EXECUTIVE SUMMARY

Application of the Department of Defense Facilities Sustainment Model (DoD FSM) to the National Aeronautics and Space Administration's (NASA) Real Property Inventory (RPI) produced an estimate of the Annual Sustainment Cost (ASC) for FY08 of $424.0 million. This represents an increase of 6.7 percent over FY07's estimate. This figure is 1.63 percent of the Current Replacement Value (CRV) of all of the National Aeronautics and Space Administration's real property assets. This is consistent with previous estimates, and for the 5th year in a row, it is below the National Research Councils generic estimate for sustainment of 2 percent - 4 percent of a facility's CRV.

This year, for the first time as part of the Facilities Sustainment Estimate, a methodology was developed for separating out repair costs from the estimated sustainment amount. The Annual Repair Cost (ARC) estimate for Fiscal Year 2008 (FY08) was $129.42 million which is 30.52 percent of the total estimated sustainment cost. This figure is consistent with the industry belief that 30 percent to 40 percent of sustainment costs should be allocated to repair. The figure is noteworthy because it is at the lower end of the scale, which implies that NASA is implementing a rigorous Preventative Maintenance (PM) Program which is forestalling the need for major repair.

As a result of the analysis of the process of determining ASC and ARC, a thorough audit of the fields in the RPI database that directly affect the calculation of these estimates is recommended. Further, an in-depth audit of the currently assigned DoD Facilities Analysis Categories (FAC) to NASA assets is recommended with a goal of creating a set of FACs and specific cost factors for the NASA's unique assets.

The process of determining the ARC should be vetted against real-world data. The data as presented would strongly suggest the continuation of an intensive PM Program where the vast majority of sustainment funding is concentrated on maintaining systems before failure occurs.

This page intentionally left blank.

ACRONYMS LIST

ACF	Area Cost Factor
ARC	Ames Research Center
ARC	Annual Repair Cost
ASC	Annual Sustainment Cost
CCF	Construction Cost Factor
CRV	Current Replacement Value
DFRC	Dryden Flight Research Center
DoD	Department of Defense
DM	Deferred Maintenance
DSN	Deep Space Network
FAC	Facilities Analysis Category
FCI	Facility Condition Index
FSM	Facility Sustainment Model
FY	Fiscal Year
GRC	Glenn Research Center
HVAC	Heating, Ventilation, Air Conditioning
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
KSC	Kennedy Space Center
LaRC	Langley Research Center
NASA	National Aeronautics and Space Administration
PM	Preventative Maintenance
QC	Quality Control
RPI	Real Property Inventory
SCI	System Condition Index
SMD	Science Mission Directorate
SSC	Stennis Space Center
SSFL	Santa Susanna Field Laboratory
UOM	Unit of Measure

1.0 BACKGROUND INFORMATION

In the past, NASA estimated sustainment funding levels by applying the National Research Council's recommendation to use a percentage of the CRV of an asset. The percentage normally suggested was between 2 percent and 4 percent and provided inadequate insight and unauditable values. Instead of relying on a sustainment estimate derived from the CRV of an asset, NASA has used the DoD FSM which uses standardized cost factors in an auditable process since 2001.

The DoD FSM provides a low-cost, non-manpower intensive alternative to rolling up previous year's maintenance costs for all NASA assets and projecting these costs into the future. Additionally, the FSM provides consistent, repeatable results which can be used to trend sustainment costs year over year. Moreover, the output of the model provides easily understood metrics that can be compared to other auditable facility metrics, such as the Deferred Maintenance (DM) Estimate.

It must be stressed that the FSM was designed as a facilities-level or agency-level tool and not as a pricing tool for individual assets. The output of the FSM gives budgetary figures rather than estimates for individual buildings, and model assumptions applicable to facilities are distorted when applying the model to low-level details.

Typical benchmarks for repair and maintenance costs for commercial facilities (sustainment) range from 1.65 percent or CRV for office facilities to 2.03 percent for industrial buildings and can be used as guideposts when analyzing NASA-specific results.

The DoD FSM, as specified, provides an estimate of sustainment which includes the amount of funding required for scheduled maintenance and periodic major repair, such as roof replacement, for the expected service life of the facility. Since NASA's budget is divided into separate categories for maintenance and major repair, starting with the FY08 FSM estimate, figures for repair and maintenance will be provided based on the ASC estimate produced by the DoD model.

For the second year in a row, the FSM is being calculated concurrently with the NASA DM Estimate. This proves to be valuable in that the RPI data gathered and modified during the DM Estimate, especially the suggested corrections and updates to the RPI data, directly affect the calculations in the FSM. Since the DM data provides insight to the condition of NASA's assets, via the System Condition Index (SCI), this data was used as a basis in the methodology used for separation of sustainment and repair values.

Industry practice assumes that up to 40 percent of the ASC of a facility will be spent on repairing assets that are in functioning and reasonable condition. This should not be confused with unexpected repair or failures which may cost upwards of 4 percent of the CRV of the asset.

DEPARTMENT OF DEFENSE FACILITIES SUSTAINMENT MODEL

The DoD FSM projects facility sustainment costs for a given FY is based on the assets assigned FAC and the corresponding Unit of Measure (UOM) and Capacity of the asset. The model projects resources necessary for maintenance and repair activity to keep assets in good working order over a 50-year service life.

Specifically, the DoD Model defines sustainment as:

> Annual maintenance and scheduled repair activities necessary to maintain the inventory of real property assets through its expected service life. It includes regularly scheduled adjustments and inspections, preventative maintenance tasks, and service calls and emergency responses. Activities also include major repairs or replacement of facility components that are expected to occur through the life cycle of facilities. This includes such work as regular roof replacement, refinishing of wall surfaces and ceilings, replacing flooring, and repairing and replacing cooling systems. Not included is the repair or replacement of non-attached equipment or furniture, or building components that typically last more than 50 years (such as foundations and structural members).

It is important to realize that the model does not include restoration, modernization, environmental compliance costs, historical preservation, or costs associated to acts of God. Nor does it include facilities operation costs such as custodial services and waste disposal.

There is a specific sustainment cost factor based on a common UOM, such as linear feet or square yards, for each FAC. The model uses commercial, off-the-shelf cost factors wherever possible. That is to say, for community equivalent assets, such as office buildings, gymnasiums, and hospitals, industry standard cost factors are used. Using these cost factors provides a level of objectivity to the cost factors applied. This adds validity to the model since the vast majority of DoD assets are covered by the commercially available cost factors.

In addition to the sustainment cost factor, a factor for the geographic location of the asset called the Area Cost Factor (ACF) is accounted for in the model. This accounts for geographic variance in labor, material, and equipment costs. Along with this extrinsic factor, a factor for inflation is included in the model so that future costs can more accurately be projected.

APPLIED METHODOLOGIES

Assignment of DoD FAC Codes to NASA Assets

Because much of the work in determining which DoD FAC most closely correlates with the NASA DM classification code and NASA classification code has been previously completed for past FSM estimates, the past reports and databases were used as a guide for assignment of the FAC. The FAC assignments provided were for the most part accurate; however, during a quality assurance review of the data, changes in previous FAC assignments were made.

As a first step a sample of the previous year's FAC assignments were reviewed. The review process consisted of looking at the assigned FAC, its description, and UOM and comparing it to both the description and UOM in the RPI, as well as, the NASA Classification Code for a given asset to see if they were the same or similar. Since it is known that not all DoD FACs correlate directly with the NASA classification scheme or that there may be omissions in the DoD FAC for unique NASA assets, engineering judgment and experience were used to validate past assignments and assign more accurate DoD FACs, when appropriate.

For new NASA assets and those assets which did not have a previous FAC assigned, the previous data and reports were used as guides for assignment of appropriate FACs.

That is to say, if a covered storage building was assigned to FAC 4421 in the past, this FAC was assigned to all uncategorized NASA covered storage buildings in the current report. There were cases where there was no previous good correlation between DoD FAC and NASA asset. In those cases, engineering judgment was used to assign an appropriate FAC.

As mentioned previously, when assigning an appropriate DoD FAC to a NASA asset, the description of the asset is taken into consideration. Also taken into consideration is UOM related to the DoD FAC. This can be a useful hint in assigning the appropriate FAC. For example, if a NASA asset has a UOM that is in “square feet” it would be inappropriate to assign a FAC that specifies a UOM of “each.”

Finally, the asset’s function is taken into consideration when assigning the FAC. Assets that have functionality related to hazardous materials would be assigned FACs that are related to hazardous materials even though their practical function and physical nature are the same as that for non-hazardous material related assets. For example, a hazardous material storage shed would not be assigned a more generic FAC of 4422 but would be assigned a FAC of 4423, which indicates more correctly the function of the shed as storing hazardous materials.

Using sound engineering and architectural judgment, the new NASA assets which do not correlate well with any DoD FAC are assigned a FAC which most closely matches the NASA asset. Using the criteria of description, function, physical character, and UOM as a guide, FACs most closely related to the NASA asset were assigned to these non-correlating assets. For example, while there is a FAC in the DoD Facilities Pricing Guide that is identified as a “missile launching pad,” this FAC would be inappropriate to assign to Launch Pad 39A at Kennedy Space Center (KSC) for many reasons, most notably because the UOM for the FAC does not match the NASA UOM for this facility. In this case, the FAC for a “propulsion test cell,” FAC 3904 was assigned to this asset.

Use of Scale Method or Ratio Method for Determining Sustainment

For those assets that closely correlate with the DoD FSM, the model simply requires that capacity, sustainment cost factor, annual cost factor, and inflation factor be multiplied together in order to determine ASC. The resulting figure is the projected sustainment for the asset for a desired FY. However, not all NASA assets correlate directly with the DoD FSM model because the DoD FACs account only for the basic facility and building equipment whereas NASA classification codes account for not only the building type but collateral equipment affixed to the asset which is used in the asset's functional scope. Because of this, sustainment costs found using the NASA capacity alone for an asset assigned to a particular DoD FAC will be inaccurate for those NASA assets that do not correlate well with the DoD model.

An asset considered not to closely correlate with the DoD model either has no analogous DoD FAC or its NASA capacity/UOM is different from the capacity/UOM dictated by the asset's analogous DoD FAC. In those cases, two alternate methods for determining sustainment will be used. The first is called the "Scale Method" and the second is called the "Ratio Method."

The "Scale Method" utilizes a multiplication factor to increase or decrease the annual sustainment cost determined in the basic DoD model. This method is typically used for facilities that match closely to the DoD model but are not an exact match because of some factor, such as size. For these facilities, an appropriate multiplication factor based on sound engineering judgment will be assigned to increase or decrease the sustainment amount.

For example, while the DoD model does account for antennae, unmodified application of the DoD model to NASA's large telescopic radio antennae would result in an annual sustainment cost that is below what is reasonable for the asset. Using engineering experience and judgment and past application of multiplication factors to various sized radio antennae, the appropriate multiplication factors for different sized antennae was applied.

The use of a multiplication factor to change the scale of the cost factor, in its narrowest sense, can be considered as directly affecting the capacity value of an asset. In this same vein, replacing capacity with an appropriate factor would allow calculation of sustainment for assets that do not correlate well with the assigned FAC UOM or are of a much different scale than the analogous DoD facility. Because the factor suggested for use in place of capacity is a ratio of two values, this second methodology is referred to as the "Ratio Method."

The "Ratio Method," applied when determining facility sustainment costs for assets that do not closely correlate to the DoD model, has been used in past FSM estimates and replaces capacity in the DoD model with a ratio. This is done with the assumption that the NASA capacity of the asset is not useful, applicable, or equivalent to the capacity in the DoD model.

The capacity is replaced with a ratio of the asset CRV divided by the DoD Construction Cost Factor (CCF) of the most closely related DoD FAC assigned to the asset. This ratio is reasonable to use because the NASA asset CRV will usually include all collateral program support equipment, while the DoD CCF will only account for the typical cost of replacing a similar building. For example, the sustainment cost for the 40x80 wind tunnel at Ames Research Center (ARC) was assigned a FAC code of 3903, which has a UOM of "each," whereas the NASA UOM is in "square feet." Since the sustainment costs would not be calculated correctly using this UOM, the capacity was replaced with the ratio of the CRV of the asset divided by CCF for that FAC.

For the current implementation, it should be noted that in all cases where an asset's UOM was "each," the ratio method was used when determining the ASC. This accounted for the relative size between similar assets. Additionally, in many cases where an asset was newly added to the database, the ratio method was used because there were many cases where there was incomplete data necessary for computing the sustainment for these assets. Finally, in cases where the ratio method was attempted but the CRV of the asset was unknown, zero, or nonsensical, the ratio used was 'one' and the cost factor as specified by the pricing guide was used without any modification for capacity or value of the asset.

Separating the DOD FSM into Repair and Sustainment

In order to separate out repair costs from the estimate of sustainment derived using the DoD FSM, a methodology based on the NASA DM model was developed. The methodology employed accounts for the age and condition of the system by using the SCI scores given during the DM assessment.

The generally accepted industry practice is to assume that between 30 percent and 40 percent of sustainment costs should be applied to repair for a properly functioning asset in reasonable condition. Assuming that an SCI of 3 for all applicable systems for an administrative building will describe it as "properly functioning and in reasonable condition," the fractional amount of repair was extrapolated for other SCI scores.

Since systems are in need of repair based partially on function, and as a result of PM practices, asset's systems were divided into two categories, long lived and short lived. Long-lived systems generally require less PM, while short-lived systems require more PM in order to keep the system functioning. As a result, the degradation curves and the resulting percent of sustainment assigned to repair for these two asset types are different.

In addition to the repair to sustainment ratios for a given SCI being different, the amount of sustainment assigned to each system would be different. For the methodology implemented, the fraction of total sustainment applied to each of an asset's systems was based on the DM methodology's System CRV percent allocation which is based on the NASA DM Category assigned to the asset.

After calculating the asset's sustainment and dividing this among the assets' systems, the ARC estimate for each system can be derived given an SCI. The repair estimates are added for the facility and are used to determine the percentage of estimated repair to estimated sustainment. The method described is for budgetary purposes only, and like the DoD FSM, it should not be applied to the asset-level in order to determine repair estimates for a particular asset.

2.0 **RESULTS**

The NASA FY08 estimate for sustainment increased by $26.5 million over the FY07 estimate to $424.0 million. This represents an increase of 6.7 percent over last year. The increase can be accounted for by the following extrinsic and intrinsic factors:

- The increase of NASA CRV by 6.8 percent
- The inflation factor of 4.45 percent
- The use of the updated DoD Facilities Pricing Guide (UFC 3-701-06)
- The use of the ratio method for determining sustainment for many new assets
- More accurate capacities in the RPI database
- The increase in the number of facilities in the RPI database.

The $424.0 million estimate for sustainment is approximately 1.63 percent of the value of the NASA-wide CRV. This figure is consistent with previous years' ratio of sustainment to CRV. Last year, the ratio of annual sustainment to CRV for FY07 was 1.63 percent.

