FACILITY 4637
Table of Contents

1 FACILITY CONDITION ASSESSMENT 1

1.1 Facility Function and Description 1
1.1.1 Architectural / Civil / Structural Systems 1
1.1.2 Mechanical / HVAC 1
1.1.3 Electrical 1
1.2 Facility 4637 Site Plan 2
1.3 Facility 4637 Floor Plans 3
1.4 Facilities Condition Assessment (FCA) Procedure 4
1.4.1 Scope and Purpose 4
1.5 Overall Building Condition Ranking 5
1.6 Architectural Facility Condition Assessment Findings 5
1.6.1 Interior 5
1.6.2 Exterior 5
1.6.3 Roof 5
1.6.4 Civil 5
1.6.5 Structural 5
1.7 Mechanical Findings 6
1.7.1 Roll-Up Door: 6
1.8 HVAC Findings 6
1.8.1 Exhaust Air Fans: 6
1.9 Electrical FCA Findings 7
1.9.1 Panel Boards: 7
1.9.2 Emergency Lighting: 7
1.9.3 Fire Alarm System: 7
1.9.4 Transformer: 7
1.10 Synopsis of FCA Actions and Recommendations 8
1.11 Safety Impact from Failure of Equipment in Poor/Replace Condition 8
1.12 Energy Recommendations 8
1.13 Estimated Costs 9
1.14 FCA Detail Summary 10

2 RELIABILITY CENTERED MAINTENANCE (RCM) ANALYSIS 11

2.1 Objectives/Team Members 11
2.2 Background 11
2.3 ELECTRICAL SYSTEMS 13
2.3.1 Panel Boards: 13
2.3.2 Emergency Lights: 14
2.3.3 Fire Alarm System: 14
2.3.4 Transformers: 14
2.4 MECHANICAL / HVAC SYSTEMS 15
2.4.1 Exhaust Air Fans: 15
2.5 MISCELLANEOUS SYSTEMS 16
2.5.1 Door System: 16
2.5.2 Roof: 16

3 APPENDIX 17

FACILITY 4637
CONTINUOUS FACILITIES ASSESSMENT
July 2012

1 FACILITY CONDITION ASSESSMENT

1.1 Facility Function and Description

The condition of this building has not been previously assessed or evaluated as this facility is new. Building 4637 is classified as **Valve Warehouse**. This building serves as a storage facility for high pressure valves utilized throughout MSFC.

This single-story high-bay facility was constructed in 2008. It has a gross area of 9,931 square feet and a net usable area of 9,860 square feet. There are no permanent building occupants. Building 4637 is assigned to the Office of the Engineering Directorate (ED01) for utilization.

1.1.1 Architectural / Civil / Structural Systems

The facility's structural framework consists of rigid steel frames on a reinforced concrete foundation. The floor is reinforced concrete. The roof system is comprised of standing-seam, metal panels on steel purlins. Exterior walls are constructed of corrugated metal panel siding on steel frames. Doors are all-metal design including one (1) overhead rolling steel door. There are no windows.

The interior finish throughout this building consists of vinyl-clad insulation (walls and ceiling) and a bare concrete floor.

Exterior parking and material staging areas are paved asphalt.

1.1.2 Mechanical / HVAC

The Mechanical/HVAC systems for the Valve Warehouse Facility 4637 include equipment designed to provide access and exhaust capabilities. One (1) electric roll up door allows the movement of large material into and out of the building. Two (2) exhaust air fans are utilized to remove the hot and/or contaminated air from the building.

1.1.3 Electrical

The main power system serving building 4637 consists of a 480-volt power supply, located outside on the south yard, to panel board 4637-PP0001. This service entrance feeds a dry-type step down transformer for low voltage (208/120V). The high voltage panel (480/277V) supplies power for operation of lighting, and motors. The low voltage panel provides 120/208V for receptacles, equipment and miscellaneous power loads. Building 4637 contains emergency lighting system to illuminate exit routes when power outages occur.

