

Panel IV: Asset Management

A Tool For Our Times

AAPA 2009
Facility Engineering Seminar and Expo

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AAPA



Agenda

- ▶ What is Asset Management ?
- ▶ Common Terminology
- ▶ AM Drivers
- ▶ Successful Enterprise AM Program
- ▶ Implementation – Planning Tools
- ▶ AM Planning Tools – Output
- ▶ What Are Others Using?
- ▶ Discussion / Questions

Asset Management

What is Asset Management?

*The systematic and integrated business practices through which owners **optimally manage their built and natural assets**, while monitoring their associated performance, risks and expenditures, in order to support missions and organizational goals, typically integrated with varying levels of service **over the life cycle of the asset.***

What Does Your Organization Use?

- ▶ Real Property Inventory
- ▶ GIS Mapping
- ▶ Capital Investment Planning System
- ▶ CMMS
- ▶ BIM
- ▶ Sustainability Goals
- ▶ LEED® Certification
 - Existing Building Operations & Maintenance (EBOM)
 - New Building

Common Terminology

- ▶ Facility Condition Index

$$\frac{\text{Deferred Maintenance Backlog (\$)}}{\text{Plant Replacement Value (\$)}} = \text{FCI}$$

- ▶ Condition Index

- SMS/EMS Rating of Facility

- ▶ Mission Dependency Index (MDI)

- ▶ MEPs / MAPs / LRMP

- 1 YR
- 5 YR
- 20 YR

- ▶ Computerized Maintenance Management System (CMMS)

FCI Values Can Mislead



Replacement Value \$140,000

Renewal Requirement \$7,000

$$\text{FCI} = \frac{7,000}{140,000} = 5\% \text{ (Good)}$$



Replacement value \$ 50,000

Renewal Requirement \$17,000

$$\text{FCI} = \frac{17,000}{50,000} = 34\% \text{ (Critical)}$$

FCI Values Can Mislead



Replace defective brakes
\$7,000



Replace leaky side windows
Repair rusted panels
\$17,000



Priority based on ratio FCI

Common Terminology

- ▶ Client Hierarchy
- ▶ Asset Inventory
 - Uniformat II (ASTM 1557E-97)

If you don't know what you own
... how can you manage it?

- ▶ Deficiencies / Defects / FIMS
- ▶ Work Packaging / WAG / Projects

The screenshot shows the TECfms facility management system interface. The top navigation bar includes 'Welcome Ray', 'Profile', 'Assets', 'Inventory', and 'D'. The left sidebar shows a hierarchy for 'County of Albemarle, VA' with sub-categories: 'General Services' (McIntire Campus, 5th Street Campus, Court Square Campus, Monticello Fire Station Campus, Old Crozet Elementary School Campus, Historic County Jail & Jailers House Campus), 'Schools & Education' (Albemarle County High School Campus, Monticello High School Campus, Western Albemarle High School Campus), and 'Parks & Recreation' (Beaver Creek Lake, Charlotte Y. Humphris Park, Chris Greene Lake). The main content area has tabs for 'Information' and 'Project Status'. A photo of a building is displayed, and below it is a table with columns 'File Type' and 'File Name'. The table contains one row with 'Hierarchy Photo' and 'McIntire.jp'.

Uniformat II – ASTM E1557

ASTM Uniformat II Classification for Building Elements (E1557-97)

Level 1 Major Group Elements	Level 2 Group Elements	Level 3 Individual Elements
A SUBSTRUCTURE	A10 Foundations	A1010 Standard Foundations A1020 Special Foundations A1030 Slab on Grade
	A20 Basement Construction	A2010 Basement Excavation A2020 Basement Walls
B SHELL	B10 Superstructure	B1010 Floor Construction B1020 Roof Construction
	B20 Exterior Enclosure	B2010 Exterior Walls B2020 Exterior Windows B2030 Exterior Doors
	B30 Roofing	B3010 Roof Coverings B3020 Roof Openings
C INTERIORS	C10 Interior Construction	C1010 Partitions C1020 Interior Doors C1030 Fittings
	C20 Stairs	C2010 Stair Construction C2020 Stair Finishes
	C30 Interior Finishes	C3010 Wall Finishes C3020 Floor Finishes C3030 Ceiling Finishes
D SERVICES	D10 Conveying	D1010 Elevators & Lifts D1020 Escalators & Moving Walks D1090 Other Conveying Systems
	D20 Plumbing	D2010 Plumbing Fixtures D2020 Domestic Water Distribution D2030 Sanitary Waste D2040 Rain Water Drainage D2090 Other Plumbing Systems
	D30 HVAC	D3010 Energy Supply D3020 Heat Generating Systems D3030 Cooling Generating Systems D3040 Distribution Systems D3050 Terminal & Package Units D3060 Controls & Instrumentation D3070 Systems Testing & Balancing D3090 Other HVAC Systems & Equipment

