

Operations & Maintenance Cost Study for NASA Facilities

Final Report for Space Science (R&D and Test) Buildings

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Overview

National Aeronautics and Space Administration (NASA) requires a credible method for estimating the operations and maintenance (O&M) requirements of its facilities.¹ The failure to anticipate future costs can lead to under-funding and diminished service life.

NASA has over 450 buildings totaling 12.6 million GSFT distributed at 24 sites in the selected inventory for this project. It is not cost effective to inspect all facilities, yet NASA needs detailed sustainment and operations estimates to support its budget planning. This project developed cost models for a sample of NASA assets with inventory details collected through site surveys. Estimates were extrapolated by facility type and size and adjusted for location to generate requirements for the selected NASA inventory.

The project employed the MARS Facility Cost Forecast System to provide cost information. Now in its eighth version, MARS is a facility cost modeling tool developed by CBRE | Whitestone and used by many federal and commercial agencies.

Phases 1 and 2 of this project called for inspections of four facility types: Administration Buildings, Propulsion Buildings, Communications Buildings, and Space Science (R&D and Test) Buildings. Eight sample buildings were chosen at two sites: the Goddard Space Flight Center (GSFC) and the Marshall Space Flight Center (MSFC). O&M estimates were generated for all buildings but the scope included formal reports for Administration and Propulsion Buildings only.

Site inspections were conducted by Jacobs Facilities, a long-time CBRE | Whitestone partner experienced in inspecting federal facilities and creating MARS component inventories. A team of three, consisting of an architect, and electrical and mechanical engineers, carried out the facility inspections.

Phase 3 of the project scope included individual reports on the two remaining facility types inspected in the previous phases, Communications and Space Science (R&D and Test) Buildings. This report describes the project methodology and presents final estimates for the Space Science (R&D and Test) Buildings in the NASA inventory.

Project Methodology

Parametric Estimates for Buildings

The project methodology entailed estimating O&M requirements for the selected NASA inventory based on the inspection and modeling of a sample of facilities. The project included four key steps:

1. Validate the existing NASA inventory and develop a sample

¹ Operations include custodial (cleaning, pest control, and trash collection), utilities (energy, water, and sewer), grounds (landscape care, mowing, and snow removal), security, telecommunications, and management. Maintenance (also known as sustainment) includes preventative maintenance, minor repair, unscheduled maintenance, and renewal and replacement.

2. Perform on-site inspections of the sample buildings
3. Develop and calibrate MARS models
4. Generate per square foot estimates of sustainment and operations costs for the sample and extrapolate to the project inventory

Study Sample

NASA has over 450 buildings at 24 sites globally in the selected inventory. Complete inspection of each site to estimate O&M requirements is impractical and costly. This project generated sustainment and operations estimates for a sample of buildings and extrapolated the costs to a selected NASA inventory.

The Statement of Work called for a sample that included one small building (approximately 10,000 square feet) and one large building (approximately 100,000 square feet) from four Classification types. The sample included two buildings from Administration Buildings, Propulsion Buildings, Communications Buildings, and Space Science (R&D and Test) Buildings. Phases 1 and 2 of the project inventory excluded other Classification types in the NASA inventory, such as Warehouses and Wind Tunnels. CBRE | Whitestone proposed buildings at the Goddard Space Flight Center and the Marshall Space Flight Center to minimize travel costs.

Table 1 shows the building detail for the inspected Space Science (R&D and Test) Buildings.

Table 1. Space Science (R&D Test) Buildings Inspection Sample						
Site	Classification	Property ID	Property Name	Year Built	Size	CRV
Goddard Space Flight Center	Space Science (R&D & Test Buildings)	1019/51/121	B-ATTITUDE CONTROL LAB BLDG/MTS	1964	8,360	\$10,712,733
Goddard Space Flight Center	Space Science (R&D & Test Buildings)	1019/51/50	B-CENTRAL FLIGHT CONTROL/RANGE BLDG	1961	113,961	\$41,722,280
Total					122,321	\$52,435,013

There are a number of variables that drive O&M costs. The project sampling plan only controls for size and Classification type. An alternative sample may control for current replacement value (CRV), age, and location.

The inspected sample was mapped to the remaining inventory by size and type. The 8k gross square foot (GSFT) building was mapped to the smaller half of the inventory, while the 114k GSFT building was mapped to the larger half. Square foot estimates were generated by MARS and then extrapolated to the inventory. All costs were indexed for location.

Space Science (R&D and Test) Buildings represent 16.2 percent of the selected NASA inventory, totaling 2.0 million GSFT and 85 buildings with a \$909.4 million CRV. Table 2 shows the Space Science (R&D and Test) Buildings inventory by Site.

Table 2. NASA Space Science (R&D Test) Buildings by Site			
Site	Count	Size	CRV
AMES Research Center	5	126,894	\$71,450,230
Dryden Flight Research Center	1	4,559	\$197,901
Glenn Research Center	4	45,923	\$16,928,476
Goddard Space Flight Center	14	700,852	\$241,907,236
Jet Propulsion Laboratory	50	898,228	\$455,054,068
Johnson Space Center	3	86,379	\$30,047,278
Langley Research Center	2	28,535	\$37,504,861
Marshall Space Flight Center	3	45,800	\$11,355,111
NASA/JSC/White Sands Test Facility	1	3,276	\$157,001
Stennis Space Center	1	90,080	\$44,105,994
Wallops Flight Facility	1	1,635	\$685,738
Total	85	2,032,161	\$909,393,894

Detailed cost models were developed for the two buildings using CBRE | Whitestone’s MARS Facility Cost Forecast System.

Description of the MARS Model

CBRE | Whitestone used MARS to estimate preventative maintenance, unscheduled maintenance, repair, and renewal/replacement costs for this project. MARS is an asset management system that estimates both deferred maintenance and future requirements on the basis of asset components and their scheduled maintenance and repair. It also estimates costs for ten operations types in the typical commercial chart of accounts. MARS was originally developed in 1996, and is currently in its eighth version. It is used by many government agencies and commercial concerns.

Sustainment	Preventive Maintenance & Minor Repair Unscheduled Maintenance Renewal & Replacement
Operations	Custodial Energy Grounds Management Pest Control Refuse Road Clearance Security Telecom Water/Sewer

Note that the definition of future M&R requirements is the same as the “sustainment” requirements used for programming by DoD and an approach endorsed in a National Research Council (NRC) study of Department of Energy facility practices.² Among other agencies, the MARS Facility Cost Forecast System has been used to forecast budgets for the IRS, FAA, USDA, and CDC. It was recently used to benchmark costs for the Department of State Overseas Embassies. MARS is also the basis for the DoD Sustainment Model and a study for NNSA validating total life-cycle facility costs at eight nuclear weapons production and research sites.³ The model is used continuously to simulate alternative facility costs for the U.S. nuclear complex.

The MARS process begins with a component inventory of a building or structure. Derived from building plans, equipment inventory data, and on-site inspections, these components are organized into UNIFORMAT category level three elements and are identified specifically in terms of product characteristics, quantity, and output level; e.g. “Single-Ply Modified Bituminous/Thermoplastic Roof,” “Condenser, Air-Cooled, 60 Ton,” or “Pipe & Fittings, ¾” Copper.”

Once the component inventory is completed, the MARS system relates maintenance tasks from a pre-defined task library to each selected component. New components and related tasks are defined as necessary. The frequency of each task determines the forecast of future required maintenance. MARS estimates four types of maintenance: preventative maintenance, unscheduled maintenance (service calls), repair, and renewal/replacement tasks. Tasks and their labor and material requirements are pre-defined by CBRE | Whitestone, but are also editable.

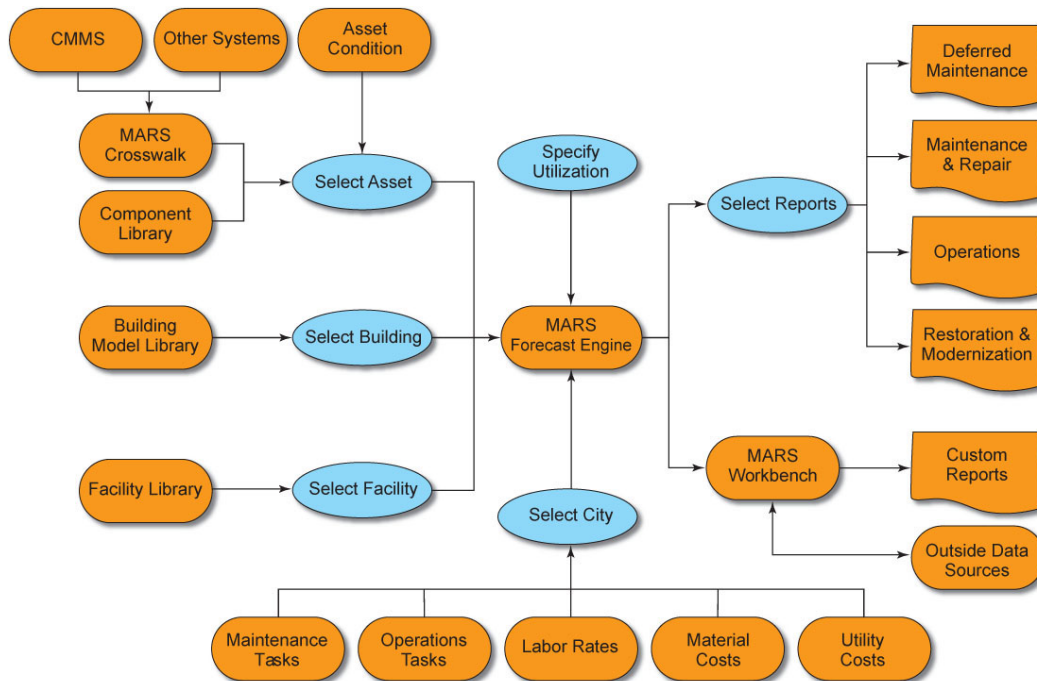
Other calibration steps include modifying default values for contract and in-house labor rates, specifying site-typical mark-up for contract expenditures, and identifying the utilization characteristics for each asset.

The sources for local wage rates and benefits are primarily the U.S. Department of Labor and Davis-Bacon Act labor agreements, and private sector employers. Both union and non-union wages are considered in determining prevailing rates by locality. State and local wage surveys are also used when available.

² National Research Council, *Intelligent Sustainment and Renewal of Department of Energy Facilities and Infrastructure*, 2004. P. 44.

³ Jacobs Facilities and Whitestone Research, *Implementation of the Department of Defense Sustainment Model, Final Report*, May 2002.

MARS Facility Cost Forecast System



MARS is also used to estimate operations costs other than maintenance and repair. These are based on the Facilities Operation Model developed jointly by the Department of Defense (DOD) and CBRE | Whitestone. This model provides costs for ten services, including those mentioned in the Federal Real Property Council (FRPC) guidance—utilities, cleaning and janitorial, and roads and grounds.⁴ Each operation type for an asset can be calibrated for a level of service (low, medium, high) to reflect the level of demand or frequency at which certain operations task are performed.

The CBRE | Whitestone operations cost models provides estimates for the following services:

Custodial. The custodial function represents the expense of cleaning offices, work areas, restrooms and common areas. Costs include local wage rates and benefits, task productivity, mark-ups for equipment, materials, supervision, and assumptions concerning the level of service. Trash removal costs are not included. Custodial service levels are defined by altering the combination and frequency of common tasks.

Energy. Energy includes all expenses related to the purchase, generation, distribution, and conservation of energy and source fuels necessary to operate an asset. The main energy sources considered are electricity and natural gas. Not included are utilities maintenance and supervision, and utility tax rates. Service levels vary according to estimated commodity demand by asset use type.

Grounds. The grounds function includes any expense related to the maintenance of exterior landscaping. It does not include sweeping or the maintenance of signage, parking lots and roadways. Costs are estimated using local wage rates and benefits,

⁴ Federal Real Property Council. *Guidance for Real Property Inventory Reporting*. Washington, D.C. August, 2012.

task productivity, mark-ups for equipment, materials and supervision, and assumptions concerning the level of service. Service levels are defined by altering the combination and frequency of common tasks.

Management. The real property management function describes all costs associated with facility management, including: public works, contracts, material procurement, facility data, furnishings, real estate, and engineering services. Costs are expressed as a fixed percentage of Plant Replacement Value. Service levels are based on the distribution of costs found in institutional and commercial settings. For this project, the level of service for all NASA buildings was set to low to reflect economies of scale in a campus environment.

Pest Control. Pest control expenses cover indoor and outdoor pest control programs, separate from the grounds function. Costs are based on the frequency of common tasks for rodent and insect abatement and inspections. Costs include prevailing labor and material rates. Service levels are defined by altering the combination and frequency of common tasks.

Refuse. Refuse costs include all expenses related to trash collection and disposal, pick-up services, fees, recycling operations and administration, composting, etc. Costs exclude handling and disposal of HAZMAT materials. Service levels vary according to estimated demand by asset use type.

Road Clearance. The road clearance function includes all expenses related to sweeping paved areas including sidewalks, walkways, and parking lots. Costs include prevailing labor and material rates, and climatic variables. Service levels are defined by altering the combination and frequency of common tasks.

Security. Security expenses relate to the physical security of assets and occupants, and include personnel, operating and monitoring security equipment. Costs include relevant prevailing labor and material rates. Service levels are defined by altering the combination and frequency of common tasks and services.

Telecommunications. Telecommunication expenses cover the purchase of all the services ordinarily associated with commercial activities, such as voice and data equipment and service subscription. The level of telecommunications is defined by the combination of services selected.

Water and Sewer. Water and Sewer expenses include all costs related to providing the asset with potable water, irrigation water, and sewage service. Estimates include local commodity costs. Service levels vary according to estimated commodity demand by asset use type.

Data Collection and Calibration

MARS Model Development

The technical work for this task involved the definition of the component inventory for the two sample Space Science (R&D and Test) Buildings. Goddard Space Flight Center staff supplied

existing equipment inventories and construction design documents before the inspection. Jacobs Facilities inspected the buildings and created draft models in MARS. In total, 451 MARS components were defined for the two facilities.

Jacobs submitted the MARS database to CBRE | Whitestone for a detailed component-by-component review. Three areas of focus included:

- 1) Check for completeness. Review the wall finishes (exterior and interior), roofing, plumbing, HVAC, fire protection, and electrical data to ensure the building model contains the appropriate components in each category.
- 2) Check for consistency. Review the building gross square feet for accuracy. Ensure the square footage of structural components (exterior walls, roofing system, interior finishes) are reasonable compared to building GSFT. Verify the capacity of the following is consistent with the building type and size:
 - Heating, cooling, and air distribution
 - Electrical service, distribution, and lighting
 - Plumbing fixtures and water distribution
 - Fire protection
- 3) Forecast review. Run the following building-level MARS reports and look for extraordinary costs (high or low) illustrating an error in the building model:
 - Average M&R Costs
 - Most Costly M&R Tasks
 - Deferred Maintenance Detail
 - Operation Cost Summary

We also compared the costs with known resources (*The Whitestone Facility Maintenance and Repair and Operations Cost References*, comparable CBRE | Whitestone project work with federal agencies, and third party sources).

Attachment A and B provide detailed MARS component lists for the two inspected Space Science (R&D and Test) Buildings at GSFC.

CBRE | Whitestone also collected information to calibrate the models for local site values.

Local Calibration of MARS

While the MARS system has pre-defined building models, labor and material costs, utility rates, and an extensive component library, all of these values can be changed or supplemented to reflect the actual site practices.

Calibration data was gathered to adjust MARS factors at both the site and the building level. Site-level information, such as labor and utility rates, was directly used to estimate O&M costs for the remaining non-inspected buildings at GSFC and MSFC.

Building-level calibration data was applied to the sample models and then extrapolated to the remaining NASA inventory by Classification type and size.

The following data was collected to calibrate the building models:

Maintenance and Repair. The sites provided contract labor rates and labor rate mark-ups. A default assumption in MARS assigns in-house labor to preventative maintenance, minor repair, and unscheduled maintenance, while contract labor performs major repair and replacement tasks. Goddard Space Flight Center and the Marshall Space Flight Center staff indicated all maintenance was performed by contract laborers. CBRE | Whitestone adjusted the MARS database accordingly.

NASA personnel specified laborers must be paid prevailing wages for the area. We used the default MARS wage rates for this study, and included a 30 percent mark-up for contract overhead.

Table 3 shows the source of the maintenance and repair factors for each site.

Table 3. Data Sources by Site, Maintenance & Repair					
Site	In-house Shop Rates	In-house Markup Rates	Contract Labor Rates	Contract Overhead Rates	Utilization
Goddard Space Flight Center	N/A	N/A	WST	WST	Site
Marshall Space Flight Center	N/A	N/A	WST	WST	Site
WST = Whitestone, Site = Respective NASA Site, N/A = Not applicable, no in-house maintenance staff					

MARS estimates also can be adjusted to reflect utilization factors that impact M&R. For example, many NASA facilities have special safety requirements which increase costs relative to conventional commercial practice. Other special requirements include high or low hours of operation and security. The two sites defined utilization factors for the eight building sample in Phases 1 & 2.

Table 4 displays the average utilization multipliers by site used to adjust for these requirements.

Table 4. Average Utilization Adjustment by Site^A				
Site	Hours of Operation^B	Security^C	Safety & Permitting^D	Sum^E
Goddard Space Flight Center	1.37	1.05	1.04	1.45
Marshall Space Flight Center	1.07	1.01	1.03	1.11

^A Calculated from individual asset multipliers assigned by the sites.
^B Hours of Operation rates building use on a weekly basis and is defined as follow s: 0.80 = 40 hours, 1.00 = 41 to 80 hours, 1.37 = 80+ hours.
^C Security is defined as follow s: 1.00 = free access, 1.01 = contractor training & daily check-in, 1.15 = full contractor accompaniment.
^D Safety & Permitting is defined as follow s: 1.00 = typical commercial & service activity, 1.07 = non-specific laboratory, 1.75 = radiological or life science research, 3.00 = nuclear facility.
^E In combination the multipliers are additive such that the total multiplier = $1 + \sum (\beta - 1)$ w here β = the multiplier value.

Operations. MARS also estimates operations costs for ten services including: custodial, energy, grounds, management, pest control, refuse, road clearance, security, telecommunications, and water & sewer. We requested utility rates, operations labor rates, and mark-ups. In addition, individual building models are calibrated in terms of level of service (low, medium, high, or none).

Each site defined levels of service for all operation types and provided several utility rates. As with M&R, CBRE | Whitestone used the default MARS wage rates and a 30 percent mark-up for contract overhead.

The utility rates provided by the two sites were significantly lower than the default MARS commercial rates. These discounts are often provided to large federal property holders like NASA. CBRE | Whitestone applied the average discounts for the calibrated sites (GSFC and MSFC) to the remaining sites in the inventory.

Table 5 shows the source of the operations calibration data.

Table 5. Data Sources by Site, Operations											
Site	Level of Service	Custodial Wage	Refuse Rates	Energy Rates	Water/Sewer Rates	Groundskeeper Wage	Pest Control Wage	Road Clearance Wage	Security Rates	Property Management	Telecom Rates
Goddard Space Flight Center	Site	WST	Site	Site	Site	WST	WST	WST	WST	Site	WST
Marshall Space Flight Center	Site	WST	WST	Site	Site	WST	WST	WST	WST	Site	WST

WST=Whitestone, Site = Respective NASA Site

Cost Estimates for Space Science (R&D and Test) Buildings

Sustainment Costs

The final sustainment estimate for the smaller GSFC Space Science (R&D and Test) Building (Property ID 1019/51/121) is an average of \$7.19 per GSFT over a 50-year period. The larger building (Property ID 1019/51/50) is \$9.35 per GSFT over the same period.

The sample estimates were extrapolated to the population. Table 6 shows sustainment costs by site for all Space Science (R&D and Test) Buildings. Sustainment estimates are expressed as 30, 40, and 50-year averages. While CBRE | Whitestone computes annual requirements, average costs are presented to smooth the annual oscillations. Overall, the sustainment requirements are an average of \$17.4 million per year over 50 years, or \$8.56 per GSFT. Expressed another way, this amounts to 1.9 percent of the \$909.4 million replacement value.

Table 6. Average Annual Estimates of Sustainment Requirements by Site, Space Science (R&D Test) Buildings

Site	GSFT	CRV	Sustainment ^A								
			30-Year Estimates			40-Year Estimates			50-Year Estimates		
			Avg. Annual Estimate	Per GSFT	Percent CRV	Avg. Annual Estimate	Per GSFT	Percent CRV	Avg. Annual Estimate	Per GSFT	Percent CRV
AMES Research Center	126,894	\$71,450,230	\$1,319,945	\$10.40	1.8%	\$1,250,587	\$9.86	1.8%	\$1,234,345	\$9.73	1.7%
Dryden Flight Research Center	4,559	\$197,901	\$39,724	\$8.71	20.1%	\$37,156	\$8.15	18.8%	\$34,568	\$7.58	17.5%
Glenn Research Center	45,923	\$16,928,476	\$369,081	\$8.04	2.2%	\$345,229	\$7.52	2.0%	\$321,181	\$6.99	1.9%
Goddard Space Flight Center	700,852	\$241,907,236	\$6,442,474	\$9.19	2.7%	\$6,146,787	\$8.77	2.5%	\$6,254,927	\$8.92	2.6%
Jet Propulsion Laboratory	898,228	\$455,054,068	\$8,285,881	\$9.22	1.8%	\$7,841,689	\$8.73	1.7%	\$7,701,225	\$8.57	1.7%
Johnson Space Center	86,379	\$30,047,278	\$710,354	\$8.22	2.4%	\$676,082	\$7.83	2.3%	\$680,705	\$7.88	2.3%
Langley Research Center	28,535	\$37,504,861	\$199,785	\$7.00	0.5%	\$186,874	\$6.55	0.5%	\$173,857	\$6.09	0.5%
Marshall Space Flight Center	45,800	\$11,355,111	\$322,769	\$7.05	2.8%	\$301,909	\$6.59	2.7%	\$280,879	\$6.13	2.5%
NASA/JSC/White Sands Test Facility	3,276	\$157,001	\$21,717	\$6.63	13.8%	\$20,314	\$6.20	12.9%	\$18,899	\$5.77	12.0%
Stennis Space Center	90,080	\$44,105,994	\$700,463	\$7.78	1.6%	\$668,738	\$7.42	1.5%	\$682,351	\$7.57	1.5%
Wallops Flight Facility	1,635	\$685,738	\$11,447	\$7.00	1.7%	\$10,708	\$6.55	1.6%	\$9,962	\$6.09	1.5%
Total^B	2,032,161	\$909,393,894	\$18,423,641	\$9.07	2.0%	\$17,486,074	\$8.60	1.9%	\$17,392,897	\$8.56	1.9%

^A Sustainment is the average annual sum of preventative maintenance, unscheduled maintenance, and major repair and replacement tasks.
^B All costs expressed in \$2012.

Operation Costs

Final estimates of ten operation costs are shown in Table 7. In total, the operation requirements for the selected Space Science (R&D and Test) Buildings are an annual average of \$19.5 million, or \$9.61 per GSFT and 2.1 percent of replacement value. Note that in commercial accounting M&R (sustainment) is often included as an operating cost, but is reported separately above.

Table 7. Annual Estimates of Operations Costs by Site, Space Science (R&D Test) Buildings

Site	Operations Type ^A												Per GSFT	Percent CRV	
	GSFT	CRV	Custodial	Energy	Grounds	Management	Pest Control	Refuse	Road Clearance	Security	Telecom	Water/Sewer			Total Costs
AMES Research Center	126,894	\$71,450,230	\$276,373	\$262,490	\$22,160	\$178,626	\$8,123	\$4,609	\$0	\$312,090	\$142,725	\$23,986	\$1,231,182	\$9.70	1.7%
Dryden Flight Research Center	4,559	\$197,901	\$8,464	\$5,637	\$841	\$495	\$189	\$154	\$0	\$12,554	\$491	\$964	\$29,789	\$6.53	15.1%
Glenn Research Center	45,923	\$16,928,476	\$78,799	\$51,125	\$4,881	\$42,321	\$1,555	\$407	\$3,678	\$128,477	\$4,944	\$11,283	\$327,471	\$7.13	1.9%
Goddard Space Flight Center	700,852	\$241,907,236	\$1,769,314	\$1,948,927	\$88,092	\$604,768	\$41,052	\$23,067	\$10,836	\$1,637,954	\$1,221,161	\$235,066	\$7,580,237	\$10.82	3.1%
Jet Propulsion Laboratory	898,228	\$455,054,068	\$1,829,924	\$1,791,534	\$165,610	\$1,137,635	\$37,287	\$30,317	\$0	\$2,050,317	\$925,243	\$190,000	\$8,157,867	\$9.08	1.8%
Johnson Space Center	86,379	\$30,047,278	\$139,847	\$180,314	\$10,498	\$75,118	\$3,505	\$2,616	\$0	\$162,630	\$131,237	\$18,200	\$723,966	\$8.38	2.4%
Langley Research Center	28,535	\$37,504,861	\$42,781	\$29,735	\$3,134	\$93,762	\$1,269	\$891	\$173	\$75,813	\$3,072	\$4,488	\$255,119	\$8.94	0.7%
Marshall Space Flight Center	45,800	\$11,355,111	\$68,481	\$69,297	\$5,739	\$28,388	\$1,317	\$1,520	\$105	\$134,464	\$4,931	\$4,159	\$318,401	\$6.95	2.8%
NASA/JSC/White Sands Test Facility	3,276	\$157,001	\$4,888	\$3,395	\$314	\$393	\$140	\$52	\$23	\$8,479	\$353	\$182	\$18,219	\$5.56	11.6%
Stennis Space Center	90,080	\$44,105,994	\$176,272	\$220,994	\$10,641	\$110,265	\$3,188	\$2,625	\$0	\$170,046	\$162,271	\$8,643	\$864,944	\$9.60	2.0%
Wallops Flight Facility	1,635	\$685,738	\$2,451	\$2,511	\$180	\$1,714	\$73	\$160	\$10	\$4,344	\$176	\$546	\$12,165	\$7.44	1.8%
Total^B	2,032,161	\$909,393,894	\$4,397,596	\$4,565,959	\$312,090	\$2,273,485	\$97,699	\$66,417	\$14,826	\$4,697,168	\$2,596,602	\$497,519	\$19,519,360	\$9.61	2.1%

^A Operations include custodial (cleaning, pest control, and trash collection), utilities (energy, water, and sewer), grounds (landscape care, mowing, and snow removal), security, telecommunications, and management.
^B All costs expressed in \$2012.

Total O&M Costs

Estimated total annual Space Science (R&D and Test) Building costs are shown in Table 8. A combination of maintenance and repair (sustainment) and operations, these costs represent an annual average for the next 50 years. Total costs are an estimated \$36.9 million per year, or can also be expressed as \$18.16 per GSFT and 4.1 percent of CRV.