1.2 Facility 4637 Site Plan

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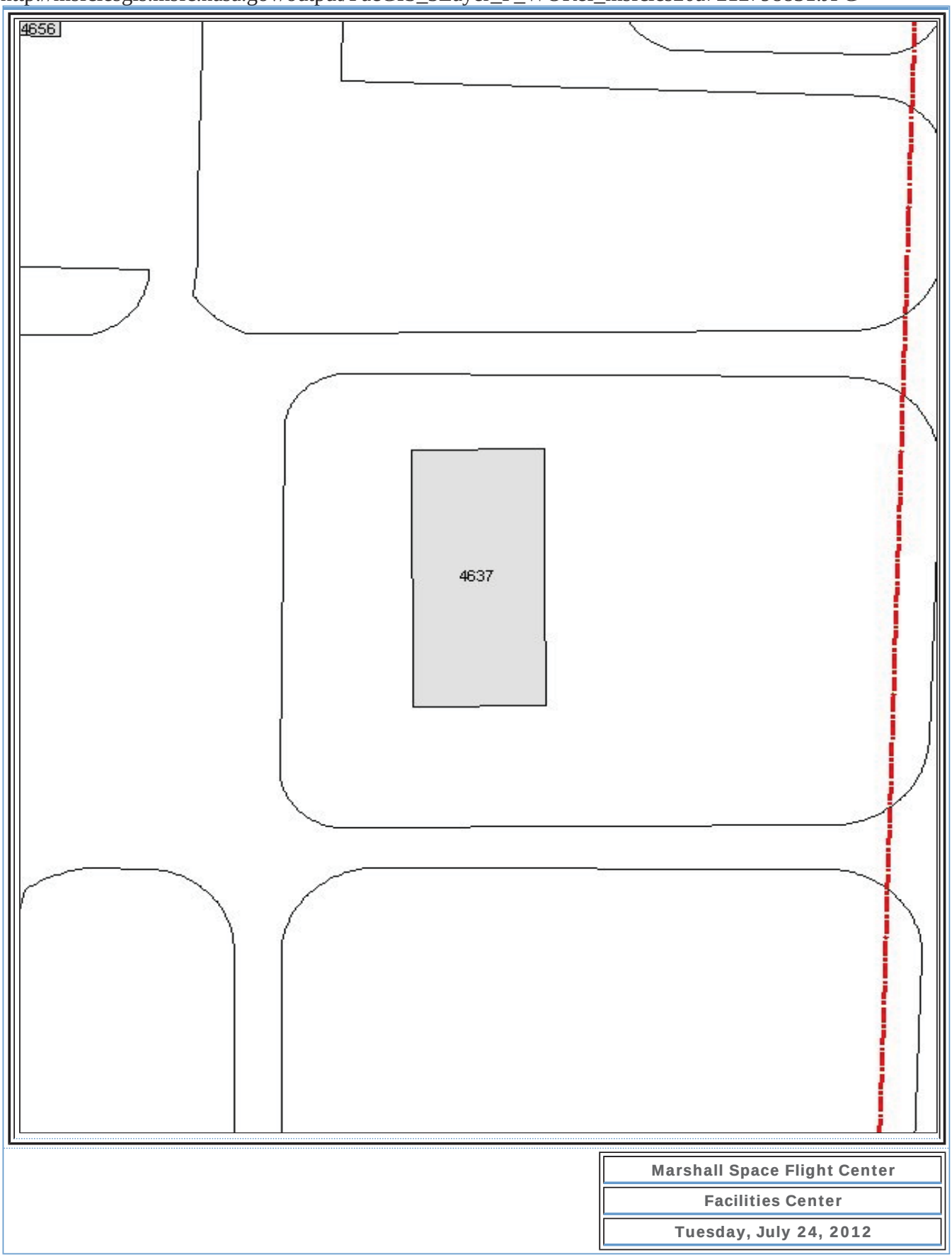
Attachment HB-21

