



Maintenance Deferred Maintenance Practice & Policy

Ivan Graff, P.E., LEED AP

Facilities Engineer

Office of Engineering and Construction Management

U. S. Department of Energy

2009
FIMS / Real
Estate
Workshop

Presentation Level: Basic



Our Questions . . .

- Why does headquarters care about maintenance and deferred maintenance?
- What is maintenance?
- When does maintenance become deferred?
- How does the government plan to clarify deferred maintenance?



What's Our Motivation?

- Executive Order 13327 Federal Real Property Asset Management
 - Sec. 4(b): “The [Federal Real Property] Council shall consider, as appropriate, the following performance measures . . .
 - (i) life-cycle **cost estimations** associated with the agency's prioritized actions . . .
 - (iv) the **operating, maintenance,** and security costs at Federal properties, including but not limited to the costs of utility services at unoccupied properties”



What's Our Motivation?

- 41 CFR 102-84 Annual Real Property Inventories
 - Establishes the reporting requirement and its applicability
- Federal Real Property Profile Guidance for Real Property Inventory Reporting
 - Based on EO 13327 and 41 CFR 102-84
 - Updated annually
 - Defines reporting element “Repair Needs”

Repair Needs: the amount necessary to ensure that a constructed asset is restored to a condition substantially equivalent to the originally intended and designed capacity, efficiency, or capability.

Federal Real Property Council Real Property Inventory - User Guidance for FY 2008 Reporting

11. CONDITION INDEX (PERFORMANCE MEASURE 2)

Exception: Land is excluded for Condition Index. Only buildings and structures will be required to have a Condition Index.

Note: Numeric values reported for Condition Index must be greater than or equal to zero.

Condition Index (CI) is a general measure of the constructed asset's condition at a specific point in time. CI is calculated as the ratio of Repair Needs to Plant Replacement Value (PRV).

Formula: $CI = (1 - \text{Repair Needs} / \text{PRV}) \times 100$

Repair Needs: the amount necessary to ensure that a constructed asset is restored to a condition substantially equivalent to the originally intended and designed capacity, efficiency, or capability. Agencies will initially determine repair needs based on existing processes, with a future goal to further refine and standardize the definition.

Plant Replacement Value (or Functional Replacement Value): the cost of replacing an existing asset at today's standards (see data element #10 Value).



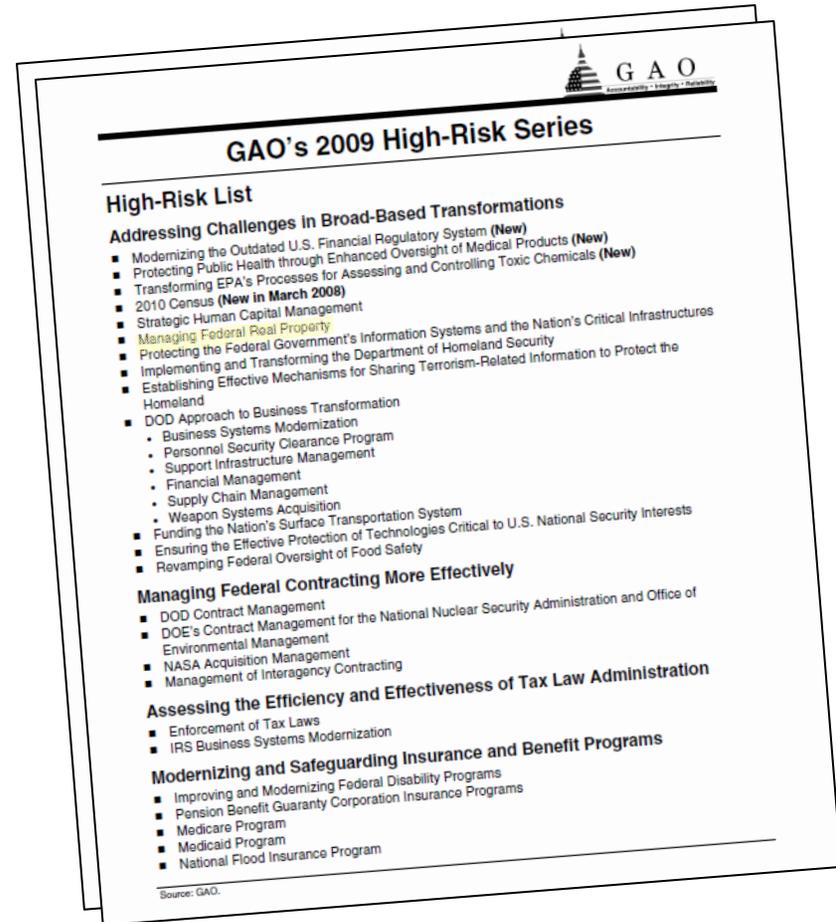
What's Our Motivation?