The FY08 1.63 percent ratio is once again below the National Research Council's recommendation that estimated sustainment to facility CRV should fall between 2 percent and 4 percent. As previously noted, the National Research Council's recommendation has been discounted by NASA for a number of reasons and the consistent estimates produced year over year using the FSM reinforce that the DoD FSM is a better model to use for its consistency and audit ability.

The most dramatic increases in ASC occurred in the Science Mission Directorate (SMD). The increase in this Directorate of over 11 percent to $132.4 million was due to the increases at the Centers which make up this directorate. The largest increase in the Directorate was projected at ARC where the sustainment related to Wind Tunnels, a Steam Generation Plant, and an Electrical substation increased dramatically. These increases were reviewed and judged reasonable given that in a majority of the cases the ratio method was used to estimate the sustainment values for these items.

All of the Directorates did show increases in sustainment, however, each had sustainment to CRV ratios that were consistent over the last several years. Summaries for NASA Directorates are shown in the following table (Table 2-1) in millions of dollars.

Table 2-1. NASA Directorate Year by Year Comparison

NAME	FY03 CRV	FY05 ASC	ASC% of CRV 05	FY04 CRV	FY06 ASC	ASC% of CRV 06	FY05 CRV	FY07 ASC	ASC% of CRV 07	FY06 CRV	FY08 ASC	ASC% of CRV 08
NASA Total	$ 22,276.00	$ 344.00	1.54%	$ 23,026.52	$ 360.45	1.57%	$ 24,385.50	$ 397.56	1.63%	$ 26,062.74	$ 424.02	1.63%
ARMD Total	$ 5,378.00	$ 66.38	1.23%	$ 5,566.88	$ 75.02	1.35%	$ 6,034.03	$ 90.23	1.50%	$ 6,328.97	$ 94.54	1.49%
SMD Total	$ 6,226.17	$ 103.48	1.66%	$ 6,650.37	$ 112.98	1.70%	$ 7,114.50	$ 118.85	1.67%	$ 7,559.88	$ 132.44	1.75%
SOMD Total	$ 10,356.96	$ 166.56	1.61%	$ 10,809.30	$ 172.43	1.60%	$ 11,236.97	$ 188.48	1.68%	$ 12,173.89	$ 197.04	1.62%

There was a NASA wide increase in the ASC estimate with many of the Centers showing increases. Only KSC, Langley Research Center (LaRC), and Stennis Space Center (SSC) showed a relative decrease in ASC compared to the FY07 estimate. The decreases at these Centers were minor compared to the Directorate totals and were due to refined application of the DoD FSM. The following table (Table 2-2) shows, in millions of dollars, the Directorate totals for each of the Centers that make up the Directorates.

Table 2-2. NASA Center Year by Year Comparison

NAME	FY03 CRV	FY05 ASC	ASC% of CRV 05	FY04 CRV	FY06 ASC	ASC% of CRV 06	FY05 CRV	FY07 ASC	ASC% of CRV 07	FY06 CRV	FY08 ASC	ASC% of CRV 08
NASA Total	$ 22,276.00	$ 344.00	1.54%	$ 23,026.52	$ 360.45	1.57%	$ 24,385.50	$ 397.56	1.63%	$ 26,062.74	$ 424.02	1.63%
DFRC Total	$ 274.00	$ 3.78	1.38%	$ 281.57	$ 4.84	1.72%	$ 307.97	$ 4.80	1.56%	$ 323.39	$ 5.96	1.84%
GRC Total	$ 2,492.00	$ 32.56	1.31%	$ 2,590.08	$ 36.98	1.43%	$ 2,783.71	$ 40.54	1.46%	$ 2,909.97	$ 47.18	1.62%
LaRC Total	$ 2,612.00	$ 30.04	1.15%	$ 2,695.23	$ 33.20	1.23%	$ 2,942.35	$ 44.89	1.53%	$ 3,095.61	$ 41.39	1.34%
ARMD Total	$ 5,378.00	$ 66.38	1.23%	$ 5,566.88	$ 75.02	1.35%	$ 6,034.03	$ 90.23	1.50%	$ 6,328.97	$ 94.54	1.49%
ARC Total	$ 3,551.00	$ 48.27	1.36%	$ 3,784.77	$ 52.16	1.38%	$ 4,030.18	$ 54.05	1.34%	$ 4,249.90	$ 63.76	1.50%
GSFC Total	$ 1,575.17	$ 25.68	1.63%	$ 1,643.86	$ 26.71	1.62%	$ 1,758.47	$ 27.97	1.59%	$ 1,900.82	$ 29.29	1.54%
JPL Total	$ 1,100.00	$ 29.54	2.69%	$ 1,221.74	$ 34.11	2.79%	$ 1,325.85	$ 36.83	2.78%	$ 1,409.16	$ 39.39	2.80%
SMD Total	$ 6,226.17	$ 103.48	1.66%	$ 6,650.37	$ 112.98	1.70%	$ 7,114.50	$ 118.85	1.67%	$ 7,559.88	$ 132.44	1.75%
JSC Total	$ 1,745.96	$ 25.30	1.45%	$ 1,854.13	$ 26.46	1.43%	$ 1,992.64	$ 28.74	1.44%	$ 2,089.83	$ 33.30	1.59%
KSC Total	$ 4,479.00	$ 87.36	1.95%	$ 4,472.95	$ 83.14	1.86%	$ 4,543.86	$ 91.45	2.01%	$ 5,206.82	$ 86.08	1.65%
MSFC Total	$ 2,508.00	$ 32.48	1.30%	$ 2,692.41	$ 34.96	1.30%	$ 2,818.06	$ 37.26	1.32%	$ 2,926.54	$ 46.71	1.60%
SSC Total	$ 1,624.00	$ 21.42	1.32%	$ 1,789.81	$ 27.87	1.56%	$ 1,882.41	$ 31.03	1.65%	$ 1,950.70	$ 30.94	1.59%
SOMD Total	$ 10,356.96	$ 166.56	1.61%	$ 10,809.30	$ 172.43	1.60%	$ 11,236.97	$ 188.48	1.68%	$ 12,173.89	$ 197.04	1.62%

Starting in FY08 the ARC was estimated as a fraction of the ASC. The methodology for determining this is described in detail in the latter part of this document. Keeping in mind that industry standards estimate that the repair cost for an asset judged to be "properly functioning and reasonable condition" is between 30 percent and 40 percent of the sustainment cost, the NASA-wide estimate was calculated at 30.52 percent of sustainment costs. The following table (Table 2-3) shows the FY08 Repair Estimate and the ARC percent of ASC in millions of dollars.

Table 2-3. NASA Repair Estimate

NAME	FY06 CRV	FY08 ASC	FY08 Repair Estimate	ARC% of ASC 08
NASA Total	$ 26,062.74	$ 424.02	$ 129.42	30.52%
DFRC Total	$ 323.39	$ 5.96	$ 1.48	24.90%
GRC Total	$ 2,909.97	$ 47.18	$ 15.19	32.20%
LaRC Total	$ 3,095.61	$ 41.39	$ 11.82	28.56%
ARMD Total	$ 6,328.97	$ 94.54	$ 28.50	30.14%
ARC Total	$ 4,249.90	$ 63.76	$ 20.53	32.20%
GSFC Total	$ 1,900.82	$ 29.29	$ 8.85	30.23%
JPL Total	$ 1,409.16	$ 39.39	$ 9.92	25.19%
SMD Total	$ 7,559.88	$ 132.44	$ 39.31	29.68%
JSC Total	$ 2,089.83	$ 33.30	$ 10.23	30.71%
KSC Total	$ 5,206.82	$ 86.08	$ 28.09	32.63%
MSFC Total	$ 2,926.54	$ 46.71	$ 13.86	29.67%
SSC Total	$ 1,950.70	$ 30.94	$ 9.44	30.53%
SOMD Total	$ 12,173.89	$ 197.04	$ 61.62	31.27%

The NASA wide percentage of 30.52 percent of sustainment is close to the lower zone of what can be expected for buildings in reasonable condition. This may be due to the conservative nature of the assumptions of the model in that a SCI score of 3 was considered to be the definition of a building in “reasonable” condition. If this assumption is sound, and allowances for this definition of “reasonable” are made, the percentages presented for each Center are very consistent with the condition the facilities at the Centers were observed in.

For example, Jet Propulsion Laboratory (JPL), and Dryden Flight Research Center (DFRC) have the lowest ratio of repair to sustainment costs. This stands to reason since the Facility Condition Index (FCI) score for JPL was determined to be 4.0 and the FCI score for DFRC was determined to be 4.1 during the FY06 DM Estimate. According to the DM estimating methodology, an SCI, which is the system-level version of the FCI, of 4 indicates that “some minor repairs could be required.” Using this as a standard, it seems reasonable then that the estimated repair costs for facilities rated around 4 be less than 30 percent.

This consistency is evident NASA-wide since the agency’s FCI score was determined to be 3.6 for all NASA assets in FY06. Additionally, each of the Centers has a FCI score greater than 3 again implying that the ratio should be closer to the lower limit of the general consensus.

The consistently lower ARC percentage is a testament to the PM Program being implemented at NASA. The conclusion drawn from these results is that the PM program is keeping ahead of any major repair that may be required by keeping systems running before a major repair is required. This further supports the contention that nearly 70 percent of the annual sustainment cost is being allocated to PM activities which forestall the need for any significant repair.

Some analysis was also done with regard to the split of the sustainment estimate between active and non-active assets and the split of the repair estimate between active and non-active assets. The following table (Table 2-4) shows how the ASC and ARC were split between active and non-active assets in millions of dollars.

Table 2-4. Active / Non-Active Split

Name	FY06 CRV	FY06 CRV Active	FY06 CRV NonActive	FY08 ASC	FY08 ASC Active	FY08 ASC NonActive	FY08 ARC	FY08 ARC Active	FY08 ARC NonActive
NASA Total	$ 26,062.74	**$ 18,480.00**	**$ 7,582.74**	$ 424.02	**$ 372.11**	**$ 51.91**	$ 129.42	**$ 111.56**	**$ 17.87**
DFRC Total	$ 323.39	**$ 320.00**	**$ 3.39**	$ 5.96	**$ 5.96**	**$ 0.00**	$ 1.48	**$ 1.48**	**$ 0.00**
GRC Total	$ 2,909.97	**$ 2,550.00**	**$ 359.97**	$ 47.18	**$ 44.93**	**$ 2.26**	$ 15.19	**$ 14.15**	**$ 1.04**
LaRC Total	$ 3,095.61	**$ 2,590.00**	**$ 505.61**	$ 41.39	**$ 38.25**	**$ 3.13**	$ 11.82	**$ 10.70**	**$ 1.12**
ARMD Total	$ 6,328.97	**$ 5,460.00**	**$ 868.97**	$ 94.54	**$ 89.14**	**$ 5.39**	$ 28.50	**$ 26.34**	**$ 2.16**
ARC Total	$ 4,249.90	**$ 1,670.00**	**$ 2,579.90**	$ 63.76	**$ 32.88**	**$ 30.88**	$ 20.53	**$ 9.87**	**$ 10.65**
GSFC Total	$ 1,900.82	**$ 1,830.00**	**$ 70.82**	$ 29.29	**$ 28.67**	**$ 0.63**	$ 8.85	**$ 8.64**	**$ 0.21**
JPL Total	$ 1,409.16	**$ 1,240.00**	**$ 169.16**	$ 39.39	**$ 37.16**	**$ 2.23**	$ 9.92	**$ 9.49**	**$ 0.44**
SMD Total	$ 7,559.88	**$ 4,740.00**	**$ 2,819.88**	$ 132.44	**$ 98.70**	**$ 33.74**	$ 39.31	**$ 28.00**	**$ 11.30**
JSC Total	$ 2,089.83	**$ 2,080.00**	**$ 9.83**	$ 33.30	**$ 33.18**	**$ 0.12**	$ 10.23	**$ 10.16**	**$ 0.07**
KSC Total	$ 5,206.82	**$ 2,320.00**	**$ 2,886.82**	$ 86.08	**$ 79.47**	**$ 6.62**	$ 28.09	**$ 25.90**	**$ 2.20**
MSFC Total	$ 2,926.54	**$ 2,580.00**	**$ 346.54**	$ 46.71	**$ 43.03**	**$ 3.68**	$ 13.86	**$ 12.55**	**$ 1.31**
SSC Total	$ 1,950.70	**$ 1,300.00**	**$ 650.70**	$ 30.94	**$ 28.58**	**$ 2.36**	$ 9.44	**$ 8.61**	**$ 0.83**
SOMD Total	$ 12,173.89	**$ 8,280.00**	**$ 3,893.89**	$ 197.04	**$ 184.26**	**$ 12.78**	$ 61.62	**$ 57.22**	**$ 4.41**

Most notably, the table shows that NASA is projected to spend nearly $52 million for sustainment of inactive assets. The vast majority of this money will be used to sustain assets in the SMD. Of that $52 million, nearly $18 million is estimated to be needed to repair the inactive facilities. This represents 34.42 percent of the sustainment value, which is reasonable since the NASA-wide FCI for inactive assets is 3.4.

The following table (Table 2-5) shows the ASC as a percentage of active and inactive CRV as well as the ARC as a percentage of active and inactive sustainment. Note that generally, due to poorer facility conditions, the ARC percent of ASC is greater for non-active assets.

Table 2-5. Percent Sustainment and Repair for Active and Non-Active Assets.

Name	FY06 CRV	FY08 ASC	FY08 ARC	ASC % of CRV Active	ASC % of CRV NonActive	ARC % of ASC Acitve	ARC% of ASC NonActive
NASA Total	$ 26,062.74	$ 424.02	$ 129.42	2.01%	0.68%	29.98%	34.42%
DFRC Total	$ 323.39	$ 5.96	$ 1.48	1.86%	0.06%	24.89%	40.09%
GRC Total	$ 2,909.97	$ 47.18	$ 15.19	1.76%	0.63%	31.50%	46.07%
LaRC Total	$ 3,095.61	$ 41.39	$ 11.82	1.48%	0.62%	27.97%	35.69%
ARMD Total	$ 6,328.97	$ 94.54	$ 28.50	1.63%	0.62%	29.54%	40.04%
ARC Total	$ 4,249.90	$ 63.76	$ 20.53	1.97%	1.20%	30.03%	34.50%
GSFC Total	$ 1,900.82	$ 29.29	$ 8.85	1.57%	0.89%	30.16%	33.54%
JPL Total	$ 1,409.16	$ 39.39	$ 9.92	3.00%	1.32%	25.53%	19.59%
SMD Total	$ 7,559.88	$ 132.44	$ 39.31	2.08%	1.20%	28.37%	33.50%
JSC Total	$ 2,089.83	$ 33.30	$ 10.23	1.60%	1.20%	30.61%	59.92%
KSC Total	$ 5,206.82	$ 86.08	$ 28.09	3.43%	0.23%	32.59%	33.18%
MSFC Total	$ 2,926.54	$ 46.71	$ 13.86	1.67%	1.06%	29.16%	35.58%
SSC Total	$ 1,950.70	$ 30.94	$ 9.44	2.20%	0.36%	30.14%	35.19%
SOMD Total	$ 12,173.89	$ 197.04	$ 61.62	2.23%	0.33%	31.05%	34.49%

Johnson Space Center is projected to spend nearly 60 percent of the sustainment funding allocated to its non-active assets on repair. This is primarily due to the poor conditions of the non-active assets at JSC, whose FCI for FY06 was determined to be 2.8.