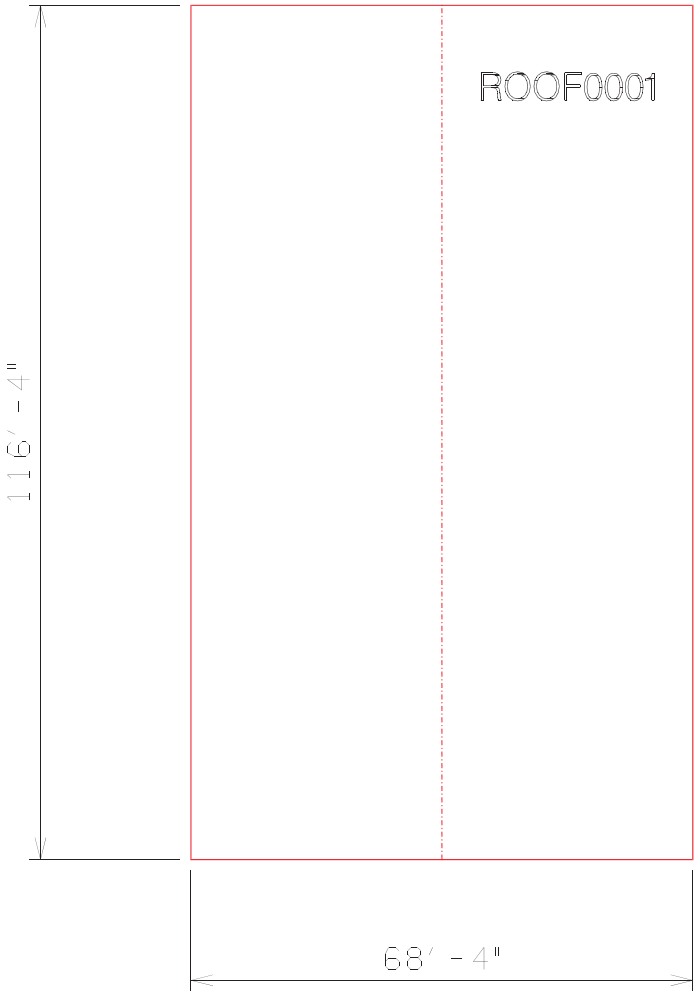
http://msfciesgis.msfc.nasa.gov/output/FacGIS_3Layer_F_WORef_msfcies20a7212798831.JPG



1.3 Facility 4637 Floor Plans

Bldg 4637

BLDG 4637



LEGEND

- DRAIN
- GUTTER
- HATCH
- SKYLIGHT
- STACK
- VENT

NOTE: All dimensions are approximate.

1.4 Facilities Condition Assessment (FCA) Procedure

1.4.1 Scope and Purpose

The purpose of this procedure is to provide a periodic scheduled visual and functional examination of facilities. Facility condition is evaluated and documented in order to provide a basis for rational funding and scheduling of necessary repairs, and to maintain the facility in a condition consistent with its assigned mission. Surveys will encompass the different components of the facilities, such as, but not limited to HVAC, roofs, interior finishes, electrical devices and pumps. Also, included are roads, grounds, sidewalks, storage tanks, drainage systems, structural systems and utility systems. The Assessments will ensure 80% accuracy of the Backlog of Maintenance and Repairs (BMAR) at all times and will include a cost estimate for corrections of any deficiencies or replacement of equipment.

The COSS Contractor Systems Engineers utilize the following reference material:

- UBC
- ACI
- IEEE
- NFPA
- ANSI
- ASME
- OSHA
- ASTM
- NECA
- ASHRAE

The COSS Contractor System Engineering Manager has overall responsibility for the FCA Report. The Systems Engineering Branch provides Systems Engineers to perform and document Facility Condition inspections and initiate the required corrective action. The COSS Contractor Systems Engineering Department develops and manages the annual Facility Condition Assessment Schedule.

Conclusions are documented after the visual inspections are complete. The FCA team members complete the engineering discrepancies and recommendations sheets describing the discrepant items, evaluating the problems and determining the proper method to achieve the necessary corrective maintenance.

1.5 Overall Building Condition Ranking

Building 4637 is in overall **good to new** condition. The ratings and conditions for the building's individual systems are described in sections 1.6 through 1.9.

1.6 Architectural Facility Condition Assessment Findings

1.6.1 Interior

Overall, the interior is in **good to new** condition. No deficiencies were noted during this FCA inspection.

1.6.2 Exterior

Overall, the exterior is in **good to new** condition. No deficiencies were noted during this FCA inspection.

1.6.3 Roof

Building 4637's roofs and gutters are in **good** condition. Even though no major deficiencies were noted during this FCA inspection, it is noted that some of the roof panels are exhibiting signs of light rust that will need to be addressed at a future date.

1.6.4 Civil

The access road and the grounds around Building 4637 are in overall **good** condition. It is recommended to remove plant undergrowth from around the perimeter of the building.