- DOE O 430.1B Real Property Asset Management
 - Section 4(d) Maintenance and Recapitalization
 - “Real property assets will be maintained in a manner that promotes operational safety, worker health, environmental protection and compliance, **property preservation**, and cost-effectiveness while meeting the program missions.”
 - Section 4(g)(2) Performance Goals and Measures
 - “Asset Condition Index . . . is the Department’s corporate measure of the condition of its facility assets. The ACI reflects the **outcomes of real property maintenance** and recapitalization policy, planning, and resource decisions.”
- Real Property Asset Management Plan (DOE ME-006)
 - Lays the course to improvement



So What's the Problem?

- GAO sees a relationship between “deteriorating facilities” and agencies’ ability to fulfill their missions.
- Federal real property management first appeared on GAO’s High Risk in FY 2003.





So What's the Problem?

Deferred Maintenance as of 9/30/08 **Buildings, Structures and Facilities Only**

(in billions of \$)

	FY 2008	FY 2007
Low Estimate	\$88.6	\$89.9
High Estimate	\$94.1	\$97.2
Critical Maintenance	\$5.0	\$12.5
"Costs"	\$373.5	\$362.6
DM / "Costs"	0.24	0.26

*Ref: 2008 Financial Report
of the United States
Government, P. 58 & 150*

- GAO reported these backlog totals:
 - April 2007: State DOE, DOI, VA, NASA, and GSA -- \$16B
 - September 2008: Same Agencies Less State -- \$30B
 - Doubled in Two Years?!
- FIMS DOE Data, FY 2008
 - DM: \$3.7B → Up 12% from FY 2007



How HQ Uses Maintenance

- As a budgeting tool . . .
 - Integrated Facilities and Infrastructure (IFI) Crosscut Table in a budget submission
 - Some programs receive dedicated operations and maintenance funding, most do not
- As a tracking measure . . .
 - FIMS Required Maintenance
 - Quarterly maintenance reporting
- As a performance indicator . . .
 - FIMS end of fiscal year
 - Actual Maintenance → Sustainment Measures
 - Deferred Maintenance → Asset Condition Index
 - Reported to OMB, FRPC, and GAO
 - Appears in financial reports



Where Do I Draw the Box?

- **ASSETS** Tangible or intangible items owned by the federal government which would have probable economic benefits that can be obtained or controlled by a federal government entity. – FASAB SFFAS No. 1



“The good things you own”

- **REAL PROPERTY ASSETS** Any interest in land, together with the improvements, facilities, structures, and fixtures located thereon, including prefabricated movable structures . . . under control of DOE – DOE O 430.1B



“The fixed items you control”



Which is the Asset?

Somewhere in here
is my asset →

Answer: It's the Tree!



A bare tree

Which is more valuable?

Leaves from the tree



<



Where Do I Draw the Box?

- Record Unit
 - An accounting convenience: You choose but . . . choose wisely
 - Hint: Think real property assets

- Retirement Unit
 - A property record unit may be composed of one or more retirement units.
 - Costs to **extend** the life of or **replace** the retirement unit shall be capitalized.
 - All other costs related to the retirement unit shall be **expensed**.



What is Maintenance?

The act of keeping fixed assets in **acceptable** condition and includes preventive maintenance, normal repairs, replacement of parts and structural components, and other activities needed to **preserve** the asset so that it functions properly and safely. – **FASAB SFFAS No.6**

The recurring day-to-day work that is required to maintain and **preserve** P&CE in a condition suitable for it to be utilized for its designated purpose. It differs from repair in that it is normally work to correct wear and tear before major repair is required, and it is usually less involved than repair work. - **DOE Accounting Handbook**



What is Maintenance?