Site	Table 8. Total Annual Costs by Site, Space Science (R&D Test) Buildings							
	O&M Estimates					Per GSFT	Percent CRV	
	GSFT	CRV	50-Year Avg. Sustainment ^A	Annual Operations ^B	Total Costs			
AMES Research Center	126,894	\$71,450,230	\$1,234,345	\$1,231,182	\$2,465,527	\$19.43	3.5%	
Dryden Flight Research Center	4,559	\$197,901	\$34,568	\$29,789	\$64,357	\$14.12	32.5%	
Glenn Research Center	45,923	\$16,928,476	\$321,181	\$327,471	\$648,652	\$14.12	3.8%	
Goddard Space Flight Center	700,852	\$241,907,236	\$6,254,927	\$7,580,237	\$13,835,164	\$19.74	5.7%	
Jet Propulsion Laboratory	898,228	\$455,054,068	\$7,701,225	\$8,157,867	\$15,859,091	\$17.66	3.5%	
Johnson Space Center	86,379	\$30,047,278	\$680,705	\$723,966	\$1,404,671	\$16.26	4.7%	
Langley Research Center	28,535	\$37,504,861	\$173,857	\$255,119	\$428,975	\$15.03	1.1%	
Marshall Space Flight Center	45,800	\$11,355,111	\$280,879	\$318,401	\$599,280	\$13.08	5.3%	
NASA/JSC/White Sands Test Facility	3,276	\$157,001	\$18,899	\$18,219	\$37,118	\$11.33	23.6%	
Stennis Space Center	90,080	\$44,105,994	\$682,351	\$864,944	\$1,547,295	\$17.18	3.5%	
Wallops Flight Facility	1,635	\$685,738	\$9,962	\$12,165	\$22,127	\$13.53	3.2%	
Total^C	2,032,161	\$909,393,894	\$17,392,897	\$19,519,360	\$36,912,257	\$18.16	4.1%	

^A Sustainment is the average annual sum of preventative maintenance, unscheduled maintenance, and major repair and replacement tasks.
^B Operations include custodial (cleaning, pest control, and trash collection), utilities (energy, water, and sewer), grounds (landscape care, mowing, and snow removal), security, telecommunications, and management.
^C All costs expressed in \$2012.

Included in Attachment A and B are detailed MARS reports for the two sample Goddard Space Flight Center Space Science (R&D and Test) Buildings.

**Attachment A: Detailed MARS Reports for GSFC Property ID
1019/51/121**

Building Component List

Whitestone Research

Building: B-Attitude Control Lab Bldg/MTS

Year Built: 1964

Building Type: Space Science Building

Facility: Goddard Space Flight Center

Original Cost: \$1

Building Num: 1019/51/121

City: Washington, D.C.

Replacement Value: \$10,712,733 **per SF:** \$1,281

Building Gsft: 8,360

Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
B1010		Concrete Ramp	1964	160 Sq Ft		
B2010		Aluminum Louver, 1st Floor	1964	2 Each		
B2010		Concrete Block, Exterior, 1st Floor	1964	11704 Sq Ft		
B2020		Aluminum Fixed Window, 24 sf, 1st Floor	1964	12 Each		
B2020		Aluminum Operable Window, 12 sf, 1st Floor	1964	1 Each		
B2030		Sliding, Motor-Operated, Exterior Door	1964	1 Each		
B2030		Wood, Solid Core, Painted, Exterior Door	1964	2 Each		
B3010		Aluminum Gutter, Downspouts, Fittings	1964	0.55 K Ln Ft		
B3010		Single-Ply Modified Bituminous/Thermoplastic Roof	1964	3450 Sq Ft		
B3010		Single-Ply Roof w/ Thermoplastic Olefin (TPO) Membrane	2008	1656 Sq Ft		
C1020		Wood, Solid Core, Painted, Interior Door	1964	1 Each		
C2010		Concrete, Exterior Stairs	1964	30 Sq Ft		
C2010		Metal, Painted, Exterior Railing	1964	72 Ln Ft		
C2010		Wood, Interior Railing	1964	120 Ln Ft		
C2010		Wood, Painted, Interior Stairs	1964	180 Sq Ft		
C3010		Concrete Block, Painted, Interior Wall Finish	1964	4650 Sq Ft		
C3010		Wood, Finished, Interior Paneling	1964	15220 Sq Ft		
C3020		Concrete, Painted Flooring	1964	5500 Sq Ft		
C3020		Wood Decking	1972	3644 Sq Ft		
C3030		Wood, Finished Ceiling	1964	5500 Sq Ft		
D3020		Ball Valve, 2"	1972	3 Each		
D3020		Pipe & Fittings, 1" Steel	1972	0.1 K Ln Ft		
D3020		Pipe Insulation, Fiberglass, Heating Water/Steam	1972	0.1 K Ln Ft		
D3030		Flow Control Valve, Motorized, 2"	1972	4 Each		
D3030		Pipe & Fittings, 2" Steel	1972	0.15 K Ln Ft		
D3030		Pipe Insulation, Fiberglass, Chilled Water	1972	0.15 K Ln Ft		
D3040		Air Handler, Single Zone, 15,000 Cfm	1998	1 Each		
D3040		Duct Insulation, Fiberglass Blanket	1972	1460 Sq Ft		

§ Indicates Component set to have PM Tasks coincide with Replacement Task.

All costs expressed in (\$) 2012.

04-Dec-13

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D3040		Ductwork	1972	1748 Lbs		
D3040		Exhaust Fan, Centrifugal, 16,000 Cfm	1998	1 Each		
D3040		Steel Damper, Motorized	1972	2 Each		
D3050		Secondary Coil, 24" x 36"	1972	2 Each		
D3060		HVAC Control Panel	1998	1 Each		
D3060		Thermostat	1998	2 Each		
D4010		Fire Department Connection, Siamese, 3"	1990	2 Each		
D4010		Fire Sprinkler Head	1990	64 Each		
D4010		Fire Sprinkler System	1990	1 Each		
D4010		Pipe & Fittings, 2" Steel	1990	0.316 K Ln Ft		
D4010		Valves & Components, Sprinkler System, 3"	1990	3 Each		
D5010		Disconnect Switch, 100 Amp.	1964	1 Each		
D5010		Disconnect Switch, 100 Amp.	1985	1 Each		
D5010		Disconnect Switch, 30 Amp.	1964	1 Each		
D5010		Disconnect Switch, 60 Amp.	2005	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	1964	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 225 Amp	2005	1 Each		
D5010		Power Panel Board, 480 V, 200 Amp.	2005	1 Each		
D5010		Secondary Transformer, Dry, 30 kVA	1964	1 Each		
D5020		Compact Fluorescent Lighting Fixture, 32 w	1995	7 Each		
D5020		Emergency Lighting Pack, 2 Light w/ Battery	1995	1 Each		
D5020		Incandescent Lighting Fixture, Basic, 200 w	1964	14 Each		
D5020		Incandescent Lighting Fixture, EP, 200 w	1964	15 Each		
D5020		Receptacle, 120 V, 15 Amp.	1990	25 Each		
D5020		Wiring Device, Switch	1990	8 Each		
D5030		Annunciation Panel	1990	1 Each		
D5030		Fire Alarm Bell, 6"	2000	2 Each		
D5030		Manual Pull Station	2000	2 Each		
D5030		Smoke Detector	1990	5 Each		
D5030		Smoke Detector, Duct	1990	2 Each		
D5090		Lightning Protection System	1964	0.5 K Ln Ft		

§ Indicates Component set to have PM Tasks coincide with Replacement Task.

All costs expressed in (\$) 2012.

04-Dec-13

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Average M&R CostsWhitestone Research

Building Number: 1019/51/121
Facility: Goddard Space Flight Center
City: Washington, D.C.

B-Attitude Control Lab Bldg/MTS
GSFT: 8,360
PRV: \$10,712,733
Built Date: 1964

M&R Average Annual Cost Forecasts

	Current Year	5 Year	20 Year	50 Year
PM & Minor Repair:	\$7,424	\$14,184	\$11,821	\$11,766
Unscheduled Maintenance:	\$4,044	\$11,014	\$7,870	\$7,857
Renewal & Replacement:	\$51,901	\$46,638	\$29,571	\$40,475
Total M&R Costs:	\$63,369	\$71,836	\$49,262	\$60,098
Per GSFT:	\$7.58	\$8.59	\$5.89	\$7.19
As % of PRV:	0.59%	0.67%	0.46%	0.56%

M&R Costs by System per Year Chart

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

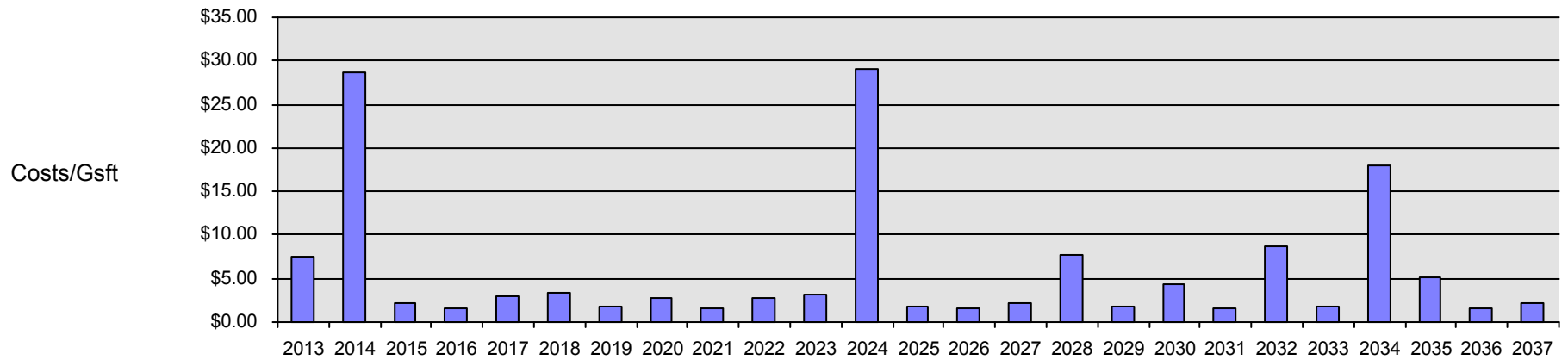
City: Washington, D.C.

Building Num: 1019/51/121

GSFT: 8360

Forecast Year: 2013 4 5 6 7 2018 9 0 1 2 2023 4 5 6 7 2028 9 0 1 2 2033 4 5 6 7

	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
A10 Foundations																									
A20 Basement Construction																									
B10 Super Structure		0.03									0.04										0.03				
B20 Exterior Enclosure	0.06	13.29	0.05	0.05	0.05	0.05	0.09	0.06	0.05	0.05	0.05	9.46	0.05	0.05	0.06	0.05	0.09	0.05	0.05	0.05	0.05	7.50	0.05	0.05	0.05
B30 Roofing	0.26	1.45	0.22	0.22	0.22	0.32	0.30	0.22	0.22	0.22	0.26	4.95	0.22	0.22	0.22	0.32	0.30	0.22	0.22	0.22	0.26	1.45	0.22	0.22	0.22
C10 Interior Construction		0.07		0.00			0.01	0.00				0.07				0.00	0.01			0.00	0.07		0.00		
C20 Stairs		1.56				0.04				0.04		0.61		0.04			0.02	0.04			0.08				
C30 Interior Finishes		9.63			0.57					0.69		7.50			0.57					5.69	7.34				0.57
D10 Conveying																									
D20 Plumbing																									
D30 HVAC	6.44	0.53	0.53	0.53	1.33	2.11	0.53	0.54	0.53	1.05	2.01	0.53	0.53	0.53	0.56	6.60	0.53	0.53	0.53	1.96	0.57	0.53	0.53	0.53	0.56
D40 Fire Protection	0.55	0.57	0.56	0.55	0.55	0.55	0.55	1.16	0.55	0.55	0.55	0.55	0.55	0.57	0.55	0.55	0.55	2.96	0.55	0.55	0.55	0.55	0.55	0.55	0.55
D50 Electrical	0.27	1.58	0.71	0.25	0.27	0.25	0.35	0.83	0.27	0.25	0.27	5.38	0.51	0.25	0.27	0.25	0.35	0.64	0.27	0.25	0.27	0.47	3.77	0.25	0.27
E10 Equipment																									
E20 Furnishings																									
F10 Special Construction																									
F20 Selective Bldg Demolition																									
G10 Site Preparation																									
G20 Site Improvements																									
G30 Site Mechanical Utilities																									
G40 Site Electrical Utilities																									
G90 Other Site Construction																									
Total	7.58	28.71	2.08	1.61	2.99	3.33	1.84	2.82	1.62	2.85	3.14	29.10	1.87	1.66	2.23	7.78	1.86	4.44	1.62	8.73	1.70	18.02	5.13	1.61	2.22



Notes: A value of "0.00" means cost of more than \$.000 but less than \$.005 per gsft. All costs expressed in (\$) 2012 per gsft.

Based on a 50-Year Forecast.

Year 1-25

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

Building Num: 1019/51/121

City: Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7	
Repair Single-Ply Modified Bituminous/Thermoplastic Roof		9,599																								9,599

C10 Interior Construction

Replace Wood, Solid Core, Painted, Interior Door																											
Finish Replaced Wood, Solid Core, Painted, Interior Door																											
Replace Wood, Solid Core, Painted, Interior Door Locks		455									455											455					
Maintain Wood, Solid Core, Painted, Interior Door Locks		35				35					35						35					35					
Refinish Wood, Solid Core, Painted, Interior Door				39				39			39					39					39					39	

C20 Stairs

Finish Repaired Wood, Interior Railing																											4
Finish Replaced Wood, Painted Interior Stairs		235																									
Replace Wood, Painted, Interior Stairs		9,100																									
Finish Repaired Wood, Painted Interior Stairs											7											7					
Repair Wood, Painted, Interior Stairs											154											154					
Refinish Wood, Painted, Interior Stairs						235				235				235							235						235
Finish Replaced Wood, Interior Railing		139																									
Replace Wood, Interior Railing		1,839																									
Refinish Metal, Painted, Exterior Railing		128																									128
Refinish Wood, Interior Railing						139				139				139							139						139
Finish Replaced Metal, Painted, Exterior Railing											109																
Replace Metal, Painted, Exterior Railing											4,844																
Repair Concrete, Exterior Stairs																											126
Repair Metal, Painted, Exterior Railing																											
Replace Concrete, Exterior Stairs		1,630																									
Repair Wood, Interior Railing																											45
Finish Repaired Metal, Painted, Exterior Railing																											

C30 Interior Finishes

Finish Repaired Wood, Finished Ceiling		241									241																241
Replace Wood Decking																											47,598
Refinish Concrete, Painted Flooring		6,683									6,683											6,683					
Repair Concrete, Painted Flooring (2% of Floors)											1,202																
Finish Repaired Concrete, Painted Flooring											133																
Replace Concrete, Painted Flooring																											
Finish Replaced Concrete, Painted Flooring																											
Repair Wood, Finished Ceiling (2% of Ceiling)		1,204									1,204											1,204					
Replace Wood, Finished, Interior Paneling																											
Replace Wood, Finished Ceiling																											

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

Building Num: 1019/51/121

City: Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Repair Single-Ply Modified Bituminous/Thermoplastic Roof																	9,599								

C10 Interior Construction

Replace Wood, Solid Core, Painted, Interior Door							1,949																		
Finish Replaced Wood, Solid Core, Painted, Interior Door							39																		
Replace Wood, Solid Core, Painted, Interior Door Locks																	455								
Maintain Wood, Solid Core, Painted, Interior Door Locks		35										35					35				35				
Refinish Wood, Solid Core, Painted, Interior Door			39								39				39				39				39		

C20 Stairs

Finish Repaired Wood, Interior Railing							4																		4
Finish Replaced Wood, Painted Interior Stairs																									
Replace Wood, Painted, Interior Stairs																									
Finish Repaired Wood, Painted Interior Stairs																	7								7
Repair Wood, Painted, Interior Stairs																	154								154
Refinish Wood, Painted, Interior Stairs		235				235						235					235				235				235
Finish Replaced Wood, Interior Railing																									
Replace Wood, Interior Railing																									
Refinish Metal, Painted, Exterior Railing																	128								
Refinish Wood, Interior Railing		139				139						139					139				139				139
Finish Replaced Metal, Painted, Exterior Railing																	109								
Replace Metal, Painted, Exterior Railing																	4,844								
Repair Concrete, Exterior Stairs																								126	
Repair Metal, Painted, Exterior Railing		170																							
Replace Concrete, Exterior Stairs																									
Repair Wood, Interior Railing																	45							45	
Finish Repaired Metal, Painted, Exterior Railing																	3								

C30 Interior Finishes

Finish Repaired Wood, Finished Ceiling																	241								241
Replace Wood Decking																		47,598							
Refinish Concrete, Painted Flooring																	6,683								6,683
Repair Concrete, Painted Flooring (2% of Floors)																									1,202
Finish Repaired Concrete, Painted Flooring																									133
Replace Concrete, Painted Flooring		60,074																							
Finish Replaced Concrete, Painted Flooring			6,683																						
Repair Wood, Finished Ceiling (2% of Ceiling)																									1,204
Replace Wood, Finished, Interior Paneling																	403,542								
Replace Wood, Finished Ceiling																	60,175								

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

Building Num: 1019/51/121

City: Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7	
Finish Replaced Wood, Finished Ceiling																										
Refinish Wood, Finished Ceiling		12,010										12,010										12,010				
Finish Repaired Concrete Block, Painted, Interior Wall Finish		144																								
Refinish Concrete Block, Painted, Interior Wall Finish		7,163										7,163										7,163				
Refinish Wood Decking					4,784					4,784					4,784										4,784	
Repoint (50% surface) Concrete Block, Painted, Interior Wall Fin		17,477																								
Repair Wood Decking (2% of Decking)										950																
Replace Concrete Block, Painted, Interior Wall Finish																										
Finish Replaced Concrete Block, Painted, Interior Wall Finish																										
Refinish Wood, Finished, Interior Paneling		25,149										25,149										25,149				
Repair Wood, Finished, Interior Paneling (2% of Walls)		8,410										8,410										8,410				
Finish Repaired Wood, Finished, Interior Paneling		505										505										505				
Finished Replaced Wood, Finished, Interior Paneling																										
Repair Concrete Block, Painted, Interior Wall Finish (2% of Wall		1,557																								

D30 HVAC

Replace Pipe & Fittings, 1" Steel (20% of Pipe)																										
Lubricate, Repack Gland, Ball Valve, 2"	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423
Replace Ball Valve, 2"																										
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel										20																
Replace Existing Ductwork (20% of Ductwork)																						5,403				
Replace 10' Section, Pipe & Fittings, 1" Steel									26													26				
Replace Thermostat						1,090										1,090										
Maintain Thermostat	80	80	80	80	80		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Replace HVAC Control Panel	4,927																					4,927				
Minor Repair, HVAC Control Panel						352					352											352				
Inspect & Maintain HVAC Control Panel		97	97	97	97	97	97	97	97	97	97	97	97	97	97		97	97	97	97	97	97	97	97	97	97
Replace Secondary Coil, 24" x 36"											3,587															
Replace Steel Damper, Motorized																								2,326		
Refinish Steel Damper, Motorized											170															
Clean, Lubricate, and Inspect Steel Damper, Motorized					83					83					83										83	
Replace Exhaust Fan, Centrifugal, 16,000 Cfm						12,421																				
Maintain Exhaust Fan, Centrifugal, 16,000 Cfm	290	290	290	290	290		290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Replace Duct Insulation (20% of Insulation)																									2,252	
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel										32																
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam					38										38							38				38
Replace Pipe Insulation, Fiberglass, Heating Water/Steam (20%											174															
Maintain Flow Control Valve & Actuator, 2"	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

Building Num: 1019/51/121

City: Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2	
Finish Replaced Wood, Finished Ceiling	12,010																									
Refinish Wood, Finished Ceiling											12,010											12,010				
Finish Repaired Concrete Block, Painted, Interior Wall Finish																										
Refinish Concrete Block, Painted, Interior Wall Finish											7,163											7,163				
Refinish Wood Decking					4,784					4,784									4,784						4,784	
Repoint (50% surface) Concrete Block, Painted, Interior Wall Fi																										
Repair Wood Decking (2% of Decking)					950																				950	
Replace Concrete Block, Painted, Interior Wall Finish	77,864																									
Finish Replaced Concrete Block, Painted, Interior Wall Finish	7,163																									
Refinish Wood, Finished, Interior Paneling											25,149											25,149				
Repair Wood, Finished, Interior Paneling (2% of Walls)											8,410											8,410				
Finish Repaired Wood, Finished, Interior Paneling											505											505				
Finished Replaced Wood, Finished, Interior Paneling	25,149																									
Repair Concrete Block, Painted, Interior Wall Finish (2% of Wal																										

D30 HVAC

Replace Pipe & Fittings, 1" Steel (20% of Pipe)											523															
Lubricate, Repack Gland, Ball Valve, 2"	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423	423
Replace Ball Valve, 2"																2,498										
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel																										
Replace Existing Ductwork (20% of Ductwork)																										5,403
Replace 10' Section, Pipe & Fittings, 1" Steel										26															26	
Replace Thermostat	1,090										1,090											1,090				
Maintain Thermostat		80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Replace HVAC Control Panel																										4,927
Minor Repair, HVAC Control Panel	352										352															352
Inspect & Maintain HVAC Control Panel	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
Replace Secondary Coil, 24" x 36"											3,587															
Replace Steel Damper, Motorized																										
Refinish Steel Damper, Motorized																										170
Clean, Lubricate, and Inspect Steel Damper, Motorized																										83
Replace Exhaust Fan, Centrifugal, 16,000 Cfm	12,421																									12,421
Maintain Exhaust Fan, Centrifugal, 16,000 Cfm		290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Replace Duct Insulation (20% of Insulation)																										2,252
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel																										
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam																										38
Replace Pipe Insulation, Fiberglass, Heating Water/Steam (20																										174
Maintain Flow Control Valve & Actuator, 2"	592	592		592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592	592

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

Building Num: 1019/51/121

City: Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Replace Valve Actuator, 2"					6,424																				
Repair Exhaust Fan, Centrifugal, 16,000 Cfm																432									
Replace 10' Section, Pipe & Fittings, 2" Steel								52													52				
Replace Air Handler, Single Zone, 20,000 Cfm	46,574															46,574									
Replace Pipe & Fittings, 2" Steel (20% of Pipe)																									
Re-tape Pipe Insulation, Fiberglass, Chilled Water					57										57						57				57
Replace Pipe Insulation, Fiberglass, Chilled Water (20% of Insul										194															
Maintain Air Handler, Single Zone, 15,000 Cfm		1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409		1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409
Repair Air Handler, Single Zone, 15,000 Cfm											3,635														
Replace Flow Control Valve, Motorized, 2"											9,363														

D40 Fire Protection

Maintain Fire Sprinkler System	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566
Replace Valves & Components, Sprinkler System																					15,015				
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel			67																						
Replace 10' Section, Pipe & Fittings, 2" Steel		110												110											
Test Gages & Valves, Fire Sprinkler System	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443
Test Fire Sprinkler Head										3,848											3,848				
Inspect & Maintain Fire Department Connection, Siamese, 3"	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436
Replace Fire Sprinkler Head																									
Replace Fire Department Connection, Siamese, 3"																									
Inspect Fire Sprinkler Head	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77

D50 Electrical

Replace Incandescent Lighting Fixture, Basic, 200 w																2,915									
Maintain Annunciation Panel	64	64	64	64	64	64	64		64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Replace Wiring Device, Switch									481															481	
Repair Wiring Device, Switch																									510
Replace Incandescent Lighting Fixture, EP, 200 w																26,709									
Replace Manual Pull Station			403																					403	
Replace Lamp, Incandescent Lighting Fixture, EP, 200 w		210								210														210	
Replace Lamp, Incandescent Lighting Fixture, Basic, 200 w		249								249														249	
Replace Emergency Lighting Pack, 2 Light w/ Battery			1,536																						1,536
Replace Lens, Replace Emergency Lighting Pack, 2 Light w/ Bat																57									
Replace Receptacle, 120 V, 15 Amp.																									1,797
Replace Annunciation Panel																									1,546
Check & Repair Manual Pull Station																									171
Replace Batteries & Check Operation, Smoke Detector	157	157	157	157	157	157	157		157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

Building Num: 1019/51/121

City: Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Replace Valve Actuator, 2"	6,424																	6,424							
Repair Exhaust Fan, Centrifugal, 16,000 Cfm											432														
Replace 10' Section, Pipe & Fittings, 2" Steel							52														52				
Replace Air Handler, Single Zone, 20,000 Cfm						46,574															46,574				
Replace Pipe & Fittings, 2" Steel (20% of Pipe)										1,054															
Re-tape Pipe Insulation, Fiberglass, Chilled Water					57										57					57					57
Replace Pipe Insulation, Fiberglass, Chilled Water (20% of Ins)										194															
Maintain Air Handler, Single Zone, 15,000 Cfm	1,409	1,409	1,409	1,409	1,409		1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409	1,409
Repair Air Handler, Single Zone, 15,000 Cfm	3,635															3,635									
Replace Flow Control Valve, Motorized, 2"					9,363																9,363				

D40 Fire Protection

Maintain Fire Sprinkler System	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566
Replace Valves & Components, Sprinkler System																15,015									
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel				67																					
Replace 10' Section, Pipe & Fittings, 2" Steel	110														110										110
Test Gages & Valves, Fire Sprinkler System	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443	1,443
Test Fire Sprinkler Head															3,848										3,848
Inspect & Maintain Fire Department Connection, Siamese, 3"	436	436		436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436	436
Replace Fire Sprinkler Head				8,145																					
Replace Fire Department Connection, Siamese, 3"				3,574																					
Inspect Fire Sprinkler Head	77	77		77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77

D50 Electrical

Replace Incandescent Lighting Fixture, Basic, 200 w							2,915																		
Maintain Annunciation Panel	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64	64
Replace Wiring Device, Switch																481									
Repair Wiring Device, Switch										510															510
Replace Incandescent Lighting Fixture, EP, 200 w						26,709																			
Replace Manual Pull Station										403															403
Replace Lamp, Incandescent Lighting Fixture, EP, 200 w		210										210					210								210
Replace Lamp, Incandescent Lighting Fixture, Basic, 200 w		249										249					249								249
Replace Emergency Lighting Pack, 2 Light w/ Battery																									1,536
Replace Lens, Replace Emergency Lighting Pack, 2 Light w/ B										57															
Replace Receptacle, 120 V, 15 Amp.																1,797									
Replace Annunciation Panel																1,546									
Check & Repair Manual Pull Station				171																					171
Replace Batteries & Check Operation, Smoke Detector	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157	157

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

Building Num: 1019/51/121

City: Washington, D.C.