1.6.5 Structural

Structurally, this building is in **good to new** condition. No deficiencies were noted during this FCA inspection.

1.7 Mechanical Findings

The mechanical components in this assessment are:

- Roll-Up Door (1)

1.7.1 Roll-Up Door:

4637 has one (1) electric roll-up door. This roll-up door provides egress for transporting various materials into and out/of this building. This roll-up door (4637-DOOR0001) is located on the north side of the building. Roll-up door (DOOR0001) is rated in **new** condition. This rating is based on its physical appearance, age, condition, and performance.

1.8 HVAC Findings

The HVAC components covered in this assessment are:

- Exhaust Air Fans (2)

1.8.1 Exhaust Air Fans:

There are two (2) exhaust air fans located in building 4637. These exhaust air fans, located on the north wall, are used to remove odors and hot air from the building areas. Both exhaust air fans (4637-EAF0001 and EAF0002) are rated in **new** condition. This rating is based on their physical appearance, age, condition, and performance.

1.9 Electrical FCA Findings

The electrical components covered in this assessment are:

- Panel Boards (2)
- Emergency Lighting (10)
- Fire Alarm System (1)
- Transformer (1)

1.9.1 Panel Boards:

There are two (2) panel boards located in building 4637. The panel boards provide 480, 277, 208, and 120 volts for power, lighting, miscellaneous equipment. Both panel boards (4637-PP0001 and RP0001) are rated in **good** condition. This rating is based on their physical appearance, condition, age and performance.

1.9.2 Emergency Lighting:

There are ten (10) emergency lights located in the egress paths of all areas of building 4637. These lights supply battery powered lighting for egress lighting when normal power is lost. All ten (10) emergency lights (4637-LTS0001, LTS0002, LTS0003, LTS0004, LTS0005, LTS0006, LTS0007, LTS0008, LTS0009 and LTS0010) are rated in **good** condition. This rating is based on their physical appearance, condition, age and performance.

1.9.3 Fire Alarm System:

The Simplex fire alarm system (4637-FAS0001) is located inside the north entrance to building 4637. This system uses pull stations, flashing lights and horns to notify employees and the fire department in case of a fire. It is rated in **good** condition. This rating is based on its physical appearance, age, condition, and performance.

1.9.4 Transformer:

There is one (1) transformer located in building 4637. It is used to step down voltage from 480/277 volts to 208/120 volts. This one (1) transformer (4637-XFMR0001) is rated in **good** condition. This rating is based on its age, performance, and condition.

1.10 Synopsis of FCA Actions and Recommendations

Due to the current condition of building 4637, this FCA Team has no recommendations.

1.11 Safety Impact from Failure of Equipment in Poor/Replace Condition

There is no equipment in building 4637 that could cause a safety impact.

1.12 Energy Recommendations

Due to the recent construction of this building, this FCA Team makes no energy recommendations.

1.13 Estimated Costs

4637 TOTAL FCA ESTIMATED COST

ARCHITECTURAL ESTIMATE	$500
MECHANICAL ESTIMATE	$0
HVAC ESTIMATE	$0
ELECTRICAL ESTIMATE	$0
4637 Total Estimate	$500

4637 ARCHITECTURAL ESTIMATE

INTERIOR

No Remarks	$0
SUBTOTAL	$0

EXTERIOR

No Remarks	$0
SUBTOTAL	$0

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4637 ARCHITECTURAL ESTIMATE (Cont.)

ROOF

No Remarks	$0
SUBTOTAL	$0

STRUCTURAL

No Remarks	$0
SUBTOTAL	$0

CIVIL

Remove Undergrowth	$500
SUBTOTAL	$500

4637 ARCHITECTURAL SUMMARY

INTERIOR	$0
EXTERIOR	$0
ROOF	$0
CIVIL	$500
STRUCTURAL	$0
SUBTOTAL	$500

4637 MECHANICAL ESTIMATE

EQUIPMENT

	POOR	REPLACE
(none)		
SUBTOTAL	$0	$0

OTHER

(none)	
SUBTOTAL	$0

Note: Only equipment rated as "Poor" or "Replace" is estimated, with "Replace" being the more urgent

