008	2009	2010	2011	2012
Total	6,508	6,645	6,763	6,938	7,440	7,558	8,045
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Arts & Humanities	879	931	984	887	1,033	1,034	1,081
	13.5%	14.0%	14.5%	12.8%	12.8%	13.7%	13.4%
Clinical, Pre-clinical & Health	397	366	378	461	447	504	613
	6.1%	5.5%	5.6%	6.6%	6.0%	6.7%	7.6%
Life Sciences	276	280	274	268	325	331	381
	4.2%	4.2%	4.1%	3.9%	4.4%	4.4%	4.7%
Physical Sciences	126	150	157	172	174	198	237
	1.9%	2.3%	2.3%	2.5%	2.3%	2.6%	2.9%
Engineering & Technology	866	885	844	833	902	845	1,029
	13.3%	13.3%	12.5%	12.0%	12.0%	11.2%	12.8%
Social Sciences	3,964	4,033	4,126	4,317	4,559	4,646	4,704
	60.9%	60.7%	61.0%	62.2%	62.2%	61.5%	58.5%

Excludes Certificate Awards

DEGREES AWARDED BY LEVEL

2012

	Bachelor's	Master's	Doctoral	Total
Total	4718	2899	428	8045
Arts & Humanities	830	239	12	1081
Clinical, Pre-clinical & Health	357	239	17	613
Life Sciences	297	45	39	381
Physical Sciences	132	82	23	237
Engineering & Technology	509	480	40	1029
Social Sciences	2593	1814	297	4704

2011

	Bachelor's	Master's	Doctoral	Total
Total	4255	2941	362	7558
Arts & Humanities	798	225	11	1034
Clinical, Pre-clinical & Health	315	185	4	504
Life Sciences	242	56	33	331
Physical Sciences	106	74	18	198
Engineering & Technology	408	398	39	845
Social Sciences	2386	2003	257	4646

2010

	Bachelor's	Master's	Doctoral	Total
Total	4202	2856	382	7440
Arts & Humanities	759	264	10	1033
Clinical, Pre-clinical & Health	302	143	2	447
Life Sciences	249	53	23	325
Physical Sciences	101	66	7	174
Engineering & Technology	411	463	28	902
Social Sciences	2380	1867	312	4559

2009

	Bachelor's	Master's	Doctoral	Total
Total	4009	2499	430	6938
Arts & Humanities	705	178	4	887
Clinical, Pre-clinical & Health	348	105	8	461
Life Sciences	189	52	27	268
Physical Sciences	106	53	13	172
Engineering & Technology	373	419	41	833
Social Sciences	2288	1692	337	4317

2008	Bachelor's	Master's	Doctoral	Total
Total	3809	2549	405	6763
Arts & Humanities	771	211	2	984
Clinical, Pre-clinical & Health	257	108	13	378
Life Sciences	189	54	31	274
Physical Sciences	101	51	5	157
Engineering & Technology	384	418	42	844
Social Sciences	2107	1707	312	4126

2007	Bachelor's	Master's	Doctoral	Total
Total	3715	2543	387	6645
Arts & Humanities	716	211	4	931
Clinical, Pre-clinical & Health	266	91	9	366
Life Sciences	147	95	38	280
Physical Sciences	82	66	2	150
Engineering & Technology	397	444	44	885
Social Sciences	2107	1636	290	4033

2006	Bachelor's	Master's	Doctoral	Total
Total	3655	2483	370	6508
Arts & Humanities	708	165	6	879
Clinical, Pre-clinical & Health	278	112	7	397
Life Sciences	151	103	22	276
Physical Sciences	70	50	6	126
Engineering & Technology	438	393	35	866
Social Sciences	2010	1660	294	3964

STEM & HEALTH SCIENCES DEGREES AWARDED

STEM & HS Combined						
	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	5 Year % Change
Bachelors	934	1,016	1,064	1,074	1,297	
% Change		8.8%	4.7%	0.9%	20.8%	38.9%
Certificates	134	131	167	221	246	
% Change		-2.2%	27.5%	32.3%	11.3%	83.6%
Master's	632	630	725	713	846	
% Change		-0.3%	15.1%	-1.7%	18.7%	33.9%
Doctorate	91	89	60	94	119	
% Change		-2.2%	-32.5%	56.7%	26.6%	30.8%
University Total	1,400	1,866	2,016	2,102	2,508	
% Change		33.3%	8.0%	4.3%	19.3%	79.1%