	Forecast Year:																								
	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Replace Batteries & Check Operation, Smoke Detector, Duct	62	62	62	62	62	62	62		62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Repair Smoke Detector																									397
Repair Smoke Detector, Duct																									160
Replace Smoke Detector																									1,176
Replace Smoke Detector, Duct																									1,563
Maintain & Repair General Wiring, Lightning Protection System	74		74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
Maintain Disconnect Switch, 60 Amp.	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Replace Lamp, Replace Emergency Lighting Pack, 2 Light w/ Ba	106				106		106		106		106		106		106		106		106		106		106		106
Replace Fire Alarm Bell, 6"																									590
Maintain Power Panel Board, 208 Y/120 V, 225 Amp.	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Maintain Disconnect Switch, 30 Amp.	39		39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Repair Disconnect Switch, 30 Amp.																									247
Replace Disconnect Switch, 30 Amp.																									581
Replace Lightning Protection General Wiring																									7,611
Repair Disconnect Switch, 60 Amp.																									251
Maintain Disconnect Switch, 100 Amp.	223	112	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223
Repair Disconnect Switch, 100 Amp.																									286
Replace Disconnect Switch, 100 Amp.																									1,971
Maintain Power Panel Board, 208 Y/120 V, 100 Amp.	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Replace Disconnect Switch, 60 Amp.																									
Replace Power Panel Board, 208 Y/120 V, 100 Amp.																									6,125
Replace Compact Fluorescent Lighting Fixture, 32 w																									1,037
Repair Power Panel Board, 208 Y/120 V, 225 Amp.																									189
Replace Power Panel Board, 208 Y/120 V, 225 Amp.																									9,250
Maintain Power Panel Board, 480 V, 200 Amp.	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Repair Power Panel Board, 480 V, 200 Amp.																									189
Replace Power Panel Board, 480 V, 200 Amp.																									11,786
Maintain Secondary Transformer, Dry, 30 kVA	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Repair Secondary Transformer, Dry, 30 kVA																									436
Replace Secondary Transformer, Dry, 30 kVA																									7,104
Replace Ballast & Lamps, Compact Fluorescent Lighting Fixture,																									902
Repair Power Panel Board, 208 Y/120 V, 100 Amp.																									189

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Attitude Control Lab Bldg/MTS

Facility: Goddard Space Flight Center

Building Num: 1019/51/121

City: Washington, D.C.

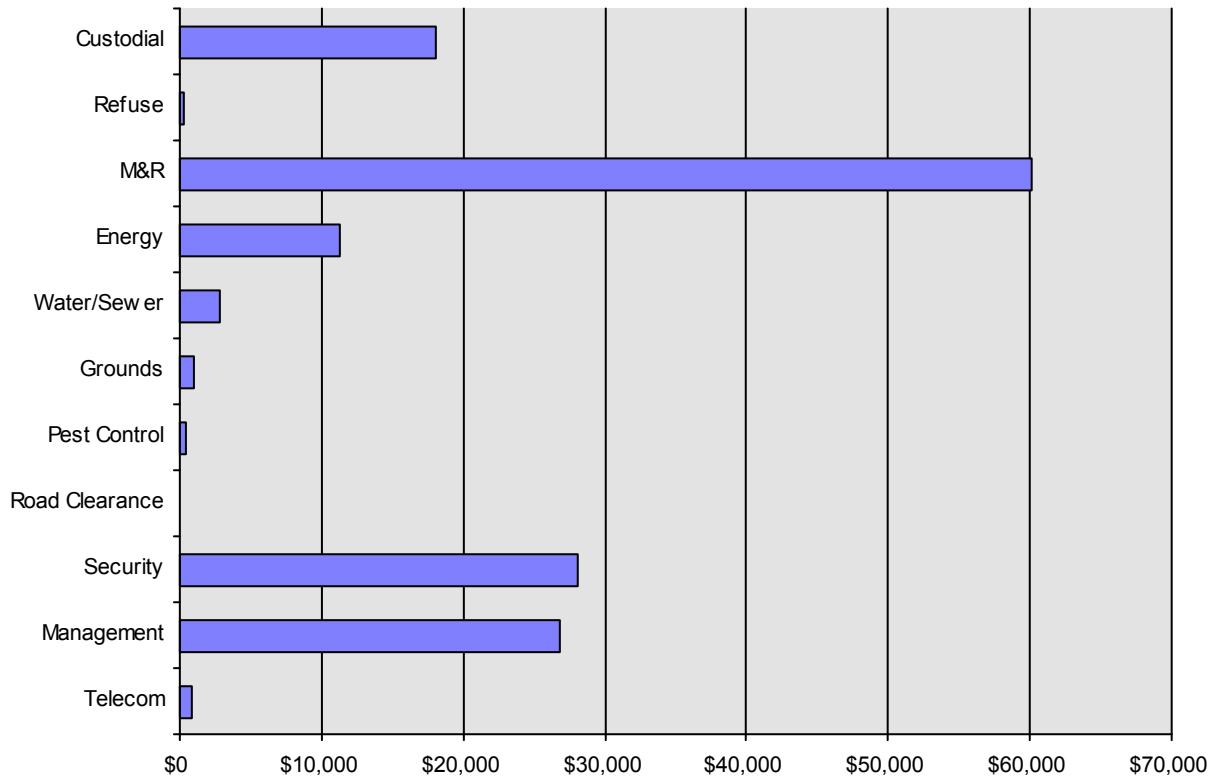
Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Replace Batteries & Check Operation, Smoke Detector, Duct	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Repair Smoke Detector									397																397
Repair Smoke Detector, Duct									160																160
Replace Smoke Detector																									1,176
Replace Smoke Detector, Duct																									1,563
Maintain & Repair General Wiring, Lightning Protection System	74		74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74
Maintain Disconnect Switch, 60 Amp.	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39		39	39	39	39	39	39	39
Replace Lamp, Replace Emergency Lighting Pack, 2 Light w/		106		106		106		106		106		106		106		106				106		106		106	
Replace Fire Alarm Bell, 6"			590																						590
Maintain Power Panel Board, 208 Y/120 V, 225 Amp.	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Maintain Disconnect Switch, 30 Amp.	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39	39
Repair Disconnect Switch, 30 Amp.									247																247
Replace Disconnect Switch, 30 Amp.																									
Replace Lightning Protection General Wiring			7,611																						
Repair Disconnect Switch, 60 Amp.									251																
Maintain Disconnect Switch, 100 Amp.	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223	223
Repair Disconnect Switch, 100 Amp.									286	286									286	286					
Replace Disconnect Switch, 100 Amp.																									
Maintain Power Panel Board, 208 Y/120 V, 100 Amp.	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120		120	120	120	120	120	120	120	120
Replace Disconnect Switch, 60 Amp.																									1,163
Replace Power Panel Board, 208 Y/120 V, 100 Amp.																									6,125
Replace Compact Fluorescent Lighting Fixture, 32 w																									1,037
Repair Power Panel Board, 208 Y/120 V, 225 Amp.									189																189
Replace Power Panel Board, 208 Y/120 V, 225 Amp.																									
Maintain Power Panel Board, 480 V, 200 Amp.	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120
Repair Power Panel Board, 480 V, 200 Amp.									189																189
Replace Power Panel Board, 480 V, 200 Amp.																									
Maintain Secondary Transformer, Dry, 30 kVA	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120	120		120	120	120	120	120	120	120	120
Repair Secondary Transformer, Dry, 30 kVA									436																
Replace Secondary Transformer, Dry, 30 kVA																									7,104
Replace Ballast & Lamps, Compact Fluorescent Lighting Fixtur									902																
Repair Power Panel Board, 208 Y/120 V, 100 Amp.									189																

Operation Costs Summary

Whitestone Research

Building: B-Attitude Control Lab Bldg/MTS **GSFT:** 8,360
Building Number: 1019/51/121 **Replacement Value:** \$10,712,733
Facility: Goddard Space Flight Center **Building Use:** Laboratory
City: Washington, D.C. **Building Type:** Space Science Building
Built Date: 1964

Operation	Annual Cost/GSFT	Annual Total	Percent
Custodial	\$2.153	\$18,001	12.0%
Energy	\$1.358	\$11,350	7.6%
Grounds	\$0.126	\$1,051	0.7%
M&R	\$7.189	\$60,099	40.1%
Management	\$3.204	\$26,782	17.9%
Pest Control	\$0.059	\$490	0.3%
Refuse	\$0.033	\$275	0.2%
Road Clearance	\$0.015	\$129	0.1%
Security	\$3.354	\$28,037	18.7%
Telecom	\$0.108	\$900	0.6%
Water/Sewer	\$0.335	\$2,804	1.9%
Building Total	\$17.93	\$149,919	100.0%



Building Operations Task Details

Whitestone Research

Building: B-Attitude Control Lab Bldg/MTS

Year Built: 1964

Building Type: Space Science Building

Facility: Goddard Space Flight Center

Original Cost: \$1

Building Num: 1019/51/121

City: Washington, D.C.

Replacement Value: \$10,712,733 **per SF:** \$1,281

Building Gsft: 8,360

Functional Area	FA GSFT	Task	Labor Cost	Material Cost	Task Cost
Operation: Custodial		Level of Service: Medium			
Laboratory	6688	Wet Mop & Rinse Hard Floor with 32 oz. Mop Using Single Bucket & Wringer	\$8,655	\$1,406	\$10,061
Laboratory	6688	Empty Trash; Wipe Clean & Re-line Basket	\$1,442	\$234	\$1,677
Laboratory	6688	Clean and Wipe Furniture with Trigger Sprayer & Cloth	\$1,279	\$208	\$1,487
Laboratory	6688	Dust Surfaces with Duster	\$962	\$156	\$1,118
Laboratory	6688	Dust Window Blinds	\$462	\$75	\$537
Office	836	Vacuum Carpet with 14" Upright Vacuum	\$1,262	\$205	\$1,467
Office	836	Empty Trash; Wipe Clean & Re-line Basket	\$180	\$29	\$210
Office	836	Clean and Wipe Furniture with Trigger Sprayer & Cloth	\$160	\$26	\$186
Office	836	Dust Surfaces with Duster	\$120	\$20	\$140
Office	836	Vacuum Upholstered Furniture with Tank or Canister Vacuum	\$62	\$10	\$72
Office	836	Dust Window Blinds	\$58	\$9	\$67
Common/Circulation Are	418	Vacuum Carpet with 14" Upright Vacuum	\$631	\$103	\$734
Common/Circulation Are	418	Vacuum Upholstered Furniture with Tank or Canister Vacuum	\$92	\$15	\$107
Common/Circulation Are	418	Empty Trash; Wipe Clean & Re-line Basket	\$90	\$15	\$105
Mechanical/Equipment R	418	Sweep Hard Floor with 48" Push Broom	\$16	\$3	\$19
Mechanical/Equipment R	418	Empty Trash; Wipe Clean & Re-line Basket	\$14	\$2	\$16
Total:			\$15,485	\$2,516	\$18,001
Operation: Grounds		Level of Service: Low			
Grounds, Improved	5016	Mow Turfgrass with 21" Power Mower	\$190	\$79	\$269
Grounds, Improved	5016	Aerate Improved Grounds	\$142	\$59	\$201
Grounds, Improved	5016	Clear Shrubs	\$119	\$49	\$168
Grounds, Improved	5016	Edge Clean & Trim Walks with Gas Powered Edger	\$79	\$33	\$112
Grounds, Improved	5016	Overseed, Improved Grounds	\$71	\$30	\$101
Grounds, Improved	5016	Vacuum with 30" Billy Goat	\$47	\$20	\$67
Grounds, Improved	5016	Clear Crabgrass	\$36	\$15	\$50
Grounds, Improved	5016	Clear Weeds with 15" Boom, Improved Grounds	\$19	\$8	\$27
Grounds, Improved	5016	Trim Around Raised Objects with String Edger	\$16	\$7	\$23

All costs expressed in (\$) 2012.

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Functional Area	FA GSFT	Task	Labor Cost	Material Cost	Task Cost
Grounds, Improved	5016	Fertilize Improved Grounds	\$14	\$6	\$20
Grounds, Improved	5016	Sweep with 30" Power Rake	\$9	\$4	\$13
Grounds, Improved	5016	Fertilize Using Power Take Off Broadcast	\$0	\$0	\$0
Total:			\$742	\$309	\$1,051
Operation: Pest Control		Level of Service: Low			
Pest Controlled	8360	Install, or Check and Re-Bait 5 Rodent Boxes	\$131	\$55	\$186
Pest Controlled	8360	Inspect Building for Pests	\$164	\$0	\$164
Pest Controlled	8360	Perform Crawling Insect Abatement	\$99	\$41	\$140
Total:			\$394	\$96	\$490
Operation: Road Clearance		Level of Service: Medium			
Pavement NASA	6688	Plow Paved Area	\$99	\$30	\$129
Total:			\$99	\$30	\$129
Operation: Security		Level of Service: High			
Secured Area	8360	Guard Lobby/Parking	\$12,286	\$1,997	\$14,283
Secured Area	8360	Patrol Building Perimeter	\$2,119	\$344	\$2,464
Total:			\$14,406	\$2,341	\$16,746

Building Operations Utility Details

Whitestone Research

Building: B-Attitude Control Lab Bldg/MTS

Year Built: 1964

Building Type: Space Science Building

Facility: Goddard Space Flight Center

Original Cost: \$1

Building Num: 1019/51/121

City: Washington, D.C.

Replacement Value: \$10,712,733 **per SF:** \$1,281

Building Gsft: 8,360

	Utility	GSFT	Demand	UM	Rate	Cost
Operation:	Energy	Level of Service: Low				
	Electricity	8360	13.020	kWh	\$0.0820	\$8,925
	Natural Gas	8360	0.558	Thm	\$0.5200	\$2,425
	Diesel	8360	0.000	Gal	\$3.3400	\$0
	Total:		13.578			\$11,350
Operation:	Refuse	Level of Service: Medium				
	Municipal Solid Waste	8360	0.370	Lbs	\$0.0711	\$220
	Recycling	8360	0.180	Lbs	\$0.0367	\$55
	Total:		0.550			\$275
Operation:	Water/Sewer	Level of Service: Medium				
	Sewer	8360	18.920	Gal	\$0.0092	\$1,455
	Water	8360	24.080	Gal	\$0.0067	\$1,349
	Total:		43.000			\$2,804

Building Operations Management Details

Whitestone Research

Building: B-Attitude Control Lab Bldg/MTS

Year Built: 1964

Building Type: Space Science Building

Facility: Goddard Space Flight Center

Original Cost: \$1

Building Num: 1019/51/121

City: Washington, D.C.

Replacement Value: \$10,712,733 **per SF:** \$1,281

Building Gsft: 8,360

		Service	Demand	UM	PRV	Cost
Operation:	Management	Level of Service: Low				
		Management	0.3%	PRV	\$10,712,733	\$26,782
		Total:				\$26,782

Building Operations Service Details

Whitestone Research

Building: B-Attitude Control Lab Bldg/MTS **Year Built:** 1964 **FTEs:** 1 **Building Type:** Space Science Building
Facility: Goddard Space Flight Center **Original Cost:** \$1 **Building Num:** 1019/51/121
City: Washington, D.C. **Replacement Value:** \$10,712,733 **per SF:** \$1,281 **Building Gsft:** 8,360

		Service*	Quantity	Rate	Cost
Operation:	Security	Level of Service: High			
		Intrusion Detection Systems	1	\$4,986	\$4,986
		System Monitoring	1	\$3,615	\$3,615
		Access Control	1	\$2,690	\$2,690
		Total:			\$11,291
Operation:	Telecom	Level of Service: High			
		Local Telephone	1	\$468	\$468
		Data	1	\$3,588	\$240
		Long Distance Telephone	1	\$192	\$192
		Total:			\$900

**Attachment B: Detailed MARS Reports for GSFC Property ID
1019/51/50**

Building Component List

Whitestone Research

Building: B-Central Flight Control/Range Bldg

Year Built: 1961

Building Type: Space Science Building

Facility: Goddard Space Flight Center

Original Cost: \$1

Building Num: 1019/51/50

City: Washington, D.C.

Replacement Value: \$41,722,280 **per SF:** \$366

Building Gsft: 113,961

Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
B1010		Concrete Decking	1961	1200 Sq Ft	Loading Dock	
B2010		Aluminum Curtain Wall System	1992	3040 Sq Ft		
B2010		Aluminum Curtain Wall System	1980	2550 Sq Ft		
B2010		Aluminum Siding, Exterior, 3rd+ Floor	1961	3810 Sq Ft		
B2010		Clay Brick, Exterior, 1st Floor	1961	12995 Sq Ft		
B2010		Clay Brick, Exterior, 2nd Floor	1961	4980 Sq Ft		
B2010		Clay Brick, Exterior, 3rd+ Floor	1961	1150 Sq Ft		
B2010		Concrete Cast-in-place, Painted, Exterior, 1st Floor	1961	1500 Sq Ft		
B2010		Concrete Cast-in-place, Painted, Exterior, 2nd Floor	1961	1000 Sq Ft		
B2030		Aluminum Frame, Fully Glazed, Exterior Door	1961	5 Each		
B2030		Steel, Painted, Exterior Door	1961	1 Each		
B2030		Steel, Painted, Exterior Double Door	1961	3 Each		
B3010		Built-up Roof	1995	18320 Sq Ft		
B3010		Built-up Roof w/ Cool Reflective Coating	1995	15322 Sq Ft		
B3010		Metal Awning	1995	1250 Sq Ft		
B3010		Metal Roof	1995	1700 Sq Ft		
C1010		Toilet Partitions, Painted Metal, Overhead Braced	1995	16 Each		
C1010		Toilet Partitions, Painted Metal, Overhead Braced	2000	16 Each		
C1020		Aluminum, Fully Glazed, Interior Door	1961	7 Each		
C1020		Steel, Painted, Interior Door	1961	79 Each		
C1020		Steel, Painted, Interior Door	2011	10 Each		
C1020		Steel, Painted, Interior Double Door	1961	27 Each		
C1020		Steel, Painted, Interior Double Door w/ Safety Glass	1961	10 Each		
C1020		Steel, Painted, w/ Safety Glass, Interior Door	1961	3 Each		
C1020		Wood, Solid Core w/ Safety Glass, Painted, Interior Door	2000	34 Each		
C1020		Wood, Solid Core w/ Safety Glass, Painted, Interior Door	1961	21 Each		
C1020		Wood, Solid Core w/ Safety Glass, Painted, Interior Door	2010	12 Each		
C1020		Wood, Solid Core, Painted, Interior Door	1961	67 Each		

§ Indicates Component set to have PM Tasks coincide with Replacement Task.

All costs expressed in (\$) 2012.

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
C1020		Wood, Solid Core, Painted, Interior Door	2000	6 Each		
C2010		Concrete, Exterior Stairs	1961	75 Sq Ft		
C2010		Concrete, Interior Stairs	1961	1150 Sq Ft		
C2010		Metal, Painted, Exterior Railing	1961	65 Ln Ft		
C2010		Wood, Interior Railing	1961	480 Ln Ft		
C3010		Ceramic Tile, 4"x4", Interior Wall Finish	1990	855 Sq Ft		
C3010		Ceramic Tile, 4"x4", Interior Wall Finish	1961	250 Sq Ft		
C3010		Ceramic Tile, 4"x4", Interior Wall Finish	1995	1620 Sq Ft		
C3010		Clay Brick, Painted, Interior Wall Finish	1961	10380 Sq Ft		
C3010		Concrete Block, Painted, Interior Wall Finish	1961	15000 Sq Ft		
C3010		Concrete, Painted, Interior Wall Finish	1961	5500 Sq Ft		
C3010		Fabric, Interior Wall Finish	1985	2410 Sq Ft		
C3010		Fabric, Interior Wall Finish	1990	915 Sq Ft		
C3010		Fabric, Interior Wall Finish	1995	6075 Sq Ft		
C3010		Fabric, Interior Wall Finish	2011	1680 Sq Ft		
C3010		Gypsum Board, Interior Wall Finish	1961	250 Sq Ft		
C3010		Gypsum Board, Interior Wall Finish	1975	5650 Sq Ft		
C3010		Gypsum Board, Interior Wall Finish	1985	17550 Sq Ft		
C3010		Gypsum Board, Interior Wall Finish	1990	22450 Sq Ft		
C3010		Gypsum Board, Interior Wall Finish	1995	6405 Sq Ft		
C3010		Gypsum Board, Interior Wall Finish	2000	8065 Sq Ft		
C3010		Gypsum Board, Interior Wall Finish	2011	2500 Sq Ft		
C3010		Gypsum Board, Interior Wall Finish	1992	4545 Sq Ft		
C3010		Plaster, Interior Wall Finish	2012	90 Sq Ft		
C3010		Plaster, Interior Wall Finish	2000	220 Sq Ft		
C3010		Plate Glass Interior Wall	1961	110 Sq Ft		
C3010		Wallpaper, Interior Wall Finish	1999	2500 Sq Ft		
C3010		Wood, Finished, Interior Paneling	1995	580 Sq Ft		
C3010		Wood, Finished, Interior Paneling	2005	1240 Sq Ft		
C3020		Access Flooring w/ Carpet, Raised	2002	3774 Sq Ft		
C3020		Access Flooring w/ Carpet, Raised	2007	3800 Sq Ft		
C3020		Access Flooring w/ Carpet, Raised	2011	2500 Sq Ft		
C3020		Access Flooring w/ Laminate, Raised	2011	3739 Sq Ft		
C3020		Access Flooring w/ Laminate, Raised	1985	9741 Sq Ft		
C3020		Access Flooring w/ Laminate, Raised	1995	4224 Sq Ft		
C3020		Access Flooring w/ Laminate, Raised	1992	16551 Sq Ft		

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All costs expressed in (\$) 2012.

Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
C3020		Carpet, Nylon 20 oz., Low Traffic	2002	10471 Sq Ft		
C3020		Carpet, Nylon 20 oz., Low Traffic	2007	6561 Sq Ft		
C3020		Carpet, Nylon 20 oz., Low Traffic	2011	1325 Sq Ft		
C3020		Ceramic Tile Flooring	1961	1200 Sq Ft		
C3020		Concrete Flooring	1961	1845 Sq Ft		
C3020		Concrete, Painted Flooring	1961	7500 Sq Ft		
C3020		Rubber Tile Flooring	2002	475 Sq Ft		
C3020		Terrazzo Flooring	1961	3600 Sq Ft		
C3020		Vinyl Tile Flooring	1961	12675 Sq Ft		
C3020		Vinyl Tile Flooring	2002	1950 Sq Ft		
C3020		Vinyl Tile Flooring	1980	10475 Sq Ft		
C3020		Vinyl Tile Flooring	1992	11555 Sq Ft		
C3030		Acoustical Tile, Dropped Ceiling	1975	16364 Sq Ft		
C3030		Acoustical Tile, Dropped Ceiling	1985	21005 Sq Ft		
C3030		Acoustical Tile, Dropped Ceiling	1990	16555 Sq Ft		
C3030		Acoustical Tile, Dropped Ceiling	1995	18500 Sq Ft		
C3030		Acoustical Tile, Dropped Ceiling	2002	6343 Sq Ft		
C3030		Acoustical Tile, Dropped Ceiling	2012	2430 Sq Ft		
C3030		Concrete, Painted Ceiling	1961	4615 Sq Ft		
C3030		Metal, Painted Ceiling	1961	6500 Sq Ft		
C3030		Metal, Painted Ceiling	1985	6500 Sq Ft		
D1010		Elevator, Hydraulic, 2,500 lbs, 3-5 Floor, 200 fpm	1995	1 Each		
D1010		Wheel Chair Lift	1995	1 Each		
D2010		Drinking Fountain, Refrigerated	1990	2 Each		
D2010		Drinking Fountain, Refrigerated	2000	13 Each		
D2010		Emergency Eye Wash	2000	1 Each		
D2010		Lavatory, Vitreous China	1995	10 Each		
D2010		Lavatory, Vitreous China	2000	18 Each		
D2010		Service Sink, Floor	2000	1 Each		
D2010		Service Sink, Floor	2000	1 Each		
D2010		Sink, Plastic	1990	1 Each		
D2010		Sink, Stainless Steel	1990	1 Each		
D2010		Sink, Stainless Steel	1995	1 Each		
D2010		Sink, Stainless Steel	2000	4 Each		
D2010		Tankless Water Closet	1995	12 Each		
D2010		Tankless Water Closet	2000	16 Each		

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All costs expressed in (\$) 2012.