MECHANICAL SUMMARY

EQUIPMENT (Poor)	$0
EQUIPMENT (Replace)	$0
OTHER	$0
MECHANICAL TOTAL	$0

4637 ELECTRICAL ESTIMATE

EQUIPMENT

	POOR	REPLACE
(none)		
SUBTOTAL	$0	$0

OTHER

(none)	
SUBTOTAL	$0

Note: Only equipment rated as "Poor" or "Replace" is estimated, with "Replace" being the more urgent

ELECTRICAL SUMMARY

EQUIPMENT (Poor)	$0
EQUIPMENT (Replace)	$0
OTHER	$0
ELECTRICAL TOTAL	$0

4637 HVAC ESTIMATE

EQUIPMENT

	POOR	REPLACE
(none)		
SUBTOTAL	$0	$0

OTHER

(none)	
SUBTOTAL	$0

Note: Only equipment rated as "Poor" or "Replace" is estimated, with "Replace" being the more urgent

HVAC SUMMARY

EQUIPMENT (Poor)	$0
EQUIPMENT (Replace)	$0
OTHER	$0
HVAC TOTAL	$0

1.14 FCA Detail Summary

An itemized list of all facility equipment (including conditions, estimates, and comments) and architectural line-item comments is available from the COSS Contractor Facility Engineering Department upon request.

2 RELIABILITY CENTERED MAINTENANCE (RCM) ANALYSIS

2.1 Objectives/Team Members

This Reliability Centered Maintenance (RCM) Analysis of this Marshall Space Flight Center Building was performed during 2008 on NASA Center Operations Support Services Contract NNM08AA54C. The COSS Contractor Facilities Engineering Department performed the analysis using a team of engineers and craft specialists. The objective of the team was to examine the facilities and collateral equipment at the building using the RCM analysis process, and to develop a proposed maintenance approach.

2.2 Background

Analysis was limited to facilities and collateral equipment in Building 4637 that is the responsibility of the COSS Facility Maintenance Contractor. Excluded were those systems that are maintained by the Army and include electric power supply to the building and some steam system equipment. Included were all facilities and collateral equipment within the building (up to 5 feet of the outer wall) associated cooling towers, emergency generators and switch gear.

To support the analysis, all systems were assigned a Failure Criticality Code and a Probability of Failure Code. Appendix A lists the systems and the codes assigned by the team. The codes, based upon similar codes used in the automotive industry[1], are identified in Tables 2-1 and 2-2. Table 2-1 builds upon the four risk categories presented in the COSS Preventive Maintenance Plan and provided additional options for the analysis team. High Risk (Category A) items are ranked 8-10. Moderate Risk (Category B) items are ranked 4-7. Low Risk (Category C) items are ranked 2-3. Negligible Risk (Category D) is ranked as 1.

[1] Reliability, Maintainability, and Supportability Guidebook, Third Edition, Society of Automotive Engineers, Inc., Warrendale, PA, 1995.

Table 2-1: Failure Criticality Codes

Ranking	Effect	Comment
1	None	No reason to expect failure to have any effect on Safety, Health, Environment or Mission.
2	Very Low	Minor disruption to facility function. Repair of failure can be accomplished during trouble call.
3	Low	Minor disruption to facility function. Repair of failure May be longer than trouble call but does not delay Mission.
4	Low to Moderate	Moderate disruption to facility function. Some portion of Mission May need to be reworked or process delayed.
5	Moderate	Moderate disruption to facility function. 100% of Mission May need to be reworked or process delayed.
6	Moderate to High	Moderate disruption to facility function. Some portion of Mission is lost. Moderate delay in restoring function.
7	High	High disruption to facility function. Some portion of Mission is lost. Significant delay in restoring function.
8	Very High	High disruption to facility function. All of Mission is lost. Significant delay in restoring function.
9	Hazard	Potential Safety, Health, or Environment issue. Failure will occur with warning.
10	Hazard	Potential Safety, Health, or Environment issue. Failure will occur without warning.