Day to day work that is required to sustain property in a condition suitable for it to be used for its designated purposes, including preventive, predictive, and corrective maintenance. – **DOE O 430.1B**

Does NOT include -

1. Operations like cleaning, material handling, grounds
2. Betterments like upgrades or in-house construction
3. Conversions or facility replacements

Does include replaced systems that –

1. Conserve energy and water
2. Have lower emissions
3. Contain renewable components



Maintenance Vs. Repair

The restoration or replacement of a deteriorated item of P&CE, such that it may be utilized for its designated purpose.
- **DOE Accounting Handbook**

Repair Definitions

The restoration of failed or malfunctioning equipment, system, or facility to its intended function or design condition. Repair does not result in a significant extension of the expected useful life.
- **DOE O 430.1B**

*Let's agree that for this discussion that a **repair** is a type of **maintenance***



Operations • Maintenance • Betterments

Expense Type	Typical of Activities that . . .	Examples
<i>Operations</i>	Support the use, but do not affect the function or longevity, of systems or assets	<ul style="list-style-type: none"> ■ <u>Cleaning</u> ■ <u>Grounds care</u> ■ <u>Snow removal</u> ■ <u>Waste disposal</u> ■ <u>Utilities</u> ■ <u>Pest management</u> ■ Safety equipment ■ Security ■ Audio / visual ■ Material handling ■ Fleet management ■ IT / telecom
<i>Maintenance</i>	Impact systems or assets AND ■ Occur on a schedule OR ■ Address unexpected or impending failures	<ul style="list-style-type: none"> ■ Periodic or occasional testing and inspection ■ Routine repair or replacement of parts including belts and lamps ■ Adjustment; lubrication; painting; or resurfacing
<i>Betterments</i>	Upgrade, expand capacity, renew, or introduce, in whole or in part, systems or facilities	<ul style="list-style-type: none"> ■ Replacing a sliding door with a roll-up door ■ Increasing electric service to a building ■ Constructing a storage structure for use by occupants in an existing adjacent building

Note: Underlined operations example expenses tracked in FIMS



Some Examples . . .



Windborne Soil Erosion on a Roof . . .

- Like roof maintenance?
- Like gutter cleaning?

Dusty Blower . . .

- Does it matter that I have to disassemble the unit?
- Does the dust impact the system?





Some Examples . . .

Dilapidated Stall . . .

- In need of a cleaning?
- Complete overhaul?
- If the toilet works, gets a new tank lid, and is disinfected, is that enough?



Clearing Debris . . .

- Do we ever clear a site for its own sake?
- Where does “grounds” stop and “remediation” begin?



Some Examples . . .



Reconstructing the Envelope . . .

- What if the work occurs in phases?
- What if the work corrects an unavoidable flaw?

Stripped to the Core . . .

- Does the asset remain?
- What if the building's requirements stay the same?





Some Examples . . .



Incidental Improvements . . .

Restoring water damaged walls in vicinity

- and added a mezzanine?
- and added insulation?
- and added a window?



Some Examples . . .

Improper Installation . . .

Does it matter when it happened?
What if it leads to a catastrophic failure?



Missing Something . . .

What if the code changes?
What if the loads are redistributed?



What is Personal Property?

- Typically something like:
 - “Temporary or movable tangible property”
- DOE definition appears in 41 CFR 109-1:
 - Property of any kind, except for:
 - Real estate, easements, rights-of-way, or permanent fixtures
 - Atomic weapons and nuclear materials
 - Petroleum in the petroleum reserves
- Maintenance addressed in DOE G 580.1-1, Section 8.14:
 - “[I]tems . . . subject to periodic calibration or maintenance are [to be] calibrated or maintained at the intervals specified in the manufacturer’s standards.”



Maintenance Becomes Deferred When ...