04-Dec-13

Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D2010		Urinal, Vitreous China	1995	4 Each		
D2010		Urinal, Vitreous China	2000	13 Each		
D2020		Circulator Pump, 1/2 HP, Cold Water	1995	3 Each		
D2020		Circulator Pump, 1/2 HP, Hot Water	2008	1 Each		
D2020		Pipe & Fittings, 1" Steel	1990	0.7 K Ln Ft		
D2020		Pipe & Fittings, 2" Copper, Cold Water	1990	0.7 K Ln Ft		
D2020		Pipe & Fittings, 3/4" Copper, Cold Water	1990	1.1 K Ln Ft		
D2020		Pipe & Fittings, 3/4" Copper, Cold Water	1961	0.2 K Ln Ft		
D2020		Pipe & Fittings, 3/4" Copper, Hot Water	1990	0.9 K Ln Ft		
D2020		Pipe & Fittings, 3/4" Copper, Hot Water	1961	0.2 K Ln Ft		
D2020		Pipe & Fittings, 4" Copper, Cold Water	1992	0.8 K Ln Ft		
D2020		Pipe Insulation, Fiberglass, Cold Water	1992	0.8 K Ln Ft		
D2020		Pipe Insulation, Fiberglass, Hot Water	1992	1 K Ln Ft		
D2020		Water Heater, Gas/Oil, 30 Gph	2008	1 Each		
D2030		Backflow Preventer, 2"	2000	1 Each		
D2030		Backflow Preventer, 3/4"	2000	3 Each		
D2030		Floor Drain	1961	9 Each		
D2030		Pipe & Fittings, 10" Cast Iron	1961	0.4 K Ln Ft		
D2030		Pipe & Fittings, 2" PVC	1992	0.7 K Ln Ft		
D2030		Pipe & Fittings, 3" Cast Iron	1985	0.9 K Ln Ft		
D2030		Pipe & Fittings, 4" Cast Iron	2011	0.1 K Ln Ft		
D2030		Pipe & Fittings, 4" PVC	1995	0.2 K Ln Ft		
D2030		Pipe & Fittings, 6" Cast Iron	1970	0.5 K Ln Ft		
D2030		Pipe & Fittings, 6" Cast Iron	1961	0.2 K Ln Ft		
D2030		Pipe & Fittings, 6" Cast Iron	1992	0.2 K Ln Ft		
D2030		Sewage Ejector Pump, 1 HP	1995	1 Each		
D2040		Roof Drain, 4-6"	1961	22 Each		
D2040		Sump Pump, 1 HP	1995	6 Each		
D2040		Sump Pump, 3 HP	1990	2 Each		
D2090		Air Compressor, 10 HP	1990	1 Each		
D2090		Air Compressor, 2 HP	2007	1 Each		
D3010		Leak Detection, Panel & Float Assembly	1995	1 Each		
D3020		Ball Valve, 6"	1996	8 Each		
D3020		Condensate Receiver Station, 10-15 Gal.	2000	2 Each		
D3020		Expansion Tank, 10 Gal.	1990	2 Each		
D3020		Expansion Tank, 100 Gal.	1961	2 Each		

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D3020		Flash Tank, 24 Gal.	1995	1 Each		
D3020	HWC-001	Heat Exchanger, Steam-to-Water, 25 Gpm	1997	1 Each		
D3020		Pipe & Fittings, 1" Steel	1992	1.1 K Ln Ft		
D3020		Pipe & Fittings, 1" Steel	1974	0.4 K Ln Ft		
D3020		Pipe & Fittings, 1" Steel	2011	0.05 K Ln Ft		
D3020		Pipe & Fittings, 2" Steel	2011	0.3 K Ln Ft		
D3020		Pipe & Fittings, 2" Steel	1974	0.25 K Ln Ft		
D3020		Pipe & Fittings, 2" Steel	1992	1.2 K Ln Ft		
D3020		Pipe & Fittings, 3" Steel	1990	0.4 K Ln Ft		
D3020		Pipe & Fittings, 3/4" Copper	2001	0.2 K Ln Ft		
D3020		Pipe & Fittings, 3/4" Copper	1992	1.4 K Ln Ft		
D3020		Pipe & Fittings, 4" Steel	1992	0.4 K Ln Ft		
D3020		Pipe & Fittings, 6" Steel	1992	0.4 K Ln Ft		
D3020		Pipe & Fittings, 6" Steel	1974	0.2 K Ln Ft		
D3020		Pipe Insulation, Fiberglass, Heating Water/Steam	1974	0.9 K Ln Ft		
D3020		Pipe Insulation, Fiberglass, Heating Water/Steam	2011	0.8 K Ln Ft		
D3020		Pipe Insulation, Fiberglass, Heating Water/Steam	1992	2.2 K Ln Ft		
D3030		Ball Valve, 4"	1990	4 Each		
D3030		Butterfly Valve, 4"	1990	4 Each		
D3030		Circulation Pump, 2 HP, Chiller & Condenser Water	1990	1 Each		
D3030		Circulation Pump, 2 HP, Chiller & Condenser Water	1990	2 Each		
D3030		Circulation Pump, 2 HP, Chiller & Condenser Water	2007	1 Each		
D3030	CHP-020	Circulation Pump, 2 HP, Chiller & Condenser Water	1992	1 Each		
D3030		Circulation Pump, 5 HP, Chiller & Condenser Water	1990	1 Each		
D3030	CHP-019A, B	Circulation Pump, 7 1/2 HP, Chiller & Condenser Water	1995	2 Each		
D3030		Circulation Pump, 7 1/2 HP, Chiller & Condenser Water	1990	1 Each		
D3030		Circulator Pump, 1/6 HP, Chilled Water	2000	2 Each		Cond.
D3030		Condenser, Air Cooled, 2 Ton	2012	1 Each		
D3030		Condenser, Air Cooled, 5 Ton	1995	5 Each		
D3030		Flow Control Valve, Motorized, 6"	1990	6 Each		
D3030		Pipe & Fittings, 1" Copper	1992	1 K Ln Ft		
D3030		Pipe & Fittings, 1" Copper	2010	0.25 K Ln Ft		
D3030		Pipe & Fittings, 1" Steel	2010	0.25 K Ln Ft		
D3030		Pipe & Fittings, 1" Steel	1992	1.4 K Ln Ft		
D3030		Pipe & Fittings, 2" Steel	2007	6 K Ln Ft		
D3030		Pipe & Fittings, 2" Steel	1974	0.4 K Ln Ft		

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D3030		Pipe & Fittings, 2" Steel	1992	1.4 K Ln Ft		
D3030		Pipe & Fittings, 3" Steel	1992	0.25 K Ln Ft		
D3030		Pipe & Fittings, 4" Steel	2010	0.1 K Ln Ft		
D3030		Pipe Insulation, Fiberglass, Chilled Water	1992	4.2 K Ln Ft		
D3030		Pipe Insulation, Fiberglass, Chilled Water	1961	0.3 K Ln Ft		
D3030		Pipe Insulation, Fiberglass, Chilled Water	1974	0.3 K Ln Ft		
D3030		Pipe Insulation, Fiberglass, Chilled Water	2010	0.8 K Ln Ft		
D3040		Air Curtain, 1,000 Cfm	1995	1 Each		
D3040	ACS-003	Air Handler, Multizone, 10,000 Cfm	1961	1 Each		
D3040	ACS-002,004	Air Handler, Multizone, 15,000 Cfm	1961	2 Each		
D3040	ACS-005	Air Handler, Multizone, 20,000 Cfm	1961	1 Each		
D3040	ACS-20, 19	Air Handler, Multizone, 20,000 Cfm	1992	2 Each		
D3040	ACS-001	Air Handler, Multizone, 50,000 Cfm	1961	1 Each		
D3040	ACS-23	Air Handler, Multizone, 8,000 Cfm	1995	1 Each		
D3040	AHU-042	Air Handler, Single Zone, 1,300 Cfm	1992	1 Each		
D3040	ACS-22	Air Handler, Single Zone, 10,000 Cfm	2007	1 Each		
D3040	ACS-21, 24	Air Handler, Single Zone, 10,000 Cfm	2000	2 Each		
D3040	AHU-014	Air Handler, Single Zone, 2,500 Cfm	1992	1 Each		
D3040	ACS-008	Air Handler, Single Zone, 20,000 Cfm	1961	1 Each		
D3040		Duct Insulation, Fiberglass Blanket	2010	2000 Sq Ft		
D3040		Duct Insulation, Fiberglass Blanket	1974	6000 Sq Ft		
D3040		Duct Insulation, Fiberglass Blanket	1992	26500 Sq Ft		
D3040		Ductwork	2011	3400 Lbs		
D3040		Ductwork	1992	66000 Lbs		
D3040		Ductwork	1974	14000 Lbs		
D3040		Exhaust Fan, Ceiling, 200-500 Cfm	1995	4 Each		
D3040		Exhaust Fan, Ceiling, 200-500 Cfm	2000	1 Each		
D3040	RAF-001, 002	Exhaust Fan, Centrifugal, 10,000 Cfm	1961	2 Each		
D3040	EXH-11, 12, 13	Exhaust Fan, Centrifugal, 2,000 Cfm	1961	3 Each		
D3040	RAF-003, 004	Exhaust Fan, Centrifugal, 2,000 Cfm	1961	2 Each		
D3040	EXH-022, 025, 026	Exhaust Fan, Centrifugal, 2,000 Cfm	1995	3 Each		
D3040	EF-2	Exhaust Fan, Centrifugal, 2,000 Cfm	1961	1 Each		
D3040	EXH-006	Exhaust Fan, Centrifugal, 2,000 Cfm	1995	1 Each		
D3040	RAF-005, 023	Exhaust Fan, Centrifugal, 5,000 Cfm	1995	2 Each		
D3040		Exhaust Fan, Roof Mounted, 2,000 Cfm	1990	2 Each		
D3040		Exhaust Fan, Roof Mounted, 2,000 Cfm	2000	2 Each		

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D3040		Variable Air Volume Box, 800 Cfm	2000	4 Each		
D3050	ACS-25,26,27,28	Air Conditioner, Computer Room, Air Cooled, 10 Ton	1995	4 Each		
D3050	ACS-29	Air Conditioner, Computer Room, Air Cooled, 3 Ton	2000	1 Each		
D3050	AHU-47,48,49	Air Conditioner, Computer Room, Air-Cooled, 2 Ton	2009	3 Each		
D3050	ACU-45, 021, 037, 41, 4	Air Conditioner, Computer Room, Chilled Water, 10 Ton	1995	5 Each		
D3050	ACS-36, 44	Air Conditioner, Computer Room, Chilled Water, 15 Ton	1994	2 Each		
D3050	ACS-45	Air Conditioner, Computer Room, Chilled Water, 5 Ton	2008	1 Each		
D3050	AHU-50	Air Conditioner, DX Packaged, Air Cooled, 2 Ton	2012	1 Each		
D3050	WCC-001	Air Conditioner, DX Packaged, Air Cooled, 5 Ton	2009	1 Each		
D3050		Fan Coil Unit, 1 Ton	2000	65 Each	Offices	
D3050		Fan Coil Unit, 1 Ton	1992	4 Each	Stairs	
D3050	AHU-030, 031	Fan Coil Unit, 1 Ton	2000	2 Each		
D3050		Fan Coil Unit, 2 Ton	2000	3 Each		
D3050	ACS-39	Fan Coil Unit, 2 Ton	2000	1 Each		
D3050	ACS-107, 207, 307	Fan Coil Unit, 2 Ton	1997	3 Each		
D3050		Unit Heater, 480v, 5kW	2000	1 Each		
D3060		Direct Digital Controls, System Points	1999	370 Each		
D3060		HVAC Control Panel	1961	2 Each		
D3060		HVAC Control Panel	1961	4 Each		
D3060		Thermostat	1961	25 Each		
D3060		Thermostat	2000	30 Each		
D3070		Air Sample Smoke Detection System	2000	5 Each		
D4010		Fire Alarm Control Panel	2000	1 Each		
D4010		Fire Department Connection, Siamese, 3"	2000	3 Each		
D4010		Fire Department Connection, Siamese, 3"	2000	5 Each		
D4010		Fire Sprinkler Head	1980	227 Each		
D4010		Fire Sprinkler Head	1992	260 Each		
D4010		Fire Sprinkler Head	2000	164 Each		
D4010		Fire Sprinkler System	2000	1 Each		
D4010		Gate Valve, 4"	1995	5 Each		
D4010		Gate Valve, 4"	2000	2 Each		
D4010		Pipe & Fittings, 1" Steel	1980	0.35 K Ln Ft		
D4010		Pipe & Fittings, 1" Steel	1980	0.55 K Ln Ft		
D4010		Pipe & Fittings, 2" Steel	1980	0.265 K Ln Ft		
D4010		Pipe & Fittings, 2" Steel	1992	0.5 K Ln Ft		
D4010		Pipe & Fittings, 4" Steel	1980	0.175 K Ln Ft		

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D4010		Pipe & Fittings, 4" Steel	1992	0.25 K Ln Ft		
D4010		Valves & Components, Sprinkler System, 3"	2000	1 Each		
D5010		Bus Duct & Fittings, AL, 800-4,000 Amp.	1961	150 Ln Ft		
D5010		Bus Duct & Fittings, AL, 800-4,000 Amp.	1992	250 Ln Ft		
D5010		Bus Switch, 60 Amp.	1961	5 Each		
D5010		Bus Switch, 60 Amp.	1992	10 Each		
D5010		Circuit Breaker, 600 V, 30-60 Amp., 3Ph.	1997	1 Each		
D5010		Circuit Breaker, 600 V, 70-100 Amp., 3 Ph.	1997	2 Each		
D5010		Disconnect Switch, 100 Amp.	2005	2 Each		
D5010		Disconnect Switch, 100 Amp.	1995	1 Each		
D5010		Disconnect Switch, 100 Amp.	1985	2 Each		
D5010		Disconnect Switch, 30 Amp.	1995	3 Each		
D5010		Disconnect Switch, 30 Amp.	2000	4 Each		
D5010		Disconnect Switch, 30 Amp.	1961	1 Each		
D5010		Disconnect Switch, 30 Amp.	2012	1 Each		
D5010		Disconnect Switch, 30 Amp.	2008	4 Each		
D5010		Disconnect Switch, 30 Amp.	1990	6 Each		
D5010		Disconnect Switch, 30 Amp.	2010	1 Each		
D5010		Disconnect Switch, 60 Amp.	2005	1 Each		
D5010		Disconnect Switch, 60 Amp.	1990	1 Each		
D5010		Disconnect Switch, 60 Amp.	2000	1 Each		
D5010		Load Bank, Indoor	1997	5 Each		
D5010		Main Switchgear, 480 V, 2,000 Amp.	2005	2 Each		
D5010		Motor Control Center w/ Main Breaker, 480 V, 600 Amp.	1997	1 Each		7 SECTIONS
D5010		Motor Control Center w/ Main Breaker, 480 V, 600 Amp.	1997	1 Each		1 SECTION
D5010		Motor Control Center w/ Main Breaker, 480 V, 600 Amp.	1997	1 Each		6 SECTIONS
D5010		Motor Control Center w/ Main Breaker, 480 V, 600 Amp.	2005	2 Each		
D5010		Motor Starter, 5-20 HP, <600 V	2005	1 Each		
D5010		Motor Starter, 5-20 HP, <600 V	1995	3 Each		
D5010		Motor Starter, 5-20 HP, <600 V	1961	1 Each		
D5010		Motor Starter, 5-20 HP, <600 V	1997	1 Each		
D5010		Motor Starter, 5-20 HP, <600 V	1975	3 Each		
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	1996	2 Each		150A
D5010	PPB-DC	Power Panel Board, 208 Y/120 V, 100 Amp.	1961	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	2003	3 Each		
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	1990	8 Each		

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	1996	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	1975	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	1961	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	2000	1 Each		125A
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	2006	1 Each		125A
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	1999	2 Each		125A
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	2004	3 Each		125A
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	2007	2 Each		125A
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	1997	9 Each		125A
D5010		Power Panel Board, 208 Y/120 V, 100 Amp.	2008	13 Each		125A
D5010		Power Panel Board, 208 Y/120 V, 200 Amp.	1995	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 200 Amp.	1961	1 Each		175A
D5010		Power Panel Board, 208 Y/120 V, 225 Amp	2000	13 Each		
D5010		Power Panel Board, 208 Y/120 V, 225 Amp	1999	6 Each		
D5010		Power Panel Board, 208 Y/120 V, 225 Amp	1988	3 Each		
D5010		Power Panel Board, 208 Y/120 V, 225 Amp	1991	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 225 Amp	1997	14 Each		
D5010		Power Panel Board, 208 Y/120 V, 400 Amp.	2009	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 400 Amp.	1989	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 400 Amp.	2012	2 Each		
D5010		Power Panel Board, 208 Y/120 V, 400 Amp.	1961	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 400 Amp.	1997	2 Each		
D5010		Power Panel Board, 208 Y/120 V, 400 Amp.	2005	1 Each		
D5010		Power Panel Board, 208 Y/120 V, 400 Amp.	2010	1 Each		
D5010		Power Panel Board, 480 V, 200 Amp.	1961	1 Each		225A
D5010		Power Panel Board, 480 V, 200 Amp.	1990	1 Each		225A
D5010		Primary Transformer, Dry, 1,000 kVA	2005	2 Each		
D5010		Primary Transformer, Dry, 1,000 kVA	1997	2 Each		
D5010		Secondary Transformer, Dry, 300 kVA	1997	1 Each		
D5010		Secondary Transformer, Dry, 50 kVA	1990	1 Each		
D5010		Secondary Transformer, Dry, 500 kVA	1997	1 Each		
D5010		Switchboard, 1600 Amp.	2005	2 Each		
D5010		Switchboard, 1600 Amp.	1997	1 Each		
D5010		Switchboard, 1600 Amp.	2009	1 Each		
D5010		Switchgear, Indoor, 600 V	1997	1 Each		
D5010	ATS-1, 2, 5, 6, 9	Transfer Switch, Auto, 600 V, 400 Amp.	1997	5 Each		

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D5020		Compact Fluorescent Lighting Fixture, 32 w	1990	20 Each		
D5020		Compact Fluorescent Lighting Fixture, 32 w	2000	51 Each		
D5020		Emergency Lighting Pack, 2 Light w/ Battery	1961	2 Each		
D5020		Emergency Lighting Pack, 2 Light w/ Battery	1985	2 Each		
D5020		Emergency Lighting Pack, 2 Light w/ Battery	2000	22 Each		
D5020		Emergency Lighting Pack, 2 Light w/ Battery	2011	3 Each		
D5020		Exit Lighting Fixture, w/ Battery	1995	26 Each		
D5020		Exit Lighting Fixture, w/ Battery	2002	8 Each		
D5020		Exit Lighting Fixture, w/ Battery	1961	4 Each		
D5020		Exit Lighting Fixture, w/ Battery	1990	2 Each		
D5020		Exit Lighting Fixture, w/ Battery	2000	16 Each		
D5020		Exit Lighting Fixture, w/ Battery	2011	1 Each		
D5020		Exit Lighting Fixture, w/ Battery	2012	1 Each		
D5020		Fluorescent Lighting Fixture, T8, 2-32w	1961	27 Each		
D5020		Fluorescent Lighting Fixture, T8, 2-32w	2010	40 Each		
D5020		Fluorescent Lighting Fixture, T8, 2-32w	1980	68 Each		
D5020		Fluorescent Lighting Fixture, T8, 2-32w	2000	195 Each		
D5020		Fluorescent Lighting Fixture, T8, 2-32w	1995	244 Each		
D5020		Fluorescent Lighting Fixture, T8, 2-32w	2005	14 Each		
D5020		Fluorescent Lighting Fixture, T8, 4-32 w	2011	30 Each		
D5020		Fluorescent Lighting Fixture, T8, 4-32 w	2012	12 Each		
D5020		Fluorescent Lighting Fixture, T8, 4-32 w	1990	153 Each		
D5020		Fluorescent Lighting Fixture, T8, 4-32 w	2010	76 Each		
D5020		Fluorescent Lighting Fixture, T8, 4-32 w	1985	83 Each		
D5020		Fluorescent Lighting Fixture, T8, 4-32 w	1995	228 Each		
D5020		Fluorescent Lighting Fixture, T8, 4-32 w	2000	384 Each		
D5020		High Pressure Sodium Lighting Fixture, 250 w	1990	2 Each		
D5020		Incandescent Lighting Fixture, Basic, 100 w	1995	36 Each		AUDITORIUM SEATS
D5020		Incandescent Lighting Fixture, Basic, 100 w	2000	3 Each		
D5020		Incandescent Lighting Fixture, Basic, 100 w	1961	16 Each		
D5020		Incandescent Lighting Fixture, Basic, 100 w	1995	15 Each		
D5020		Incandescent Lighting Fixture, Basic, 100 w	2011	8 Each		
D5020		Receptacle, 120 V, 15 Amp.	1961	400 Each		
D5020		Receptacle, 120 V, 15 Amp.	1974	600 Each		
D5020		Receptacle, 120 V, 15 Amp.	1992	800 Each		
D5020		Receptacle, 120 V, 15 Amp.	2002	200 Each		

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Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D5020		Receptacle, 120 V, 15 Amp.	2011	150 Each		
D5020		Wiring Device, Switch	1961	110 Each		
D5020		Wiring Device, Switch	1974	100 Each		
D5020		Wiring Device, Switch	1994	250 Each		
D5020		Wiring Device, Switch	2000	150 Each		
D5030		Alarm Siren	1961	4 Each		
D5030		Annunciation Panel	2000	1 Each		
D5030		Camera, Interior, Closed Circuit, Fixed Color	2000	8 Each		
D5030		Card Reader	2011	3 Each		
D5030		Card Reader	2005	46 Each		
D5030		Fire Alarm Bell, 6"	2000	2 Each		
D5030		Fire Alarm Horn & Strobe	2012	2 Each		
D5030		Fire Alarm Horn & Strobe	2011	7 Each		
D5030		Fire Alarm Horn & Strobe	1995	3 Each		
D5030		Fire Alarm Horn & Strobe	2000	115 Each		
D5030		Heat Detector	1995	6 Each		
D5030		Keypad	2000	9 Each		
D5030		Manual Pull Station	1985	2 Each		
D5030		Manual Pull Station	2000	21 Each		
D5030		Motion Detector	2012	1 Each		
D5030		Motion Detector	2011	4 Each		
D5030		Motion Detector	1980	5 Each		
D5030		Motion Detector	2000	2 Each		
D5030		Motion Detector	1995	20 Each		
D5030		Public Address Speaker	2011	12 Each		
D5030		Public Address Speaker	1990	15 Each		
D5030		Public Address Speaker	1995	42 Each		
D5030		Security System Panel	2000	2 Each		
D5030		Security System Panel	1995	1 Each		
D5030		Smoke Detector	1995	19 Each		
D5030		Smoke Detector	2000	14 Each		
D5030		Smoke Detector, Duct	1995	9 Each		
D5090		Inverter	1998	1 Each		
D5090		Inverter Battery	1998	24 Each		
D5090		Power Supply/Conditioner	2000	2 Each		
D5090		Power Supply/Conditioner	2012	2 Each		

§ Indicates Component set to have PM Tasks coincide with Replacement Task.

All costs expressed in (\$) 2012.

04-Dec-13

Uniformat	Asset Description	Component	Date	Quantity	Location	Notes
D5090		Uninterruptible Power Supply, 30 kVA	2011	1 Each		
D5090		Uninterruptible Power Supply, 450 kVA	2010	2 Each		
D5090		Uninterruptible Power Supply, 750 KVA	2011	2 Each		
E1020		Sink, Epoxy Resin, Laboratory	2011	1 Each		

Average M&R Costs

Whitestone Research

Building Number: 1019/51/50
Facility: Goddard Space Flight Center
City: Washington, D.C.

B-Central Flight Control/Range Bldg
GSFT: 113,961
PRV: \$41,722,280
Built Date: 1961

M&R Average Annual Cost Forecasts

	Current Year	5 Year	20 Year	50 Year
PM & Minor Repair:	\$177,159	\$169,153	\$179,970	\$178,916
Unscheduled Maintenance:	\$117,509	\$113,883	\$122,688	\$121,170
Renewal & Replacement:	\$17,197	\$581,748	\$673,990	\$764,910
Total M&R Costs:	\$311,865	\$864,784	\$976,648	\$1,064,996
Per GSFT:	\$2.74	\$7.59	\$8.57	\$9.35
As % of PRV:	0.75%	2.07%	2.34%	2.55%

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Clean & Reseal Clay Brick, Exterior, 2nd Floor									17,615										17,615						
Repair Clay Brick, Exterior, 2nd Floor (2% of Walls)																									
Repair Concrete, Cast-in-place, Painted, Exterior, 1st Floor (2%																								736	
Finish Replaced Concrete, Cast-in-place, Painted, Exterior, 1st F																									
Replace Concrete, Cast-in-place, Painted, Exterior, 1st Floor																									
Repoint (50% surface) Clay Brick, Exterior, 2nd Floor																									
Refinish Concrete, Cast-in-place, Painted, Exterior, 1st Floor									3,122										3,122						
Replace Clay Brick, Exterior, 3rd+ Floor																								68,856	
Repoint (50% surface) Clay Brick, Exterior, 3rd+ Floor																									
Repair Clay Brick, Exterior, 3rd+ Floor (2% of Walls)																									
Clean & Reseal Clay Brick, Exterior, 3rd+ Floor									5,270										5,270						
Replace Clay Brick, Exterior, 2nd Floor																								271,975	

B30 Roofing

Non-Destructive Moisture Inspection, Built-up Roof w/ Cool Refle			1,528						1,528					1,528										1,528	
Replace Metal Roof																								27,152	
Repair Metal Roof			617						617					617					617						
Maintain Metal Roof	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301
Replace Metal Awning														22,726											
Repair Metal Awning			3,937																						
Refinish Metal Awning			3,446																					3,446	
Minor Replacement, Metal Roof (2% of Roof)			543																						
Maintain Built-up Roof w/ Cool Reflective Coating	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996
Replace Membrane, Built-up Roof														291,135											
Place New Membrane Over Existing, Built-up Roof																									
Non-Destructive Moisture Inspection, Built-up Roof			1,826						1,826										1,826					1,826	
Maintain Built-up Roof	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192		1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192
Replace Membrane, Built-up Roof w/ Cool Reflective Coating																			300,302						
Place New Membrane Over Existing, Built-up Roof w/ Cool Refle														172,394											

C10 Interior Construction

Refinish Steel, Painted, w/ Safety Glass Interior Door	125				125				125					125					125					125	
Refinish Wood, Solid Core, Painted, Interior Door	2,768			248	2,768			248	2,768			248	2,768			248	2,768			248	2,768		248	2,768	
Finish Replaced Steel, Painted, w/ Safety Glass Interior Door																								125	
Replace Steel, Painted, w/ Safety Glass Interior Door																								5,452	
Maintain Wood, Solid Core, Painted, Interior Door Locks		222	2,479					222	2,479					222	2,479				222	2,479			222	2,479	
Maintain Steel, Painted, w/ Safety Glass Interior Door Locks				111					111					111					111						
Maintain Wood, Solid Core w/ Safety Glass, Painted, Interior Doo			1,701	777				1,701	777					1,701	777				1,701	777			1,701	777	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Clean & Reseal Clay Brick, Exterior, 2nd Floor									17,615										17,615						
Repair Clay Brick, Exterior, 2nd Floor (2% of Walls)																									5,440
Repair Concrete, Cast-in-place, Painted, Exterior, 1st Floor (2% Finish Replaced Concrete, Cast-in-place, Painted, Exterior, 1st Floor																									3,122
Replace Concrete, Cast-in-place, Painted, Exterior, 1st Floor																									32,423
Repoint (50% surface) Clay Brick, Exterior, 2nd Floor																									27,775
Refinish Concrete, Cast-in-place, Painted, Exterior, 1st Floor						3,122										3,122									
Replace Clay Brick, Exterior, 3rd+ Floor																									
Repoint (50% surface) Clay Brick, Exterior, 3rd+ Floor																									6,981
Repair Clay Brick, Exterior, 3rd+ Floor (2% of Walls)																									1,377
Clean & Reseal Clay Brick, Exterior, 3rd+ Floor																									5,270
Replace Clay Brick, Exterior, 2nd Floor																									5,270

B30 Roofing

Non-Destructive Moisture Inspection, Built-up Roof w/ Cool Ref						1,528													1,528							1,528
Replace Metal Roof																										
Repair Metal Roof						617													617							617
Maintain Metal Roof	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301	301
Replace Metal Awning																										22,726
Repair Metal Awning																										3,937
Refinish Metal Awning																										3,446
Minor Replacement, Metal Roof (2% of Roof)																										543
Maintain Built-up Roof w/ Cool Reflective Coating	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996	996
Replace Membrane, Built-up Roof																										291,135
Place New Membrane Over Existing, Built-up Roof						138,056																				
Non-Destructive Moisture Inspection, Built-up Roof						1,826													1,826							1,826
Maintain Built-up Roof	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192	1,192
Replace Membrane, Built-up Roof w/ Cool Reflective Coating																										
Place New Membrane Over Existing, Built-up Roof w/ Cool Refl																										172,394

C10 Interior Construction

Refinish Steel, Painted, w/ Safety Glass Interior Door						125													125							125
Refinish Wood, Solid Core, Painted, Interior Door							248	2,768											248	2,768						248 2,768
Finish Replaced Steel, Painted, w/ Safety Glass Interior Door																										
Replace Steel, Painted, w/ Safety Glass Interior Door																										
Maintain Wood, Solid Core, Painted, Interior Door Locks									222	2,479									222	2,479						222 2,479
Maintain Steel, Painted, w/ Safety Glass Interior Door Locks						111													111							111
Maintain Wood, Solid Core w/ Safety Glass, Painted, Interior D									444										1,701	777						1,701 777