Table 2-2: Probability of Failure Codes

Ranking	Statistical	Comment
1	1/10,000	Remote probability of occurrence; unreasonable to expect failure to occur.
2	1/5,000	Low failure rate. Similar to past design that has, in the past, had low failure rates for given volume.
3	1/2,000	Low failure rate. Similar to past design that has, in the past, had low failure rates for given volume.
4	1/1,000	Occasional failure rate. Similar to past design that has, in the past, had similar failure rates for given volume.
5	1/500	Moderate failure rate. Similar to past design that has, in the past, had moderate failure rates for given volume.
6	1/200	Moderate to high failure rate. Similar to past design that has, in the past, had moderate failure rates for given volume.
7	1/100	High failure rate. Similar to past design that has, in the past, had high failure rates that have caused problems.
8	1/50	High failure rate. Similar to past design that has, in the past, had high failure rates that have caused problems.
9	1/20	Very High failure rate. Almost certain to cause problems.
10	1/10+	Very High failure rate. Almost certain to cause problems.

2.3 ELECTRICAL SYSTEMS

Electrical systems include all circuits from the substation to the load. Systems analyzed are listed in Table 2-3.

Table 2-3: Building 4637 Electrical Systems

Component Name	Criticality Code	Probability of Failure Code	Number of Items
Panel Boards	4	2	2
Emergency Lighting	9	2	10
Fire Alarm System	9	2	1
Transformer	4	2	1
Total Number of Components			**14**

2.3.1 Panel Boards:

The panel boards provide electrical power distribution through low amperage circuit breakers. Typical loads include lighting, office equipment, computers and receptacles. Failure modes include development of high resistance connections within the electrical circuits and failure of the overload protection devices. Failure rates for all panels are considered low due to their current conditions.

Panel Boards (4637-PP0001 and RP0001) PM Job Steps:

1095-Day Breaker Exercising PM:

1. Exercise all breakers in distribution panels 3-4 times.
2. Install knockout hole plugs as necessary.
3. Identify power feed for panel board and list an updated panel schedule.

There are no changes we recommend to the current PM Program for these panel boards.

2.3.2 Emergency Lights:

4637's emergency lights provide personnel protection from darkness during power outages. The emergency lights' failure modes are excessive heat, electrical shortages and battery failures. The failure rate for these emergency lights is considered low due to their current condition.

Emergency Lights (4637-LTS0001, LTS0002, LTS0003, LTS0004, LTS0005, LTS0006, LTS0007, LTS0008, LTS0009 and LTS0010) PM Job Steps:

30-Day Fluorescent Emergency Light PM:
1. Check condition of lamps.
2. Perform 30 second light operational test.

365-Day Fluorescent Emergency Light PM:
1. Check condition of lamps.
2. Check condition of battery.
3. Perform 1.5 hour operational test.

No changes are recommended to the current maintenance of these fluorescent emergency light systems, as they are in compliance with the Life Safety Code Requirements.

2.3.3 Fire Alarm System:

Simplex Fire Alarm System (4637-FAS0001) PM Job Steps:

30-Day Fire Alarm System PM:
1. Inspect panel.
2. Inspect smoke detectors for damage and obstructions.

180-Day Fire Alarm System PM:
1. Repeat the 30-day PM steps.
2. Verify operation of all pull stations and bells.
3. Clean, test and calibrate smoke detectors if applicable.

No changes are recommended to the current maintenance of this fire alarm system, as it is in compliance with the Life Safety Code and NFPA Code requirements.

2.3.4 Transformers:

The dry type transformers provide voltage step-down functions for various loads. Transformers are considered highly reliable units. Failures are associated with insulation failure and connection failure. The failure rate for this transformer is considered low due to its current condition. This transformer is not currently on a PM program and none is recommended at this time.

2.4 MECHANICAL / HVAC SYSTEMS

Mechanical systems include components associated with heating, ventilation, and air conditioning, and other pumping systems. Systems analyzed are listed in Table 2-4.

Table 2-4: Building 4637 Mechanical/ HVAC Systems

Component Name	Criticality Code	Probability of Failure Code	Number of Items
Exhaust Air Fans	2	1	2
Total Number of Items			**2**

2.4.1 Exhaust Air Fans:

Exhaust Air Fans (4637-EAF0001 and EAF0002) PM Job Steps:

180-Day PM:

1. Start and stop fan with local switch.
2. Check motor and fan shaft bearings for noise, vibration, overheating and lubricate as necessary.
3. Check belts for wear, tension and alignment, if applicable, adjust as required.
4. If any problems are found issue a work request.