As was expected there were occasions when the NASA asset did not correlate directly with any of the specified DoD FACs. Likewise, there were occasions where even though there was good correlation with the DoD FAC, the asset's UOM did not match the DoD UOM or the asset's Capacity was nonsensical. In all of these cases the Ratio Method was used to determine the ASC for the asset.

For the FY08 estimate there were 2357 assets valued at $17.17 billion which utilized the Ratio Method in order to determine ASC. The ASC for these assets is $307.38 million or 1.8 percent of the CRV of these assets. The ARC for these assets is $91.21 million or 29.7 percent of the ASC.

This is mitigated slightly by the rule which states that the 802 assets valued at $3.84 billion with a UOM of “Each” should always utilize the Ratio Method to determine the ASC. These assets have an ASC of $99.86 million, which is 2.6% of the CRV of these assets. The ARC for these assets is 27.28 million or 27.3% of the ASC.

Further, a thorough analysis of the data showed incompatible UOM or capacities frequently for FAC 8211, which identifies an asset as a heat source (e.g. boiler house) and FAC 8131, which identifies an asset as an electrical substation. An example of inappropriate capacity for FAC 8131 is found for asset 89 at Glenn Research Center

(GRC) which currently shows a capacity of 334,000 Kilovolt-Amperes. Similarly, asset 1215 at LaRC is assigned FAC 8211. This asset shows a capacity of 15,947 million BTU per Hour in the RPI. In these cases the ratio method was used to determine the ASC.

Unlike boiler houses and electrical substations, there are several cases where assets had no analogous match to DoD FAC as described in the DoD Pricing Guide. These assets were typically thought to be part of an asset's system and not stand-alone assets themselves. For example, Cooling Towers and Alarm Systems were assigned generic FACs for this estimate even though these assets are considered part of an asset's systems by the DoD FSM. Cooling Towers were assigned FAC 8929 and assets under this FAC had a total CRV of $200.4 million with an ASC of $17.16 million which was determined using the Ratio Method. Alarm systems were assigned FAC 8999 and assets under this FAC code had a total CRV of $39.98 million, but have no ASC per the DoD methodology.

Finally, there were also many instances where a generic FAC of 1499 was assigned to an asset. This FAC is assigned to miscellaneous systems that are part of another system. With a total CRV of $133.66 million, and ASC of $2.1 million, this FAC is a catch-all for assets that do not fit under other FACs.

New assets, of which there were 282, had a CRV of $166.83 million and an ASC of $1.77 million or 1.1% of the CRV of these assets. These assets added only $156,221, or 8.8% of the ASC, to the NASA wide ARC since they were for the most part in excellent condition.

3.0 RECOMMENDATIONS

As in the FY06 DM Estimate, a thorough independent audit of real property information is recommended. This type of audit would help in refining the ASC estimate further because the DoD FSM primarily uses the capacity and UOM of an asset to determine the ASC. Secondarily, if an inadequate or non-correlating UOM or a nonsensical UOM is encountered during calculation of the ASC, the CRV is used to determine the ASC in the FSM. Since there were many instances encountered where there was an incongruity between UOM, nonsensical capacity, or missing CRV, it may be useful to have these items audited before the next calculation of the ASC.

As stated, the Ratio Method was used to determine ASC in cases such as these. While the Ratio Method is a valid, repeatable, and auditable method for determining ASC, correction of underlying data anomalies in UOM, Capacity, and CRV may lead to more accurate estimates for sustainment and repair.

Since the determination of the appropriate analogous DoD FAC is necessary to determine the ASC, an audit of the current FACs assigned to NASA assets is recommended. During the assignment of FACs for new facilities, a quality control (QC) check was simultaneously performed to validate past FAC assignments. During these checks, there were several assignments that, by engineering judgment, seemed incorrect. Due to time constraints, an asset by asset review was not performed; therefore, only those errors encountered during new FAC assignment and QC checks were corrected. Since the FAC assignment determines the cost factor to be used in calculating the ASC, it is imperative that the most appropriate FAC be assigned to an asset.

Furthermore, it is recommended that for the unique NASA assets, a unique set of FAC codes and cost factors be created. Because of the unique nature of NASA assets, such as Launch Pad 39A at KSC and the 70-Meter Antenna in the Deep Space Network (DSN), the current methods of estimating sustainment based on the ratio and scale methods may not be as precise as necessary for budgetary estimation. It would be a fruitful exercise to look at a fraction of the most unique and expensive assets, determine more appropriate cost factors for these assets, and assign them to a new NASA-specific FAC code for use in future ASC estimates.

This is also suggested for assets that are not necessarily unique to NASA but are cataloged as individual assets in the RPI like Cooling Towers and Alarm Systems. These assets are usually account for as part of an asset's systems in the DoD FSM, but are treated as individual assets by NASA. Again, if a unique set of NASA specific FAC codes is created for assets such as Cooling Towers and Alarm Systems more appropriate sustainment and repair figures may be determined.

Further examination of the ARC assumptions is also recommended. Since this year's determination of the ARC was based on a new but sound engineering model, it would be beneficial if the results of the estimate were vetted against real world NASA costs for repair. The model can be easily modified by changing the curves which model the degradation of an asset based on SCI score. Therefore, if an examination of real world numbers indicates that alterations should be made to the model, this can be easily accomplished.

From a holistic point of view, the results of the ARC estimate indicate that a continued focus on an intensive and extensive PM program is recommended. The prevention of the need to repair because of a good PM Program are evident in the results and should be continued especially when considering that unexpected repairs and failures can cost as high as 4 percent of the CRV of the asset. In this case, as in many others, a preventative approach is the most economical way to keep NASA's assets in a service-ready status.

APPENDIX A - CALCULATION OF REPAIR VS. SUSTAINMENT METHODOLOGY

The most direct method for determining repair costs is to analyze past failure rates and service calls for a set of assets. From this data, a predictive model can be created which can be applied to any FY given appropriate inflation factors. Due to time and cost restrictions, however, a roll-up and analysis of several years of data is impractical. As a result, the methodology for the repair percentage of sustainment costs was developed using NASA's DM model as a basis.

This is an appropriate model to use considering that there are two important factors that usually drive repair costs-age of the facility and a good PM Program. Consider the age of the facility. In the first years of a facility there will be very little repair costs incurred, unless there is an unexpected need for repair. As the building ages, however, there will be more and more need for repair of certain building systems, thus, the fraction of repair to sustainment costs will increase. For example, common practice is to assume that the split between repair and sustainment costs for a properly functioning facility in reasonable condition is 40/60. As the facility ages it is not uncommon to see ratios grow to 70/30 or higher in order to keep the facility serviceable.

A PM Program can forestall the growth of this ratio since an effective PM Program will reduce minor service disruptions and delay major repair. The effectiveness of life-cycle savings associated with a good PM Program is generally regarded to be drastic in terms of equipment and facility lives. Since NASA has in place an effective PM Program, especially with regard to its unique mission critical assets, a survey of the current condition of the assets can be used as an indication of how old the facility is and how effective the PM Program is. Since the NASA-wide deferred maintenance effort was just completed, the FCI, or more specifically, the SCI, can be used to evaluate the current condition of an asset's systems in terms of how much repair would be required to keep the system in serviceable condition.

The DM assessment judges the condition of nine asset systems. These systems can be broken into two categories – long-lived systems and short-lived systems. In terms of repair, long-lived systems are those systems that are not mechanically complex, have a longer life, and have a lower and / or a more predictable failure rate. Further, the assumption is that the chance of these systems failing in a given year is much less than that of a more complex system and that they generally require less PM than other systems. These systems are as follows: structure, interior finishes, exterior, and roof.

Short-lived systems, on the other hand, are mechanically more complex, more likely to deteriorate with time, and have more potential failure points. In order to keep these systems operational, more PM must be performed on them. The short-lived systems are: Heating, ventilation, air conditioning (HVAC); electrical; plumbing; conveyance; and program support equipment.

For example, it is logical to assume that it will take less maintenance to sustain the interior finishes of a building than it would to sustain a HVAC system. The HVAC system is complex and the regular maintenance required to keep air filters clean, condensation drains free-flowing, and louvers functional. In short, keeping the HVAC system operational would be much more maintenance than to keep the interior walls of a facility operational. The assumption is that NASA would allocate a relatively lower percentage of sustainment cost to the interior finish of the asset than to the asset's HVAC system.

The percentage of sustainment cost would also be dictated by the actual condition of the system. Those systems that are new, or are not in need of repair, would have all of their sustainment costs allocated to maintenance. While those systems that show wear and age will have a percentage of sustainment costs allocated to repair the system. Since the DM methodology rates each system in terms of condition relative to repair (see Table A-1), the SCI score can be used as a guide to allocate the percentage of sustainment costs required for repair.

Table A-1. DM Assessment Ratings Matrix

	Excellent 5	Good 4	Fair 3	Poor 2	Bad 1
STRUCTURE Walls, Floors, Stairwells, Loading Docks, Pavement, Equipment Slabs, Steel Framing	Only normal preventative maintenance required.	Some minor repairs could be required. Does not affect structural integrity or intended use.	Cracking, crazing, and/or visual defects. Could affect structural integrity or intended use.	Visible settlement, structural defects; significant repairs required.	Unrepairable; replacement required.
EXTERIOR Walls, Windows, Doors, Exterior Finishes, Caulking at Joints, Doors, and Windows	Only normal preventative maintenance required.	Sound and weatherproof. Some minor repairs could be required.	Not completely sound or weatherproof. Wear and tear visually noticeable. More minor repairs required.	Not sound or weatherproof; significant repairs required.	Unrepairable; replacement required.
ROOF Roof Coverings, Roof Openings, Gutters, Flashing	Only normal preventative maintenance required.	Watertight, sound flashing and penetrations; positive drainage. Some minor repairs could be required.	Mostly watertight. More minor repairs required.	Not waterproof. Obvious evidence of leaking from interior assessment. Significant repairs required.	Significant leaking, deteriorated. Requires entire re-roof.
HVAC Supply/Exhaust Fans, Indv. A/C Units, DX Units and Heat Pumps, Controls, Chillers, Boilers, Steam and Condensate Piping (only if fed from within the bldg)	Only normal preventative maintenance required. Equipment room clean and neat.	Some minor repairs could be required.	More minor repairs required. Some signs of corrosion, leaking, alarm indicators and poor housekeeping are obvious.	Significant repairs required. Not functioning as intended. Obvious poor housekeeping and maintenance practices due to excessive corrosion, leaking, or alarm indicators. Does not meet all codes. Obvious age issues and problems getting replacement parts.	Nonfunctional; system unrepairable; complete replacement required. System unsafe and does not meet codes.
ELECTRICAL Service and Distribution, Lighting, Branch Wiring, Communications, Security, Fire Protection	Only normal preventative maintenance required.	Some minor repairs could be required. Meets code.	More minor repairs required. Mostly functional.	Significant repairs required. System not fully functional for building's intended use. Systems obsolete. Does not meet all codes. Age issue a factor.	Unrepairable; replacement required. Repair parts not available. Systems do not meet code and are unsafe.
PLUMBING Potable/Non-potable Water Systems, Sanitary Sewer and Septic, Bathrooms, Fire Protection Piping, Water Treatment Systems	Only normal preventative maintenance required.	Some minor repairs could be required. Good fixture and piping appearance; no leaks.	More minor repairs required. Wear and tear noticeable.	Significant repairs required. Fixtures and plumbing are obsolete. Many leaks and obvious corrosion in piping systems.	Nonfunctional; system unrepairable; complete replacement required.
CONVEYANCE Elevators, Escalators, Cranes (Overhead, Gantry, Semi-Gantry), Jib Boom Cranes, Overhead Hoist, Monorail	Only normal preventative maintenance required.	Some minor repairs could be required.	More repairs required; overall conveying system generally functional.	Significant repairs required. Does not meet all codes.	Existing system not operational and unrepairable; replacement required. Unsafe to use.
INTERIOR Floor Coverings, Interior Walls, Ceilings, Doors, Stairs	Only normal preventative maintenance required.	Some minor repairs could be required. Slight evidence of marring, discoloration, fading or cracking.	More minor repairs required. Wear and tear noticeable. Mismatched and/or broken/damaged flooring, wall coverings and ceilings.	Significant repairs required. Broken elements. Wear and tear excessive.	Replacement required.
PROGRAM EQUIPMENT Collateral: Removal would impair usefulness, safety or environment of the facility (antennae, hydraulics, motors, pumps)	Only normal preventative maintenance required.	Some minor repairs could be required. Safe to use; meets all codes.	More minor repairs required. Wear and tear noticeable. Meets most codes.	Significant repairs required. Broken elements. Wear and tear excessive.	Replacement required. Unsafe to use.

It should be noted, however, that the DoD FSM specifically states that repair for systems whose service life is beyond 50 years is not considered. That is, systems that typically last longer than 50 years, such as building structures and foundations, are not considered as having a percentage of their sustainment allocated to repair. As a result, for the methodology described in determining percent repair of sustainment costs, the structural components of assets are not allocated any repair costs. Besides the structural components of the asset, the NASA DM category 18.2, covering storm drains, ditches, dams, and retaining walls will not have any repair costs associated with them.

However, DM Category 21, pavement, is considered in the methodology for determining repair costs because there are known periodic repairs that must take place on pavement even though the DM model considers this category as entirely structural in nature. Although, systemically roads only consist of a structural component and the DoD FSM does not consider any repair cost with regard to this component, periodic repair does take place in the form of repaving and patching of potholes.

The following curves (Figures A-1 and A-2) illustrate the fraction of repair costs to sustainment, shown as “Repair Fraction” along the ordinate of the chart, for long-lived systems and short-lived systems. These curves are based on the curves for repair and deterioration as defined in the DM model. Further, they assume that systems with an SCI of 5 need no repair and that a “properly functioning facility with assets in reasonable condition” has an overall FCI of around 3. With this assumption, an administrative building with a FCI of 3 will need to allocate approximately the industry standard of 30-40 percent of sustainment costs to repair.