- FASAB SFFAS No.6
 - “[It] was not performed when it should have been or was scheduled to be performed **but was put off or rescheduled for a future period.**”
 - Reporting entities receive “maximum flexibility
 - Not audited
- DOE O 430.1B
 - “[It] was not performed when it should have been or was scheduled to be and which, therefore, is **put off or delayed beyond its optimum period.**”
 - DOE expects repeatable and logical maintenance program
 - Auditable and verifiable



Optimum Period

- “That time in the life cycle of an asset when maintenance actions should be accomplished to preserve and maximize the useful life of the asset. The determination is based on engineering/maintenance analysis and is *independent of funding availability or other resource implications.*”

*You have a narrow band
of time to catch the train*

*The prudent manager
effectively predicts the
schedule*



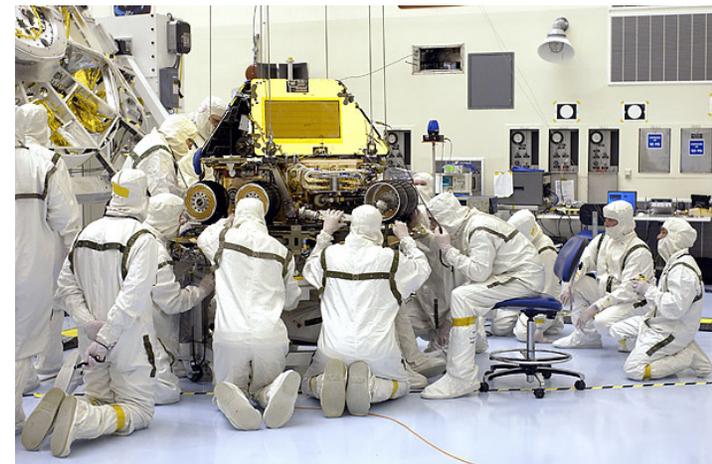
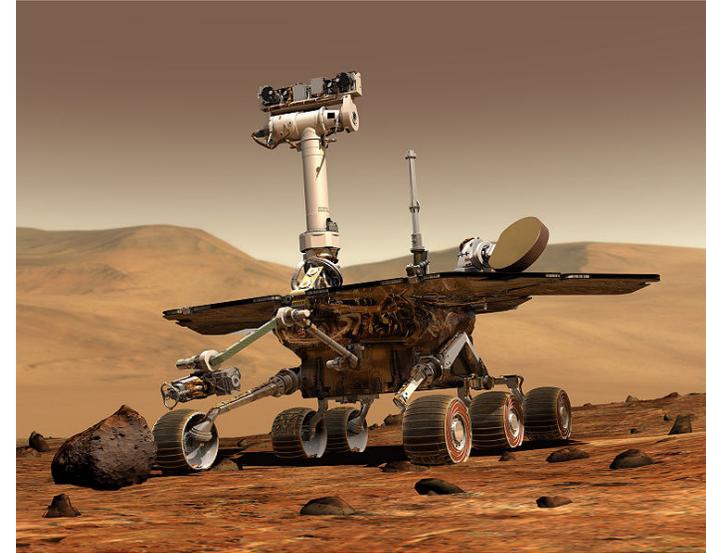


Service Life: Expect the Unexpected

- Remember the Mars Rovers?
 - Service Life: 90 Solar Days
 - Actual Lives: 5+ Years
 - Opportunity - 1,906
 - Spirit - 1,927

- Has their long life delayed replacement plans? You bet!

- Why have they lasted so long?
 - Winds sweep dust off solar panels
 - Parking on steep terrain tilts solar arrays towards the sun
 - Built-in diagnostics





Do I Ever Use Service Life?

- Condition assessments tell you when you have reached the optimum period.
- Inspections must occur at least once every five years.
- Increasing the frequency thoroughness of inspections as the item approaches its “service life” increases the likelihood that you will *catch the train*.

ATTACHMENT 10-1
ATTACHMENT 10-1
STANDARD SERVICE LIVES¹

Item	Service Life (Years)
Absorbers	20
Accelerators	20
Acid handling equipment	10
Adsorbers	20
Agitators and mixers	20
Air-conditioning equipment:	20
Large (over 20 tons)	15
Medium (5-20 tons)	10
Small (under 5 tons)	20
Air coolers (spray oil)	12
Aircraft	25
Air preheaters	20
Air supply units	10
Alley, robot, complete	20
Ash handling systems	20
Autoclaves	5 ²
Automatic data processing equipment	10
Automotive equipment:	10
Ambulances	10
Buses, passenger	10
Carriers, weapon	10
Cars, armored	5
Jeeps	6
Sedans	6
Scooters	6
Station wagons	10
Trailers, automotive (all types)	10
Trucks (all types):	10
Heavy	8
Light	20
Bag sealers	20
Baking panels	20
Balers:	25
Metal	20
Paper	15
Bar turners	20
Bath, temperature	10
Batteries, storage (stationary)	10
Battery chargers	25
Beds, cooling	25

¹Power marketing administrations should refer to publications or studies on utility service lives.
²Effective October 1, 1998.