There are no changes we recommend to the current PM Program for these exhaust air fans.

2.5 MISCELLANEOUS SYSTEMS

Systems analyzed in this section are listed in Table 2-5.

Table 2-5: Building 4637 Miscellaneous Systems

Component Name	Criticality Code	Probability of Failure Code	Number of Items
Roll-Up Door	4	1	1
Roof	6	2	1
Total Number of Items			**2**

2.5.1 Door System:

The electric roll-up door provides access to remove or supply large equipment and personnel into the building. Failure modes include development of high resistance connections within the electrical circuits, failure of the chain mechanism and failure of the motor. Failure rate for this electric roll-up door is considered low due to its current condition.

Electric Roll-Up Door (4637-DOOR0001) PM Job Steps:

180-Day Millwright PM:

1. Inspect drive mechanism.
2. Inspect brake settings if applicable.
3. Check master link on chains.
4. Visually inspect alignment of tracks.
5. Lubricate tracks as necessary.
6. Inspect mounts to ensure they are sufficiently sized.
7. Inspect chain drive adjustments.
8. If any problems are found, issue a work request.

There are no changes we recommend to the current PM Program for this electric roll-up door.

2.5.2 Roof:

An annual preventive maintenance schedule and inspection is followed for the roof at Building 4637. This inspection includes a visual search of the entire roof system for general surface condition, leaks, ponding, flashing condition, penetrations, gutter condition, membrane condition, and roof drain and scupper conditions. The most recent roof conditions are noted in this report from both the actual FCA inspection and/or from the 365-Day P. M. Roof Inspection Report (viewable on FacGIS). Building 4637 has a standing-seam, metal panel roof system. Since this is a new building, this roof has just been set-up in MAXIMO and also for P.M. activities.

3 APPENDIX

Building 4637 RCM Components (Mech/HVAC/Misc)

MAXIMO#	DESCRIPTION	LOCATION	C	P
4637-DOOR0001	Roll-Up Door	Roll-Up Door, Rm 100, North Side - Disconnect at door	4	1
4637-EAF0001	Exhaust Air Fan	Exhaust Air Fan, Rm 100 Northwest- Disconnect Under Fan	2	1
4637-EAF0002	Exhaust Air Fan	Exhaust Air Fan, Rm 100 Northeast - Disconnect Under Fan	2	1

Building 4637 RCM Components (Electrical)

MAXIMO#	DESCRIPTION	LOCATION	C	P
4637-FAS0001	Fire Alarm System	Fire Alarm System, Inside NW Corner	9	2
4637-LC0001	Lighting Contactor	Lighting Contactor, Rm 100 East Wall	4	2
4637-LTS0001	Emergency Lights	Emergency Lighting - Rm 100, 1st Row Center	9	2
4637-LTS0002	Emergency Lights	Emergency Lighting - Rm 100, 2nd Row West End	9	2
4637-LTS0003	Emergency Lights	Emergency Lighting - Rm 100, 2nd Row East End	9	2
4637-LTS0004	Emergency Lights	Emergency Lighting - Rm 100, 4th Row Center	9	2
4637-LTS0005	Emergency Lights	Emergency Lighting - Rm 100, 5th Row West	9	2
4637-LTS0006	Emergency Lights	Emergency Lighting - Rm 100, 6th Row East	9	2
4637-LTS0007	Emergency Lights	Emergency Lighting - Rm 100, 7th Row Center	9	2
4637-LTS0008	Emergency Lights	Emergency Lighting - Rm 100, 9th Row West	9	2
4637-LTS0009	Emergency Lights	Emergency Lighting - Rm 100, 10th Row Center	9	2
4637-LTS0010	Emergency Lights	Emergency Lighting - Rm 100, 10th Row East	9	2
4637-PP0001	Power Panel	Power Panel, Rm 100 East Wall	4	2
4637-RP0001	Receptacle Panel Board	Receptacle Panel, Rm 100 East Wall	4	2
4637-SSS0001	Starter Safety Switch	Starter Safety Switch, Rm 100, North Wall	4	2
4637-SSS0002	Starter Safety Switch	Starter Safety Switch, Rm 100, North Wall	4	2
4637-XFMR0001	Transformer	Transformer, Rm 100 East Wall	4	2