Level 3 Elements	Level 4 Sub-Elements
B2020 Exterior Windows	B2021 Windows B2022 Curtain Walls B2023 Storefronts
B2030 Exterior Doors	B2031 Glazed Doors & Entrances B2032 Solid Exterior Doors B2033 Revolving Doors B2034 Overhead Doors B2039 Other Doors & Entrances
B3010 Roof Coverings	B3011 Roof Finishes B3012 Traffic Toppings & Paving Membranes B3013 Roof Insulation & Fill B3014 Flashings & Trim B3015 Roof Eaves and Soffits B3016 Gutters and Downspouts
B3020 Roof Openings	B3021 Glazed Roof Openings B3022 Roof Hatches B3023 Gravity Roof Ventilators
C1010 Partitions	C1011 Fixed Partitions C1012 Demountable Partitions C1013 Retractable Partitions C1014 Site Built Toilet Partitions C1015 Site Built Compartments Cubicles C1016 Interior Balustrades and Screens C1017 Interior Windows & Storefronts
C1020 Interior Doors	C1021 Interior Doors C1022 Interior Door Frames C1023 Interior Door Hardware C1024 Interior Door Wall Opening Elements C1025 Interior Door Sidelights & Transoms C1026 Interior Hatches & Access Doors C1027 Door Painting & Decoration
C1030 Fittings	C1031 Fabricated Toilet Partitions C1032 Fabricated Compartments & Cubicles

Common Terminology

- ▶ Project (Deficiency) Prioritization Algorithm
 - Weighted Score
 - Analytical Hierarchical Processing (AHP)
 - ASTM E1765
 - Maximize Return on Investment
 - Mission Dependency Index
 - Risk to Mission (TEC ARMR[©])

PROBABILITY	SEVERITY				
	INSIGNIFICANT	MINOR	MODERATE	SIGNIFICANT	CATASTROPHIC
CERTAIN	MEDIUM	HIGH	EXTREME	EXTREME	EXTREME
LIKELY	MEDIUM	HIGH	HIGH	EXTREME	EXTREME
POSSIBLE	LOW	MEDIUM	HIGH	EXTREME	EXTREME
UNLIKELY	LOW	LOW	MEDIUM	HIGH	EXTREME
REMOTE	LOW	LOW	MEDIUM	HIGH	HIGH