STEM Only						
	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	5 Year % Change
Bachelors	677	668	762	759	940	
% Change		-1.3%	14.1%	-0.4%	23.8%	38.8%
Certificates	121	116	143	200	214	
% Change		-4.1%	23.3%	39.9%	7.0%	76.9%
Master's	524	525	582	528	607	
% Change		0.2%	10.9%	-9.3%	15.0%	15.8%
Doctorate	78	81	58	90	102	
% Change		3.8%	-28.4%	55.2%	13.3%	30.8%
University Total	1,400	1,390	1,545	1,577	1,863	
% Change		-0.7%	11.2%	2.1%	18.1%	33.1%

Health Science Only						
	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	5 Year % Change
Bachelors	257	348	302	315	357	
% Change		35.4%	-13.2%	4.3%	13.3%	38.9%
Certificates	13	15	24	21	32	
% Change		15.4%	60.0%	-12.5%	52.4%	146.2%
Master's	108	105	143	185	239	
% Change		-2.8%	36.2%	29.4%	29.2%	121.3%
Doctorate	13	8	2	4	17	
% Change		-38.5%	-75.0%	100.0%	325.0%	30.8%
University Total	1,400	476	471	525	645	
% Change		-66.0%	-1.1%	11.5%	22.9%	-53.9%

ATTACHMENT 3: MASON DEGREE PROGRAMS IN HEALTH SCIENCE AND STEM FIELDS

Mason Degree Programs Health Science and Science, Technology, Engineering, and Mathematics (STEM) 2012-2013

Bachelors:

Health Science

Athletic Training, B.S.
Community Health, B.S.
Health Administration, B.S.
Nursing, B.S.N.
Medical Technology, B.S.

STEM

Environmental and Sustainability Studies, B.A.
Neuroscience, B.S.
Biology, B.A.
Chemistry, B.A.
Geography, B.A.
Geology, B.A.
Mathematics, B.A.
Astronomy, B.S.
Biology, B.S.
Computational and Data Sciences, B.S.
Computer Game Design, B.F.A.
Chemistry, B.S.
Earth Science, B.S.
Environmental Science, B.S.
Forensic Science, B.S.
Geography, B.S.
Global and Environmental Change, B.S.
Mathematics, B.S.
Physics, B.S.
Applied Computer Science, B.S.
Applied Information Technology, B.S.
Bioengineering, B.S.
Civil and Infrastructure Engineering, B.S.
Computer Engineering, B.S.
Computer Science, B.S.
Electrical Engineering, B.S.
Systems Engineering, B.S.

Certificates:

Health Science

Nutrition
Food Security
Forensic Nursing
Gerontology
Global Health
Health Information Systems
Nursing Administration
Nursing Education
Nutrition
Public Health Leadership and Management
Physician Practice Management
Public Health
Qlty Improvement/Outcomes Mgt
Senior Housing Administration

STEM

Biostatistics
Epidemiology
Rehabilitation Science
Computational Social Science
Applied Conservation Science
Applied Cyber Security
Cognitive Neuroscience
Environmental Management
Advanced Biomedical Sciences
Actuarial Sciences
Bioinformatics & Comp Biology
Computational Tec & Applicat
Environmental Management
Forensics
Computer Networking
Communications and Networking
Database Management
Discovery, Design, Innovation
E-commerce
Foundations of Info Systems
Federal Statistics
Intelligent Agents
Information Engineering
Informatn Security & Assurance
Leading Technical Enterprises
Military Operations Research
Network Technologies & Applic
Software Engineering for C4I

Geospatial Intelligence
Geographic Information Science
Remote Sensing&Image Processng
Computer Science
Information Technology
Architcture-Based Sys Integrtn
Adv Networking Protocols-TCOM
Cmnd, Cntrl, Comm, Cmpt & Intl
Computational Modeling
Civil Infrstructure&Security Engr

Syst Engineering Analys & Arch
Signal Processing
Sys Engr of Com, Inf, & SIS
Software Architecture
Software Engineering
TCOM Forensics and Security
Web-based Software Engineering
Wireless Communications
Water Resources Engineering
Intelligence Technologies

Masters:

Health Science

Public Health, M.P.H.
Global Health, M.S.
Health Informatics, M.S.