Figure A-1. Deterioration Curve for Long-Lived Systems

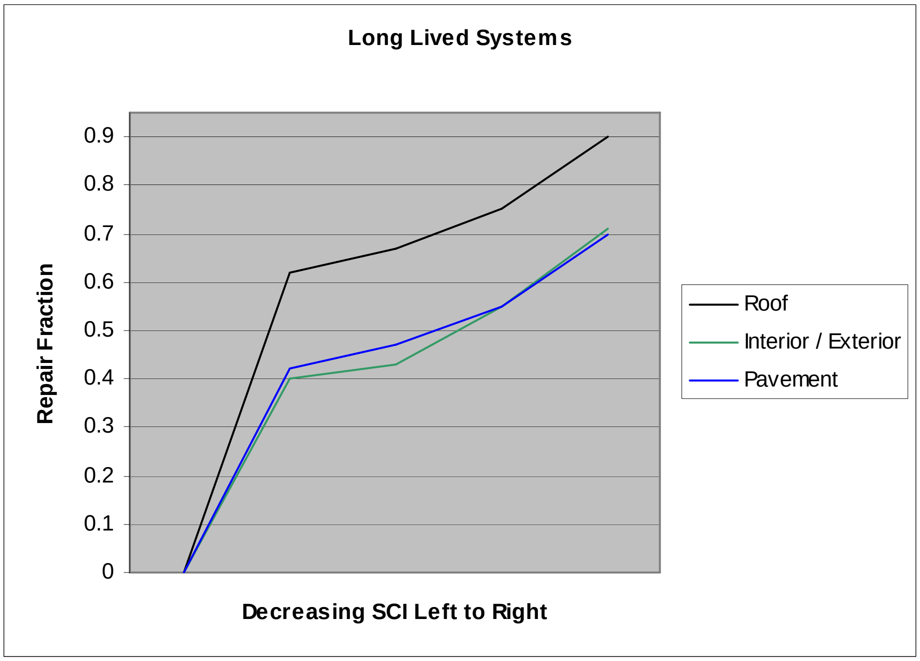
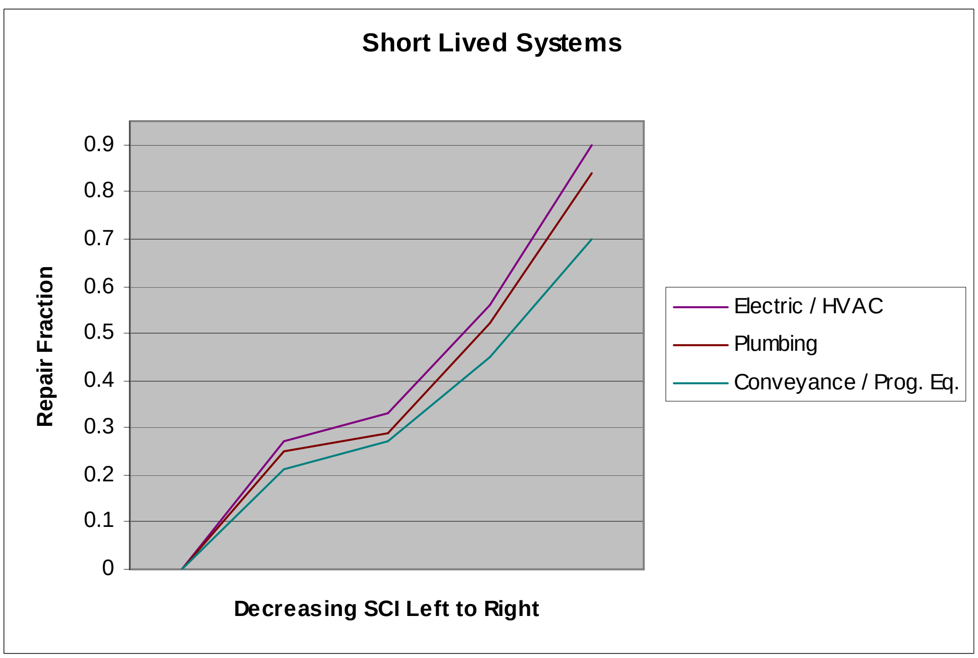


Figure A-2. Deterioration Curve for Short-Lived Systems



Since SCI is limited to discrete whole numbers the following table (Table A-2) is used to calculate the fraction of sustainment allocated to repair for a given SCI score. For emphasis, the table also shows the allocation for structural systems as zero in all cases.

Table A-2. Fraction of Sustainment Allocated to Repair by SCI Score

SCI Score	5	4	3	2	1
Pavement	0.00	0.42	0.47	0.55	0.70
Structure	0.00	0.00	0.00	0.00	0.00
Exterior	0.00	0.40	0.43	0.55	0.71
Roof	0.00	0.62	0.67	0.75	0.90
HVAC	0.00	0.27	0.33	0.56	0.90
Electric / HVAC	0.00	0.27	0.33	0.56	0.90
Plumbing	0.00	0.25	0.29	0.52	0.84
Conveyance	0.00	0.21	0.27	0.45	0.70
Interior / Exterior	0.00	0.40	0.43	0.55	0.71
Program Equipment	0.00	0.21	0.27	0.45	0.70

Note also that for all systems, the percent of sustainment allocated for repair never exceeds 100 percent. This is because it is assumed that the costs of repair are only to bring the system into functionality so that it can continue its mission. This is the assumption even though the DM methodology states that a SCI score of 1 signifies that the system is irreparable and in need of replacement. The methodology for determining the fraction of repair to sustainment, as presented, does not consider repair costs in the case where a system needs to be demolished, removed, and replaced or the case where major renovation to the system is required.

This assumption for systems having an SCI score of 1 is appropriate for two reasons. First, is because the FSM does not include replacement and renovation of systems and; therefore, the amount of sustainment allocated in the model would not cover the cost of replacing or renovating the system. Second, there are very few NASA assets that have systems that are rated 1 and; therefore, on a macroscopic level, their contributions to the repair estimate are minimal. If NASA is interested in determining the cost of replacement and renovation, however, there are existing models which predict these costs, which can be in excess of 150 percent of the system CRV.

Since an asset is made of up to nine systems, the asset's CRV is allocated by a known percentage across systems by the NASA DM model. Similarly, the methodology for assigning a percentage of sustainment to repair assigns sustainment cost to asset's systems by the same percentages for a given NASA DM category. In this methodology, the system value is considered a proxy for allocation of sustainment funds with a few notable exceptions. That is to say, the assumption is that in most cases those systems that are valued higher will have a proportionally larger amount of sustainment funds assigned to them. The sustainment is thus distributed among the nine systems by NASA DM category according to the following table (Table A-3).

Table A-3. System CRV Percent

DM Cat	NASA_BLDG	STRUC	EXT	ROOF	HVAC	ELEC	PLUMB	CONV	INTF	EQUIP	SUM
1	R&D and Test Buildings	0.18	0.19	0.04	0.15	0.2	0.04	0.01	0.15	0.04	1
2	R&D Structures and Facilities	0.4	0.17	0.01	0.06	0.25	0.02	0.02	0.03	0.04	1
3	Wind Tunnels	0.3	0.05	0.01	0.01	0.15	0.01	0.01	0.01	0.45	1
4	Engine/Vehicle Static Test Facilities	0.38	0.03	0.01	0.04	0.26	0.01	0.03	0.02	0.22	1
5	Administrative Buildings	0.19	0.17	0.06	0.16	0.18	0.05	0.03	0.16	0	1
6	Training Buildings	0.18	0.2	0.05	0.12	0.21	0.05	0.01	0.18	0	1
7	Trailers	0.2	0.19	0.06	0.18	0.2	0.02	0	0.15	0	1
8	Storage Buildings	0.6	0.15	0.1	0.04	0.06	0.01	0	0.04	0	1
9	Storage Facilities	0.55	0.22	0.11	0.03	0.04	0.01	0	0.04	0	1
10	Fuel Storage Tanks	0.7	0.13	0.02	0	0.1	0.05	0	0	0	1
10.1	Specialized Liquid Storage Tanks	0.51	0.13	0.02	0	0.14	0.2	0	0	0	1
10.2	Fueling Stations & Systems	0.4	0.1	0.05	0.05	0.15	0.2	0	0.05	0	1
11	Magazines	0.33	0.3	0.05	0.06	0.15	0.02	0	0.09	0	1
12	Comm. & Tracking Buildings	0.21	0.2	0.05	0.16	0.18	0.05	0	0.15	0	1
13	Comm. & Tracking Facilities	0.55	0.1	0.02	0.05	0.26	0	0	0.02	0	1
13.1	Large Antennas	0.2	0.2	0.02	0.05	0.15	0.02	0.01	0.02	0.33	1
13.2	Small Antennas	0.5	0.3	0	0	0.1	0	0	0	0.1	1
14	Mission Control Operations Buildings	0.22	0.13	0.05	0.15	0.2	0.04	0.02	0.1	0.09	1
15	Lighting	0.17	0	0	0	0.83	0	0	0	0	1
16	Electrical Distribution System	0.39	0.03	0	0	0.58	0	0	0	0	1
16.1	Power Generation/Power Plant	0.3	0.1	0.05	0.1	0.39	0.01	0	0.05	0	1
16.2	Electric Substations, Switchgear & Transfer Yards	0.1	0.07	0	0	0.83	0	0	0	0	1
17	HVAC Distribution	0.3	0.1	0	0	0.33	0.27	0	0	0	1
17.1	HVAC Generation	0.2	0.1	0.05	0.35	0.1	0.15	0	0.05	0	1
18	Waste Water Collection & Disposal System	0.5	0.02	0.02	0	0.05	0.41	0	0	0	1
18.1	Waste Water Facilities & Treatment Plants	0.34	0.1	0.05	0.03	0.15	0.32	0	0.01	0	1
18.2	Storm drains, Ditches, Dams, Retaining walls	0.9	0	0	0	0.05	0.05	0	0	0	1
19	Potable Water Distribution System	0.38	0.05	0.02	0	0.05	0.5	0	0	0	1
19.1	Potable Water Facilities & Treatment Plants	0.25	0.05	0.05	0.03	0.24	0.37	0	0.01	0	1
20	Launch Pads	0.51	0.1	0.03	0.03	0.25	0.04	0.02	0.02	0	1
20.1	Launch support camera pads	0.8	0.1	0	0	0.1	0	0	0	0	1
20.2	Launch propellant & high pressure gas facilities	0.48	0.05	0.02	0	0.2	0.25	0	0	0	1
21	Pavement	1	0	0	0	0	0	0	0	0	1
22	Rail	0.95	0	0	0	0.05	0	0	0	0	1
23	Maintenance Facilities & PW Shops	0.2	0.14	0.06	0.13	0.3	0.09	0	0.08	0	1
23.1	Operational maintenance. facilities	0.2	0.14	0.06	0.13	0.28	0.09	0.02	0.08	0	1
24	Other Buildings	0.22	0.15	0.12	0.1	0.15	0.11	0	0.15	0	1
25	Other Facilities	0.71	0.1	0.02	0.05	0.1	0.01	0	0.01	0	1
26	Land & Easements	1	0	0	0	0	0	0	0	0	1
27	Compressed Air Distribution	0.5	0	0	0	0.1	0.4	0	0	0	1
27.1	Compressed Air Generation	0.25	0.1	0.05	0.05	0.15	0.35	0	0.05	0	1
28	Prefab buildings, various uses	0.18	0.17	0.05	0.15	0.15	0.15	0	0.15	0	1
29	Berthing & Housing	0.15	0.17	0.09	0.16	0.18	0.07	0.02	0.16	0	1

As stated earlier, however, the FSM does not consider systems whose functional life is greater than 50 years, such as structure and foundation, as having any sustainment amount assigned to repair. For structure, the percentage allocation of CRV is not applicable to the sustainment model when determining the repair costs of that system. However, since the total of allocated percentages must equal one, the structural component of the percent CRV is divided between the short-lived systems–those needing more periodic maintenance, as prescribed by the following:

- HVAC 30 percent
- Electrical Equipment 30 percent
- Program Equipment 20 percent
- Plumbing 10 percent
- Conveyance 10 percent

For example, administrative buildings, DM category 5, would have their structural percentage of 19 percent distributed among the 5 short-lived systems as follows:

- HVAC 5.7 percent
- Electric 5.7 percent
- Program Equipment 3.8 percent
- Plumbing 1.9 percent
- Conveyance 1.9 percent

Note that for DM Category 21, there is no redistribution of the structural component among these systems. Normally, all of the sustainment costs associated with pavement would be allocated to maintenance, but in this case, as stated earlier, there is an assumption that there is periodic repair required, so it is necessary to assign all sustainment costs to the structural system of pavement.

The redistribution of sustainment costs in light of repair by this method is sound in that the short-lived systems do require more periodic maintenance than the long-lived systems. Consider that more maintenance is generally necessary on electrical systems than on exterior finishes. Further, maintenance on electrical systems is also generally more costly and time intensive than on plumbing over time in order to keep the system operational.

An important caveat to this is redistribution of sustainment funds for systems which are non-existent for a given NASA DM category. For example, DM Category 5, administration buildings, would not normally have any allocation of sustainment to program support equipment because this system is not found in this type of asset. In these cases, the percent sustainment is equally distributed across the short-lived systems if they exist for the asset. Again, considering DM Category 5, the 3.8 percent for Program Equipment would be divided equally among the HVAC, Electrical, Plumbing, and Conveyance systems.

After review of each NASA DM category and application of the redistribution of the structural component and the redistribution of the component for non-existent systems a new matrix that describes the distribution of sustainment across an asset is created. This matrix shows the percentage of sustainment funds typically allocated to each of the assets systems.

Now that the sustainment for each system is known, the fraction of repair to sustainment (Table A-2) can be applied to each system based on the SCI of the system. Totaling the result of this operation will give the amount of expected repair for the asset. Since the sustainment and repair amounts are not considered accurate for individual assets, the sustainment and the repair amounts should be totaled for a facility. Dividing the repair amount by the sustainment amount yields the percent repair costs of sustainment.

Example of Calculation:

- An administrative building whose sustainment was calculated according to the DoD FSM as being $20,000 has SCI ratings of 3 for each system in the asset. The sustainment for each of the assets systems as calculated by the described method is found to be allocated as follows:

	Sustainment %	Sustainment value
Structure	0.00%	$ -
Exterior	17.00%	$3,400.00
Roof	6.00%	$1,200.00
HVAC	22.65%	$4,530.00
Electrical	24.65%	$4,930.00
Plumbing	7.85%	$1,570.00
Conveyance	5.85%	$1,170.00
Interior	16.00%	$3,200.00
Program Equipment	0.00%	$ -

Based on the SCI for each asset in the system, the percent of repair to sustainment is applied according to Table A-2, resulting in the following:

	% Repair	Repair Costs
Structure	0%	$ -
Exterior	43%	$1,462.00
Roof	67%	$804.00
HVAC	33%	$1,494.90
Electrical	33%	$1,626.90
Plumbing	29%	$455.30
Conveyance	27%	$315.90
Interior	43%	$1,376.00
Program Equipment	27%	$ -
Total		$7,535.00

The total repair for this asset, based on the system condition methodology described here and sustainment costs for the asset as prescribed by the DoD FSM, is $7,535.00. This is equivalent to 37.7 percent of the estimated sustainment level required for this asset.

Considerations

The methodology for determining the percentage of sustainment allocated to repair presented here operates under a few assumptions that may bear further scrutiny if there is an opportunity to refine the model. Primarily these assumptions surround the following

- The application of sustainment percentages to an asset's systems.
- The application of repair percentages for systems rated as 5 or 1.
- The assumption that a "properly functioning facility with assets in reasonable condition" has SCI ratings of 3.