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Finish Replaced Steel, Painted, Interior Double Doors																									2,184
Replace Steel, Painted, w/ Safety Glass Interior Door Locks									1,432										1,432						
Replace Wood, Solid Core, Painted, Interior Door Locks								2,862	31,969									2,862	31,969						
Replace Wood, Solid Core, Painted, Interior Door																									
Refinish Wood, Solid Core w/ Safety Glass, Painted, Interior Doo	868	496		1,404	868	496		1,404	868	496		1,404	868	496		1,404	868	496		1,404	868	496		1,404	868
Replace Wood, Solid Core w/ Safety Glass, Painted, Interior Doo								21,949	10,020									21,949	10,020						
Replace Wood, Solid Core w/ Safety Glass, Painted, Interior Doo																									
Finish Replaced Wood, Solid Core w/ Safety Glass, Painted, Inte																									
Refinish Steel, Painted, Interior Double Door	2,184				2,184				2,184				2,184				2,184				2,184				
Finish Replaced Steel, Painted, Interior Double Door w/ Safety G																									1,541
Finish Replaced Wood, Solid Core, Painted, Interior Door																									
Maintain Steel, Painted, Interior Door Locks				3,292					3,292				3,292					3,292							369
Refinish Toilet Partitions, Painted Metal, Overhead Braced				661		661				661	661				661	661			661	661					661
Replace Toilet Partitions, Painted Metal, Overhead Braced			19,772					19,772																	19,772
Maintain Aluminum, Fully Glazed, Interior Door Locks				258					258				258						258						258
Replace Aluminum, Fully Glazed, Interior Door Locks									3,339										3,339						
Refinish Steel, Painted, Interior Door	3,263	413		3,263	413			3,263	413		3,263	413		3,263	413		3,263	413		3,263	413			3,263	413
Replace Steel, Painted, Interior Door Locks									42,464										42,464						
Replace Steel, Painted, Interior Door																									102,972
Replace Steel, Painted, Interior Double Door Locks									12,882										12,882						
Replace Steel, Painted, Interior Double Door																									76,245
Replace Aluminum, Fully Glazed, Interior Door																									
Replace Steel, Painted, Interior Double Door w/ Safety Glass Loc									4,771										4,771						
Finish Replaced Steel, Painted, Interior Door																									3,263
Maintain Steel, Painted, Interior Double Door w/ Safety Glass Lo				594					594				594					594							594
Maintain Steel, Painted, Interior Double Door Locks				999					999				999					999							999
Refinish Steel, Painted, Interior Double Door w/ Safety Glass	1,541			1,541				1,541			1,541			1,541			1,541			1,541				1,541	
Replace Steel, Painted, Interior Double Door w/ Safety Glass																									39,976

C20 Stairs

Finish Replaced Metal, Painted, Exterior Railing									103																
Repair Metal, Painted, Exterior Railing																									161
Replace Wood, Interior Railing																									
Finish Repaired Wood, Interior Railing									18																18
Repair Wood, Interior Railing									190																190
Refinish Wood, Interior Railing	584			584				584			584			584			584			584				584	584
Finish Replaced Wood, Interior Railing																									
Finish Repaired Metal, Painted, Exterior Railing																									3

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Finish Replaced Steel, Painted, Interior Double Doors																									
Replace Steel, Painted, w/ Safety Glass Interior Door Locks									1,432										1,432						
Replace Wood, Solid Core, Painted, Interior Door Locks													2,862	31,969									2,862	31,969	
Replace Wood, Solid Core, Painted, Interior Door			12,253	136,827																					
Refinish Wood, Solid Core w/ Safety Glass, Painted, Interior Do	496				496		1,404	868	496		1,404	868			1,404	868	496		1,404	868	496		1,404	868	496
Replace Wood, Solid Core w/ Safety Glass, Painted, Interior Do			5,726										16,223	10,020									21,949	10,020	
Replace Wood, Solid Core w/ Safety Glass, Painted, Interior Do			69,435	42,885									24,507												
Finish Replaced Wood, Solid Core w/ Safety Glass, Painted, Int			1,404	868									496												
Refinish Steel, Painted, Interior Double Door			2,184			2,184					2,184				2,184				2,184				2,184		
Finish Replaced Steel, Painted, Interior Double Door w/ Safety																									
Finish Replaced Wood, Solid Core, Painted, Interior Door			248	2,768																					
Maintain Steel, Painted, Interior Door Locks				3,292					3,292					3,292					3,292					3,292	
Refinish Toilet Partitions, Painted Metal, Overhead Braced		661				661	661			661	661			661	661				661			661			
Replace Toilet Partitions, Painted Metal, Overhead Braced			19,772															19,772					19,772		
Maintain Aluminum, Fully Glazed, Interior Door Locks				258					258					258					258						
Replace Aluminum, Fully Glazed, Interior Door Locks				3,339										3,339											
Refinish Steel, Painted, Interior Door		413	3,263			413	3,263			413	3,263			413	3,263			413	3,263			413	3,263		
Replace Steel, Painted, Interior Door Locks				4,771					37,693					4,771					37,693				4,771		
Replace Steel, Painted, Interior Door																									
Replace Steel, Painted, Interior Double Door Locks									12,882										12,882						
Replace Steel, Painted, Interior Double Door																									
Replace Aluminum, Fully Glazed, Interior Door																								21,326	
Replace Steel, Painted, Interior Double Door w/ Safety Glass L									4,771										4,771						
Finish Replaced Steel, Painted, Interior Door																									
Maintain Steel, Painted, Interior Double Door w/ Safety Glass L				594					594					594					594					594	
Maintain Steel, Painted, Interior Double Door Locks				999					999					999					999					999	
Refinish Steel, Painted, Interior Double Door w/ Safety Glass			1,541			1,541				1,541				1,541				1,541				1,541			
Replace Steel, Painted, Interior Double Door w/ Safety Glass																									

C20 Stairs

Finish Replaced Metal, Painted, Exterior Railing																										103
Repair Metal, Painted, Exterior Railing																										
Replace Wood, Interior Railing																										7,712
Finish Repaired Wood, Interior Railing																										18
Repair Wood, Interior Railing																										190
Refinish Wood, Interior Railing				584					584					584				584				584				
Finish Replaced Wood, Interior Railing																										584
Finish Repaired Metal, Painted, Exterior Railing																										

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7		
Refinish Metal, Painted, Exterior Railing																										120	
Replace Concrete, Interior Stairs																											58,128
Repair Concrete, Interior Stairs									4,410																		
Replace Concrete, Exterior Stairs																											
Repair Concrete, Exterior Stairs										328																	328
Replace Metal, Painted, Exterior Railing									4,584																		
C30 Interior Finishes																											
Repair Carpet, Nylon 20 oz., Low Traffic (2% of Carpet)				240	1,192				240	1,903				3,095				240	1,192					240	1,903		
Repair Rubber Tile Flooring (2% of Floors)																	106										
Finish Replaced Concrete, Painted Flooring																											9,552
Replace Concrete, Painted Flooring																											85,872
Finish Repaired Concrete, Painted Flooring									192																		
Repair Concrete, Painted Flooring (2% of Floors)										1,718																	
Refinish Concrete, Painted Flooring										9,552									9,552								
Replace Concrete Flooring																											21,125
Repair Concrete Flooring (2% of Floors)										423																	
Replace Ceramic Tile Flooring																											
Replace Carpet, Nylon 20 oz., Low Traffic					95,152					59,622				12,040					95,152								59,622
Replace Rubber Tile Flooring									5,343																		
Repair Access Flooring w/ Laminate, Raised (2% of Floors)			7,089											2,721				7,089	12,044							3,073	
Replace Carpet on Access Flooring, Raised					39,356				25,892	39,085				39,356				25,892								39,085	
Replace Access Flooring w/ Laminate, Raised					602,338			153,724																		354,502	136,073
Repair Ceramic Tile Flooring (2% of Floors)										774																	774
Finish Repaired Concrete, Painted Ceiling																											
Finish Repaired Wood, Finished, Interior Paneling			62											62													62
Repair Access Flooring w/ Carpet, Raised (2% of Floors)					2,747					2,765				1,819													
Finish Replaced Metal, Painted Ceiling																											13,882
Finish Repaired Metal, Painted Ceiling																											277
Repair Metal, Painted Ceiling (2% of Ceiling)																											5,556
Refinish Metal, Painted Ceiling			13,882						13,882					13,882					13,882								13,882
Replace Metal, Painted Ceiling																											279,572
Replace Concrete, Painted Ceiling																											181,280
Repair Terrazzo Flooring (2% of Floors)										1,955																	
Repair Concrete, Painted Ceiling (2% of Ceiling)																											
Refinish Concrete, Painted Ceiling										10,023									10,023								
Replace Acoustical Tile, Dropped Ceiling								94,810						74,723					83,503								28,631
Repair Acoustic Tile, Dropped Ceiling (2% of Ceiling)	1,669			1,493				2,047	219	1,669								3,941	219							1,493	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2	
Refinish Metal, Painted, Exterior Railing				120																					120	
Replace Concrete, Interior Stairs																										
Repair Concrete, Interior Stairs																		4,410								
Replace Concrete, Exterior Stairs																									4,273	
Repair Concrete, Exterior Stairs														328												
Replace Metal, Painted, Exterior Railing														4,584												
C30 Interior Finishes																										
Repair Carpet, Nylon 20 oz., Low Traffic (2% of Carpet)					3,095			240	1,192				240	1,903					3,095				240	1,192		
Repair Rubber Tile Flooring (2% of Floors)									106																	
Finish Replaced Concrete, Painted Flooring																										
Replace Concrete, Painted Flooring																										
Finish Repaired Concrete, Painted Flooring														192												
Repair Concrete, Painted Flooring (2% of Floors)														1,718												
Refinish Concrete, Painted Flooring								9,552										9,552								
Replace Concrete Flooring														423												
Repair Concrete Flooring (2% of Floors)														423												
Replace Ceramic Tile Flooring																									24,612	
Replace Carpet, Nylon 20 oz., Low Traffic				12,040					95,152					59,622			12,040								95,152	
Replace Rubber Tile Flooring	5,343																5,343									
Repair Access Flooring w/ Laminate, Raised (2% of Floors)												7,089	2,721						12,044				3,073			
Replace Carpet on Access Flooring, Raised				39,356				25,892	39,085					39,356			25,892								39,085	
Replace Access Flooring w/ Laminate, Raised				602,338			153,724																354,502	136,073		
Repair Ceramic Tile Flooring (2% of Floors)														774												
Finish Repaired Concrete, Painted Ceiling																									201	
Finish Repaired Wood, Finished, Interior Paneling							62										62									
Repair Access Flooring w/ Carpet, Raised (2% of Floors)				2,747					2,765					1,819												
Finish Replaced Metal, Painted Ceiling																									13,882	
Finish Repaired Metal, Painted Ceiling																									277	
Repair Metal, Painted Ceiling (2% of Ceiling)																									5,556	
Refinish Metal, Painted Ceiling							13,882	13,882									13,882	13,882								
Replace Metal, Painted Ceiling																									279,572	
Replace Concrete, Painted Ceiling																										
Repair Terrazzo Flooring (2% of Floors)														1,955												
Repair Concrete, Painted Ceiling (2% of Ceiling)																									3,583	
Refinish Concrete, Painted Ceiling								10,023										10,023								
Replace Acoustical Tile, Dropped Ceiling								73,861	10,968									94,810							74,723	
Repair Acoustic Tile, Dropped Ceiling (2% of Ceiling)	3,370	1,888				1,493		572	1,894	1,669						1,493	1,476	572	219	1,669						

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50

City: Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7	
Replace Vinyl Tile Flooring		58,578	48,410					9,012								53,401						58,578	48,410			
Repair Vinyl Tile Flooring (2% of Floors)						818					898	742					138								818	
Replace Terrazzo Flooring																									53,347	
Finish Replaced Concrete, Painted Ceiling																									10,023	
Refinish Concrete Block, Painted, Interior Wall Finish									24,221											24,221						
Finish Repaired Concrete, Painted, Interior Wall Finish																										
Repair Concrete, Painted, Interior Wall Finish (2% of Walls)																										
Refinish Concrete, Painted, Interior Wall Finish									8,881											8,881						
Finish Replaced Concrete Block, Painted, Interior Wall Finish																									24,221	
Replace Concrete Block, Painted, Interior Wall Finish																									263,297	
Finish Repaired Concrete Block, Painted, Interior Wall Finish																										
Replace Concrete, Painted, Interior Wall Finish																									193,476	
Repair Concrete Block, Painted, Interior Wall Finish (2% of Wall																										
Finish Replaced Clay Brick, Painted, Interior Wall Finish																									16,761	
Replace Clay Brick, Interior Wall Finish																									299,437	
Repoint (50% of surface) Clay Brick, Interior Wall Finish																										
Repair Clay Brick, Interior Wall Finish (2% of Walls)																										
Refinish Clay Brick, Painted, Interior Wall Finish									16,761											16,761						
Replace Ceramic Tile, 4"x4", Interior Wall Finish																									4,828	
Replace Access Flooring w/ Carpet, Raised																137,347					138,293				90,983	
Repair Wood, Finished, Interior Paneling (2% of Walls)		1,055											1,055												1,055	
Repoint (50% surface) Concrete Block, Painted, Interior Wall Fin																										
Repair Plaster, Interior Wall Finish (2% of Walls)								84													35					
Replace Wallpaper, Interior Wall Finish								6,458																		
Finish Repaired Clay Brick, Painted, Interior Wall Finish																										
Repair Wallpaper, Interior Wall Finish (2% of Walls)			140													140									140	
Replace Plate Glass Interior Wall																										
Repair Ceramic Tile, 4"x4", Interior Wall Finish (2% of Walls)			626					330	97				626							330	97				626	
Repair Plate Glass Interior Wall																									292	
Finish Replaced Concrete, Painted, Interior Wall Finish																									8,881	
Finish Repaired Plaster, Interior Wall Finish								8													3					
Refinish Plaster, Interior Wall Finish								347		141										347		141				
Finish Replaced Gypsum Board, Interior Wall Finish																									395	
Replace Gypsum Board, Interior Wall Finish																									948	
Finish Repaired Gypsum Board, Interior Wall Finish			380					254	8				553							708	79	143			380	
Repair Gypsum Board, Interior Wall Finish (2% of Walls)			914					611	18				1,330							1,702	190	345			914	
Refinish Gypsum Board, Interior Wall Finish			46,734					48,170	4,341	7,174			46,734							48,170	4,341	7,174			46,734	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50

City: Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Replace Vinyl Tile Flooring	9,012								53,401					58,578	48,410				9,012						
Repair Vinyl Tile Flooring (2% of Floors)				898	742					138								818				898	742		
Replace Terrazzo Flooring																									
Finish Replaced Concrete, Painted Ceiling																									
Refinish Concrete Block, Painted, Interior Wall Finish									24,221									24,221							
Finish Repaired Concrete, Painted, Interior Wall Finish																								178	
Repair Concrete, Painted, Interior Wall Finish (2% of Walls)																								3,818	
Refinish Concrete, Painted, Interior Wall Finish									8,881									8,881							
Finish Replaced Concrete Block, Painted, Interior Wall Finish																									
Replace Concrete Block, Painted, Interior Wall Finish																									
Finish Repaired Concrete Block, Painted, Interior Wall Finish																								485	
Replace Concrete, Painted, Interior Wall Finish																									
Repair Concrete Block, Painted, Interior Wall Finish (2% of Wal																								5,265	
Finish Replaced Clay Brick, Painted, Interior Wall Finish																									
Replace Clay Brick, Interior Wall Finish																									
Repoint (50% of surface) Clay Brick, Interior Wall Finish																								70,858	
Repair Clay Brick, Interior Wall Finish (2% of Walls)																								5,989	
Refinish Clay Brick, Painted, Interior Wall Finish									16,761									16,761							
Replace Ceramic Tile, 4"x4", Interior Wall Finish																									
Replace Access Flooring w/ Carpet, Raised															137,347			138,293						90,983	
Repair Wood, Finished, Interior Paneling (2% of Walls)								1,055										1,055							
Repoint (50% surface) Concrete Block, Painted, Interior Wall Fi																								59,096	
Repair Plaster, Interior Wall Finish (2% of Walls)			84												35								84		
Replace Wallpaper, Interior Wall Finish		6,458																				6,458			
Finish Repaired Clay Brick, Painted, Interior Wall Finish																								336	
Repair Wallpaper, Interior Wall Finish (2% of Walls)										140								140							
Replace Plate Glass Interior Wall																								18,073	
Repair Ceramic Tile, 4"x4", Interior Wall Finish (2% of Walls)			330					626	97				330				626	97				330			
Repair Plate Glass Interior Wall																									
Finish Replaced Concrete, Painted, Interior Wall Finish																									
Finish Repaired Plaster, Interior Wall Finish			8												3								8		
Refinish Plaster, Interior Wall Finish			347		141										347	141						347		141	
Finish Replaced Gypsum Board, Interior Wall Finish															8,919								27,704		
Replace Gypsum Board, Interior Wall Finish															21,440								66,597		
Finish Repaired Gypsum Board, Interior Wall Finish			254					553					708	79	143		202	8				254			
Repair Gypsum Board, Interior Wall Finish (2% of Walls)			611					1,330					1,702	190	345		485	18				611			
Refinish Gypsum Board, Interior Wall Finish			48,170	3,946	7,174			46,734	395				48,170	3,946	7,174		37,815	395				57,090	3,946	7,174	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7	
Replace Fabric, Interior Wall Finish			5,673					2,154					14,299													
Repair Fabric, Interior Wall Finish (2% of Walls)			310						87				123				47	87						433		
Refinish Wood, Finished, Interior Paneling			3,152										3,152											3,152		

D10 Conveying

Maintain Wheel Chair Lift	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134
Renovate Wheel Chair Lift																									19,540
Maintain Elevator, Hydraulic, 2,500 lbs, 3-5 Floor, 200 fpm	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499
Renovate Elevator, Hydraulic, 2,500 lbs, 3-5 Floor, 200 fpm																									180,424

D20 Plumbing

Check & Adjust, Air Compressor, 10 HP	140	140		140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Install New Gasket & Bolts, Pipe & Fittings, 6" Cast Iron					71			178																	
Replace 10' Section, Pipe & Fittings, 6" Cast Iron				263		658			263						263		658				263				
Install New Gasket & Bolts, Pipe & Fittings, 4" Cast Iron																									35
Replace 10' Section, Pipe & Fittings, 4" Cast Iron										106															106
Replace Pipe & Fittings, 3" Cast Iron (20% of Pipe)																									223
Install New Gasket & Bolts, Pipe & Fittings, 3" Cast Iron																									546
Replace 10' Section, Pipe & Fittings, 3" Cast Iron																									546
Replace Floor Drain																									
Maintain Floor Drain	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442
Re-tape Pipe Insulation, Fiberglass, Hot Water										400					400						400				400
Maintain Backflow Preventer, 2"	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225
Replace Backflow Preventer, 3/4"										3,853											3,853				
Replace Pipe & Fittings, 6" Cast Iron (20% of Pipe)																									5,264
Maintain Backflow Preventer, 3/4"	295	295	295	295	295	295	295		295	295	295	295	295	295	295	295	295		295	295	295	295	295	295	295
Replace Water Heater, Gas/Oil, 30 Gph							3,195									3,195									
Overhaul Water Heater, Gas/Oil, 30 Gph	280										280													280	
Clean Water Heater, Gas/Oil, 30 Gph	336	336	336	336	336		336	336	336	336	336	336	336	336	336		336	336	336	336	336	336	336	336	336
Replace Pipe Insulation, Fiberglass, Hot Water (20% of Insulation)																									1,357
Replace Pipe Insulation, Fiberglass, Cold Water (20% of Insulation)																									1,087
Replace Backflow Preventer, 2"																									2,754
Inspect & Lubricate Sump Pump, 1 HP	284	284		284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284
Replace Air Compressor, 10 HP			15,920																						
Repair Air Compressor, 10 HP			1,771				1,771				1,771				1,771						1,771				1,771
Resolder Joint, Pipe & Fittings, 3/4" Copper, Hot Water									147				664											147	664
Replace Air Compressor, 2 HP																									10,819
Re-tape Pipe Insulation, Fiberglass, Cold Water										319					319										319

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50

City: Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Replace Fabric, Interior Wall Finish				3,954				5,673					2,154					14,299							
Repair Fabric, Interior Wall Finish (2% of Walls)		47						310						87				123				47		87	
Refinish Wood, Finished, Interior Paneling								3,152										3,152							

D10 Conveying

Maintain Wheel Chair Lift	2,134	2,134	2,134	2,134	2,134	2,134	2,134		2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134	2,134
Renovate Wheel Chair Lift								19,540																	
Maintain Elevator, Hydraulic, 2,500 lbs, 3-5 Floor, 200 fpm	12,499	12,499	12,499	12,499	12,499	12,499	12,499		12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499	12,499
Renovate Elevator, Hydraulic, 2,500 lbs, 3-5 Floor, 200 fpm								180,424																	

D20 Plumbing

Check & Adjust, Air Compressor, 10 HP	140	140		140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Install New Gasket & Bolts, Pipe & Fittings, 6" Cast Iron					71																			71	
Replace 10' Section, Pipe & Fittings, 6" Cast Iron			263		658						263				263					658			263		
Install New Gasket & Bolts, Pipe & Fittings, 4" Cast Iron																									35
Replace 10' Section, Pipe & Fittings, 4" Cast Iron										106													106		
Replace Pipe & Fittings, 3" Cast Iron (20% of Pipe)																									10,908
Install New Gasket & Bolts, Pipe & Fittings, 3" Cast Iron																									
Replace 10' Section, Pipe & Fittings, 3" Cast Iron								546																	546
Replace Floor Drain				4,175																					
Maintain Floor Drain	442	442	442		442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442	442
Re-tape Pipe Insulation, Fiberglass, Hot Water										400					400						400				400
Maintain Backflow Preventer, 2"	225	225		225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225
Replace Backflow Preventer, 3/4"			3,853												3,853									3,853	
Replace Pipe & Fittings, 6" Cast Iron (20% of Pipe)								13,162																	
Maintain Backflow Preventer, 3/4"	295	295		295	295	295	295	295	295	295	295	295	295	295	295	295	295	295	295	295	295	295	295	295	295
Replace Water Heater, Gas/Oil, 30 Gph	3,195									3,195											3,195				
Overhaul Water Heater, Gas/Oil, 30 Gph						280										280									
Clean Water Heater, Gas/Oil, 30 Gph		336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336	336
Replace Pipe Insulation, Fiberglass, Hot Water (20% of Insulati					1,357																				
Replace Pipe Insulation, Fiberglass, Cold Water (20% of Insula					1,087																				
Replace Backflow Preventer, 2"			2,754												2,754									2,754	
Inspect & Lubricate Sump Pump, 1 HP	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284	284
Replace Air Compressor, 10 HP			15,920																						
Repair Air Compressor, 10 HP		1,771				1,771					1,771					1,771					1,771			1,771	
Resolder Joint, Pipe & Fittings, 3/4" Copper, Hot Water								147							664						147			664	
Replace Air Compressor, 2 HP																									10,819
Re-tape Pipe Insulation, Fiberglass, Cold Water									319						319										319

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg

Facility: Goddard Space Flight Center

Building Num: 1019/51/50

City: Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7	
Check & Adjust, Air Compressor, 2 HP	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	
Replace Pump & Motor Assembly, Sump Pump, 3 HP																										4,495
Overhaul Sump Pump, 3 HP			190					190						190											190	
Inspect & Lubricate Sump Pump, 3 HP	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94		94	94	94	94	94	94	94	94
Repair Air Compressor, 2 HP			1,356				1,356				1,356				1,356				1,356						1,356	
Overhaul Sump Pump, 1 HP								572						572					572							
Replace 10' Section, Pipe & Fittings, 10" Cast Iron									936												936					
Replace Roof Drain, 4-6"																										
Maintain Roof Drain, 4-6"	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104
Replace Sewage Ejector Pump, 1 HP			3,580																						3,580	
Inspect & Lubricate Sewage Ejector Pump, 1 HP	50	50		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Replace Pipe & Fittings, 4" DWV PVC (20% of Pipe)														2,531												
Replace 10' Section, Pipe & Fittings, 4" DWV PVC			132																						132	
Replace Pipe & Fittings, 2" DWV PVC (20% of Pipe)										7,367																
Replace 10' Section, Pipe & Fittings, 2" DWV PVC																					368					
Replace Pipe & Fittings, 10" Cast Iron (20% of Pipe)																									18,713	
Install New Gasket & Bolts, Pipe & Fittings, 10" Cast Iron																										
Replace Pump & Motor Assembly, Sump Pump, 1 HP			7,308																						7,308	
Replace Faucet Washer & Clean Trap, Sink, Floor		49		49		49		49		49		49		49		49		49		49		49		49		49
Replace Valve Set, Sink, Stainless Steel			210					1,050						210							841					
Repair Strainer, Sink, Stainless Steel		120		482		120				120		482				120					482					
Replace Faucet Washer & Clean Trap, Sink, Stainless Steel	43	211	43	211	43	211	43	211	43	211	43	211	43	211	43	211	43	169	43	211	43	211	43	211	43	211
Replace Sink, Plastic								2,599																	2,599	
Replace Valve Set, Sink, Plastic																					210					
Repair Strainer, Sink, Plastic		120														120										
Replace Faucet Washer & Clean Trap, Sink, Plastic		43		43		43				43		43		43		43		43		43		43		43		43
Replace Sink, Enameled Steel																									3,985	
Replace Sink, Stainless Steel																					1,532				1,532	
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel			154																							
Repair Strainer, Sink, Floor				234									234										234			
Replace Pipe & Fittings, 3/4" Copper, Hot Water (20% of Pipe)			6,541																						1,453	
Replace Valve Set, Lavatory, Vitreous China			2,101					3,782						2,101											3,782	
Replace Washer & Spud Connection, Lavatory, Vitreous China		1,208		670					1,208		670					1,208										670
Replace Faucet Washer & Clean Trap, Lavatory, Vitreous China	423	762	423	762	423	762	423	762	423	762	423	762	423	762	423	762	423	762		1,184		1,184		423	762	
Replace Emergency Eye Wash Station														1,464												
Repack Valve Glands, Emergency Eye Wash								50																	50	
Inspect & Clean Spray Heads, Emergency Eye Wash			41			41			41				41			41			41				41			41

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Check & Adjust, Air Compressor, 2 HP	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140
Replace Pump & Motor Assembly, Sump Pump, 3 HP													4,495												
Overhaul Sump Pump, 3 HP			190					190										190					190		
Inspect & Lubricate Sump Pump, 3 HP	94	94	94	94	94	94	94	94	94	94	94	94		94	94	94	94	94	94	94	94	94	94	94	94
Repair Air Compressor, 2 HP			1,356				1,356				1,356				1,356			1,356					1,356		
Overhaul Sump Pump, 1 HP			572					572					572										572		
Replace 10' Section, Pipe & Fittings, 10" Cast Iron											936												936		
Replace Roof Drain, 4-6"					17,623																				
Maintain Roof Drain, 4-6"	1,104	1,104	1,104		1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104	1,104
Replace Sewage Ejector Pump, 1 HP																		3,580							
Inspect & Lubricate Sewage Ejector Pump, 1 HP	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50		50	50	50	50	50	50	50
Replace Pipe & Fittings, 4" DWV PVC (20% of Pipe)																		2,531							
Replace 10' Section, Pipe & Fittings, 4" DWV PVC									132																
Replace Pipe & Fittings, 2" DWV PVC (20% of Pipe)															7,367										
Replace 10' Section, Pipe & Fittings, 2" DWV PVC					368																				368
Replace Pipe & Fittings, 10" Cast Iron (20% of Pipe)																									
Install New Gasket & Bolts, Pipe & Fittings, 10" Cast Iron																									144
Replace Pump & Motor Assembly, Sump Pump, 1 HP																		7,308							
Replace Faucet Washer & Clean Trap, Sink, Floor		49		49		49		49		49		49		49		49		49		49		49		49	
Replace Valve Set, Sink, Stainless Steel			210					210				1,050						210				1,050			
Repair Strainer, Sink, Stainless Steel	120				120			120		482			120		120		482				120		120		120
Replace Faucet Washer & Clean Trap, Sink, Stainless Steel	211	43	43	43	211	43	211	43	211	43	211	43	211	43	211	43	211	43	211	43	211	43	211	43	211
Replace Sink, Plastic													2,599												
Replace Valve Set, Sink, Plastic								210															210		
Repair Strainer, Sink, Plastic					120																120				
Replace Faucet Washer & Clean Trap, Sink, Plastic		43		43		43		43		43		43		43		43		43		43		43		43	
Replace Sink, Enameled Steel																									
Replace Sink, Stainless Steel			6,127																						
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel			154																						
Repair Strainer, Sink, Floor						234								234								234			
Replace Pipe & Fittings, 3/4" Copper, Hot Water (20% of Pipe)			6,541																						1,453
Replace Valve Set, Lavatory, Vitreous China		2,101						3,782				2,101					3,782					2,101			
Replace Washer & Spud Connection, Lavatory, Vitreous China				1,208		670					1,208		670				1,208		670			1,208		670	
Replace Faucet Washer & Clean Trap, Lavatory, Vitreous Chin	423	762	423	762	423	762	423	762	423	762	423	762	423	762	423	762	423	762	423	762	423	762	423	762	423
Replace Emergency Eye Wash Station															1,464										
Repack Valve Glands, Emergency Eye Wash								50															50		
Inspect & Clean Spray Heads, Emergency Eye Wash			41			41			41			41			41			41			41			41	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg

Facility: Goddard Space Flight Center

Building Num: 1019/51/50

City: Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Replace Drinking Fountain, Refrigerated								22,549									22,549								
Replace Coolant & Adjust Drinking Fountain, Refrigerated		737		737		737				737		737		737		737				737		737		737	
Replace Valve Set, Sink, Enameled Steel								344										344							
Replace 10' Section, Pipe & Fittings, 2" Copper, Cold Water																								570	
Replace Lavatory, Vitreous China																		7,117						12,811	
Replace Flush Valve, Tankless Water Closet			499					666					499					666							
Replace 10' Section, Pipe & Fittings, 1" Steel		192												192											
Replace Pipe & Fittings, 4" Copper, Cold Water (20% of Pipe)						36,542																			
Replace 10' Section, Pipe & Fittings, 4" Copper, Cold Water																									1,827
Replace Pipe & Fittings, 2" Copper, Cold Water (20% of Pipe)			11,391																						
Resolder Joint, Pipe & Fittings, 2" Copper, Cold Water														517										517	
Replace 10' Section, Pipe & Fittings, 3/4" Copper, Hot Water										73														327	
Replace Pipe & Fittings, 3/4" Copper, Cold Water (20% of Pipe)			7,994																						1,453
Replace 10' Section, Pipe & Fittings, 3/4" Copper, Cold Water										73														400	
Replace Flush Valve, Urinal, Vitreous China		2,976		915				2,976		915						2,976									915
Resolder Joint, Pipe & Fittings, 4" Copper, Cold Water														590											590
Replace Tankless Water Closet																		11,736						15,647	
Resolder Joint, Pipe & Fittings, 3/4" Copper, Cold Water									147				812						147					812	
Replace Urinal, Vitreous China																		5,402						17,558	
Inspect & Lubricate Circulator Pump, 1/2 HP, Cold Water	141	141		141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141
Overhaul Circulator Pump, 1/2 HP, Cold Water								284						284				284							
Replace Circulator Pump, 1/2 HP, Cold Water			13,374																					13,374	
Inspect & Lubricate Circulator Pump, 1/2 HP, Hot Water	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Overhaul Circulator Pump, 1/2 HP, Hot Water	94					94					94										94				
Replace Circulator Pump, 1/2 HP, Hot Water																									4,458

D30 HVAC

Maintain Flash Tank, 24 Gal.	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Replace Pipe & Fittings, 6" Steel (20% of Pipe)																									
Replace 10' Section, Pipe & Fittings, 6" Steel				362						181						362								181	
Install New Gasket & Bolts, Pipe & Fittings, 3" Steel			100																						
Replace 10' Section, Pipe & Fittings, 3" Steel		213												213											
Replace Pipe & Fittings, 2" Steel (20% of Pipe)																									
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel					264						55													67	
Replace 10' Section, Pipe & Fittings, 2" Steel				442						93	111					442							93	111	
Replace Flash Tank, 24 Gal.																1,173									
Repair Flash Tank, 24 Gal.			886					886										886					886		
Maintain Heat Exchanger, Steam-to-Water, 25 Gpm	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2	
Replace Drinking Fountain, Refrigerated		22,549																								
Replace Coolant & Adjust Drinking Fountain, Refrigerated	737					737					737															737
Replace Valve Set, Sink, Enameled Steel									344										344							
Replace 10' Section, Pipe & Fittings, 2" Copper, Cold Water																										570
Replace Lavatory, Vitreous China																										
Replace Flush Valve, Tankless Water Closet			499						666										499							499
Replace 10' Section, Pipe & Fittings, 1" Steel	192																									192
Replace Pipe & Fittings, 4" Copper, Cold Water (20% of Pipe)						36,542																				
Replace 10' Section, Pipe & Fittings, 4" Copper, Cold Water																										1,827
Replace Pipe & Fittings, 2" Copper, Cold Water (20% of Pipe)			11,391																							
Resolder Joint, Pipe & Fittings, 2" Copper, Cold Water																			517							517
Replace 10' Section, Pipe & Fittings, 3/4" Copper, Hot Water																										73
Replace Pipe & Fittings, 3/4" Copper, Cold Water (20% of Pipe)			7,994																							1,453
Replace 10' Section, Pipe & Fittings, 3/4" Copper, Cold Water																										400
Replace Flush Valve, Urinal, Vitreous China						2,976			915										2,976							915
Resolder Joint, Pipe & Fittings, 4" Copper, Cold Water																										590
Replace Tankless Water Closet																										
Resolder Joint, Pipe & Fittings, 3/4" Copper, Cold Water																										812
Replace Urinal, Vitreous China																										
Inspect & Lubricate Circulator Pump, 1/2 HP, Cold Water	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141	141								141
Overhaul Circulator Pump, 1/2 HP, Cold Water			284						284																	284
Replace Circulator Pump, 1/2 HP, Cold Water																										13,374
Inspect & Lubricate Circulator Pump, 1/2 HP, Hot Water	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47	47
Overhaul Circulator Pump, 1/2 HP, Hot Water	94					94										94										94
Replace Circulator Pump, 1/2 HP, Hot Water																										4,458

D30 HVAC

Maintain Flash Tank, 24 Gal.	41	41		41	41	41	41	41	41	41	41	41	41	41	41	41	41	41								41
Replace Pipe & Fittings, 6" Steel (20% of Pipe)																										3,654
Replace 10' Section, Pipe & Fittings, 6" Steel			362						181																	181
Install New Gasket & Bolts, Pipe & Fittings, 3" Steel			100																							
Replace 10' Section, Pipe & Fittings, 3" Steel	213																									213
Replace Pipe & Fittings, 2" Steel (20% of Pipe)																										1,842
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel						264																				67
Replace 10' Section, Pipe & Fittings, 2" Steel			442						93	111																111
Replace Flash Tank, 24 Gal.			1,173																							1,173
Repair Flash Tank, 24 Gal.																										886
Maintain Heat Exchanger, Steam-to-Water, 25 Gpm	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7	
Replace Expansion Tank, 100 Gal.																										
Maintain Expansion Tank, 100 Gal.	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Replace Expansion Tank, 10 Gal.																										
Maintain Expansion Tank, 10 Gal.	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Replace Condensate Receiver Station, 10-15 Gal.			19,657															19,657								
Repair Condensate Receiver Station, Motor, 10-15 Gal.								5,545					5,545											5,545		
Repair Condensate Receiver Station, 10-15 Gal.						1,479			1,479			1,479			1,479						1,479			1,479		
Maintain Condensate Receiver Station, 10-15 Gal.	254	254		254	254	254	254	254	254	254	254	254	254	254	254	254	254		254	254	254	254	254	254	254	
Replace Ball Valve, 6"				21,285																				21,285		
Replace Leak Detection, Panel & Float Assembly													7,953													
Lubricate, Repack Gland, Ball Valve, 6"	1,183	1,183	1,183		1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	
Maintain Air Conditioner, Computer Room, Air-Cooled, 2 Ton	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782		2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	
Repair Exhaust Fan, Centrifugal, 10,000 Cfm																										
Replace Exhaust Fan, Centrifugal, 10,000 Cfm								16,734																		
Maintain Exhaust Fan, Roof Mounted, 2,000 Cfm	705	705	705	705	705	705	705	353	705	705	705	705	705	705	705	705	705	353	705	705	705	705	705	705	705	
Repair Exhaust Fan, Roof Mounted, 2,000 Cfm								757											757							
Replace Exhaust Fan, Roof Mounted, 2,000 Cfm								4,645											4,645							
Maintain Variable Air Volume Box, 800 Cfm	2,578	2,578		2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578		2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	
Replace Air Handler, Single Zone, 1,300 Cfm									9,967																	9,967
Replace Variable Air Volume Box, 800 Cfm			25,196																25,196							
Repair Exhaust Fan, Centrifugal, 5,000 Cfm													757													
Repair Air Conditioner, Computer Room, Air-Cooled, 2 Ton							16,639																			
Replace Air Conditioner, Computer Room, Air-Cooled, 2 Ton																					82,241					
Maintain Air Conditioner, Computer Room, Air Cooled, 3 Ton	927	927	927	927	927	927	927		927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	
Repair Air Conditioner, Computer Room, Air Cooled, 3 Ton																										
Replace Air Conditioner, Computer Room, Air Cooled, 3 Ton																										
Maintain Air Conditioner, Computer Room, Air Cooled, 10 Ton	3,817	3,817		3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	
Repair Variable Air Volume Box, 800 Cfm													3,306													
Replace Existing Ductwork (20% of Ductwork)																										
Maintain Air Handler, Single Zone, 2,500 Cfm	695	695	695	695	695	695	695	695	695		695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	
Repair Air Handler, Single Zone, 2,500 Cfm																										
Replace Air Handler, Single Zone, 2,500 Cfm																										
Repair Air Handler, Single Zone, 10,000 Cfm						3,292								6,586							3,292					
Maintain Air Handler, Single Zone, 20,000 Cfm	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360		1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	
Repair Air Handler, Single Zone, 20,000 Cfm																										
Maintain Exhaust Fan, Centrifugal, 10,000 Cfm	353	353	353	353	353	353	353	353		353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	
Replace Duct Insulation (20% of Insulation)																										

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2	
Replace Expansion Tank, 100 Gal.																									8,176	
Maintain Expansion Tank, 100 Gal.	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Replace Expansion Tank, 10 Gal.			2,362																							
Maintain Expansion Tank, 10 Gal.	84	84		84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Replace Condensate Receiver Station, 10-15 Gal.									19,657																	19,657
Repair Condensate Receiver Station, Motor, 10-15 Gal.			5,545										5,545					5,545								
Repair Condensate Receiver Station, 10-15 Gal.		1,479			1,479						1,479			1,479			1,479			1,479						
Maintain Condensate Receiver Station, 10-15 Gal.	254	254	254	254	254	254	254		254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254	254
Replace Ball Valve, 6"																										21,285
Replace Leak Detection, Panel & Float Assembly																										7,953
Lubricate, Repack Gland, Ball Valve, 6"	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183	1,183				1,183	1,183	1,183	1,183	1,183	1,183
Maintain Air Conditioner, Computer Room, Air-Cooled, 2 Ton	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782		2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782	2,782
Repair Exhaust Fan, Centrifugal, 10,000 Cfm																										757
Replace Exhaust Fan, Centrifugal, 10,000 Cfm				16,734																						16,734
Maintain Exhaust Fan, Roof Mounted, 2,000 Cfm	705	705	353	705	705	705	705	705	705	705	705	705	353	705	705	705	705	705	705	705	705	705	353	705	705	705
Repair Exhaust Fan, Roof Mounted, 2,000 Cfm			757										757													757
Replace Exhaust Fan, Roof Mounted, 2,000 Cfm			4,645										4,645													4,645
Maintain Variable Air Volume Box, 800 Cfm	2,578	2,578	2,578	2,578	2,578	2,578	2,578		2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578	2,578
Replace Air Handler, Single Zone, 1,300 Cfm																9,967										
Replace Variable Air Volume Box, 800 Cfm									25,196																	25,196
Repair Exhaust Fan, Centrifugal, 5,000 Cfm									757																	
Repair Air Conditioner, Computer Room, Air-Cooled, 2 Ton		16,639																								16,639
Replace Air Conditioner, Computer Room, Air-Cooled, 2 Ton																82,241										
Maintain Air Conditioner, Computer Room, Air Cooled, 3 Ton	927	927		927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927	927
Repair Air Conditioner, Computer Room, Air Cooled, 3 Ton																6,706										
Replace Air Conditioner, Computer Room, Air Cooled, 3 Ton			30,724																							30,724
Maintain Air Conditioner, Computer Room, Air Cooled, 10 Ton	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817	3,817				3,817	3,817	3,817	3,817	3,817	3,817
Repair Variable Air Volume Box, 800 Cfm			3,306																							3,306
Replace Existing Ductwork (20% of Ductwork)				11,017												213,850										
Maintain Air Handler, Single Zone, 2,500 Cfm	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695	695
Repair Air Handler, Single Zone, 2,500 Cfm																2,935										2,935
Replace Air Handler, Single Zone, 2,500 Cfm																										13,499
Repair Air Handler, Single Zone, 10,000 Cfm			6,586								3,292								6,586							3,292
Maintain Air Handler, Single Zone, 20,000 Cfm	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360
Repair Air Handler, Single Zone, 20,000 Cfm																4,422										4,422
Maintain Exhaust Fan, Centrifugal, 10,000 Cfm	353	353	353		353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353
Replace Duct Insulation (20% of Insulation)			3,233																							42,834

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Replace Exhaust Fan, Centrifugal, 5,000 Cfm			10,486																						10,486
Maintain Fan & Motor, Exhaust Fan, Ceiling 200-500 Cfm	471	471	94	471	471	471	471	377	471	471	471	471	471	471	471	471	471	471	471	471	471	471	94	471	471
Replace Fan & Motor, Exhaust Fan, Ceiling 200-500 Cfm			4,904					1,227																	4,904
Maintain Exhaust Fan, Centrifugal, 2,000 Cfm	1,766	1,766	1,059	1,766	1,766	1,766	1,766	1,766	707	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,059	1,766	1,766
Repair Exhaust Fan, Centrifugal, 2,000 Cfm													1,514												2,271
Replace Exhaust Fan, Centrifugal, 2,000 Cfm			11,613						17,419																11,613
Maintain Exhaust Fan, Centrifugal, 5,000 Cfm	353	353		353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353		353	353
Maintain Air Conditioner, Computer Room, Chilled Water, 5 Ton	929	929	929	929	929	929	929	929	929	929	929	929	929	929	929		929	929	929	929	929	929	929	929	929
Replace Air Handler, Single Zone, 20,000 Cfm									61,964																61,964
Inspect & Maintain HVAC Control Panel	608	608	608	608	608	608	608	608		608	608	608	608	608	608	608	608	608	608	608	608	608	608	608	608
Repair Air Conditioner, Computer Room, Air Cooled, 10 Ton														97,745											
Repair Fan Coil Unit, 2 Ton					2,894									3,859											2,894
Replace Fan Coil Unit, 2 Ton			14,841												11,131										14,841
Maintain Unit Heater, 480v, 5kW	231	231		231	231	231	231	231	231	231	231	231	231	231	231	231			231	231	231	231	231	231	231
Repair Unit Heater, 480v, 5kW														240											
Replace Unit Heater, 480v, 5kW			1,474																						1,474
Replace Fan Coil Unit, 1 Ton			188,500							11,254															11,254
Replace Direct Digital Controls, System Points						364,317										364,317									
Repair Fan Coil Unit, 1 Ton													51,036												3,048
Minor Repair, HVAC Control Panel				2,212										2,212											2,212
Replace HVAC Control Panel									30,988																30,988
Maintain Thermostat	2,298	2,298	2,298	2,298	2,298	2,298	2,298	1,044	1,254	2,298	2,298	2,298	2,298	2,298	2,298	2,298	2,298	1,044	1,254	2,298	2,298	2,298	2,298	2,298	2,298
Replace Thermostat								17,136	14,280										17,136	14,280					
Annual PM, Air Sample Smoke Detection System	8,041	8,041	8,041	8,041	8,041	8,041	8,041		8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041
Replace Air Sample Smoke Detection System								364,709																	
Install New Gasket & Bolts, Pipe & Fittings, 6" Steel					188									94											
Monitor Direct Digital Controls, System Points	15,460	15,460	15,460	15,460	15,460	15,460		15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460			15,460	15,460	15,460	15,460	15,460	15,460	
Replace Air Conditioner, Computer Room, Chilled Water, 15 To			100,657																						100,657
Maintain Air Handler, Single Zone, 10,000 Cfm	4,083	4,083	1,360	4,083	4,083	4,083	4,083	4,083	2,722	4,083	4,083	4,083	4,083	4,083	4,083	4,083	4,083	1,360	4,083	4,083	4,083	4,083	4,083	4,083	2,722
Repair Air Conditioner, Computer Room, Chilled Water, 5 Ton						12,534																			
Replace Air Conditioner, Computer Room, Chilled Water, 5 Ton																29,339									
Maintain Air Conditioner, Computer Room, Chilled Water, 10 To	4,771	4,771		4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771		4,771	4,771
Repair Air Conditioner, Computer Room, Chilled Water, 10 Ton														63,071											
Replace Air Conditioner, Computer Room, Chilled Water, 10 To			232,685																						232,685
Maintain Fan Coil Unit, 2 Ton	3,344	3,344	1,433	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	1,911	3,344	3,344	1,433	3,344	3,344	3,344	3,344	3,344	3,344	3,344
Repair Air Conditioner, Computer Room, Chilled Water, 15 Ton														32,925											
Replace Air Conditioner, Computer Room, Air Cooled, 10 Ton			189,901																						189,901

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Replace Exhaust Fan, Centrifugal, 5,000 Cfm																			10,486						
Maintain Fan & Motor, Exhaust Fan, Ceiling 200-500 Cfm	471	471	377	471	471	471	471	471	471	471	471	471	471	471	471	471	471	94	471	471	471	471	377	471	471
Replace Fan & Motor, Exhaust Fan, Ceiling 200-500 Cfm			1,227															4,904					1,227		
Maintain Exhaust Fan, Centrifugal, 2,000 Cfm	1,766	1,766	1,766	707	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,766	1,059	1,766	1,766	1,766	1,766	1,766	707	1,766
Repair Exhaust Fan, Centrifugal, 2,000 Cfm								1,514							2,271										
Replace Exhaust Fan, Centrifugal, 2,000 Cfm				17,419														11,613						17,419	
Maintain Exhaust Fan, Centrifugal, 5,000 Cfm	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353	353		353	353	353	353	353	353	353
Maintain Air Conditioner, Computer Room, Chilled Water, 5 To	929	929	929	929	929	929	929	929	929	929		929	929	929	929	929	929	929	929	929	929	929	929	929	929
Replace Air Handler, Single Zone, 20,000 Cfm															61,964										
Inspect & Maintain HVAC Control Panel	608	608	608	608	608	608	608	608	608	608	608	608	608			608	608	608	608	608	608	608	608	608	608
Repair Air Conditioner, Computer Room, Air Cooled, 10 Ton																									
Repair Fan Coil Unit, 2 Ton			3,859													2,894			3,859						
Replace Fan Coil Unit, 2 Ton					11,131			14,841												11,131			14,841		
Maintain Unit Heater, 480v, 5kW	231	231	231	231	231	231			231	231	231	231	231	231	231	231	231	231	231	231	231	231		231	231
Repair Unit Heater, 480v, 5kW			240																240						
Replace Unit Heater, 480v, 5kW								1,474																1,474	
Replace Fan Coil Unit, 1 Ton							188,500								11,254								188,500		
Replace Direct Digital Controls, System Points		364,317										364,317										364,317			
Repair Fan Coil Unit, 1 Ton			51,036							3,048									51,036						3,048
Minor Repair, HVAC Control Panel				2,212					2,212											2,212				2,212	
Replace HVAC Control Panel															30,988										
Maintain Thermostat	2,298	2,298	1,044	1,254	2,298	2,298	2,298	2,298	2,298	2,298	2,298	2,298	1,044	1,254	2,298	2,298	2,298	2,298	2,298	2,298	2,298	2,298	1,044	1,254	2,298
Replace Thermostat			17,136	14,280										17,136	14,280								17,136	14,280	
Annual PM, Air Sample Smoke Detection System	8,041	8,041		8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041	8,041		8,041	8,041
Replace Air Sample Smoke Detection System			364,709																				364,709		
Install New Gasket & Bolts, Pipe & Fittings, 6" Steel				188																					
Monitor Direct Digital Controls, System Points	15,460		15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460		15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460	15,460
Replace Air Conditioner, Computer Room, Chilled Water, 15 T																									100,657
Maintain Air Handler, Single Zone, 10,000 Cfm	4,083	4,083	4,083	4,083	4,083	4,083	4,083	1,360	4,083	4,083	4,083	4,083	4,083	4,083	4,083	2,722	4,083	4,083	4,083	4,083	4,083	4,083	1,360	4,083	4,083
Repair Air Conditioner, Computer Room, Chilled Water, 5 Ton	12,534																							12,534	
Replace Air Conditioner, Computer Room, Chilled Water, 5 To											29,339														
Maintain Air Conditioner, Computer Room, Chilled Water, 10 T	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771	4,771		4,771	4,771	4,771	4,771	4,771	4,771	4,771
Repair Air Conditioner, Computer Room, Chilled Water, 10 Ton											63,071														
Replace Air Conditioner, Computer Room, Chilled Water, 10 T																									232,685
Maintain Fan Coil Unit, 2 Ton	3,344	3,344	3,344	3,344	1,911	3,344	3,344	1,433	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	3,344	1,911	3,344	3,344	1,433	3,344
Repair Air Conditioner, Computer Room, Chilled Water, 15 Ton								32,925																	
Replace Air Conditioner, Computer Room, Air Cooled, 10 Ton																									189,901

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Maintain Air Conditioner, DX Packaged, Air Cooled, 2 Ton	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354
Repair Air Conditioner, DX Packaged, Air Cooled, 2 Ton										1,783															
Replace Air Conditioner, DX Packaged, Air Cooled, 2 Ton																					3,900				
Maintain Air Conditioner, DX Packaged, Air Cooled, 5 Ton	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354		354	354	354	354	354	354	354	354
Repair Air Conditioner, DX Packaged, Air Cooled, 5 Ton										4,267															
Replace Air Conditioner, DX Packaged, Air Cooled, 5 Ton																					9,077				
Maintain Fan Coil Unit, 1 Ton	33,922	33,922	1,911	33,922	33,922	33,922	33,922	33,922	33,922	32,011	33,922	33,922	33,922	33,922	33,922	33,922	33,922	1,911	33,922	33,922	33,922	33,922	33,922	33,922	32,011
Maintain Air Conditioner, Computer Room, Chilled Water, 15 To	1,908		1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908
Replace Condenser, Air-Cooled, 2 Ton															5,431										
Repair Circulation Pump, 5 HP, Chiller & Condenser Water			155											155				155							
Replace Circulation Pump, 2 HP, Chiller & Condenser Water								17,246		11,497													17,246	11,497	
Replace Circulation Pump, 5 HP, Chiller & Condenser Water										5,749														5,749	
Maintain Circulation Pump, 7 1/2 HP, Chiller & Condenser Wate	225	225	225	225	225	225	225	150	225	225	225	225	74	225	225	225	225	225	225	225	225	225	225	150	225
Repair Circulation Pump, 7 1/2 HP, Chiller & Condenser Water			579						386					193				579						386	
Replace Circulation Pump, 7 1/2 HP, Chiller & Condenser Water								6,650					13,302											6,650	
Replace 10' Section, Pipe & Fittings, 1" Copper																					103				412
Repair Condenser, Air-Cooled, 2 Ton										1,348															1,348
Maintain Circulation Pump, 2 HP, Chiller & Condenser Water	374	374	374	374	374	374	374	149	374	225	374	374	374	374	374	374	374	374	374	374	374	374	374	149	374
Maintain Condenser, Air-Cooled, 5 Ton	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140		1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140
Repair Condenser, Air-Cooled, 5 Ton			7,256																					7,256	
Replace Air Handler, Single Zone, 10,000 Cfm			71,355							35,677											71,355				35,677
Maintain Flow Control Valve & Actuator, 6"	930	930	930	930	930	930	930	930	930	930	930		930	930	930	930	930	930	930	930	930	930	930	930	930
Repair Air Handler, Single Zone, 1,300 Cfm																									2,894
Replace Flow Control Valve, Motorized, 6"												42,973													
Resolder Joint, Pipe & Fittings, 1" Copper										185					742						185				742
Maintain Condenser, Air-Cooled, 2 Ton	228	228	228	228	228	228	228	228	228	228	228	228	228	228		228	228	228	228	228	228	228	228	228	228
Install New Gasket & Bolts, Pipe & Fittings, 4" Steel					140																				
Repair Heat Exchanger, Steam-to-Water, 25 Gpm							891							891									891		
Replace Heat Exchanger, Steam-to-Water, 25 Gpm																5,094									
Resolder Joint, Pipe & Fittings, 3/4" Copper									149							1,038								149	1,038
Replace 10' Section, Pipe & Fittings, 3/4" Copper									73																511
Replace Pipe & Fittings, 3/4" Copper (20% of Pipe)														1,458											
Replace 10' Section, Pipe & Fittings, 1" Steel										109	14										301			109	14
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel					242								88												11
Repair Circulation Pump, 2 HP, Chiller & Condenser Water			467		310									467		310					467		310		
Replace 10' Section, Pipe & Fittings, 4" Steel					292											292									
Maintain Circulation Pump, 5 HP, Chiller & Condenser Water	74	74	74	74	74	74	74		74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74	74