Chapter 10. Plant and Capital Equipment 10-27

DOE Accounting Handbook Chapter 10



Do I Have to Assess all Units?

- DOE does not accept sampling methods for estimating deferred maintenance (FASAB: “life-cycle cost analysis”). Why?
 - You can not assume a future condition.
 - One is rarely representative of all.
 - Seeing is believing – DOE O 430.1B requires technical evaluation and reporting of real property condition by professionals.

- Models with condition-based inputs will provide a better target than text book service lives.





If We Won't Fix It, Is It Deferred?

- To report deferred maintenance, identify the deficiency and determine optimum period.
 - Many deficiencies are not at their optimum period!
 - The prudent facility manager identifies the optimum period.
 - Painting the accelerator tunnel wall
 - Repairing a pump packing leak
- No need to report a deficiency that will not reach its optimum period for correction.
- However, deferring specific classes of deficiencies (for example painting) seems short sighted.





If It Is Obsolete, Is It Deferred?

	Deferred Maintenance?
A Real Property Record (<i>record unit</i>)	No
Components (<i>retirement units</i>)	Yes

- Does obsolescence have a role in determining optimum period?
 - Yes, especially when failure impacts mission.



- Product, parts and related lifecycle services have been released for sale

- Spare parts made and manufacturer support available

- Repair services and parts are available through 3rd party

- No support or parts available
- Failure results in long outages and sub-optimal repair practices

Courtesy of: ABB Inc.



Worse than Deferred Maintenance ...

- What to do when deferred maintenance exceeds the replacement plant value (RPV)?
 - *Hint: Think about when the asset condition index is less than zero*
 - This means it would cost more to repair or replace components than build new
 - RPV **does not** include decommissioning and demolition costs, so it may still make sense to resolve the backlog
- What do we have? An “impaired asset!”

“Impairment exists when the carrying amount of a long-lived asset or asset group exceeds its fair value and is nonrecoverable.” – **FASB Statement No. 144**



Need to Test for Asset Impairment?

- Answer “yes” to these questions and it may be time to test for impairment:
 - Have first costs greatly exceeding initial expectations?
 - Has the RPV of a long-lived asset decreased sharply?
 - Has the use or configuration of the long-lived asset changed significantly?
 - Have regulations impacting activities changed recently?
 - Has the asset experienced or anticipates funding cuts?
 - Does the site now plan to decommission the long-lived asset significantly before the end of its estimated useful life?

- Got an impaired asset? Have you addressed it in the ten year site plan?



When Does Deferred Maintenance Disappear?

- We can close deferred maintenance when:
 - The work needed is complete or obviated,
 - The facility is demolished, or,
 - The facility is permanently transferred out of DOE or no longer leased
- The following FIMS property status codes indicate the record no longer has deferred maintenance:
 - 8, 10, 17, and all two letter codes except XP and XX
- *Note: if the facility remains, then the extant deferred maintenance follows, and DOE should disclose its maintenance logs to the extent practicable.*





Let's Look Again at the Problem...

GAO-09-10, a report on repair and maintenance backlogs released November 2008

- How do six agencies estimate their repair and maintenance backlogs?

“The backlog estimates do not necessarily reflect the [expected] costs . . . to repair and maintain assets essential to their missions or to avert risks to their missions.” (3)

- How have backlogs impacted operations?

“It is difficult to predict when or where an incident might occur that would severely impact an agency’s mission.” (24)

- How do they manage their backlogs?

“FRPP was purposefully vague in defining repair needs so agencies could use their existing data collection and reporting processes.” (7)



What's in a "Backlog"?