- The assumption that a building's structure never requires repair.

The percentage of sustainment attributed to each of the asset's nine systems was modeled under the assumption that more sustainment dollars would go to the systems that had a higher relative value in terms of CRV, than other systems in the asset. This may run counter to the assumption that long-lived systems generally have less sustainment allocated to them and may distort the model. For example, although interior finishes are considered a long-lived system the allocation of CRV percent to this system is often higher than the allocation of CRV percent to plumbing, conveyance, and program support equipment, which are short-lived systems, even after redistribution of the CRV percentage normally allocated to structure.

At this time, the distortion is considered relevant at a detailed level, but not so relevant at a macroscopic level. However, future improvements to the model should concentrate on further analyzing the method by which sustainment is allocated to each of the asset's systems.

It is assumed in the methodology that systems rated with an SCI score of 5 require no repair in the upcoming year. While this may be true, it is uncertain if this is actually the case. Alternately, even with a good PM Program, systems can fail regardless of their current condition. If this assumption is made, the percentage allocation to repair for an SCI score of 5 may need to be increased from zero in the current model. If minimal repair is required on these excellent condition systems where the SCI score is 5, assuming a percentage of half or a third of the percentage allocation for a system that is properly functioning and in reasonable condition, where the SCI score is 3 is within the bounds of sound engineering judgment.

The methodology as implemented would thus allocate less to repair than if the assumption was that repair was required for systems in excellent condition.

On the other hand, the model as implemented does not acknowledge a system that is in need of replacement or repair. That is, although a system is rated as "bad" with a corresponding SCI score of 1' which in the DM methodology means that the system is irreparable and in need of replacement, the model presented here assumes that these systems can, in fact, be repaired to a functioning status. As explained earlier, there is sound reason why this assumption can be made; however, further analysis may suggest that the percentage allocated to repair to systems in bad condition be raised to 100 percent.

The assumption that a properly functioning facility with assets in reasonable condition was defined as assets whose SCI scores are 3 can further be examined as well. It may be more reasonable to suggest that facilities with assets whose scores fall between 3 and 4 are properly functioning and in reasonable condition. However, since the DM estimating method rates systems in whole numbers, the value of 3 was chosen. It is possible, however, to remap the degradation curve so that the generally assumed repair to sustainment ratio of 40/60 is moved to somewhere between 3 and 4.

This type of adjustment would be noticed readily on the detailed level; however, it may not have such an effect on the macroscopic level. If it does have an effect on the macroscopic level, the repair as percentage of sustainment would increase. Since shifting the degradation curves (Figures A-1 and A-2) as it relates to SCI for each system to handle these three considerations is possible, further enhancements to the model should explore this.

Finally, the DoD FSM states that no repair is performed on structures that typically last longer than 50 years. Based on this, the methodology presented here assumed that for all structural components not related to paving, DM Category 21, that there would not be any estimated repair calculated. However, the DM Estimation method specifies that the evaluation of an asset's structure includes pavement and sidewalks immediately surrounding the structure. Since this is the case, an argument can be made that repair does in fact get performed on structural components of assets implying that the presented model underestimates repair for a facility.

The model takes into consideration that the amount of surrounding repairable structure i.e., pavement to for an asset is small compared to the overall structure of the asset. Therefore, the fractional amount of estimated repair for these elements to the whole structure would be small. Future improvements to the model may consider including a fractional amount of sustainment costs to structure in order to account for costs associated with these types of repairs.

This page intentionally left blank.

APPENDIX B - CENTER DETAILS (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 26,062,738,426.01	**$ 424,017,280.94**	1.6%	$ 372,109,776.04	$ 51,907,504.90	**$ 129,423,583.49**	$ 111,556,848.91	$ 17,866,734.58
Goddard Space Flight Center	$ 1,900,824,931.76	**$ 29,293,031.43**	1.5%	$ 28,665,787.72	$ 627,243.71	**$ 8,854,601.01**	$ 8,644,202.92	$ 210,398.09
Wallops Flight Facility (WFF)	$ 723,246,052.99	**$ 10,389,386.44**	1.4%	$ 9,874,553.20	$ 514,833.24	**$ 3,029,266.24**	$ 2,859,724.51	$ 169,541.73
Bilateration Range Transponder (BRT)	$ 27,260.63	**$ 941.77**	3.5%	$ 941.77	$ -	**$ 826.12**	$ 826.12	$ -
Mobile Laser Ranging System (MOBLAS)	$ 2,495,274.43	**$ 56,021.04**	2.2%	$ 33,844.76	$ 22,176.28	**$ 27,847.58**	$ 20,092.80	$ 7,754.78
Verylong Baseline Interferometry (VLBI)	$ 139,875.82	**$ 3,483.02**	2.5%	$ 255.20	$ 3,227.83	**$ 2,625.21**	$ -	$ 2,625.21
Goddard Space Flight Center (GSFC)	$ 1,056,289,570.15	**$ 16,155,830.87**	1.5%	$ 16,071,622.68	$ 84,208.19	**$ 4,937,081.61**	$ 4,907,608.74	$ 29,472.87
Spaceflight Data Tracking Network (STDN)	$ 35,278,072.48	**$ 1,543,025.91**	4.4%	$ 1,541,640.54	$ 1,385.37	**$ 549,952.48**	$ 549,443.45	$ 509.03
Shiloh Microwave Link Facility (SMLF)	$ 61,763.35	**$ 1,023.82**	1.7%	$ -	$ 1,023.82	**$ 358.34**	$ -	$ 358.34
Space Transportation System (STS)	$ 20,052.59	**$ 388.98**	1.9%	$ -	$ 388.98	**$ 136.14**	$ -	$ 136.14
White Sands Complex (WSC)	$ 83,267,009.32	**$ 1,142,929.58**	1.4%	$ 1,142,929.58	$ -	**$ 306,507.29**	$ 306,507.29	$ -
Glenn Research Center	$ 2,909,968,261.08	**$ 47,184,207.27**	1.6%	$ 44,927,407.70	$ 2,256,799.57	**$ 15,191,960.15**	$ 14,152,153.99	$ 1,039,806.15
Plum Brook Station (PBS)	$ 801,722,618.74	**$ 8,731,851.69**	1.1%	$ 6,475,313.71	$ 2,256,537.98	**$ 3,077,997.82**	$ 2,038,332.46	$ 1,039,665.36
Glenn Research Center (GRC)	$ 2,108,245,642.34	**$ 38,452,355.58**	1.8%	$ 38,452,093.99	$ 261.59	**$ 12,113,962.32**	$ 12,113,821.53	$ 140.79
Stennis Space Center	$ 1,950,696,465.43	**$ 30,938,786.28**	1.6%	$ 28,580,714.94	$ 2,358,071.34	**$ 9,444,576.35**	$ 8,614,725.34	$ 829,851.00
Stennis Space Center (SSC)	$ 1,950,696,465.43	**$ 30,938,786.28**	1.6%	$ 28,580,714.94	$ 2,358,071.34	**$ 9,444,576.35**	$ 8,614,725.34	$ 829,851.00
Kennedy Space Center	$ 5,206,817,634.06	**$ 86,084,354.66**	1.7%	$ 79,468,046.59	$ 6,616,308.07	**$ 28,090,872.93**	$ 25,895,453.72	$ 2,195,419.21
Kennedy Space Center (KSC)	$ 5,202,155,804.87	**$ 86,019,391.95**	1.7%	$ 79,444,439.34	$ 6,574,952.61	**$ 28,068,135.98**	$ 25,887,191.18	$ 2,180,944.80
Transoceanic Abort Landing Sites (TAL)	$ 4,389,259.50	**$ 58,518.97**	1.3%	$ 23,607.25	$ 34,911.71	**$ 20,481.64**	$ 8,262.54	$ 12,219.10
Space Launch Complex (SLC)	$ 272,569.69	**$ 6,443.75**	2.4%	$ -	$ 6,443.75	**$ 2,255.31**	$ -	$ 2,255.31
Marshall Space Flight Center	$ 2,926,544,879.61	**$ 46,711,705.05**	1.6%	$ 43,028,651.07	$ 3,683,053.99	**$ 13,858,763.34**	$ 12,548,465.55	$ 1,310,297.79
Brigham (BRIGHAM)	$ 1,537,888.44	**$ 34,993.54**	2.3%	$ 34,993.54	$ -	**$ 12,247.74**	$ 12,247.74	$ -
Marshall Space Flight Center (MSFC)	$ 1,534,109,205.70	**$ 14,373,183.52**	0.9%	$ 13,318,375.04	$ 1,054,808.48	**$ 4,925,580.99**	$ 4,488,582.28	$ 436,998.70
Santa Susana Field Laboratory (SSFL)	$ 100,719,077.81	**$ 1,814,026.52**	1.8%	$ 1,350,362.61	$ 463,663.90	**$ 470,274.50**	$ 402,045.08	$ 68,229.42
Michoud Assembly Facility (MAF)	$ 1,290,178,707.66	**$ 30,489,501.48**	2.4%	$ 28,324,919.88	$ 2,164,581.60	**$ 8,450,660.12**	$ 7,645,590.46	$ 805,069.67
Johnson Space Center	$ 2,089,829,881.27	**$ 33,302,541.64**	1.6%	$ 33,184,902.13	$ 117,639.51	**$ 10,227,613.62**	$ 10,157,129.73	$ 70,483.89
Johnson Space Center (JSC)	$ 1,581,965,552.88	**$ 23,432,246.51**	1.5%	$ 23,314,728.08	$ 117,518.43	**$ 7,808,709.18**	$ 7,738,267.66	$ 70,441.52
Ellington Field (EF)	$ 113,060,563.63	**$ 1,998,420.26**	1.8%	$ 1,998,417.75	$ 2.51	**$ 590,139.18**	$ 590,138.30	$ 0.88
White Sands Test Facility (WSTF)	$ 350,827,047.45	**$ 7,139,378.26**	2.0%	$ 7,139,259.68	$ 118.58	**$ 1,598,021.08**	$ 1,597,979.58	$ 41.50
Palmdale (PALMDALE)	$ 43,976,717.31	**$ 732,496.61**	1.7%	$ 732,496.61	$ -	**$ 230,744.19**	$ 230,744.19	$ -
Jet Propulsion Laboratory	$ 1,409,156,421.78	**$ 39,394,910.49**	2.8%	$ 37,161,613.54	$ 2,233,296.96	**$ 9,923,769.64**	$ 9,486,277.12	$ 437,492.52
Jet Propulsion Laboratory (JPL)	$ 773,561,638.38	**$ 13,329,295.23**	1.7%	$ 13,329,295.23	$ -	**$ 3,700,837.39**	$ 3,700,837.39	$ -
Deep Space Network (DSN)	$ 626,496,685.23	**$ 25,898,268.23**	4.1%	$ 23,664,971.27	$ 2,233,296.96	**$ 6,174,042.48**	$ 5,736,549.96	$ 437,492.52
Table Mountain Observatory (TMF)	$ 9,098,098.17	**$ 167,347.03**	1.8%	$ 167,347.03	$ -	**$ 48,889.77**	$ 48,889.77	$ -
Langly Research Center	$ 3,095,612,741.66	**$ 41,388,039.50**	1.3%	$ 38,253,325.74	$ 3,134,713.75	**$ 11,818,740.75**	$ 10,699,903.70	$ 1,118,837.05
Langley Research Center (LARC)	$ 3,095,612,741.66	**$ 41,388,039.50**	1.3%	$ 38,253,325.74	$ 3,134,713.75	**$ 11,818,740.75**	$ 10,699,903.70	$ 1,118,837.05
Ames Research Center	$ 4,249,900,722.14	**$ 63,755,586.75**	1.5%	$ 32,877,142.41	$ 30,878,444.34	**$ 20,527,821.46**	$ 9,874,447.81	$ 10,653,373.64
Ames Research Center (ARC)	$ 2,777,986,676.92	**$ 43,323,249.26**	1.6%	$ 26,902,043.31	$ 16,421,205.95	**$ 12,214,899.86**	$ 7,486,267.31	$ 4,728,632.55
Camp Parks (CP)	$ 7,240,499.33	**$ 363,294.45**	5.0%	$ 340,941.05	$ 22,353.40	**$ 153,609.86**	$ 145,491.41	$ 8,118.46
Crows Landing	$ 91,428,717.43	**$ 1,905,621.56**	2.1%	$ 121,422.09	$ 1,784,199.47	**$ 1,210,685.88**	$ 43,584.99	$ 1,167,100.89
Moffet Federal Airfield (MFA)	$ 1,373,244,828.46	**$ 18,163,421.48**	1.3%	$ 5,512,735.96	$ 12,650,685.52	**$ 6,948,625.86**	$ 2,199,104.12	$ 4,749,521.74
Dryden Flight Research Center	$ 323,386,487.22	**$ 5,964,117.87**	1.8%	$ 5,962,184.20	$ 1,933.67	**$ 1,484,864.24**	$ 1,484,089.03	$ 775.21
Dryden Flight Research Center (DFRC)	$ 323,386,487.22	**$ 5,964,117.87**	1.8%	$ 5,962,184.20	$ 1,933.67	**$ 1,484,864.24**	$ 1,484,089.03	$ 775.21

This page intentionally left blank.