Common Terminology

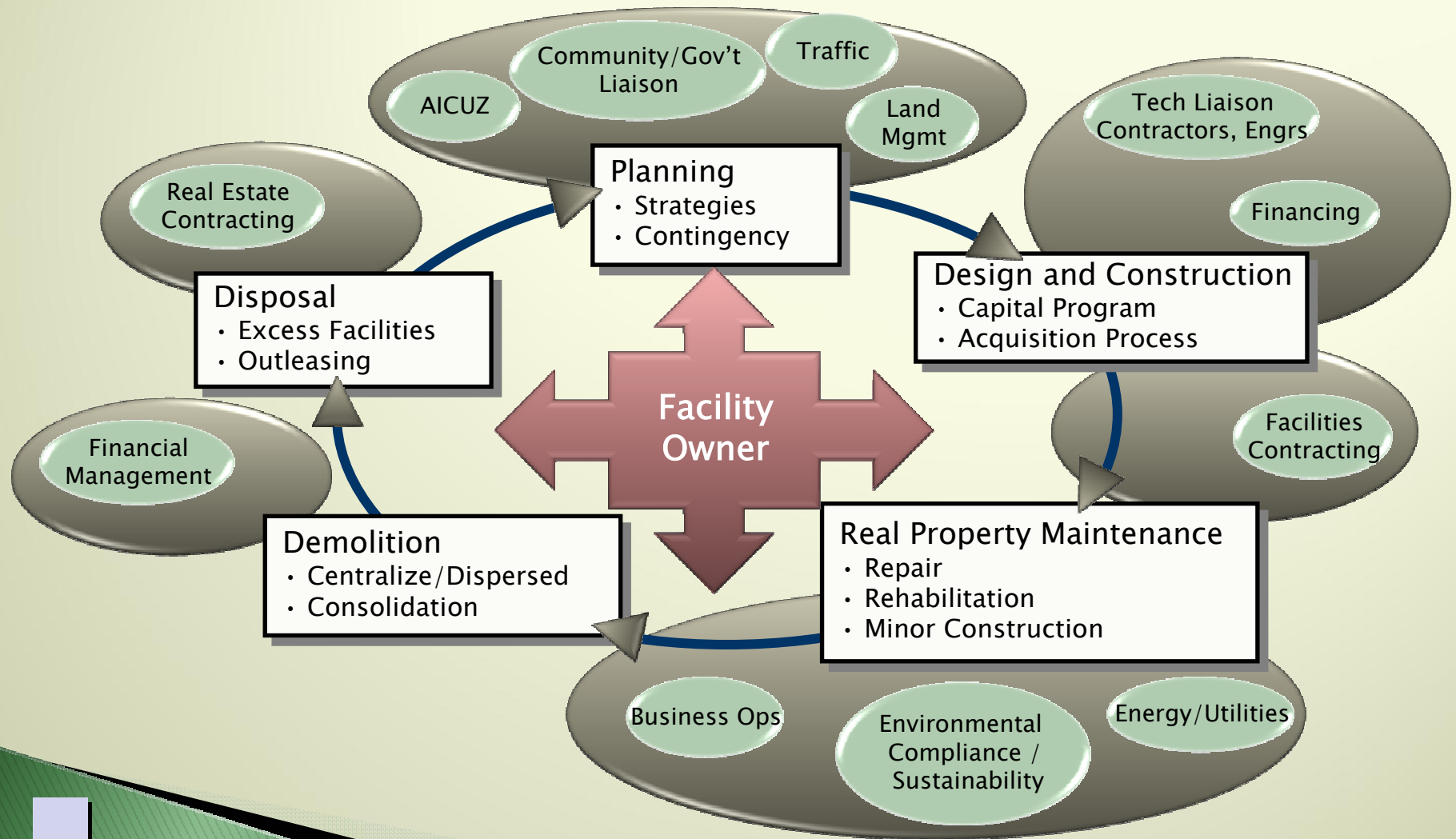
- ▶ Computerized Maintenance Management Systems (CMMS)
 - Typical Systems
 - IBMmaximo
 - TRIRIGA Operations
 - PWTools
 - Work Order Execution
 - Labor
 - Materials
 - Equipment
 - Financial Component
 - Purchasing Component

Asset Management Drivers

▶ AM Drivers

- **EO 13327 (2004) – Federal Real Property Asset Management**
 - Mandates AM Plans
 - Life Cycle / Total Cost of Ownership
- **EO 13423 (2007) – Strengthening Federal Environmental, Energy and Transportation Management**
 - Energy / Water Conservation Goals
 - 5 Guiding Principles Federal Leadership in High Performance and Sustainable Buildings
- **EO 13514 (2009) – Energy / Water Conservation**
 - EO 13423+ More Aggressive Goals
 - \$\$\$\$ Impacts / Ramifications

