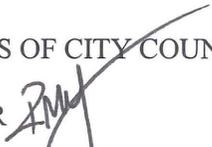


City of Alexandria, Virginia

MEMORANDUM

DATE: APRIL 18, 2014

TO: HONORABLE MAYOR AND MEMBERS OF CITY COUNCIL

THROUGH: RASHAD M. YOUNG, CITY MANAGER 

FROM: NELSIE L. SMITH, DIRECTOR, OFFICE OF MANAGEMENT AND BUDGET 

SUBJECT: BUDGET MEMO #24: NETWORK OPERATING CENTER "NOC" JUSTIFICATION

This memorandum is in response to the requests of Council members Wilson and Chapman regarding the proposed relocation of the City's Network Operations Center (NOC) and information on the cost effectiveness of utilizing a private data management and storage facility, commonly referred to as a co-location site, to host the City's data.

For reasons detailed in the following, there is a compelling need to immediately address issues related to the current NOC. Staff has proposed a \$6.5 million capital improvement project to construct a City-owned and operated data operations facility. The development of this facility will provide a long-term solution to current and future issues related to the management and storage of City data. However, staff recognizes that rapidly changing technology and industry trends may potentially offer options for a similar outcome at lesser capital expense. Staff continues to explore these options and is working to understand the implication of employing alternatives. Once a thorough assessment of options is complete and prior to any commitment of construction funding, staff will provide Council with additional information and specifics on this project.

Current Network Operations Center Issues

The NOC houses equipment which supports and manages the City's mission-critical data infrastructure. Equipment located in the NOC provides for the management and storage of data which supports some facet of nearly every City operation or service. The NOC is currently located in leased space at 123 N. Pitt Street and consists of 240 individual pieces of equipment including routers, firewalls, switches, telecommunications core equipment (VOIP), physical servers, two data storage arrays and various network appliances. Proper care and protection of this equipment requires sufficient cooling, redundancy of power source, immediate fire suppression and appropriate equipment spacing.

Staff has proposed to relocate the existing NOC from its current location to the Public Safety Center on Mill Road. The proposed relocation results from ongoing issues with HVAC systems within the leased space which impede the City's ability to effectively manage the temperatures of the NOC. Given the very high heat generation of data equipment, a sufficiently cooled environment is needed for NOC equipment to properly function. Unfortunately, optimal temperatures for NOC equipment operation have been observed to result in moisture condensation

within the structure of the building housing the NOC. The building's landlord has expressed concerns that condensation in the building, combined with the significant floor weight load of our equipment, is degrading the structure of the building. The landlord is asking we remediate the problem immediately. Both ITS and General Services have determined that the only effective way to mitigate building damage is to raise temperatures in the NOC (less cooling of the space). However, this risks the viability and longevity of our data management and storage equipment.

General Services and ITS have been working with the building landlord for more than a year to address the concerns of the landlord while still ensuring the NOC equipment is not placed at undue risk. A variety of options for maintaining the NOC in its current location have been explored, however the leased space housing the NOC is not adequate for its current use. As a result there is not a mutually satisfactory alternative that permits the NOC to continue to operate in its current location without significant risk to either building structure or City equipment.

In order to successfully address the NOC location issues, staff has proposed a new, City-owned facility be constructed. The project is estimated to cost \$6.5 million which includes both construction of space specifically designed to house a NOC, and the equipment necessary for operations. Staff contends a City-owned facility is preferred over a contracted co-location operation. A City-owned facility would allow maximum flexibility in managing the asset for current and future needs, provide the City complete operational control over our core data infrastructure, and long-term produce a more cost effective operation than would be realized with a contracted co-location arrangement.

For comparison purposes, the following tables are provided to highlight the operational pros and cons for both a City-owned facility and a contracted co-location facility. Project implementation costs and long-term cost are included for both options. As noted, a private, co-location facility would require a contract with a private entity who would then assume responsibility for the City's data management, storage and security.

BUILD NOC VS. CO-LOCATION OF NOC

Build NOC at Mill Road	
Pros	Cons
City controlled, readily accessible for updates, application management, etc.	Significant start up investment for design and construction
Easy access to systems	Utilizes scarce project management resources to oversee build-out and implementation
Ability to establish and enforce operational standards	Reduced facility security and fortifications due to multi-purpose use of building
Stability over NOC	
Potential for	

Co-location of NOC	
Pros	Cons
Reduces initial investment considerably	Long-term, recurring cost
Provider must assume all risks associated with day-to-day operations	Lack of control over systems and standards
Heightened security and fortification of facility designed for a single purpose	Network latency can cause performance issues
Improved access to Internet service providers	Restricted staff access to facility
	Dependency on the

Build NOC at Mill Road	
Pros	Cons
secondary NOC exchanges with other jurisdictions	
Scalability built in allows for expansion at minimum costs	
Potential location for future municipal fiber Head-End	
Long-term cost effectiveness	
Allows choice for an enterprise private cloud option as backup	