APPENDIX C - RATIO METHOD CALCULATIONS (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 17,170,013,487.01	**$ 307,377,515.37**	1.8%	$ 267,852,204.23	$ 39,525,311.15	**$ 91,209,708.79**	$ 78,752,452.00	$ 12,457,256.78
Goddard Space Flight Center	$ 685,654,803.27	**$ 12,961,077.39**	1.9%	$ 12,592,947.20	$ 368,130.18	**$ 3,881,174.01**	$ 3,744,608.46	$ 136,565.55
Wallops Flight Facility (WFF)	$ 148,158,753.26	**$ 3,213,776.43**	2.2%	$ 2,954,628.81	$ 259,147.63	**$ 890,837.97**	$ 793,374.24	$ 97,463.73
Bilateration Range Transponder (BRT)	$ 27,260.63	**$ 941.77**	3.5%	$ 941.77	$ -	**$ 826.12**	$ 826.12	$ -
Mobile Laser Ranging System (MOBLAS)	$ 2,495,274.43	**$ 56,021.04**	2.2%	$ 33,844.76	$ 22,176.28	**$ 27,847.58**	$ 20,092.80	$ 7,754.78
Verylong Baseline Interferometry (VLBI)	$ 126,063.59	**$ 2,320.26**	1.8%	$ 255.20	$ 2,065.07	**$ 1,661.42**	$ -	$ 1,661.42
Goddard Space Flight Center (GSFC)	$ 514,565,511.53	**$ 8,358,342.62**	1.6%	$ 8,276,278.88	$ 82,063.74	**$ 2,503,485.90**	$ 2,474,763.60	$ 28,722.31
Spaceflight Data Tracking Network (STDN)	$ 12,593,117.82	**$ 1,201,734.65**	9.5%	$ 1,200,469.98	$ 1,264.67	**$ 428,665.77**	$ 428,196.93	$ 468.84
Shiloh Microwave Link Facility (SMLF)	$ 61,763.35	**$ 1,023.82**	1.7%	$ -	$ 1,023.82	**$ 358.34**	$ -	$ 358.34
Space Transportation System (STS)	$ 20,052.59	**$ 388.98**	1.9%	$ -	$ 388.98	**$ 136.14**	$ -	$ 136.14
White Sands Complex (WSC)	$ 7,607,006.07	**$ 126,527.81**	1.7%	$ 126,527.81	$ -	**$ 27,354.78**	$ 27,354.78	$ -
Glenn Research Center	$ 2,198,266,731.18	**$ 42,052,802.57**	1.9%	$ 40,243,095.14	$ 1,809,707.43	**$ 13,580,676.52**	$ 12,719,914.51	$ 860,762.01
Plum Brook Station (PBS)	$ 311,838,629.86	**$ 6,434,957.32**	2.1%	$ 4,625,511.48	$ 1,809,445.84	**$ 2,375,037.54**	$ 1,514,416.32	$ 860,621.22
Glenn Research Center (GRC)	$ 1,886,428,101.32	**$ 35,617,845.25**	1.9%	$ 35,617,583.66	$ 261.59	**$ 11,205,638.98**	$ 11,205,498.19	$ 140.79
Stennis Space Center	$ 1,495,270,231.31	**$ 24,287,439.44**	1.6%	$ 21,983,194.22	$ 2,304,245.22	**$ 7,773,408.00**	$ 6,963,343.94	$ 810,064.06
Stennis Space Center (SSC)	$ 1,495,270,231.31	**$ 24,287,439.44**	1.6%	$ 21,983,194.22	$ 2,304,245.22	**$ 7,773,408.00**	$ 6,963,343.94	$ 810,064.06
Kennedy Space Center	$ 3,754,979,730.56	**$ 65,912,930.92**	1.8%	$ 59,542,734.13	$ 6,370,196.79	**$ 21,147,500.37**	$ 19,048,339.11	$ 2,099,161.26
Kennedy Space Center (KSC)	$ 3,754,109,146.96	**$ 65,901,566.05**	1.8%	$ 59,537,940.19	$ 6,363,625.86	**$ 21,143,522.67**	$ 19,046,661.24	$ 2,096,861.43
Transoceanic Abort Landing Sites (TAL)	$ 598,013.91	**$ 4,921.12**	0.8%	$ 4,793.94	$ 127.19	**$ 1,722.39**	$ 1,677.88	$ 44.52
Space Launch Complex (SLC)	$ 272,569.69	**$ 6,443.75**	2.4%	$ -	$ 6,443.75	**$ 2,255.31**	$ -	$ 2,255.31
Marshall Space Flight Center	$ 2,142,753,826.02	**$ 32,640,662.33**	1.5%	$ 29,106,305.16	$ 3,534,357.16	**$ 9,470,974.71**	$ 8,197,232.26	$ 1,273,742.45
Marshall Space Flight Center (MSFC)	$ 1,077,982,555.90	**$ 9,485,774.85**	0.9%	$ 8,441,262.87	$ 1,044,511.98	**$ 3,416,040.28**	$ 2,982,347.46	$ 433,692.82
Santa Susana Field Laboratory (SSFL)	$ 44,458,095.79	**$ 1,001,661.93**	2.3%	$ 658,961.54	$ 342,700.39	**$ 239,006.29**	$ 195,462.65	$ 43,543.64
Michoud Assembly Facility (MAF)	$ 1,020,313,174.33	**$ 22,153,225.55**	2.2%	$ 20,006,080.76	$ 2,147,144.79	**$ 5,815,928.14**	$ 5,019,422.15	$ 796,505.99
Johnson Space Center	$ 1,125,711,736.98	**$ 18,924,563.88**	1.7%	$ 18,880,544.16	$ 44,019.71	**$ 5,570,815.00**	$ 5,534,932.10	$ 35,882.89
Johnson Space Center (JSC)	$ 851,952,765.50	**$ 12,958,741.41**	1.5%	$ 12,914,840.28	$ 43,901.14	**$ 4,314,260.57**	$ 4,278,419.18	$ 35,841.39
Ellington Field (EF)	$ 2,563,388.44	**$ 81,996.20**	3.2%	$ 81,996.20	$ -	**$ 22,460.64**	$ 22,460.64	$ -
White Sands Test Facility (WSTF)	$ 263,767,844.03	**$ 5,671,544.55**	2.2%	$ 5,671,425.98	$ 118.58	**$ 1,165,175.25**	$ 1,165,133.74	$ 41.50
Palmdale (PALMDALE)	$ 7,427,739.01	**$ 212,281.72**	2.9%	$ 212,281.72	$ -	**$ 68,918.53**	$ 68,918.53	$ -
Jet Propulsion Laboratory	$ 978,323,927.50	**$ 31,294,606.75**	3.2%	$ 29,330,040.92	$ 1,964,565.83	**$ 7,480,551.52**	$ 7,266,877.59	$ 213,673.94
Jet Propulsion Laboratory (JPL)	$ 467,863,613.10	**$ 8,729,868.83**	1.9%	$ 8,729,868.83	$ -	**$ 2,293,574.00**	$ 2,293,574.00	$ -
Deep Space Network (DSN)	$ 505,500,707.12	**$ 22,459,083.83**	4.4%	$ 20,494,518.00	$ 1,964,565.83	**$ 5,157,783.74**	$ 4,944,109.80	$ 213,673.94
Table Mountain Observatory (TMF)	$ 4,959,607.28	**$ 105,654.10**	2.1%	$ 105,654.10	$ -	**$ 29,193.79**	$ 29,193.79	$ -
Langley Research Center	$ 2,371,937,827.53	**$ 34,786,391.92**	1.5%	$ 32,437,284.20	$ 2,349,107.72	**$ 9,809,539.34**	$ 8,926,089.29	$ 883,450.05
Langley Research Center (LARC)	$ 2,371,937,827.53	**$ 34,786,391.92**	1.5%	$ 32,437,284.20	$ 2,349,107.72	**$ 9,809,539.34**	$ 8,926,089.29	$ 883,450.05
Ames Research Center	$ 2,388,983,836.08	**$ 42,698,591.05**	1.8%	$ 21,919,326.38	$ 20,779,264.67	**$ 12,157,863.37**	$ 6,014,522.27	$ 6,143,341.10
Ames Research Center (ARC)	$ 2,175,623,045.35	**$ 37,442,897.45**	1.7%	$ 21,683,151.39	$ 15,759,746.06	**$ 10,467,831.57**	$ 5,939,817.60	$ 4,528,013.97
Camp Parks (CP)	$ 257,766.55	**$ 14,459.21**	5.6%	$ 8,098.95	$ 6,360.26	**$ 4,813.14**	$ 4,211.46	$ 601.68
Crows Landing (CROWS LANDING)	$ 807,075.04	**$ 13,856.57**	1.7%	$ 34.48	$ 13,822.10	**$ 8,308.16**	$ 16.14	$ 8,292.02
Moffet Federal Airfield (MFA)	$ 212,295,949.14	**$ 5,227,377.82**	2.5%	$ 228,041.56	$ 4,999,336.26	**$ 1,676,910.50**	$ 70,477.07	$ 1,606,433.43
Dryden Flight Research Center	$ 28,130,836.58	**$ 1,818,449.12**	6.5%	$ 1,816,732.70	$ 1,716.42	**$ 337,205.94**	$ 336,592.45	$ 613.49
Dryden Flight Research Center (DFRC)	$ 28,130,836.58	**$ 1,818,449.12**	6.5%	$ 1,816,732.70	$ 1,716.42	**$ 337,205.94**	336592.4541	$ 613.49

This page intentionally left blank.

APPENDIX D – NEWLY ADDED TO RPI ASSETS (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 166,830,649.46	**$ 1,772,712.93**	1.1%	$ 1,747,574.24	$ 25,138.69	**$ 156,221.03**	$ 148,711.75	$ 7,509.28
Glenn Research Center	$ 763,252.00	**$ 42,661.65**	5.6%	$ 42,661.65	$ -	**$ 11,906.87**	$ 11,906.87	$ -
Plum Brook Station (PBS)	$ 763,252.00	**$ 42,661.65**	5.6%	$ 42,661.65	$ -	**$ 11,906.87**	$ 11,906.87	$ -
Goddard Space Flight Center	$ 8,782,586.43	**$ 52,648.13**	0.6%	$ 51,262.77	$ 1,385.37	**$ 13,320.43**	$ 12,811.39	$ 509.03
Goddard Space Flight Center (GSFC)	$ 40,968.11	**$ 3,156.75**	7.7%	$ 3,156.75	$ -	**$ 445.24**	$ 445.24	$ -
Wallops Flight Facility (WFF)	$ 124,570.00	**$ 2,335.07**	1.9%	$ 2,335.07	$ -	**$ 390.55**	$ 390.55	$ -
Spaceflight Data Tracking Network (STDN)	$ 8,611,245.44	**$ 45,650.30**	0.5%	$ 44,264.93	$ 1,385.37	**$ 12,484.64**	$ 11,975.61	$ 509.03
White Sands Complex (WSC)	$ 5,802.88	**$ 1,506.01**	26.0%	$ 1,506.01	$ -	**$ -**	$ -	$ -
Kennedy Space Center	$ 960,000.00	**$ 43,428.44**	4.5%	$ 43,167.56	$ 260.88	**$ 14,210.13**	$ 14,081.54	$ 128.59
Kennedy Space Center (KSC)	$ 960,000.00	**$ 43,428.44**	4.5%	$ 43,167.56	$ 260.88	**$ 14,210.13**	$ 14,081.54	$ 128.59
Marshall Space Flight Center	$ 25,395,410.66	**$ 249,333.90**	1.0%	$ 239,830.16	$ 9,503.74	**$ 72,122.50**	$ 70,181.14	$ 1,941.37
Marshall Space Flight Center (MSFC)	$ 25,314,720.96	**$ 232,478.00**	0.9%	$ 230,534.85	$ 1,943.15	**$ 68,127.07**	$ 67,347.68	$ 779.39
Santa Susana Field Laboratory (SSFL)	$ 689.70	**$ 12,148.99**	1761.5%	$ 4,588.40	$ 7,560.58	**$ 2,681.74**	$ 1,519.75	$ 1,161.98
Michoud Assembly Facility (MAF)	$ 80,000.00	**$ 4,706.91**	5.9%	$ 4,706.91	$ -	**$ 1,313.70**	$ 1,313.70	$ -
Jet Propulsion Laboratory	$ 20,363,620.15	**$ 95,514.99**	0.5%	$ 94,016.04	$ 1,498.94	**$ 12,715.22**	$ 12,715.22	$ -
Jet Propulsion Laboratory (JPL)	$ 17,669,865.43	**$ 9,818.09**	0.1%	$ 9,818.09	$ -	**$ 2,727.46**	$ 2,727.46	$ -
Deep Space Network (DSN)	$ 2,693,754.72	**$ 85,696.89**	3.2%	$ 84,197.95	$ 1,498.94	**$ 9,987.76**	$ 9,987.76	$ -
Langley Research Center	$ 8,623,000.00	**$ 97,198.49**	1.1%	$ 97,198.49	$ -	**$ 26,277.40**	$ 26,277.40	$ -
Langley Research Center (LARC)	$ 8,623,000.00	**$ 97,198.49**	1.1%	$ 97,198.49	$ -	**$ 26,277.40**	$ 26,277.40	$ -
Ames Research Center	$ 1,800,000.00	**$ 45,730.10**	2.5%	$ 33,240.34	$ 12,489.76	**$ 4,930.29**	$ -	$ 4,930.29
Ames Research Center (ARC)	$ 1,800,000.00	**$ 45,730.10**	2.5%	$ 33,240.34	$ 12,489.76	**$ 4,930.29**	$ -	$ 4,930.29
Dryden Flight Research Center	$ 82,780.22	**$ 4,094.02**	4.9%	$ 4,094.02	$ -	**$ 618.15**	$ 618.15	$ -
Dryden Flight Research Center (DFRC)	$ 82,780.22	**$ 4,094.02**	4.9%	$ 4,094.02	$ -	**$ 618.15**	$ 618.15	$ -
Johnson Space Center	$ 100,060,000.00	**$ 1,142,103.21**	1.1%	$ 1,142,103.21	$ -	**$ 120.03**	$ 120.03	$ -
White Sands Test Facility (WSTF)	$ 100,060,000.00	**$ 1,142,103.21**	1.1%	$ 1,142,103.21	$ -	**$ 120.03**	$ 120.03	$ -

Note that whenever possible, the standard method for determining the ASC was used. This is true even if, as is common for new assets, there is no reasonable CRV value for the asset. As a result, the ASC percent of CRV may not make sense. This is the case for the Santa Susana Field Laboratory (SSFL), for example, where the assets' CRV values are unreasonable.

This page intentionally left blank.