Health Systems Management, M.S.
Senior Housing Administration, M.S.
Nursing, M.S.N

STEM

Management of Secure Information Systems, M.S.
Biodefense, M.S.
Bioinformatics and Computational Biology, M.S.
Biology, M.S.
Biomedical Sciences, M.S.
Bioinformatics Management, M.S
Chemistry, M.S.
Computational Science, M.S.
Earth Systems Science, M.S.
Environmental Science and Policy, M.S.
Forensic Science, M.S.
Geographic and Cartographic Sciences, M.S.
Geoinformatics and Geospatial Intelligence, M.S.
Geotechnical, Construction, and Structural Engineering,
MENG
Mathematics, M.S.

Applied and Engineering Physics, M.S.
Applied Information Technology, M.S.
Civil and Infrastructure Engineering, M.S.
Computer Forensics, M.S.
Computer Engineering, M.S.
Computer Science, M.S.
Electrical Engineering, M.S.
Information Security and Assurance, M.S.
Information Systems, M.S.
Operations Research, M.S.
Statistical Science, M.S.
Software Engineering, M.S.
Systems Engineering, M.S.
Telecommunications, M.S.

Doctorate:

Health Science

Nursing Practice, DNP

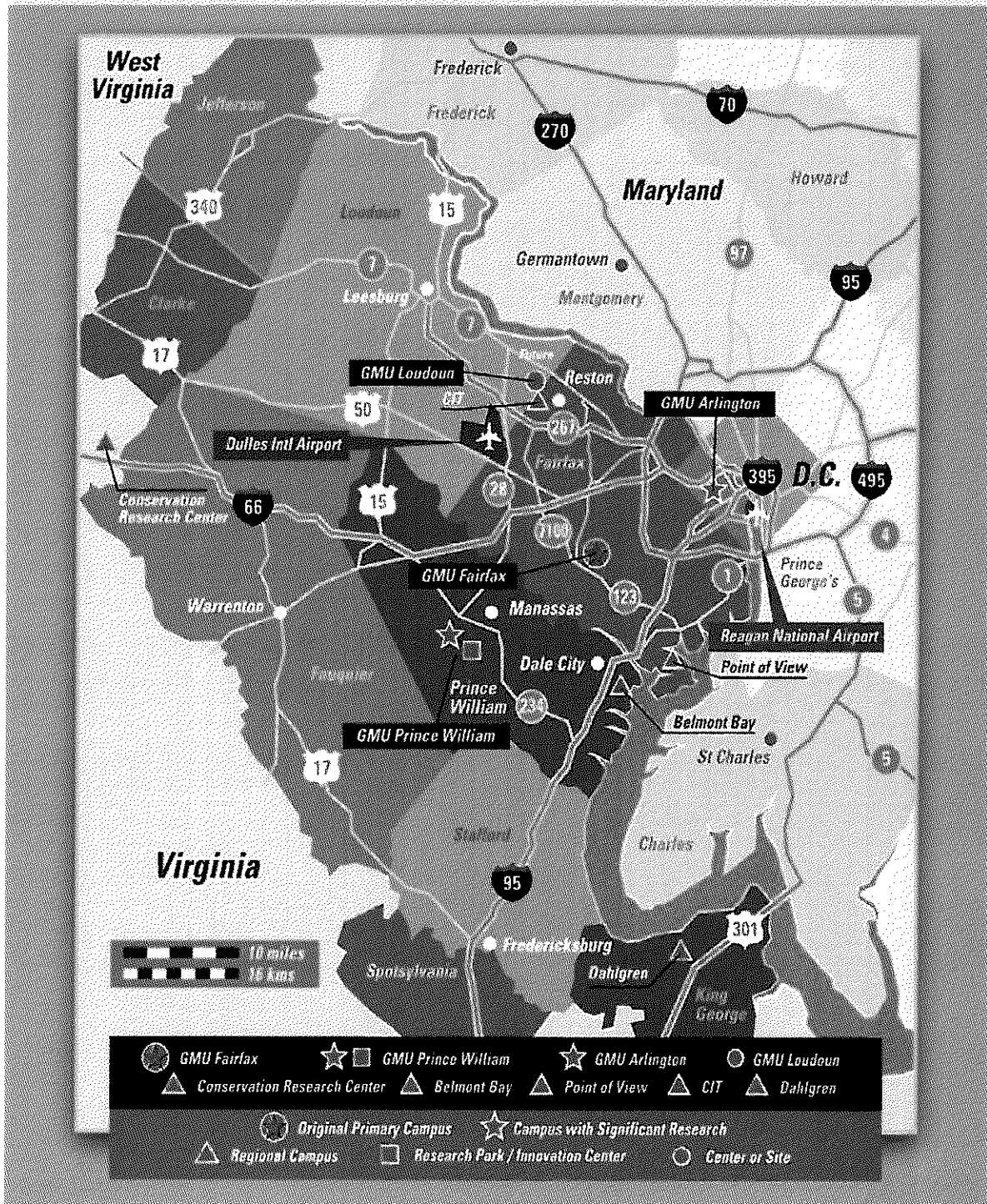
Nursing, Ph.D.