Co-location of NOC	
Pros	Cons
	internet for access to data (assuming non dedicated fiber)
	Limited control over increasing hosting costs
	Requires secondary lease agreements with additional offsite location for backup

COST ESTIMATES OF BUILD NOC VS. CO-LOCATION OF NOC

Build NOC		Co-Location of NOC	
Item / Task	Costs	Item/Task	Costs
Estimated Facility Build-Out Costs (see Attachment #1)	\$3,174,000*	Estimated Facility Build-Out Costs	N/A
Operating System/Application Monitoring	\$300,000	Hosting of Physical Servers	\$19,756
Cabling (fiber runs and data cables)	\$150,000	Shared Managed Firewall Services	\$3,810
Enterprise Architect - Subject matter expertise for Enterprise Infrastructure (SANs, VMWare Active Directory, Windows Server 2012, P2V physical servers, identify redundancy options, and UCS Blades/Switches)	\$196,000	Hosting of Storage Space	\$12,000
		Comcast 10 Gig Circuit*	\$17,000
Professional relocation services	\$50,000	Professional Relocation Services	\$50,000
Subject matter expertise for network design/enterprise architect	\$175,000	IT Project Management services	\$182,000
Storage Area network and backup environment - installation, hardware, and configuration services to include design of redundancy at an alternate location	\$500,000	Contingency and Disaster Recovery	\$800,000
Core Network equipment (switches, etc.)	\$550,000	Core Network equipment (switches, etc.)	\$250,000
Network schematic (current and future) and as-is inventory of Mill Road, Wheeler Ave, and Pitt Street	\$50,000	Subject matter expertise for network design/enterprise architect	\$175,000

**See Attachment I for more detail of build-out costs*

Build NOC		Co-Location of NOC	
Item / Task	Costs	Item/Task	Costs
Telephone services relocation/design/implementation	\$140,000	Storage Area network and backup environment - installation, hardware, and configuration services to include design of redundancy at an alternate location	\$500,000
Comcast - dedicated fiber for the NOC (assuming move to Public Safety Center @ Mill Rd.)	\$25,000	Dedicated fiber line to co-location facility	\$2,700,000
IT Project Management services	\$364,000		
Contingency and Disaster Recovery	\$800,000		
Estimated Total IT Costs	\$3,300,000	Estimated IT Costs	\$4,709,566
Total Implementation Costs	\$6,474,000	Total Implementation Costs	\$4,799,566
Estimated Annual Costs after Year 1	\$348,000	Estimated Annual Costs after Year 1	\$630,792

City-owned facility		Year	Leased facility	
Yearly Cost	Total Cost		Yearly Cost	Total Cost*
\$6,500,000		Year 1	\$4,709,566	
\$348,000	\$6,848,000	Year 2	\$630,792	\$5,340,358
\$348,000	\$7,196,000	Year 3	\$630,792	\$5,971,150
\$348,000	\$7,544,000	Year 4	\$630,792	\$6,601,942
\$348,000	\$7,892,000	Year 5	\$630,792	\$7,232,734
\$348,000	\$8,240,000	Year 6	\$630,792	\$7,863,526
\$348,000	\$8,588,000	Year 7	\$630,792	\$8,494,318
\$348,000	\$8,936,000	Year 8	\$630,792	\$9,125,110
\$348,000	\$9,284,000	Year 9	\$630,792	\$9,755,902
\$348,000	\$9,632,000	Year 10	\$630,792	\$10,386,694
\$348,000	\$9,980,000	Year 11	\$630,792	\$11,017,486
\$348,000	\$10,328,000	Year 12	\$630,792	\$11,648,278
\$348,000	\$10,676,000	Year 13	\$630,792	\$12,279,070
\$348,000	\$11,024,000	Year 14	\$630,792	\$12,909,862
\$348,000	\$11,372,000	Year 15	\$630,792	\$13,540,654
\$348,000	\$11,720,000	Year 16	\$630,792	\$14,171,446
\$348,000	\$12,068,000	Year 17	\$630,792	\$14,802,238
\$348,000	\$12,416,000	Year 18	\$630,792	\$15,433,030
\$348,000	\$12,764,000	Year 19	\$630,792	\$16,063,822
\$348,000	\$13,112,000	Year 20	\$630,792	\$16,694,614

**The assumption of cost effectiveness after Year 8 assumes construction of a dedicated fiber link between the City's network and the co-location site at an estimated cost of \$2.7 million. Without a dedicated fiber connection, an internet circuit is used for transmission of data from the co-location site to the City's network. There is some inherent risk to data reliability associated with utilizing a non-dedicated connection. If a dedicated fiber connection is not utilized, Year 1 costs of the co-location option are reduced to \$2.09 million and cost effectiveness of the City-owned option is realized in Year 17.*