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2	
Maintain Air Conditioner, DX Packaged, Air Cooled, 2 Ton	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	354	
Repair Air Conditioner, DX Packaged, Air Cooled, 2 Ton					1,783																				1,783	
Replace Air Conditioner, DX Packaged, Air Cooled, 2 Ton															3,900											
Maintain Air Conditioner, DX Packaged, Air Cooled, 5 Ton	354	354	354	354	354	354	354	354	354	354	354		354	354	354	354	354	354	354	354	354	354	354	354	354	
Repair Air Conditioner, DX Packaged, Air Cooled, 5 Ton		4,267																							4,267	
Replace Air Conditioner, DX Packaged, Air Cooled, 5 Ton															9,077											
Maintain Fan Coil Unit, 1 Ton	33,922	33,922	33,922	33,922	33,922	33,922	33,922	1,911	33,922	33,922	33,922	33,922	33,922	33,922	32,011	33,922	33,922	33,922	33,922	33,922	33,922	33,922	33,922	1,911	33,922	33,922
Maintain Air Conditioner, Computer Room, Chilled Water, 15 T	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908		1,908	1,908	1,908	1,908	1,908	1,908	1,908	1,908	
Replace Condenser, Air-Cooled, 2 Ton					5,431																				5,431	
Repair Circulation Pump, 5 HP, Chiller & Condenser Water			155					155											155						155	
Replace Circulation Pump, 2 HP, Chiller & Condenser Water																17,246									11,497	
Replace Circulation Pump, 5 HP, Chiller & Condenser Water																5,749										
Maintain Circulation Pump, 7 1/2 HP, Chiller & Condenser Wat	225	225	74	225	225	225	225	225	225	225	225	225	225	225	225	225	225	74	225	225	225	225	225	225	225	
Repair Circulation Pump, 7 1/2 HP, Chiller & Condenser Water			193					579											193						579	
Replace Circulation Pump, 7 1/2 HP, Chiller & Condenser Wat			13,302												6,650										13,302	
Replace 10' Section, Pipe & Fittings, 1" Copper																			103						412	
Repair Condenser, Air-Cooled, 2 Ton																1,348										
Maintain Circulation Pump, 2 HP, Chiller & Condenser Water	374	374	374	374	374	374	374	374	374	374	374	374	149	374	225	374	374	374	374	374	374	374	374	374	374	
Maintain Condenser, Air-Cooled, 5 Ton	1,140	1,140		1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140		1,140	1,140	1,140	1,140	1,140	1,140	1,140	
Repair Condenser, Air-Cooled, 5 Ton																7,256										
Replace Air Handler, Single Zone, 10,000 Cfm								71,355								35,677									71,355	
Maintain Flow Control Valve & Actuator, 6"	930	930	930		930	930	930	930	930	930	930	930	930	930	930	930	930	930	930	930	930		930	930	930	
Repair Air Handler, Single Zone, 1,300 Cfm																2,894									2,894	
Replace Flow Control Valve, Motorized, 6"				42,973																					42,973	
Resolder Joint, Pipe & Fittings, 1" Copper								185							742			185							742	
Maintain Condenser, Air-Cooled, 2 Ton	228	228	228	228		228	228	228	228	228	228	228	228	228	228	228	228	228	228	228	228		228	228	228	
Install New Gasket & Bolts, Pipe & Fittings, 4" Steel					140																					
Repair Heat Exchanger, Steam-to-Water, 25 Gpm				891								891							891							
Replace Heat Exchanger, Steam-to-Water, 25 Gpm																									5,094	
Resolder Joint, Pipe & Fittings, 3/4" Copper									149						1,038										149	1,038
Replace 10' Section, Pipe & Fittings, 3/4" Copper										73															511	
Replace Pipe & Fittings, 3/4" Copper (20% of Pipe)					10,207										1,458											
Replace 10' Section, Pipe & Fittings, 1" Steel			301						109	14					301								14		109	
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel					242																				11	
Repair Circulation Pump, 2 HP, Chiller & Condenser Water			467		310			467		310								467		310			467		310	
Replace 10' Section, Pipe & Fittings, 4" Steel			292													292										
Maintain Circulation Pump, 5 HP, Chiller & Condenser Water	74	74	74	74	74	74	74	74	74	74	74	74		74	74	74	74	74	74	74	74	74	74	74	74	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

	Forecast Year:																								
	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam	360			319			360		319	880				319	880		360		319	880		360		880	
Replace Pipe Insulation, Fiberglass, Heating Water/Steam (20%					4,016						1,643													1,461	
Lubricate, Repack Gland, Butterfly Valve, 4"	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360	360			360	360	360	360	360	360	
Replace Butterfly Valve, 4"																			7,567						
Lubricate, Repack Gland, Ball Valve, 4"	591	591	591	591	591	591	591	591	591	591	591	591	591	591	591	591			591	591	591	591	591	591	
Replace Ball Valve, 4"																			6,091						
Replace Valve Actuator, 6"								41,612																	
Replace Pipe & Fittings, 1" Steel (20% of Pipe)																									
Maintain Air Handler, Multizone, 20,000 Cfm	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	2,885	1,442	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	2,885	1,442	
Repair Air Handler, Multizone, 8,000 Cfm			4,106																				4,106		
Replace Air Handler, Multizone, 8,000 Cfm													33,677												
Maintain Air Handler, Multizone, 10,000 Cfm	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420		1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	
Replace Pipe & Fittings, 1" Copper (20% of Pipe)					8,246																		2,061		
Replace Air Handler, Multizone, 10,000 Cfm									40,555															40,555	
Replace Condenser, Air-Cooled, 5 Ton													38,152												
Maintain Air Handler, Multizone, 8,000 Cfm	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078		1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	
Replace Air Handler, Multizone, 15,000 Cfm										109,777														109,777	
Repair Air Handler, Multizone, 10,000 Cfm																				4,277					
Repair Air Handler, Multizone, 20,000 Cfm																				6,094	12,187				
Replace Air Handler, Multizone, 20,000 Cfm									71,940	143,880													71,940	143,880	
Maintain Air Handler, Multizone, 50,000 Cfm	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690		1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	
Repair Air Handler, Multizone, 50,000 Cfm																					10,728				
Replace Air Handler, Multizone, 50,000 Cfm									172,453															172,453	
Maintain Air Handler, Single Zone, 1,300 Cfm	640	640	640	640	640	640	640	640	640		640	640	640	640	640	640	640	640	640	640	640	640	640	640	
Repair Air Handler, Multizone, 15,000 Cfm																					10,711				
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel					307																		55		
Inspect & Lubricate Circulator Pump, 1/6 HP, Chilled Water	94	94	94	94	94	94	94		94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	
Overhaul Circulator Pump, 1/6 HP, Chilled Water			190											190						190				190	
Replace Circulator Pump, 1/6 HP, Chilled Water									6,226																
Maintain Air Handler, Multizone, 15,000 Cfm	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838		2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	
Replace 10' Section, Pipe & Fittings, 1" Steel				385						68						385						68			
Replace Air Curtain, 1,000 Cfm			1,769																					1,769	
Replace 10' Section, Pipe & Fittings, 2" Steel				515			2,212			147						515				2,212			147		
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel					309							88								1,324					
Replace 10' Section, Pipe & Fittings, 3" Steel				132												132									
Install New Gasket & Bolts, Pipe & Fittings, 3" Steel					62																				
Replace 10' Section, Pipe & Fittings, 4" Steel										73													73		

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Re-tape Pipe Insulation, Fiberglass, Heating Water/Steam		360		319			360		319	880				319	880		360		319	880		360			880
Replace Pipe Insulation, Fiberglass, Heating Water/Steam (20					4,016							1,643													1,461
Lubricate, Repack Gland, Butterfly Valve, 4"	360	360	360	360	360	360	360	360	360	360	360	360		360	360	360	360	360	360	360	360	360	360	360	360
Replace Butterfly Valve, 4"																					7,567				
Lubricate, Repack Gland, Ball Valve, 4"	591	591	591	591	591	591	591	591	591	591	591	591		591	591	591	591	591	591	591	591	591	591	591	591
Replace Ball Valve, 4"																									6,091
Replace Valve Actuator, 6"		41,612																							41,612
Replace Pipe & Fittings, 1" Steel (20% of Pipe)																									2,193
Maintain Air Handler, Multizone, 20,000 Cfm	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	2,885	1,442	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327	4,327
Repair Air Handler, Multizone, 8,000 Cfm																									4,106
Replace Air Handler, Multizone, 8,000 Cfm																									33,677
Maintain Air Handler, Multizone, 10,000 Cfm	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420		1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420	1,420
Replace Pipe & Fittings, 1" Copper (20% of Pipe)																									2,061
Replace Air Handler, Multizone, 10,000 Cfm																									40,555
Replace Condenser, Air-Cooled, 5 Ton																									38,152
Maintain Air Handler, Multizone, 8,000 Cfm	1,078	1,078		1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078	1,078
Replace Air Handler, Multizone, 15,000 Cfm																									109,777
Repair Air Handler, Multizone, 10,000 Cfm																									4,277
Repair Air Handler, Multizone, 20,000 Cfm																									6,094 12,187
Replace Air Handler, Multizone, 20,000 Cfm																									71,940 143,880
Maintain Air Handler, Multizone, 50,000 Cfm	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690		1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690
Repair Air Handler, Multizone, 50,000 Cfm																									10,728
Replace Air Handler, Multizone, 50,000 Cfm																									172,453
Maintain Air Handler, Single Zone, 1,300 Cfm	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640	640
Repair Air Handler, Multizone, 15,000 Cfm																									10,711
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel																									55
Inspect & Lubricate Circulator Pump, 1/6 HP, Chilled Water	94	94		94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Overhaul Circulator Pump, 1/6 HP, Chilled Water																									190
Replace Circulator Pump, 1/6 HP, Chilled Water																									6,226
Maintain Air Handler, Multizone, 15,000 Cfm	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838		2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838	2,838
Replace 10' Section, Pipe & Fittings, 1" Steel																									385
Replace Air Curtain, 1,000 Cfm																									1,769
Replace 10' Section, Pipe & Fittings, 2" Steel																									515
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel																									2,212
Replace 10' Section, Pipe & Fittings, 3" Steel																									147
Install New Gasket & Bolts, Pipe & Fittings, 3" Steel																									132
Replace 10' Section, Pipe & Fittings, 4" Steel																									73

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7	
Install New Gasket & Bolts, Pipe & Fittings, 4" Steel																									35	
Re-tape Pipe Insulation, Fiberglass, Chilled Water		120	319	120			120	319	120	1,680			319	120	1,680		120	319	120	1,680		120				1,680
Replace Pipe Insulation, Fiberglass, Chilled Water (20% of Insul						5,714							409											1,088	409	
Maintain Air Curtain, 1,000 Cfm	41	41		41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Replace Pipe & Fittings, 2" Steel (20% of Pipe)																										
Replace Fan & Motor, Air Curtain, 1,000 Cfm																									356	

D40 Fire Protection

Replace Gate Valve, 4"						5,347											13,367								5,347	
Replace Pipe & Fittings, 1" Steel (20% of Pipe)																										
Replace 10' Section, Pipe & Fittings, 2" Steel				281												281										
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel						109																		58		
Replace Pipe & Fittings, 2" Steel (20% of Pipe)																										
Replace 10' Section, Pipe & Fittings, 4" Steel						309										309										
Install New Gasket & Bolts, Pipe & Fittings, 4" Steel						87																		61		
Inspect & Test Fire Alarm Control Panel	268	268		268	268	268	268	268	268	268	268	268	268	268	268	268	268			268	268	268	268	268	268	268
Repack Gland, Gate Valve, 4"				448									448		179											
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel																								196		
Replace Pipe & Fittings, 4" Steel (20% of Pipe)																										
Inspect & Maintain Fire Department Connection, Siamese, 3"	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829
Replace Fire Alarm Control Panel				5,209																				5,209		
Replace Valves & Components, Sprinkler System																									5,247	
Replace 10' Section, Pipe & Fittings, 1" Steel						246																			246	
Repair Fire Alarm Control Panel																223									223	
Inspect Fire Sprinkler Head	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821	821
Test Fire Sprinkler Head																									24,647	
Replace Fire Sprinkler Head																									16,389	
Maintain Fire Sprinkler System																									30,283	
Test Gages & Valves, Fire Sprinkler System	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	
Replace Fire Department Connection, Siamese, 3"	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	

D50 Electrical

Repair Wiring Device, Switch																										23,438
Maintain Annunciation Panel	67	67		67	67	67	67	67	67	67	67	67	67	67	67	67	67									10,046
Replace Wiring Device, Switch				9,467																						6,697
Annual PM, Motion Detector	401	401	150	401	401	401	401	313	351	389	401	401	150	401	401	401	401	401	401	401	401	401	401	150	401	401
Maintain Alarm Siren	166	166	166	166	166	166	166	166			166	166	166	166	166	166	166	166	166	166	166	166	166	166	166	7,366
Replace Alarm Siren																										16,741
																										763

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2	
Install New Gasket & Bolts, Pipe & Fittings, 4" Steel																									35	
Re-tape Pipe Insulation, Fiberglass, Chilled Water		120	319	120			120	319	120	1,680			319	120	1,680		120	319	120	1,680		120				1,680
Replace Pipe Insulation, Fiberglass, Chilled Water (20% of Ins)						5,714									409									1,088	409	
Maintain Air Curtain, 1,000 Cfm	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41	41
Replace Pipe & Fittings, 2" Steel (20% of Pipe)															2,949											
Replace Fan & Motor, Air Curtain, 1,000 Cfm																									356	

D40 Fire Protection

Replace Gate Valve, 4"																										13,367	5,347
Replace Pipe & Fittings, 1" Steel (20% of Pipe)																										4,917	
Replace 10' Section, Pipe & Fittings, 2" Steel			281													281											
Install New Gasket & Bolts, Pipe & Fittings, 2" Steel						109																					
Replace Pipe & Fittings, 2" Steel (20% of Pipe)																										1,947	
Replace 10' Section, Pipe & Fittings, 4" Steel			309													309											
Install New Gasket & Bolts, Pipe & Fittings, 4" Steel						87																					
Inspect & Test Fire Alarm Control Panel	268	268	268	268	268	268	268		268	268	268	268	268	268	268	268	268	268	268	268	268	268	268	268	268	268	268
Repack Gland, Gate Valve, 4"		448					179																			179	
Install New Gasket & Bolts, Pipe & Fittings, 1" Steel																											
Replace Pipe & Fittings, 4" Steel (20% of Pipe)																										2,540	
Inspect & Maintain Fire Department Connection, Siamese, 3"	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	1,829	
Replace Fire Alarm Control Panel																										5,209	
Replace Valves & Components, Sprinkler System																										5,247	
Replace 10' Section, Pipe & Fittings, 1" Steel																										246	
Repair Fire Alarm Control Panel																										223	
Inspect Fire Sprinkler Head	821	821	821	821	492	821	821	821	821	821	821	821	821	614	821	821	821	821	821	821	821	821	821	821	821	821	
Test Fire Sprinkler Head																										14,309	
Replace Fire Sprinkler Head																										16,389	
Replace Fire Sprinkler Head																										24,647	
Replace Fire Sprinkler Head																										34,686	
Maintain Fire Sprinkler System	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	1,642	
Test Gages & Valves, Fire Sprinkler System	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	1,512	
Replace Fire Department Connection, Siamese, 3"																										14,989	

D50 Electrical

Repair Wiring Device, Switch																										10,046	6,697	7,366			
Maintain Annunciation Panel	67	67	67	67	67	67	67		67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67		
Replace Wiring Device, Switch																										15,776	9,467	6,311	6,942	15,776	9,467
Annual PM, Motion Detector	401	401	313	351	389	401	401	150	401	401	401	401	313	351	389	401	401	150	401	401	401	401	401	401	401	401	313	351	389		
Maintain Alarm Siren	166	166	166		166	166	166	166	166	166	166	166	166		166	166	166	166	166	166	166	166	166	166	166	166	166	166	166		
Replace Alarm Siren																										763	763	763			

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Replace Motion Detector			18,881					6,607	3,776	944			18,881					6,607	3,776	944			18,881		
Replace Annunciation Panel			1,620																						
Maintain Camera, Interior, Closed Circuit, Fixed Color	1,005	1,005	1,005	1,005	1,005	1,005	1,005		1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005		1,005	1,005	1,005	1,005	1,005	1,005	1,005
Replace Camera, Interior, Closed Circuit, Fixed Color								21,763																	
Replace Receptacle, 120 V, 15 Amp.		45,197							30,131	15,066										11,300	60,263		45,197		
Replace Card Reader			64,714						4,221				64,714							4,221			64,714		
Replace Ballast & Lamps, Fluorescent Lighting Fixture, T8, 4-32			14,393					39,712	5,203	2,081			39,538							66,590			14,393		
Replace Fire Alarm Bell, 6"								619																	
Maintain Card Reader	6,150	6,150	377	6,150	6,150	6,150	6,150	6,150	5,773	6,150	6,150	6,150	377	6,150	6,150	6,150	6,150	6,150	5,773	6,150	6,150	6,150	377	6,150	6,150
Replace Incandescent Lighting Fixture, Basic, 100 w			11,131						655	3,491										1,746			11,131		
Replace Lamp, Incandescent Lighting Fixture, Basic, 100 w			52	410				872	137				924	410						924	274		52	410	
Replace HP Sodium Lighting Fixture, 250 w																				3,063					
Replace Ballast & Lamp, HP Sodium Lighting Fixture, 250 w								1,096																	
Replace Fire Alarm Horn & Strobe			743					28,500												1,734	496		743		
Replace Fluorescent Lighting Fixture, T8, 2-32 w			66,365					71,533	7,343				3,808							10,880			66,365		
Check & Repair Manual Pull Station													2,061												
Replace Ballast & Lamps, Fluorescent Lighting Fixture, T8, 2-32			2,427					6,936					42,312							45,608	4,682		2,427		
Replace Exit Lighting Fixture, w/ Battery			13,916					8,564	2,140	4,282										1,070	535	535	13,916		
Replace Lamp, Exit Lighting Fixture, w/ Battery			2,009	558	1,003			3,125	111	111			4,911	558	1,003					4,688	447	892	2,009	558	1,003
Replace Emergency Lighting Pack, 2 Light w/ Battery								35,401	3,218				3,218												
Replace Lens, Replace Emergency Lighting Pack, 2 Light w/ Bat			117						176											1,290	117		117		
Replace Lamp, Replace Emergency Lighting Pack, 2 Light w/ Ba	777	2,438	777	2,438	777	2,438	777		555	2,438	777	2,438	555	2,438	777	2,438	777	2,438	777	2,438	444	2,438	777	2,438	777
Replace Compact Fluorescent Lighting Fixture, 32 w								7,918												3,105					
Replace Fluorescent Lighting Fixture, T8, 4-32 w			62,013					104,444					22,575							62,285	8,159	3,263	62,013		
Replace Uninterruptible Power Supply, 30 kVA													46,244												
Replace Inverter Battery							9,602													9,602					
Annual PM, Inverter	1,281	1,281	1,281	1,281	1,281		1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281
Annual PM, Power Supply/Conditioner	3,228	3,228	1,614	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	1,614	3,228	3,228	3,228	3,228	3,228
Replace Inverter							4,701																		
Replace Power Supply/Conditioner			84,089										84,089							84,089					
Maintain Keypad	1,129	1,129	1,129	1,129	1,129	1,129	1,129		1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129			1,129	1,129	1,129	1,129	1,129	1,129
Replace Battery, Uninterruptible Power Supply, 30 kVA								461																	461
Replace Smoke Detector			3,452										4,685							3,452					
Maintain Uninterruptible Power Supply, 450 kVA	126	126	126	126	126	126	126	126	126	126	126	126		126	126	126	126	126	126	126	126	126	126	126	126
Replace Uninterruptible Power Supply Battery, 450 kVA								921																	921
Replace Uninterruptible Power Supply Motor Generator, 450 kV													159,871												
Maintain Uninterruptible Power Supply, 750 kVA	126	126	126	126	126	126	126	126	126	126	126	126	126		126	126	126	126	126	126	126	126	126	126	126

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50

City: Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Replace Motion Detector			6,607	3,776	944				18,881				6,607	3,776	944				18,881				6,607	3,776	944
Replace Annunciation Panel									1,620															1,620	
Maintain Camera, Interior, Closed Circuit, Fixed Color	1,005	1,005		1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005		1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005		1,005	1,005
Replace Camera, Interior, Closed Circuit, Fixed Color			21,763										21,763										21,763		
Replace Receptacle, 120 V, 15 Amp.				30,131	15,066									11,300	60,263			45,197					30,131	15,066	
Replace Card Reader				4,221					64,714					4,221				64,714					4,221		
Replace Ballast & Lamps, Fluorescent Lighting Fixture, T8, 4-3			39,712	5,203	2,081				39,538				66,590					14,393				39,712	5,203	2,081	
Replace Fire Alarm Bell, 6"			619																				619		
Maintain Card Reader	6,150	6,150	6,150	5,773	6,150	6,150	6,150	377	6,150	6,150	6,150	6,150	6,150	5,773	6,150	6,150	6,150	377	6,150	6,150	6,150	6,150	6,150	5,773	6,150
Replace Incandescent Lighting Fixture, Basic, 100 w			655	3,491										1,746				11,131				655	3,491		
Replace Lamp, Incandescent Lighting Fixture, Basic, 100 w			872	137					924	410			924	274				52	410			872	137		
Replace HP Sodium Lighting Fixture, 250 w													3,063												
Replace Ballast & Lamp, HP Sodium Lighting Fixture, 250 w			1,096																			1,096			
Replace Fire Alarm Horn & Strobe			28,500											1,734	496			743				28,500			
Replace Fluorescent Lighting Fixture, T8, 2-32 w			71,533	7,343					3,808				10,880					66,365				71,533	7,343		
Check & Repair Manual Pull Station			2,061															2,061							
Replace Ballast & Lamps, Fluorescent Lighting Fixture, T8, 2-3			6,936						42,312				45,608	4,682				2,427				6,936			
Replace Exit Lighting Fixture, w/ Battery			8,564	2,140	4,282								1,070	535	535			13,916				8,564	2,140	4,282	
Replace Lamp, Exit Lighting Fixture, w/ Battery			3,125	111	111				4,911	558	1,003		4,688	447	892			2,009	558	1,003		3,125	111	111	
Replace Emergency Lighting Pack, 2 Light w/ Battery			35,401	3,218					3,218					4,828								35,401	3,218		
Replace Lens, Replace Emergency Lighting Pack, 2 Light w/ B				176									1,290	117				117					176		
Replace Lamp, Replace Emergency Lighting Pack, 2 Light w/	2,438	777		555	2,438	777	2,438	555	2,438	777	2,438	777	2,438	444	2,438	777	2,438	777	2,438	777	2,438	777		555	2,438
Replace Compact Fluorescent Lighting Fixture, 32 w			7,918											3,105								7,918			
Replace Fluorescent Lighting Fixture, T8, 4-32 w			104,444						22,575				62,285	8,159	3,263			62,013				104,444			
Replace Uninterruptible Power Supply, 30 kVA				46,244															46,244						
Replace Inverter Battery	9,602											9,602													
Annual PM, Inverter		1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281	1,281		1,281	1,281	1,281
Annual PM, Power Supply/Conditioner	3,228	3,228	3,228	3,228	1,614	3,228	3,228	1,614	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	3,228	1,614	3,228	3,228	1,614	3,228
Replace Inverter	4,701																								4,701
Replace Power Supply/Conditioner				84,089				84,089										84,089					84,089		
Maintain Keypad	1,129	1,129		1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129		1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129		1,129	1,129
Replace Battery, Uninterruptible Power Supply, 30 kVA														461											
Replace Smoke Detector			4,685					3,452										4,685					4,685		
Maintain Uninterruptible Power Supply, 450 kVA	126	126		126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126
Replace Uninterruptible Power Supply Battery, 450 kVA														921											
Replace Uninterruptible Power Supply Motor Generator, 450 k			159,871															159,871							
Maintain Uninterruptible Power Supply, 750 kVA	126	126	126		126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7																							
Replace Uninterruptible Power Supply Battery, 750 kVA	921																																															
Replace Uninterruptible Power Supply Motor Generator, 750 kV	259,431																																															
Maintain Uninterruptible Power Supply, 30 kVA	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62																							
Maintain Security System Panel	251				126				126				251				251				126				251																							
Repair Heat Detector	517												517																																			
Replace Heat Detector	1,518												1,518																																			
Replace Ballast & Lamps, Compact Fluorescent Lighting Fixture,	2,701												6,887																																			
Replace Access Keypad	7,381												7,381																																			
Repair Switchgear, Indoor, 600 V (5% of total fuses)	638												638																																			
Replace Manual Pull Station	4,859												4,859																																			
Annual PM, Clean and Maintain Inverter Battery	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620																							
Replace Public Address Speaker	7,033												19,692				5,626				7,033																											
Replace Smoke Detector, Duct	7,374												7,374																																			
Replace Security System Panel	705												1,412				1,412				705																											
Replace Batteries & Check Operation, Smoke Detector	1,087	1,087	626	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087	461	1,087	1,087	1,087	1,087	626	1,087	1,087	1,087	1,087	1,087	1,087																							
Replace Batteries & Check Operation, Smoke Detector, Duct	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296																							
Repair Smoke Detector	1,582												1,582																																			
Repair Smoke Detector, Duct	749												749																																			
Check Operation, Heat Detector	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249																							
Maintain Public Address Speaker	2,859	2,859	2,859	2,859	2,859	2,859	2,859	2,237	2,859	2,859	2,859	2,859	1,119	2,362	2,859	2,859	2,859	2,859	2,859	2,859	2,859	2,859	2,237	2,859	2,859																							
Replace Disconnect Switch, 60 Amp.	1,119																																															
Replace Power Panel Board, 208 Y/120 V, 100 Amp.	51,367								12,841				19,263				57,787				12,842				6,420				19,263				19,263				6,420				6,420				12,842			
Replace Switchgear, Indoor, 600 V	7,101																																															
Maintain Power Panel Board, 208 Y/120 V, 100 Amp.	6,028	6,028	6,028	6,028	6,028	6,028	6,028	5,024	5,776	6,028	6,028	6,028	6,028	5,651	4,899	6,028	5,778	5,902	6,028	6,028	5,651	5,651	5,902	5,902	5,778																							
Replace Motor Starter, 5-20 HP, <600 V	3,602	2,402			1,201												3,602				3,602				2,402																							
Replace Coil, Motor Starter, 5-20 HP, <600 V	1,464		1,097		1,464	733	1,097	1,464	733	1,097	1,097	733	1,097	1,464	733	1,097	366	733	1,464		1,097		1,464	733	1,097																							
Inspect & Clean Motor Starter, 5-20 HP, <600 V	503	755	588	755	755	755	755	755	755	755	672	755	755	755	755	755	503	755	503	755	588	755	755	755																								
Replace Motor Control Center w/ Main Breaker, 480 V, 600 Amp	90,293												60,195																																			
Repair Motor Control Center w/ Main Breaker, 480 V, 600 Amp.	2,947												4,419																																			
Maintain Motor Control Center w/ Main Breaker, 480 V, 600 Amp	942	942	942	942	377	942	942	942	942	942	942	942	942	565	942	942	942	942	942	942	942	942	942	942	377																							
Replace Main Switchgear, 480 V, 2,000 Amp.	765,963																																															
Repair Main Switchgear, 480 V, 2,000 Amp.	11,657												11,657																																			
Maintain Main Switchgear, 480 V, 2,000 Amp.	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005																							
Replace Disconnect Switch, 100 Amp.	4,131																																															
Replace Transfer Switch, Auto, 600 V, 400 Amp.	81,084												81,084																																			
Replace Circuit Breaker, 600 V, 70-100 Amp., 3 Ph.	81,084																																															
Replace Bus Duct & Fittings, AL, 800-4,000 Amp.	254,954												152,973																																			