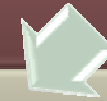
Successful AM Program



Successful AM Program

Investment Planning Tools

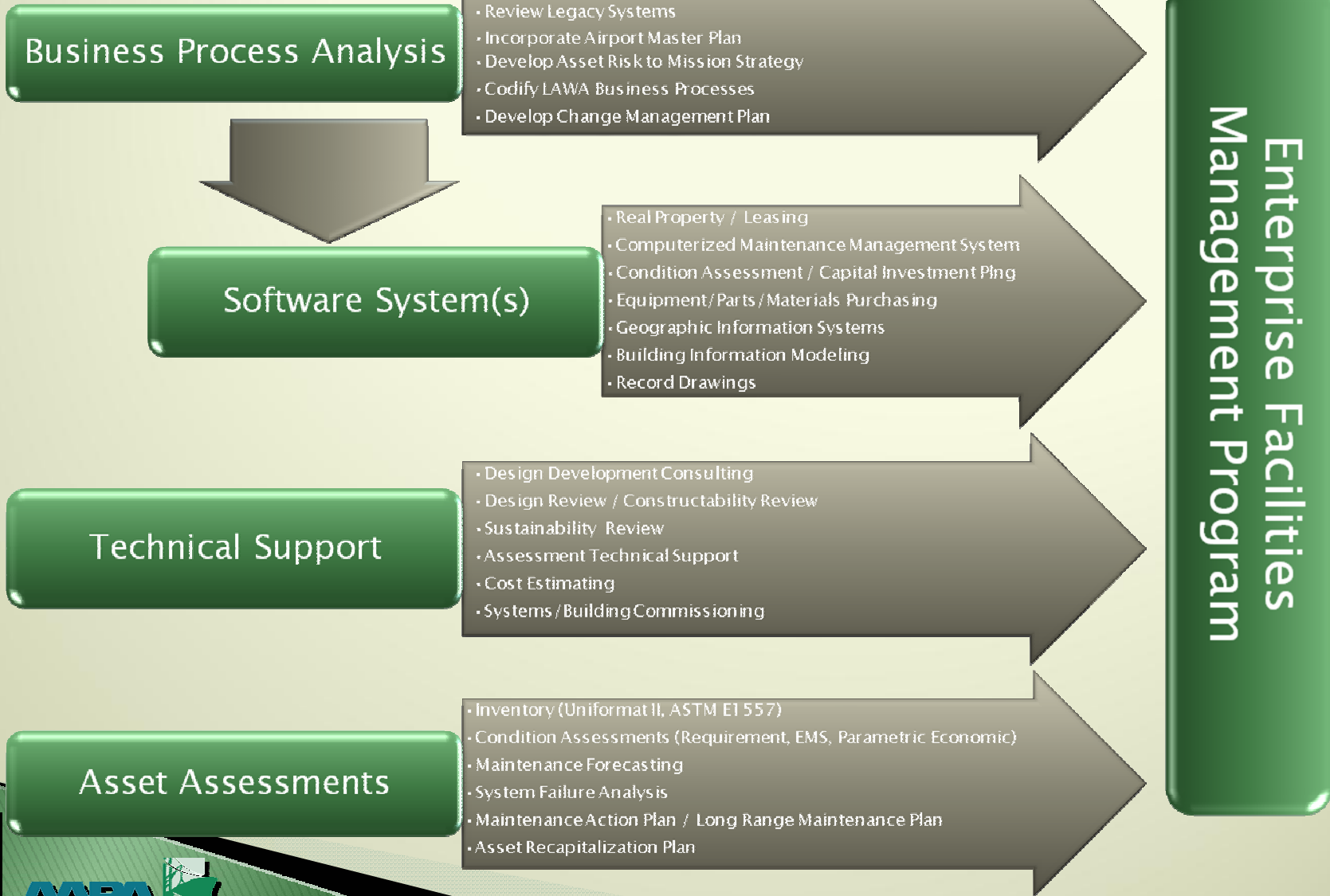
- Builder™
- VERTEX™
- TECfms™
- VFA Facility™