APPENDIX E – ASSETS WITH UOM OF "EACH" (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 3,839,952,447.47	$ 99,855,155.78	2.6%	$ 87,776,970.14	$ 12,078,185.64	$ 27,279,072.06	$ 23,503,292.92	$ 3,775,779.14
Glenn Research Center	$ 185,907,097.64	$ 5,434,740.08	2.9%	$ 5,338,787.14	$ 95,952.94	$ 1,720,822.52	$ 1,705,432.71	$ 15,389.81
Plum Brook Station (PBS)	$ 19,520,922.00	$ 676,551.29	3.5%	$ 580,859.94	$ 95,691.35	$ 125,196.60	$ 109,947.57	$ 15,249.02
Glenn Research Center (GRC)	$ 166,386,175.64	$ 4,758,188.79	2.9%	$ 4,757,927.20	$ 261.59	$ 1,595,625.93	$ 1,595,485.14	$ 140.79
Goddard Space Flight Center	$ 71,942,375.44	$ 1,729,343.34	2.4%	$ 1,636,786.21	$ 92,557.13	$ 406,740.96	$ 389,851.80	$ 16,889.16
Bilateration Range Transponder (BRT)	$ 27,260.63	$ 941.77	3.5%	$ 941.77	$ -	$ 826.12	$ 826.12	$ -
Mobile Laser Ranging System (MOBLAS)	$ 2,495,274.43	$ 56,021.04	2.2%	$ 33,844.76	$ 22,176.28	$ 27,847.58	$ 20,092.80	$ 7,754.78
Verylong Baseline Interferometry (VLBI)	$ 126,063.59	$ 2,320.26	1.8%	$ 255.20	$ 2,065.07	$ 1,661.42	$ -	$ 1,661.42
Goddard Space Flight Center (GSFC)	$ 26,253,055.02	$ 593,407.21	2.3%	$ 592,439.50	$ 967.70	$ 127,654.22	$ 127,315.53	$ 338.70
Spaceflight Data Tracking Network (STDN)	$ 5,422,370.77	$ 160,720.93	3.0%	$ 159,456.26	$ 1,264.67	$ 43,592.99	$ 43,124.15	$ 468.84
Shiloh Microwave Link Facility (SMLF)	$ 61,763.35	$ 1,023.82	1.7%	$ -	$ 1,023.82	$ 358.34	$ -	$ 358.34
Space Transportation System (STS)	$ 20,052.59	$ 388.98	1.9%	$ -	$ 388.98	$ 136.14	$ -	$ 136.14
Wallops Flight Facility (WFF)	$ 35,602,541.52	$ 881,572.02	2.5%	$ 816,901.42	$ 64,670.60	$ 204,077.48	$ 197,906.53	$ 6,170.95
White Sands Complex (WSC)	$ 1,933,993.54	$ 32,947.31	1.7%	$ 32,947.31	$ -	$ 586.67	$ 586.67	$ -
Stennis Space Center	$ 941,289,446.66	$ 15,821,231.01	1.7%	$ 13,529,564.50	$ 2,291,666.51	$ 5,197,819.83	$ 4,391,747.47	$ 806,072.36
Stennis Space Center (SSC)	$ 941,289,446.66	$ 15,821,231.01	1.7%	$ 13,529,564.50	$ 2,291,666.51	$ 5,197,819.83	$ 4,391,747.47	$ 806,072.36
Kennedy Space Center	$ 1,303,496,678.81	$ 35,227,135.29	2.7%	$ 29,803,924.43	$ 5,423,210.86	$ 10,121,515.60	$ 8,364,671.30	$ 1,756,844.30
Kennedy Space Center (KSC)	$ 1,303,224,109.12	$ 35,220,691.54	2.7%	$ 29,803,924.43	$ 5,416,767.11	$ 10,119,260.29	$ 8,364,671.30	$ 1,754,588.99
Space Launch Complex (SLC)	$ 272,569.69	$ 6,443.75	2.4%	$ -	$ 6,443.75	$ 2,255.31	$ -	$ 2,255.31
Marshall Space Flight Center	$ 418,962,990.23	$ 4,755,681.62	1.1%	$ 1,943,033.23	$ 2,812,648.39	$ 1,481,417.40	$ 585,697.10	$ 895,720.30
Marshall Space Flight Center (MSFC)	$ 312,176,416.19	$ 2,424,546.22	0.8%	$ 1,409,962.76	$ 1,014,583.46	$ 886,307.99	$ 461,802.58	$ 424,505.41
Santa Susana Field Laboratory (SSFL)	$ 34,258,713.43	$ 735,823.59	2.1%	$ 413,125.10	$ 322,698.49	$ 121,726.12	$ 80,990.75	$ 40,735.37
Michoud Assembly Facility (MAF)	$ 72,527,860.61	$ 1,595,311.81	2.2%	$ 119,945.37	$ 1,475,366.44	$ 473,383.30	$ 42,903.78	$ 430,479.52
Johnson Space Center	$ 193,714,348.78	$ 5,631,022.85	2.9%	$ 5,626,407.45	$ 4,615.40	$ 1,484,966.59	$ 1,482,183.32	$ 2,783.27
Johnson Space Center (JSC)	$ 75,027,700.93	$ 2,154,101.75	2.9%	$ 2,149,604.92	$ 4,496.82	$ 573,540.57	$ 570,798.81	$ 2,741.76
Ellington Field (EF),Texas	$ 2,116,049.07	$ 78,544.76	3.7%	$ 78,544.76	$ -	$ 21,909.72	$ 21,909.72	$ -
White Sands Test Facility (WSTF)	$ 116,418,121.97	$ 3,392,885.33	2.9%	$ 3,392,766.76	$ 118.58	$ 889,118.10	$ 889,076.60	$ 41.50
Palmdale (PALMDALE)	$ 152,476.81	$ 5,491.01	3.6%	$ 5,491.01	$ -	$ 398.19	$ 398.19	$ -
Jet Propulsion Laboratory	$ 472,586,922.24	$ 21,282,608.20	4.5%	$ 20,636,677.29	$ 645,930.91	$ 5,062,118.28	$ 4,848,964.34	$ 213,153.94
Jet Propulsion Laboratory (JPL)	$ 15,489,115.01	$ 1,035,729.16	6.7%	$ 1,035,729.16	$ -	$ 181,005.01	$ 181,005.01	$ -
Deep Space Network (DSN)	$ 453,449,213.89	$ 20,182,807.32	4.5%	$ 19,536,876.41	$ 645,930.91	$ 4,868,921.35	$ 4,655,767.41	$ 213,153.94
Table Mountain Observatory (TMF)	$ 3,648,593.34	$ 64,071.71	1.8%	$ 64,071.71	$ -	$ 12,191.92	$ 12,191.92	$ -
Langly Research Center	$ 196,058,107.32	$ 7,385,859.83	3.8%	$ 7,320,540.79	$ 65,319.04	$ 1,378,945.35	$ 1,344,997.66	$ 33,947.69
Langley Research Center (LARC)	$ 196,058,107.32	$ 7,385,859.83	3.8%	$ 7,320,540.79	$ 65,319.04	$ 1,378,945.35	$ 1,344,997.66	$ 33,947.69
Ames Research Center	$ 38,569,066.25	$ 1,111,097.25	2.9%	$ 464,816.96	$ 646,280.28	$ 189,839.50	$ 154,862.65	$ 34,976.85
Ames Research Center (ARC)	$ 11,524,620.06	$ 390,728.96	3.4%	$ 390,728.96	$ -	$ 128,850.19	$ 128,850.19	$ -
Crows Landing (CROWS LANDING)	$ 423,528.93	$ 5,002.82	1.2%	$ 34.48	$ 4,968.34	$ 4,191.58	$ 16.14	$ 4,175.44
Moffet Federal Airfield (MFA)	$ 26,620,917.26	$ 715,365.47	2.7%	$ 74,053.53	$ 641,311.94	$ 56,797.73	$ 25,996.32	$ 30,801.41
Dryden Flight Research Center	$ 17,425,414.10	$ 1,476,436.32	8.5%	$ 1,476,432.14	$ 4.18	$ 234,886.02	$ 234,884.55	$ 1.46
Site: Dryden Flight Research Center (DFRC)	$ 17,425,414.10	$ 1,476,436.32	8.5%	$ 1,476,432.14	$ 4.18	$ 234,886.02	$ 234,884.55	$ 1.46

This page intentionally left blank.

APPENDIX F – FAC 8211-HEAT SOURCE (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 259,403,754.28	**$ 10,789,728.94**	4.2%	$ 10,785,630.73	$ 4,098.21	**$ 2,489,657.81**	$ 2,488,143.17	$ 1,514.63
Glenn Research Center	$ 17,042,519.92	**$ 497,178.61**	2.9%	$ 496,954.87	$ 223.74	**$ 83,360.48**	$ 83,165.49	$ 194.99
Plum Brook Station (PBS)	$ 7,053,124.49	**$ 419,457.76**	5.9%	$ 419,234.02	$ 223.74	**$ 58,577.90**	$ 58,382.91	$ 194.99
Glenn Research Center (GRC)	$ 9,989,395.43	**$ 77,720.85**	0.8%	$ 77,720.85	$ -	**$ 24,782.59**	$ 24,782.59	$ -
Goddard Space Flight Center	$ 55,807,616.61	**$ 482,740.67**	0.9%	$ 482,740.67	$ -	**$ 159,200.31**	$ 159,200.31	$ -
Goddard Space Flight Center (GSFC)	$ 34,595,720.94	**$ 346,729.19**	1.0%	$ 346,729.19	$ -	**$ 119,864.28**	$ 119,864.28	$ -
Wallops Flight Facility (WFF)	$ 21,211,895.67	**$ 136,011.48**	0.6%	$ 136,011.48	$ -	**$ 39,336.03**	$ 39,336.03	$ -
Stennis Space Center	$ 1,533,147.83	**$ 48,936.66**	3.2%	$ 48,936.66	$ -	**$ 5,932.35**	$ 5,932.35	$ -
Stennis Space Center (SSC)	$ 1,533,147.83	**$ 48,936.66**	3.2%	$ 48,936.66	$ -	**$ 5,932.35**	$ 5,932.35	$ -
Kennedy Space Center	$ 13,575,449.40	**$ 85,410.70**	0.6%	$ 81,536.24	$ 3,874.46	**$ 29,210.65**	$ 27,891.01	$ 1,319.64
Kennedy Space Center (KSC)	$ 13,575,449.40	**$ 85,410.70**	0.6%	$ 81,536.24	$ 3,874.46	**$ 29,210.65**	$ 27,891.01	$ 1,319.64
Marshall Space Flight Center	$ 91,392,867.78	**$ 5,519,580.47**	6.0%	$ 5,519,580.47	$ -	**$ 1,054,127.54**	$ 1,054,127.54	$ -
Marshall Space Flight Center (MSFC)	$ 10,060,500.15	**$ 50,531.18**	0.5%	$ 50,531.18	$ -	**$ 17,469.24**	$ 17,469.24	$ -
Michoud Assembly Facility (MAF)	$ 81,332,367.63	**$ 5,469,049.29**	6.7%	$ 5,469,049.29	$ -	**$ 1,036,658.29**	$ 1,036,658.29	$ -
Johnson Space Center	$ 3,076,594.34	**$ 198,869.51**	6.5%	$ 198,869.51	$ -	**$ 48,273.24**	$ 48,273.24	$ -
Johnson Space Center (JSC)	$ 981,802.60	**$ 59,417.60**	6.1%	$ 59,417.60	$ -	**$ 20,947.46**	$ 20,947.46	$ -
White Sands Test Facility (WSTF)	$ 2,094,791.74	**$ 139,451.91**	6.7%	$ 139,451.91	$ -	**$ 27,325.78**	$ 27,325.78	$ -
Langly Research Center	$ 50,825,542.71	**$ 3,075,905.27**	6.1%	$ 3,075,905.27	$ -	**$ 797,349.78**	$ 797,349.78	$ -
Langley Research Center (LARC)	$ 50,825,542.71	**$ 3,075,905.27**	6.1%	$ 3,075,905.27	$ -	**$ 797,349.78**	$ 797,349.78	$ -
Ames Research Center	$ 25,216,210.79	**$ 796,965.72**	3.2%	$ 796,965.72	$ -	**$ 277,082.86**	$ 277,082.86	$ -
Ames Research Center (ARC)	$ 8,533,622.95	**$ 751,714.92**	8.8%	$ 751,714.92	$ -	**$ 264,443.28**	$ 264,443.28	$ -
Moffet Federal Airfield (MFA)	$ 16,682,587.84	**$ 45,250.80**	0.3%	$ 45,250.80	$ -	**$ 12,639.58**	$ 12,639.58	$ -
Dryden Flight Research Center	$ 933,804.90	**$ 84,141.33**	9.0%	$ 84,141.33	$ -	**$ 35,120.59**	$ 35,120.59	$ -
Dryden Flight Research Center (DFRC)	$ 933,804.90	**$ 84,141.33**	9.0%	$ 84,141.33	$ -	**$ 35,120.59**	$ 35,120.59	$ -

This page intentionally left blank.

APPENDIX G - FAC 8929-MISCELLANEOUS UTILITY FACILITY, COOLING TOWERS (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 200,398,267.19	**$ 17,160,357.08**	8.6%	$ 15,565,073.88	$ 1,595,283.21	**$ 3,583,273.33**	$ 3,424,694.45	$ 158,578.88
Glenn Research Center	$ 35,871,421.58	**$ 3,037,398.71**	8.5%	$ 3,037,398.71	$ -	**$ 977,831.99**	$ 977,831.99	$ -
Plum Brook Station (PBS)	$ 1,473,128.67	**$ 119,895.68**	8.1%	$ 119,895.68	$ -	**$ 38,919.57**	$ 38,919.57	$ -
Glenn Research Center (GRC)	$ 34,398,292.91	**$ 2,917,503.04**	8.5%	$ 2,917,503.04	$ -	**$ 938,912.42**	$ 938,912.42	$ -
Goddard Space Flight Center	$ 14,742,446.34	**$ 1,721,970.97**	11.7%	$ 1,565,639.68	$ 156,331.28	**$ 553,899.16**	$ 466,985.79	$ 86,913.37
Mobile Laser Ranging System (MOBLAS)	$ 17,789.97	**$ 1,508.86**	8.5%	$ 1,508.86	$ -	**$ 1,329.31**	$ 1,329.31	$ -
Goddard Space Flight Center (GSFC)	$ 302,495.14	**$ 26,433.69**	8.7%	$ 26,433.69	$ -	**$ 7,137.10**	$ 7,137.10	$ -
Spaceflight Data Tracking Network (STDN)	$ 7,157,820.02	**$ 1,040,559.75**	14.5%	$ 1,040,559.75	$ -	**$ 384,813.01**	$ 384,813.01	$ -
Wallops Flight Facility (WFF)	$ 7,264,341.21	**$ 653,468.66**	9.0%	$ 497,137.38	$ 156,331.28	**$ 160,619.74**	$ 73,706.37	$ 86,913.37
Stennis Space Center	$ 618,819.01	**$ 48,244.11**	7.8%	$ 48,244.11	$ -	**$ 2,048.77**	$ 2,048.77	$ -
Stennis Space Center (SSC)	$ 618,819.01	**$ 48,244.11**	7.8%	$ 48,244.11	$ -	**$ 2,048.77**	$ 2,048.77	$ -
Kennedy Space Center	$ 11,499,286.75	**$ 817,830.50**	7.1%	$ 788,068.47	$ 29,762.02	**$ 245,856.57**	$ 235,720.97	$ 10,135.60
Kennedy Space Center (KSC)	$ 11,499,286.75	**$ 817,830.50**	7.1%	$ 788,068.47	$ 29,762.02	**$ 245,856.57**	$ 235,720.97	$ 10,135.60
Marshall Space Flight Center	$ 4,643,496.91	**$ 401,081.09**	8.6%	$ 344,445.07	$ 56,636.02	**$ 58,020.98**	$ 32,510.13	$ 25,510.85
Santa Susana Field Laboratory (SSFL)	$ 200,465.92	**$ 20,437.45**	10.2%	$ 20,437.45	$ -	**$ 5,115.30**	$ 5,115.30	$ -
Michoud Assembly Facility (MAF)	$ 4,443,030.99	**$ 380,643.64**	8.6%	$ 324,007.61	$ 56,636.02	**$ 52,905.68**	$ 27,394.83	$ 25,510.85
Johnson Space Center	$ 38,930,542.87	**$ 3,166,105.26**	8.1%	$ 3,126,700.95	$ 39,404.32	**$ 847,009.62**	$ 813,909.99	$ 33,099.63
Johnson Space Center (JSC)	$ 17,274,210.26	**$ 1,331,925.53**	7.7%	$ 1,292,521.21	$ 39,404.32	**$ 378,200.32**	$ 345,100.70	$ 33,099.63
Ellington Field (EF)	$ 801,658.12	**$ 61,811.74**	7.7%	$ 61,811.74	$ -	**$ 17,236.82**	$ 17,236.82	$ -
White Sands Test Facility (WSTF)	$ 20,724,395.23	**$ 1,757,746.70**	8.5%	$ 1,757,746.70	$ -	**$ 448,106.46**	$ 448,106.46	$ -
Palmdale (PALMDALE)	$ 130,279.26	**$ 14,621.29**	11.2%	$ 14,621.29	$ -	**$ 3,466.01**	$ 3,466.01	$ -
Jet Propulsion Laboratory	$ 22,195,495.34	**$ 2,412,177.13**	10.9%	$ 1,107,368.82	$ 1,304,808.31	**$ 203,860.35**	$ 203,860.35	$ -
Jet Propulsion Laboratory (JPL)	$ 9,399,205.65	**$ 958,246.73**	10.2%	$ 958,246.73	$ -	**$ 167,032.02**	$ 167,032.02	$ -
Deep Space Network (DSN)	$ 12,796,289.69	**$ 1,453,930.40**	11.4%	$ 149,122.09	$ 1,304,808.31	**$ 36,828.33**	$ 36,828.33	$ -
Langley Research Center	$ 71,569,493.58	**$ 5,518,355.63**	7.7%	$ 5,518,355.63	$ -	**$ 682,077.80**	$ 682,077.80	$ -
Langley Research Center (LARC)	$ 71,569,493.58	**$ 5,518,355.63**	7.7%	$ 5,518,355.63	$ -	**$ 682,077.80**	$ 682,077.80	$ -
Ames Research Center	$ 146,486.18	**$ 16,440.20**	11.2%	$ 8,098.95	$ 8,341.25	**$ 7,130.89**	$ 4,211.46	$ 2,919.44
Camp Parks (CP)	$ 72,163.64	**$ 8,098.95**	11.2%	$ 8,098.95	$ -	**$ 4,211.46**	$ 4,211.46	$ -
Moffet Federal Airfield (MFA)	$ 74,322.54	**$ 8,341.25**	11.2%	$ -	$ 8,341.25	**$ 2,919.44**	$ -	$ 2,919.44
Dryden Flight Research Center	$ 180,778.63	**$ 20,753.49**	11.5%	$ 20,753.49	$ -	**$ 5,537.20**	$ 5,537.20	$ -
Site: Dryden Flight Research Center (DFRC)	$ 180,778.63	**$ 20,753.49**	11.5%	$ 20,753.49	$ -	**$ 5,537.20**	$ 5,537.20	$ -

This page intentionally left blank.