Important: This table reflects the GAO report and does not necessarily reflect agency policy

	Work Past Due (defr. maint.)	Corrective Work (not scheduled)	Betterments (stds / mission)	Recapitalization Projects
Energy	X			
NASA	X		X	
Interior	X			
VA		X		
GSA		X	X	
Defense			X	X



GAO's Full Recommendations

“[Develop] a uniform reporting requirement in the FRPP that would capture the government’s . . . real property repair and maintenance [costs].”

“[Define] repair and maintenance costs related to all assets that agencies determine to be important to their mission. (25)”



Plans to Clarify Deferred Maintenance

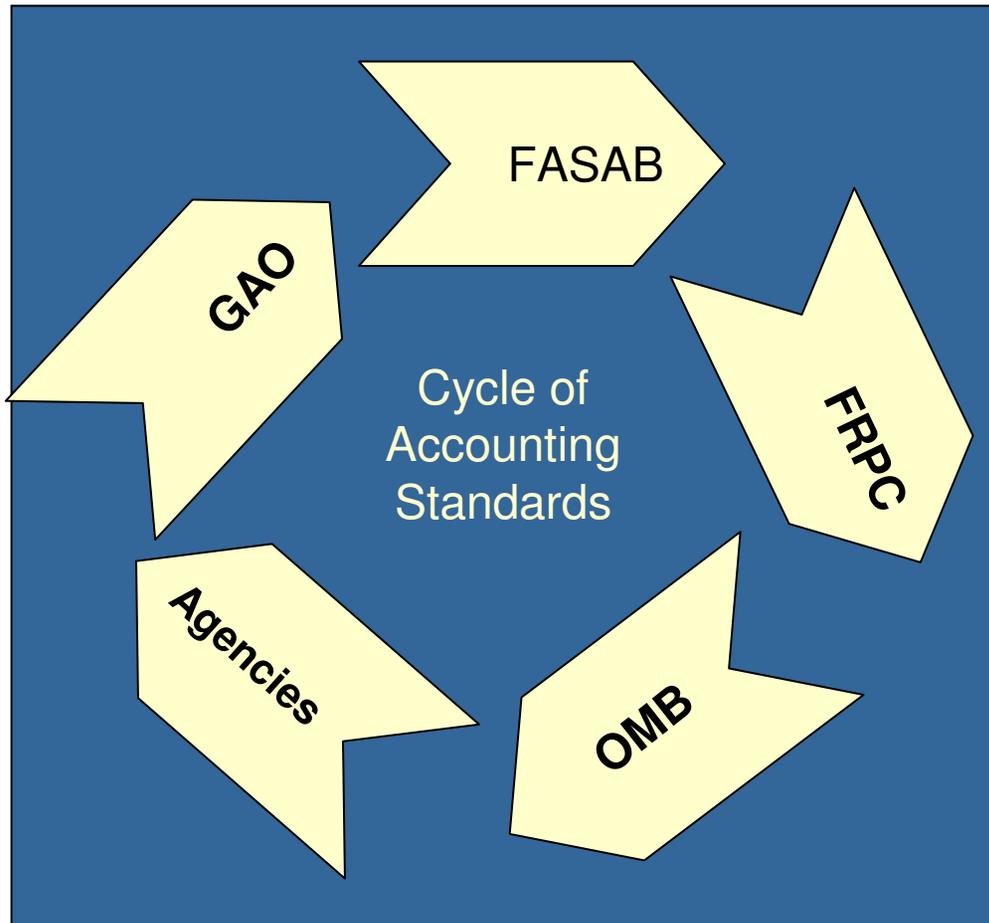
- FASAB recently convened a deferred maintenance and asset Impairment task force
 - Purpose: Provide technical advice to the Board so it can develop better federal accounting standards.
 - Objectives:
 - Review –
 - Current required supplemental information disclosures
 - Existing GAAP literature
 - Technical criteria regarding deferred maintenance and asset impairment
 - Then identify enhancements that will assist in providing more useful information to internal and external decision makers.

- Follow developments here:

http://www.fasab.gov/deferredmaintenance_asset.html



One Path Forward...



1. FASAB with agency and FFC input proposes a standard
2. FRPC incorporates in reporting requirements
3. OMB ensures compliance
4. Agencies report DM to GAO
5. GAO recommends refinements to standards