Investment Execution Tools

- IBMmaximo
- TRIRIGA Operations
- PWTools

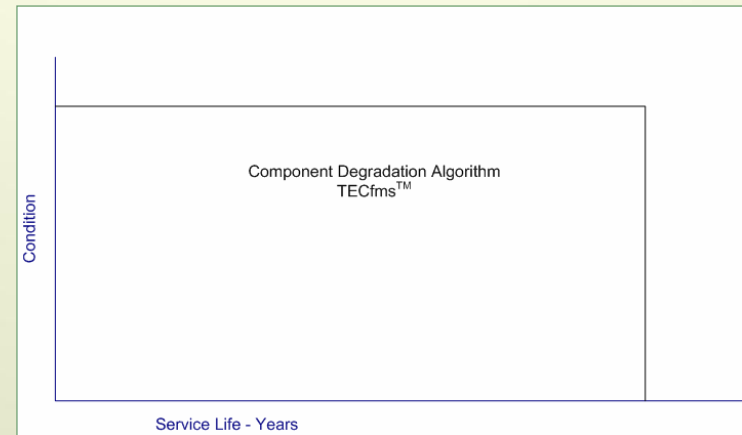
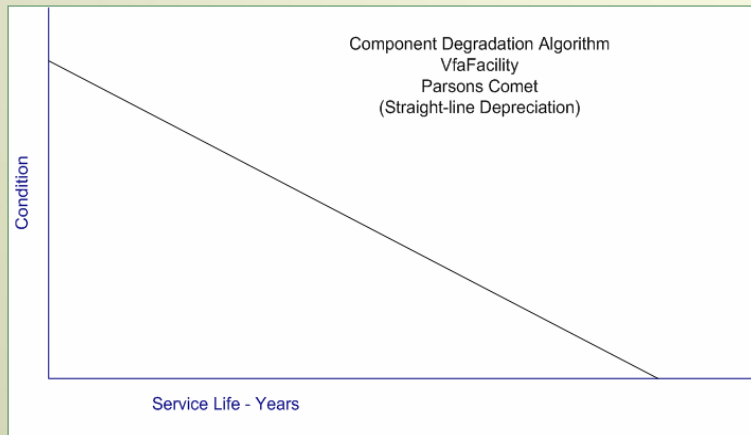
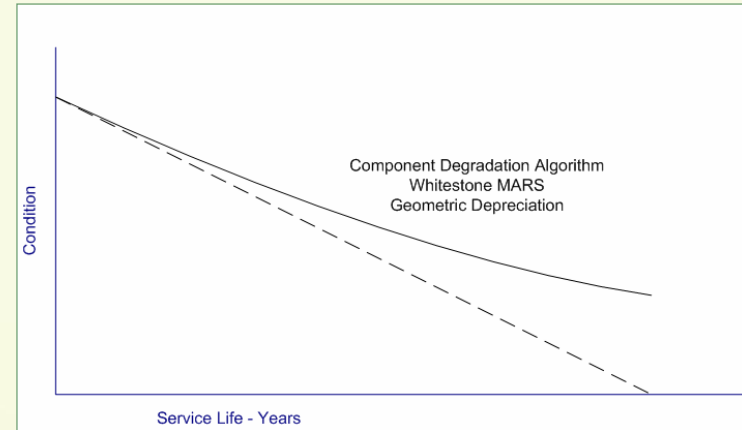
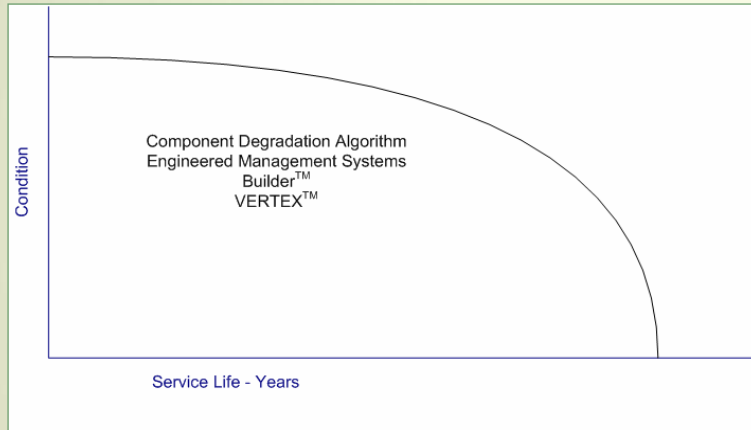
Successful AM Program



AM Planning Tools


- ▶ Software Planning/Analysis Tools – Three (3) Options
 - Requirements Based “Traditional”
 - TECfms™
 - VFA Facility™ (VFA)
 - AMS (ISES)
 - Comet (Parsons)
 - Engineered (Sustainment) Management Systems
 - Builder™
 - VERTEX®
 - Economic
 - Whitestone MARS

AM Planning Tools



AM Planning Tools – Output

► Component Inventory

TEC Inc. Berth 603 Inventory Report 

1 - W Wharf (Berth 603)