STEM

Rehabilitation Science, Ph.D.
Computational Social Science, Ph.D.
Biodefense, Ph.D.
Bioinformatics and Computational Biology, Ph.D.
Biosciences, Ph.D.
Chemistry and Biochemistry, Ph.D.
Climate Dynamics, Ph.D.
Computational Sciences and Informatics, Ph.D.
Earth Systems and Geoinformation Sciences, Ph.D.
Environmental Science and Public Policy, Ph.D.

Mathematics, Ph.D.
Neuroscience, Ph.D.
Physics, Ph.D.
Information Technology, Engr.
Civil and Infrastructure Engineering, Ph.D.
Computer Science, Ph.D.
Electrical and Computer Engineering, Ph.D.
Information Technology, Ph.D.
Systems Engineering & Operations Research, Ph.D.
Statistical Science, Ph.D.

Northern Virginia Service Area of George Mason University



ATTACHMENT 5: LEVELS OF COMMITMENT TO COMMUNITY ENGAGEMENT

	Level One: Low Relevance	Level Two: Medium Relevance	Level Three: High Relevance	Level Four: Full Integration
Mission	No mention or undefined rhetorical reference	Engagement is part of what we do as educated citizens	Engagement is an aspect of our academic agenda	Engagement is a central and defining characteristic
Leadership (Presidents, Vice Presidents, Deans, Chairs)	Engagement not mentioned as a priority; general rhetorical references to community or society	Expressions that describe institution as asset to community through economic impact	Interest in and support for specific, short-term community projects; engagement discussed as a part of learning and research	Broad leadership commitment to a sustained engagement agenda with ongoing funding support and community input
Promotion, Tenure, Hiring	Idea of engagement is confused with traditional view of service	Community engagement mentioned; volunteerism or consulting may be included in portfolio	Formal guidelines for defining, documenting & rewarding engaged teaching/research	Community-based research and teaching are valid criteria for hiring and reward
Organization Structure and Funding	No units focus on engagement or volunteerism	Units may exist to foster volunteerism/community services	Various separate centers and institutes are organized to support engagement; soft funding	Infrastructure exists (with base funding) to support partnerships and widespread faculty/student participation
Student Involvement & Curriculum	Part of extracurricular student life activities	Organized institutional support for volunteer activity and community leadership development	Opportunity for internships, practice, some service-learning courses	Service learning and community-based learning integrated across curriculum; linked to learning goals
Faculty Involvement	Traditional service defined as campus duties; committees; little support for interdisciplinary work	Pro bono consulting; community volunteerism acknowledged	Tenured/senior faculty may pursue community-based research; some teach service-learning courses	Community-based research and learning intentionally integrated across disciplines; interdisciplinary work is supported
Community Involvement	Random, occasional, symbolic or limited individual or group involvement	Community representation on advisory boards for departments or schools	Community influences campus through active partnerships, participation in service-learning programs or specific grants	Community involved in defining, conducting and evaluating community-based research and teaching; sustained partnerships
External Communications and Fundraising	Community engagement not an emphasis	Stories of students or alumni as good citizens; partnerships are grant dependent	Emphasis on economic impact of institution; public role of centers, institutes, extension	Engagement is integral to fundraising goals; joint grants/gifts with community; base funding