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2		
Replace Uninterruptible Power Supply Battery, 750 kVA																										921	
Replace Uninterruptible Power Supply Motor Generator, 750 k						259,431																				259,431	
Maintain Uninterruptible Power Supply, 30 kVA	62	62	62			62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62	62
Maintain Security System Panel	251	126				126	251					251	126			126	251					251	126				
Repair Heat Detector																										517	
Replace Heat Detector						1,518																				1,518	
Replace Ballast & Lamps, Compact Fluorescent Lighting Fixtur						2,701										6,887										2,701	
Replace Access Keypad						7,381										7,381										7,381	
Repair Switchgear, Indoor, 600 V (5% of total fuses)																638											
Replace Manual Pull Station																4,859										4,859	
Annual PM, Clean and Maintain Inverter Battery		2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	2,620	
Replace Public Address Speaker						19,692	5,626									7,033						19,692	5,626				
Replace Smoke Detector, Duct						7,374																				7,374	
Replace Security System Panel						1,412										1,412										1,412	
Replace Batteries & Check Operation, Smoke Detector	1,087	1,087	461	1,087	1,087	1,087	1,087	626	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087	1,087	461	1,087	1,087	1,087	1,087	1,087	626	1,087	1,087	
Replace Batteries & Check Operation, Smoke Detector, Duct	296	296		296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	296	
Repair Smoke Detector						1,166										1,582										1,166	
Repair Smoke Detector, Duct																749											
Check Operation, Heat Detector	249	249		249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249	
Maintain Public Address Speaker	2,859	2,859	1,119	2,362	2,859	2,859	2,859	2,859	2,859	2,859	2,859	2,859	2,859	2,237	2,859	2,859	2,859	2,859	1,119	2,362	2,859	2,859	2,859	2,859	2,859	2,859	
Replace Disconnect Switch, 60 Amp.				1,219												1,219										1,219	
Replace Power Panel Board, 208 Y/120 V, 100 Amp.	83,472															51,367	12,841									19,263	
Replace Switchgear, Indoor, 600 V																										7,101	
Maintain Power Panel Board, 208 Y/120 V, 100 Amp.	4,397	6,028	6,028	6,028	6,028	6,028	6,028	6,028	6,028	6,028	6,028	6,028	5,024	5,776	6,028	6,028	6,028	6,028	6,028	5,651	4,899	6,028	5,778	5,902	6,028	6,028	
Replace Motor Starter, 5-20 HP, <600 V				1,201												3,602										1,201	
Replace Coil, Motor Starter, 5-20 HP, <600 V	1,464	733	1,097	1,097	733	1,097	1,464	733	1,097	366	733		1,464		1,097	1,464	733	1,097	1,464	733	1,097	1,464	733	1,097	733	1,097	
Inspect & Clean Motor Starter, 5-20 HP, <600 V	755	755	755	672	755	755	755	755	755	503	755	503	755	588	755	755	755	755	755	755	755	755	755	672	755	755	
Replace Motor Control Center w/ Main Breaker, 480 V, 600 Am																60,195										90,293	
Repair Motor Control Center w/ Main Breaker, 480 V, 600 Amp.																4,419										2,947	
Maintain Motor Control Center w/ Main Breaker, 480 V, 600 Am	942	942	942	942	942	942	942	565	942	942	942	942	942	942	942	942	942	942	942	942	942	942	942	942	942	942	
Replace Main Switchgear, 480 V, 2,000 Amp.																765,963											
Repair Main Switchgear, 480 V, 2,000 Amp.						11,657										11,657										11,657	
Maintain Main Switchgear, 480 V, 2,000 Amp.	1,005	1,005	1,005	1,005	1,005	1,005	1,005		1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	1,005	
Replace Disconnect Switch, 100 Amp.																2,066										4,131	
Replace Transfer Switch, Auto, 600 V, 400 Amp.																										81,084	
Replace Circuit Breaker, 600 V, 70-100 Amp., 3 Ph.																4,437											
Replace Bus Duct & Fittings, AL, 800-4,000 Amp.																										254,954	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg

Facility: Goddard Space Flight Center

Building Num: 1019/51/50

City: Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7
Replace Bus Switch, 60 Amp.									8,415	16,831									8,415	16,831					
Maintain Circuit Breaker, 600 V, 30-60 Amp., 3 Ph.	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Repair Circuit Breaker, 600 V, 30-60 Amp., 3 Ph.					704										704										704
Replace Circuit Breaker, 600 V, 30-60 Amp., 3 Ph.																									
Repair Disconnect Switch, 100 Amp.			1,497										1,497											898	
Repair Circuit Breaker, 600 V, 70-100 Amp., 3 Ph.					1,406										1,406										1,406
Maintain Disconnect Switch, 100 Amp.	585	585	585	585	585	585	585	585	585	585	585	585	585	585	585	585	585	585	585	585	585	585	351	585	585
Maintain Disconnect Switch, 30 Amp.	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828	828
Repair Disconnect Switch, 30 Amp.			777			1,035		2,845	258	258			777			1,035		2,845	258	258			777		
Replace Disconnect Switch, 30 Amp.																									
Maintain Disconnect Switch, 60 Amp.	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123	
Repair Disconnect Switch, 60 Amp.			263					526					263						526				263		
Maintain Power Panel Board, 208 Y/120 V, 200 Amp.	252	252	252	252	252	252	252	252	126	252	252	252	126	252	252	252	252	252	252	252	252	252	252	252	
Maintain Circuit Breaker, 600 V, 70-100 Amp., 3 Ph.	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
Replace Switchboard, 1600 Amp.															42,855									85,711	
Repair Power Panel Board, 208 Y/120 V, 200 Amp.			198																198				198		
Repair Secondary Transformer, Dry, 300 kVA					804																			804	
Repair Power Panel Board, 208 Y/120 V, 100 Amp.	593	593	198	790	2,174	2,569	395	198			593	593	198	198	395	2,569		1,581	395				593	1,778	
Maintain Secondary Transformer, Dry, 500 kVA	126	126	126	126	126	126	126	126	126	126	126	126	126	126		126	126	126	126	126	126	126	126	126	
Repair Secondary Transformer, Dry, 500 kVA					708																			708	
Replace Secondary Transformer, Dry, 50 kVA								8,514																	
Maintain Switchboard, 1600 Amp.	166	166	166	166	166	166	166	166	166	166	166	166	166	166	125	166	166	166	166	166	166	166	82	166	
Maintain Secondary Transformer, Dry, 300 kVA	126	126	126	126	126	126	126	126	126	126	126	126	126	126		126	126	126	126	126	126	126	126	126	
Maintain Load Bank, Indoor			628					628			628			628			628			628			628		
Maintain Switchgear, Indoor, 600 V			62					62			62			62			62			62			62		
Repair Load Bank, Indoor															5,504										
Replace Load Bank, Indoor					192,923																			192,923	
Inspect & Clean Transfer Switch, Auto, 600 V, 400 Amp.	207	207		207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	207	
Repair Transfer Switch, Auto, 600 V, 400 Amp.								1,902						1,902						1,902					
Replace Secondary Transformer, Dry, 500 kVA																46,278									
Repair Power Panel Board, 208 Y/120 V, 400 Amp.			198		395		198	198		395			198					395	198	198	395			395	
Replace Power Panel Board, 208 Y/120 V, 200 Amp.									9,156					9,156											
Maintain Power Panel Board, 208 Y/120 V, 225 Amp.	4,644	4,644	4,644	4,644	4,644	4,267	4,644	4,644	4,517	4,644	4,644	4,644	4,644	4,644	2,886	4,644	3,891	3,013	4,644	4,644	4,644	4,644	4,644	4,644	
Repair Power Panel Board, 208 Y/120 V, 225 Amp.					2,766		1,186	2,569								593			198					2,766	
Replace Secondary Transformer, Dry, 300 kVA																33,195									
Maintain Power Panel Board, 208 Y/120 V, 400 Amp.	1,132	1,132	1,132	1,132	1,132	1,132	1,006	1,132	1,006	1,132	1,132	1,132	1,132	1,132	882	1,132	1,132	1,132	1,132	1,132	1,132	1,132	1,006	1,132	
Repair Secondary Transformer, Dry, 50 kVA																								458	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Replace Bus Switch, 60 Amp.				8,415	16,831									8,415	16,831									8,415	16,831
Maintain Circuit Breaker, 600 V, 30-60 Amp., 3 Ph.	50	50	50	50	50	50	50	50	50		50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Repair Circuit Breaker, 600 V, 30-60 Amp., 3 Ph.																					704				
Replace Circuit Breaker, 600 V, 30-60 Amp., 3 Ph.										1,754															
Repair Disconnect Switch, 100 Amp.								1,198										898							
Repair Circuit Breaker, 600 V, 70-100 Amp., 3 Ph.																					1,406				
Maintain Disconnect Switch, 100 Amp.	585	585	585	585	585	585	585	468	585	585	585	585	585	585	585	585	585	351	585	585	585	585	585	585	585
Maintain Disconnect Switch, 30 Amp.	828	828	579	828	828	828	828	704	828	828	828	828	663	828	828	828	828	828	828	828	663	828	787	787	787
Repair Disconnect Switch, 30 Amp.	1,035		1,294	258	258						1,035		1,810	258	258			777					2,587		
Replace Disconnect Switch, 30 Amp.			3,659					1,830					2,440								2,440	610	610	610	
Maintain Disconnect Switch, 60 Amp.	123	123	82	123	123	123	123	123	123	123	123	123	82	123	123	123	123	82	123	123	123	123	123	123	123
Repair Disconnect Switch, 60 Amp.			263					263					263											526	
Maintain Power Panel Board, 208 Y/120 V, 200 Amp.	252	252	252	252	252	252	252	252	252	252	252	252	126	252	252	252	126	252	252	252	252	252	252	252	252
Maintain Circuit Breaker, 600 V, 70-100 Amp., 3 Ph.	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Replace Switchboard, 1600 Amp.			42,855																		42,855				
Repair Power Panel Board, 208 Y/120 V, 200 Amp.				198				198																198	
Repair Secondary Transformer, Dry, 300 kVA										804															
Repair Power Panel Board, 208 Y/120 V, 100 Amp.	395	1,778	395		593	593	198	790	2,174	2,569	395	198			593	593	198	198	395	2,569		1,581	395		
Maintain Secondary Transformer, Dry, 500 kVA	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126		126	126	126	126	126
Repair Secondary Transformer, Dry, 500 kVA										708															
Replace Secondary Transformer, Dry, 50 kVA													8,514												
Maintain Switchboard, 1600 Amp.	166	125	166	166	166	166	166	166	166	166	166	166	166	166	166	166	166	166	166	125	166	166	166	166	166
Maintain Secondary Transformer, Dry, 300 kVA	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126		126	126	126	126	126
Maintain Load Bank, Indoor			628			628			628			628			628			628					628		
Maintain Switchgear, Indoor, 600 V			62			62			62			62			62			62					62		
Repair Load Bank, Indoor										5,504															
Replace Load Bank, Indoor																					192,923				
Inspect & Clean Transfer Switch, Auto, 600 V, 400 Amp.	207	207	207	207	207	207	207	207	207	207	207	207		207	207	207	207	207	207	207	207	207	207	207	207
Repair Transfer Switch, Auto, 600 V, 400 Amp.	1,902					1,902					1,902										1,902			1,902	
Replace Secondary Transformer, Dry, 500 kVA																								46,278	
Repair Power Panel Board, 208 Y/120 V, 400 Amp.		198		198				198		395		198	198		395			198				395	198	198	395
Replace Power Panel Board, 208 Y/120 V, 200 Amp.													9,156					9,156							
Maintain Power Panel Board, 208 Y/120 V, 225 Amp.	4,644	4,644	4,644	4,644	4,644	4,644	4,644	4,644	4,644	4,644	4,267	4,644	4,644	4,517	4,644	4,644	4,644	4,644	4,644	2,886	4,644	3,891	3,013	4,644	4,644
Repair Power Panel Board, 208 Y/120 V, 225 Amp.	593	1,186	2,569	198					2,766		1,186	2,569									593			198	
Replace Secondary Transformer, Dry, 300 kVA																								33,195	
Maintain Power Panel Board, 208 Y/120 V, 400 Amp.	1,132	1,006	1,006	1,132	882	1,132	1,132	1,132	1,132	1,132	1,132	1,006	1,132	1,006	1,132	1,132	1,132	1,132	1,132	882	1,132	1,132	1,132	1,132	1,132
Repair Secondary Transformer, Dry, 50 kVA			458																					458	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50 **City:** Washington, D.C.

Forecast Year:	2013	4	5	6	7	2018	9	0	1	2	2023	4	5	6	7	2028	9	0	1	2	2033	4	5	6	7	
Replace Power Panel Board, 208 Y/120 V, 400 Amp.							11,554		11,554						23,109										11,554	
Maintain Power Panel Board, 480 V, 200 Amp.	252	252	252	252	252	252	252	126	126	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	252	
Repair Power Panel Board, 480 V, 200 Amp.																		198	198							
Replace Power Panel Board, 480 V, 200 Amp.							12,355		12,355																	
Maintain Primary Transformer, Dry, 1,000 kVA	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	502	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	502	1,003	1,003
Repair Primary Transformer, Dry, 1,000 kVA									3,405																	
Replace Primary Transformer, Dry, 1,000 kVA															268,265										268,265	
Maintain Secondary Transformer, Dry, 50 kVA	126	126	126	126	126	126	126		126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	126	
Replace Power Panel Board, 208 Y/120 V, 225 Amp.							29,090		9,696						135,751		58,180	126,055								

E10 Equipment

Replace Sink, Epoxy, Laboratory																										803
Replace Faucet Washer & Clean Trap, Sink, Epoxy	43		43		43		43		43		43		43		43		43		43		43		43		43	
Repair Strainer, Sink, Epoxy							122																		122	
Replace Valve Set, Sink, Epoxy									233																233	

M&R Costs by Task

Whitestone Research

04-Dec-13

Building: B-Central Flight Control/Range Bldg **Facility:** Goddard Space Flight Center

Building Num: 1019/51/50

City: Washington, D.C.

Forecast Year:	2038	9	0	1	2	2043	4	5	6	7	2048	9	0	1	2	2053	4	5	6	7	2058	9	0	1	2
Replace Power Panel Board, 208 Y/120 V, 400 Amp.		11,554	11,554		23,109							11,554		11,554						23,109					
Maintain Power Panel Board, 480 V, 200 Amp.		252	252	252	252	252	252	252	252	252	252	252	126	126	252	252	252	252	252	252	252	252	252	252	252
Repair Power Panel Board, 480 V, 200 Amp.			198	198																		198	198		
Replace Power Panel Board, 480 V, 200 Amp.														12,355	12,355										
Maintain Primary Transformer, Dry, 1,000 kVA	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	1,003	502	1,003	1,003	1,003	1,003	1,003
Repair Primary Transformer, Dry, 1,000 kVA					3,405									3,405											
Replace Primary Transformer, Dry, 1,000 kVA																									268,265
Maintain Secondary Transformer, Dry, 50 kVA	126	126	126	126	126	126	126	126	126	126	126	126		126	126	126	126	126	126	126	126	126	126	126	126
Replace Power Panel Board, 208 Y/120 V, 225 Amp.											29,090		9,696							135,751	58,180	126,055			

E10 Equipment

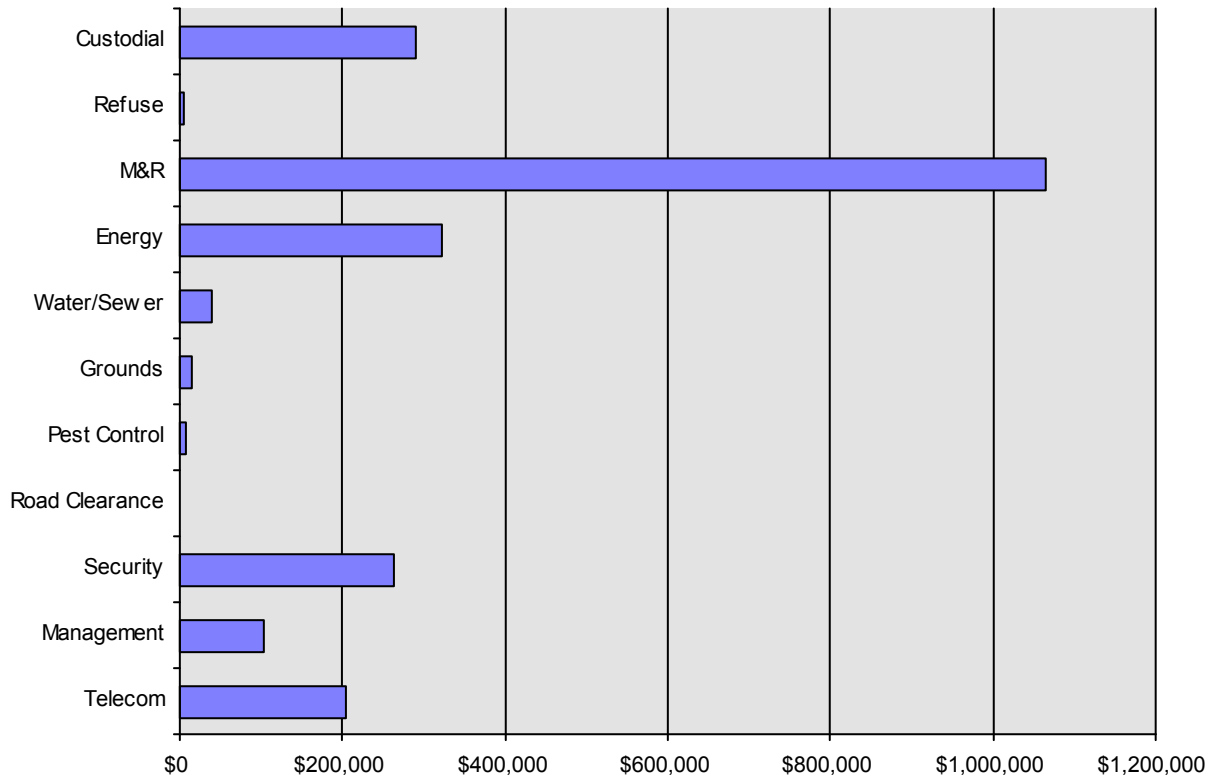
Replace Sink, Epoxy, Laboratory				803																					803
Replace Faucet Washer & Clean Trap, Sink, Epoxy	43		43			43		43		43		43		43		43		43			43		43		43
Repair Strainer, Sink, Epoxy														122											
Replace Valve Set, Sink, Epoxy																									233

Operation Costs Summary

Whitestone Research

Building: B-Central Flight Control/Range Bldg **GSFT:** 113,961
Building Number: 1019/51/50 **Replacement Value:** \$41,722,280
Facility: Goddard Space Flight Center **Building Use:** Laboratory
City: Washington, D.C. **Building Type:** Space Science Building
Built Date: 1961

Operation	Annual Cost/GSFT	Annual Total	Percent
Custodial	\$2.538	\$289,224	12.5%
Energy	\$2.832	\$322,757	14.0%
Grounds	\$0.126	\$14,324	0.6%
M&R	\$9.345	\$1,064,988	46.0%
Management	\$0.915	\$104,306	4.5%
Pest Control	\$0.059	\$6,675	0.3%
Refuse	\$0.033	\$3,751	0.2%
Road Clearance	\$0.015	\$1,762	0.1%
Security	\$2.300	\$262,155	11.3%
Telecom	\$1.801	\$205,290	8.9%
Water/Sewer	\$0.335	\$38,223	1.7%
Building Total	\$20.30	\$2,313,453	100.0%



Building Operations Task Details

Whitestone Research

Building: B-Central Flight Control/Range Bldg

Year Built: 1961

Building Type: Space Science Building

Facility: Goddard Space Flight Center

Original Cost: \$1

Building Num: 1019/51/50

City: Washington, D.C.

Replacement Value: \$41,722,280 **per SF:** \$366

Building Gsft: 113,961

Functional Area	FA GSFT	Task	Labor Cost	Material Cost	Task Cost
Operation: Custodial		Level of Service: Medium			
Conference Room	49003	Vacuum Carpet with 14" Upright Vacuum	\$73,982	\$12,022	\$86,004
Office	49003	Vacuum Carpet with 14" Upright Vacuum	\$73,982	\$12,022	\$86,004
Conference Room	49003	Clean and Wipe Furniture with Trigger Sprayer & Cloth	\$28,113	\$4,568	\$32,682
Conference Room	49003	Empty Trash; Wipe Clean & Re-line Basket	\$10,569	\$1,717	\$12,286
Office	49003	Empty Trash; Wipe Clean & Re-line Basket	\$10,569	\$1,717	\$12,286
Office	49003	Clean and Wipe Furniture with Trigger Sprayer & Cloth	\$9,371	\$1,523	\$10,894
Office	49003	Dust Surfaces with Duster	\$7,046	\$1,145	\$8,191
Office	49003	Vacuum Upholstered Furniture with Tank or Canister Vacuum	\$3,610	\$587	\$4,196
Office	49003	Dust Window Blinds	\$3,382	\$550	\$3,932
Common/Circulation Are	5698	Vacuum Carpet with 14" Upright Vacuum	\$8,603	\$1,398	\$10,000
Common/Circulation Are	5698	Vacuum Upholstered Furniture with Tank or Canister Vacuum	\$1,259	\$205	\$1,464
Common/Circulation Are	5698	Empty Trash; Wipe Clean & Re-line Basket	\$1,229	\$200	\$1,429
Mechanical/Equipment R	5698	Sweep Hard Floor with 48" Push Broom	\$221	\$36	\$257
Mechanical/Equipment R	5698	Empty Trash; Wipe Clean & Re-line Basket	\$189	\$31	\$220
Auditorium	2279	Vacuum Carpet with 14" Upright Vacuum	\$3,441	\$559	\$4,000
Auditorium	2279	Pick Up Loose Debris with Lobby Pan & Porter Broom	\$2,949	\$479	\$3,428
Auditorium	2279	Vacuum Upholstered Furniture with Tank or Canister Vacuum	\$2,182	\$355	\$2,537
Auditorium	2279	Empty Trash; Wipe Clean & Re-line Basket	\$492	\$80	\$571
Restroom	1139	Service Restroom: Empty Trash, Clean & Disinfect Fixtures, Wipe Mirrors, Replace Supplies, Wet M	\$5,159	\$838	\$5,997
Restroom	1139	Service Restroom: Empty Trash, Replace Supplies & Touch Up as Needed	\$791	\$129	\$920
Break Room	1139	Empty, Clean and Disinfect Refrigerator	\$630	\$102	\$732
Break Room	1139	Damp Wipe Interior and Exterior Cupboard	\$403	\$65	\$468
Break Room	1139	Scrub and Damp Wipe Sinks	\$202	\$33	\$235
Break Room	1139	Wet Mop & Rinse Hard Floor with 32 oz. Mop Using Double Bucket & Wringer	\$189	\$31	\$220
Break Room	1139	Clean and Polish Metal Surfaces with Trigger Sprayer & Cloth	\$151	\$25	\$176
Break Room	1139	Empty Trash; Wipe Clean & Re-line Basket	\$82	\$13	\$95
Total:			\$248,794	\$40,429	\$289,224

All costs expressed in (\$) 2012.

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Functional Area	FA GSFT	Task	Labor Cost	Material Cost	Task Cost
Operation: Grounds		Level of Service: Low			
Grounds, Improved	68376	Mow Turfgrass with 21" Power Mower	\$2,587	\$1,076	\$3,663
Grounds, Improved	68376	Aerate Improved Grounds	\$1,938	\$806	\$2,744
Grounds, Improved	68376	Clear Shrubs	\$1,618	\$673	\$2,291
Grounds, Improved	68376	Edge Clean & Trim Walks with Gas Powered Edger	\$1,073	\$447	\$1,520
Grounds, Improved	68376	Overseed, Improved Grounds	\$969	\$403	\$1,372
Grounds, Improved	68376	Vacuum with 30" Billy Goat	\$647	\$269	\$916
Grounds, Improved	68376	Clear Crabgrass	\$484	\$202	\$686
Grounds, Improved	68376	Clear Weeds with 15" Boom, Improved Grounds	\$258	\$107	\$365
Grounds, Improved	68376	Trim Around Raised Objects with String Edger	\$220	\$91	\$311
Grounds, Improved	68376	Fertilize Improved Grounds	\$194	\$81	\$274
Grounds, Improved	68376	Sweep with 30" Power Rake	\$128	\$53	\$181
Grounds, Improved	68376	Fertilize Using Power Take Off Broadcast	\$0	\$0	\$0
Total:			\$10,116	\$4,208	\$14,324
Operation: Pest Control		Level of Service: Low			
Pest Controlled	113961	Install, or Check and Re-Bait 5 Rodent Boxes	\$1,789	\$744	\$2,533
Pest Controlled	113961	Inspect Building for Pests	\$2,240	\$0	\$2,240
Pest Controlled	113961	Perform Crawling Insect Abatement	\$1,343	\$559	\$1,902
Total:			\$5,372	\$1,303	\$6,675
Operation: Road Clearance		Level of Service: Medium			
Pavement NASA	91168	Plow Paved Area	\$1,354	\$408	\$1,762
Total:			\$1,354	\$408	\$1,762
Operation: Security		Level of Service: High			
Secured Area	113961	Guard Lobby/Parking	\$167,481	\$27,216	\$194,697
Secured Area	113961	Patrol Building Perimeter	\$28,890	\$4,695	\$33,585
Total:			\$196,372	\$31,910	\$228,282

Building Operations Utility Details

Whitestone Research

Building: B-Central Flight Control/Range Bldg

Year Built: 1961

Building Type: Space Science Building

Facility: Goddard Space Flight Center

Original Cost: \$1

Building Num: 1019/51/50

City: Washington, D.C.

Replacement Value: \$41,722,280 **per SF:** \$366

Building Gsft: 113,961

		Utility	GSFT	Demand	UM	Rate	Cost
Operation:	Energy	Level of Service: Medium					
		Electricity	113961	29.949	kWh	\$0.0820	\$279,866
		Natural Gas	113961	0.724	Thm	\$0.5200	\$42,891
		Diesel	113961	0.000	Gal	\$3.3400	\$0
		Total:		30.673			\$322,757
Operation:	Refuse	Level of Service: Medium					
		Municipal Solid Waste	113961	0.370	Lbs	\$0.0711	\$2,998
		Recycling	113961	0.180	Lbs	\$0.0367	\$753
		Total:		0.550			\$3,751
Operation:	Water/Sewer	Level of Service: Medium					
		Sewer	113961	18.920	Gal	\$0.0092	\$19,837
		Water	113961	24.080	Gal	\$0.0067	\$18,386
		Total:		43.000			\$38,223

Building Operations Management Details

Whitestone Research

Building: B-Central Flight Control/Range Bldg

Year Built: 1961

Building Type: Space Science Building

Facility: Goddard Space Flight Center

Original Cost: \$1

Building Num: 1019/51/50

City: Washington, D.C.

Replacement Value: \$41,722,280 **per SF:** \$366

Building Gsft: 113,961

		Service	Demand	UM	PRV	Cost
Operation:	Management	Level of Service: Low				
		Management	0.3%	PRV	\$41,722,280	\$104,306
		Total:				\$104,306

Building Operations Service Details

Whitestone Research

Building: B-Central Flight Control/Range Bldg	Year Built: 1961	FTEs: 228	Building Type: Space Science Building
Facility: Goddard Space Flight Center	Original Cost: \$1		Building Num: 1019/51/50
City: Washington, D.C.	Replacement Value: \$41,722,280	per SF: \$366	Building Gsft: 113,961

		Service*	Quantity	Rate	Cost
Operation:	Security	Level of Service: High			
		Intrusion Detection Systems	3	\$4,986	\$14,958
		System Monitoring	3	\$3,615	\$10,845
		Access Control	3	\$2,690	\$8,070
		Total:			\$33,873
Operation:	Telecom	Level of Service: High			
		Local Telephone	228	\$468	\$106,704
		Data	228	\$3,588	\$54,810
		Long Distance Telephone	228	\$192	\$43,776
		Total:			\$205,290