Inventory Description	Unifomat	Quantity	Units	Install Year	Eff. Age	Rem. Life
G30 Site Mechanical Utilities						
G3030 Storm Sewer (\$659,625)						
Storm Sewer Outfall	Storm Sewer	1.00	EA	1980	25	6
G90 Other Site Construction						
G9090 Other Site Construction (\$0)						
Berth 603 Crane Rail	Railroad Spurs	2,056.00	LF	1980	29	21
H10 Waterfront Structures						
H1010 Substructure (\$6,596,250)						
Berth 603 Sheet Pile Cells	Substructure	1,028.00	LF	1980	29	46
H1030 Deck (\$4,221,600)						
Berth 603 Concrete Deck Panels	Deck	66,820.00	SF	1980	29	21
H1040 Mooring & Berthing System (\$659,625)						
Berth 603 Fender System	Mooring & Berthing System	1,028.00	LF	2005	4	46
Berth 603 Mooring Bollards	Mooring & Berthing System	8.00	EA	1980	29	21
Berth 603 Mooring Cleats	Mooring & Berthing System	9.00	EA	1980	29	21
H50 Waterfront Utilities						
H5010 Civil/Mechanical Utilities (\$527,700)						
Berth 603 Water Vaults	Civil/Mechanical Utilities	4.00	EA	1980	29	21
H5020 Electrical Utilities (\$527,700)						
Berth 603 2400 V Vaults	Electrical Utilities	1.00	EA	1980	29	21