APPENDIX H – FAC 8999-MISCELLANEOUS COMPONENT OF OTHER FACILITY, ALARM SYSTEMS (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 38,981,945.15	**$ -**	0.0%	$ -	$ -	**$ -**	$ -	$ -
Goddard Space Flight Center	$ 5,187,564.81	0	0	0	0	0	0	0
Wallops Flight Facility (WFF)	$ 748,882.23	0	0	0	0	0	0	0
Goddard Space Flight Center (GSFC)	$ 4,438,682.58	0	0	0	0	0	0	0
Stennis Space Center	$ 3,967,226.38	0	0	0	0	0	0	0
Stennis Space Center (SSC)	$ 3,967,226.38	0	0	0	0	0	0	0
Kennedy Space Center	$ 4,236,438.63	0	0	0	0	0	0	0
Kennedy Space Center (KSC)	$ 4,170,767.96	0	0	0	0	0	0	0
Transoceanic Abort Landing Sites (TAL)	$ 65,670.67	0	0	0	0	0	0	0
Marshall Space Flight Center	$ 6,476,764.58	0	0	0	0	0	0	0
Marshall Space Flight Center (MSFC)	$ 4,869,486.03	0	0	0	0	0	0	0
Michoud Assembly Facility (MAF)	$ 1,607,278.55	0	0	0	0	0	0	0
Johnson Space Center	$ 6,122,791.01	0	0	0	0	0	0	0
Johnson Space Center (JSC)	$ 4,541,142.03	0	0	0	0	0	0	0
Ellington Field (EF)	$ 253,009.06	0	0	0	0	0	0	0
White Sands Test Facility (WSTF)	$ 1,112,354.89	0	0	0	0	0	0	0
Palmdale (PALMDALE)	$ 216,285.03	0	0	0	0	0	0	0
Ames Research Center	$ 9,514,506.44	0	0	0	0	0	0	0
Ames Research Center (ARC)	$ 5,621,238.78	0	0	0	0	0	0	0
Moffet Federal Airfield (MFA)	$ 3,893,267.66	0	0	0	0	0	0	0
Glenn Research Center	$ 2,076,975.57	0	0	0	0	0	0	0
Glenn Research Center (GRC)	$ 2,076,975.57	0	0	0	0	0	0	0
Dryden Flight Research Center	$ 1,399,677.73	0	0	0	0	0	0	0
Dryden Flight Research Center (DFRC)	$ 1,399,677.73	0	0	0	0	0	0	0

Note that facilities tagged with FAC of 8999 have no associated sustainment cost and thus no repair cost per the DoD Model

This page intentionally left blank.

APPENDIX I - FAC 1499 -MISCELLANEOUS OPERATIONS SUPPORT FACILITY (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 133,656,995.06	**$ 2,099,232.01**	1.6%	$ 2,050,898.26	$ 48,333.76	**$ 640,008.65**	$ 620,398.79	$ 19,609.87
Glenn Research Center	$ 546,195.50	**$ 9,583.46**	1.8%	$ 7,520.64	$ 2,062.83	**2918.767766**	$ 2,196.78	$ 721.99
Plum Brook Station (PBS)	$ 546,195.50	**$ 9,583.46**	1.8%	$ 7,520.64	$ 2,062.83	**2918.767766**	$ 2,196.78	$ 721.99
Goddard Space Flight Center	$ 6,518,485.11	**$ 132,238.66**	2.0%	$ 108,007.86	$ 24,230.80	**48598.60906**	$ 39,598.21	$ 9,000.40
Bilateration Range Transponder (BRT)	$ 27,260.63	**$ 941.77**	3.5%	$ 941.77	$ -	**826.1177419**	$ 826.12	$ -
Mobile Laser Ranging System (MOBLAS)	$ 2,475,674.64	**$ 54,480.58**	2.2%	$ 32,304.31	$ 22,176.28	**26489.83382**	$ 18,735.06	$ 7,754.78
Verylong Baseline Interferometry (VLBI)	$ 91,433.40	**$ 1,538.58**	1.7%	$ 255.20	$ 1,283.38	**975.7249537**	$ -	$ 975.72
Goddard Space Flight Center (GSFC)	$ 1,128,946.42	**$ 21,267.89**	1.9%	$ 20,496.75	$ 771.14	**5986.465711**	$ 5,716.57	$ 269.90
Spaceflight Data Tracking Network (STDN)	$ 48,305.72	**$ 740.50**	1.5%	$ 740.50	$ -	**259.1764403**	$ 259.18	$ -
Wallops Flight Facility (WFF)	$ 2,746,864.30	**$ 53,269.34**	1.9%	$ 53,269.34	$ -	**14061.29038**	$ 14,061.29	$ -
Stennis Space Center	$ 4,283,884.81	**$ 71,999.59**	1.7%	$ 58,997.28	$ 13,002.31	**26076.98616**	$ 19,644.04	$ 6,432.95
Stennis Space Center (SSC)	$ 4,283,884.81	**$ 71,999.59**	1.7%	$ 58,997.28	$ 13,002.31	**26076.98616**	$ 19,644.04	$ 6,432.95
Kennedy Space Center	$ 119,259,950.07	**$ 1,830,765.11**	1.5%	$ 1,824,321.36	$ 6,443.75	**548961.5979**	$ 546,706.29	$ 2,255.31
Kennedy Space Center (KSC)	$ 118,987,380.38	**$ 1,824,321.36**	1.5%	$ 1,824,321.36	$ -	**546706.2871**	$ 546,706.29	$ -
Space Launch Complex (SLC)	$ 272,569.69	**$ 6,443.75**	2.4%	$ -	$ 6,443.75	**2255.310794**	$ -	$ 2,255.31
Marshall Space Flight Center	$ 330,400.98	**$ 4,563.04**	1.4%	$ 2,522.46	$ 2,040.58	**2614.788098**	$ 1,472.47	$ 1,142.32
Marshall Space Flight Center (MSFC)	$ 275,691.32	**$ 3,360.61**	1.2%	$ 1,320.03	$ 2,040.58	**2311.465833**	$ 1,169.15	$ 1,142.32
Santa Susana Field Laboratory (SSFL)	$ 54,709.66	**$ 1,202.44**	2.2%	$ 1,202.44	$ -	**303.3222656**	$ 303.32	$ -
Johnson Space Center	$ 2,581,841.52	**$ 46,981.03**	1.8%	$ 46,981.03	$ -	**9650.982874**	$ 9,650.98	$ -
Johnson Space Center (JSC), Texas	$ 136,542.33	**$ 2,269.66**	1.7%	$ 2,269.66	$ -	**498.9508496**	$ 498.95	$ -
White Sands Test Facility (WSTF)	$ 2,445,299.19	**$ 44,711.37**	1.8%	$ 44,711.37	$ -	**9152.032024**	$ 9,152.03	$ -
Langly Research Center	$ 33,298.20	**$ 553.50**	1.7%	$ -	$ 553.50	**56.89933699**	$ -	$ 56.90
Langley Research Center (LARC)	$ 33,298.20	**$ 553.50**	1.7%	$ -	$ 553.50	**56.89933699**	$ -	$ 56.90
Dryden Flight Research Center	$ 102,938.87	**$ 2,547.62**	2.5%	$ 2,547.62	$ -	**1130.023289**	$ 1,130.02	$ -
Dryden Flight Research Center (DFRC)	$ 102,938.87	**$ 2,547.62**	2.5%	$ 2,547.62	$ -	**1130.023289**	$ 1,130.02	$ -

This page intentionally left blank.

APPENDIX J – FAC 8131-ELECTRICAL SUBSTATIONS (IN DOLLARS)

Name	FY06 CRV	ASC	ASC % of CRV	ASC Active	ASC NonActive	ARC	ARC Active	ARC NonActive
NASA Total	$ 328,069,105.70	**$ 14,542,549.95**	4.4%	$ 14,478,196.67	$ 64,353.29	**$ 3,752,291.12**	$ 3,730,365.61	$ 21,925.50
Glenn Research Center	$ 95,434,053.77	**$ 5,632,321.88**	5.9%	$ 5,577,491.03	$ 54,830.85	**$ 1,582,254.18**	$ 1,563,926.18	$ 18,328.00
Plum Brook Station (PBS)	$ 9,898,192.54	**$ 610,759.20**	6.2%	$ 555,928.35	$ 54,830.85	**$ 172,648.82**	$ 154,320.82	$ 18,328.00
Glenn Research Center (GRC)	$ 85,535,861.23	**$ 5,021,562.68**	5.9%	$ 5,021,562.68	$ -	**$ 1,409,605.36**	$ 1,409,605.36	$ -
Goddard Space Flight Center	$ 7,391,511.74	**$ 314,142.15**	4.3%	$ 305,960.57	$ 8,181.58	**$ 102,400.31**	$ 99,546.86	$ 2,853.45
Goddard Space Flight Center (GSFC)	$ 4,975,700.58	**$ 298,607.37**	6.0%	$ 298,607.37	$ -	**$ 98,540.43**	$ 98,540.43	$ -
Wallops Flight Facility (WFF)	$ 2,415,811.16	**$ 15,534.78**	0.6%	$ 7,353.20	$ 8,181.58	**$ 3,859.88**	$ 1,006.43	$ 2,853.45
Kennedy Space Center	$ 43,011,396.74	**$ 1,324,744.51**	3.1%	$ 1,324,744.51	$ -	**$ 368,986.36**	$ 368,986.36	$ -
Kennedy Space Center (KSC)	$ 43,011,396.74	**$ 1,324,744.51**	3.1%	$ 1,324,744.51	$ -	**$ 368,986.36**	$ 368,986.36	$ -
Marshall Space Flight Center	$ 52,162,448.29	**$ 2,083,493.28**	4.0%	$ 2,083,493.28	$ -	**$ 458,787.00**	$ 458,787.00	$ -
Santa Susana Field Laboratory (SSFL)	$ 740,518.11	**$ 463.56**	0.1%	$ 463.56	$ -	**$ 33.63**	$ 33.63	$ -
Michoud Assembly Facility (MAF)	$ 51,421,930.18	**$ 2,083,029.72**	4.1%	$ 2,083,029.72	$ -	**$ 458,753.37**	$ 458,753.37	$ -
Johnson Space Center	$ 22,646,005.24	**$ 1,143,514.78**	5.0%	$ 1,143,514.78	$ -	**$ 373,191.87**	$ 373,191.87	$ -
Johnson Space Center (JSC)	$ 21,088,495.48	**$ 1,110,547.90**	5.3%	$ 1,110,547.90	$ -	**$ 365,045.58**	$ 365,045.58	$ -
White Sands Test Facility (WSTF)	$ 1,557,509.76	**$ 32,966.89**	2.1%	$ 32,966.89	$ -	**$ 8,146.28**	$ 8,146.28	$ -
Jet Propulsion Laboratory	$ 40,750.40	**$ 8,308.85**	20.4%	$ 7,718.45	$ 590.41	**$ 847.59**	$ 516.96	$ 330.63
Deep Space Network (DSN)	$ 14,325.40	**$ 6,458.70**	45.1%	$ 5,868.29	$ 590.41	**$ 340.84**	$ 10.21	$ 330.63
Table Mountain Observatory (TMF)	$ 26,425.00	**$ 1,850.15**	7.0%	$ 1,850.15	$ -	**$ 506.76**	$ 506.76	$ -
Langley Research Center	$ 41,671,671.19	**$ 307,144.13**	0.7%	$ 307,144.13	$ -	**$ 101,234.22**	$ 101,234.22	$ -
Langley Research Center (LARC)	$ 41,671,671.19	**$ 307,144.13**	0.7%	$ 307,144.13	$ -	**$ 101,234.22**	$ 101,234.22	$ -
Ames Research Center	$ 56,747,153.14	**$ 3,484,490.68**	6.1%	$ 3,483,740.23	$ 750.45	**$ 699,427.99**	$ 699,014.57	$ 413.42
Ames Research Center (ARC)	$ 55,472,545.31	**$ 3,237,187.56**	5.8%	$ 3,237,187.56	$ -	**$ 620,052.77**	$ 620,052.77	$ -
Crows Landing (CROWS LANDING)	$ 109,223.40	**$ 750.45**	0.7%	$ -	$ 750.45	**$ 413.42**	$ -	$ 413.42
Moffet Federal Airfield (MFA)	$ 1,165,384.43	**$ 246,552.67**	21.2%	$ 246,552.67	$ -	**$ 78,961.81**	$ 78,961.81	$ -
Dryden Flight Research Center	$ 8,964,115.19	**$ 244,389.69**	2.7%	$ 244,389.69	$ -	**$ 65,161.59**	$ 65,161.59	$ -
Dryden Flight Research Center (DFRC)	$ 8,964,115.19	**$ 244,389.69**	2.7%	$ 244,389.69	$ -	**$ 65,161.59**	$ 65,161.59	$ -

This page intentionally left blank.