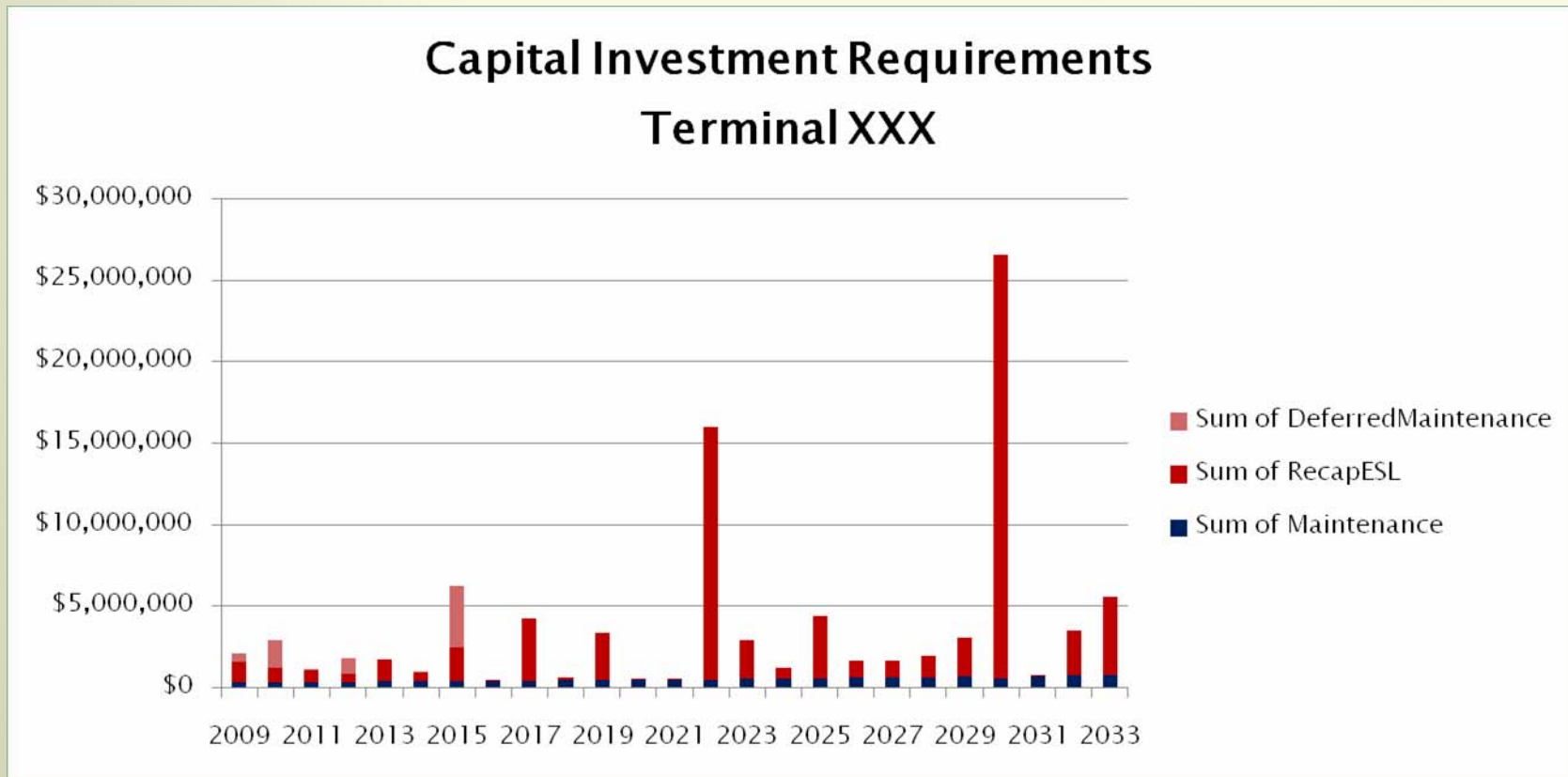
AM Planning Tools – Output

► 5 Year Maintenance Action Plan (MAP)

County of Albemarle, VA Five (5) Year Maintenance Action Plan (MAP)										
Asset Name	Deficiency Title	Rec. Year	Deficiency Score	Package Score	Package Number	Package Name	Raw Total Cost	Inflated Total Cost	Status	Map Year
5th Street County Office Building	Replace VFD on Air Handling Unit	2009	10.00	7.50	2 - AF	Replace Selected HVAC Units	\$15,886.64	\$19,063.97	0 - Active - Pre Work Reception Board	1
Old Crozet Elementary School	Rusted/failed lintel	2009	10.00	8.00	6 - AD	Refurbish Brick and Mortar	\$2,532.23	\$3,038.68	0 - Active - Pre Work Reception Board	1
Old Crozet Elementary School	Open areaway/light well	2010	10.00	6.33	6 - AH	Small General Projects	\$712.47	\$889.16	0 - Active - Pre Work Reception Board	1
Historic County Jail	Interior paint.	2013	10.00	7.25	7 - AA	Patch and Paint	\$24,888.58	\$34,939.34	0 - Active - Pre Work Reception Board	1
Historic County Jail	Failing stone lintel	2013	10.00	7.63	7 - AD	Refurbish Brick and Rock Walls	\$26.06	\$36.58	0 - Active - Pre Work Reception Board	1
5th Street County Office Building	Johnson Metasys Control System needs renovation	2009	9.00	9.00	2 - AD	Improved HVAC Controls	\$47,950.67	\$57,540.80	0 - Active - Pre Work Reception Board	1
McIntire County Office Building	Failed windows	2010	9.00	5.50	1 - AK	Refurbish Windows and Doors	\$41,361.17	\$51,618.74	0 - Active - Pre Work Reception Board	1
McIntire County Office Building	Exist. windows	2010	9.00	5.50	1 - AK	Refurbish Windows and Doors	\$492.32	\$614.42	0 - Active - Pre Work Reception Board	1
Historic County Jail	Interior metal doors.	2013	9.00	6.13	7 - AG	Refurbish Windows Doors Stairs	\$2,103.71	\$2,953.25	0 - Active - Pre Work Reception Board	1
Historic County Jail	Exterior metal doors.	2013	9.00	6.13	7 - AG	Refurbish Windows Doors Stairs	\$353.42	\$496.14	0 - Active - Pre Work Reception Board	1
Historic County Jail	ADA	2009	8.50	8.50	7 - AF	Replace Plumbing	\$45,958.45	\$55,150.14	0 - Active - Pre Work Reception Board	1
Old Crozet Elementary School	ADA Bathrooms	2009	8.50	8.50	6 - AE	Upgrade ADA	\$23,300.98	\$27,961.18	0 - Active - Pre Work Reception Board	1
General District Court House	ADA bathrooms	2009	8.50	8.25	3 - AE	Renovate for ADA	\$11,878.34	\$14,254.01	0 - Active - Pre Work Reception Board	1
Jailers House	Existing Bathroom	2009	8.50	8.50	8 - AH	Refurbish Bathroom	\$1,584.38	\$1,901.26	0 - Active - Pre Work Reception Board	1
Circuit Court House	ADA bathrooms	2010	8.50	6.75	4 - AD	Renovation for ADA	\$11,944.92	\$14,907.26	0 - Active - Pre Work Reception Board	1
Historic County Jail	Failed central boiler and heating system	2013	8.50	8.50	7 - AE	Replace HVAC	\$26,967.53	\$37,857.83	0 - Active - Pre Work Reception Board	1
Historic County Jail	Failed plumbing systems	2013	8.50	8.50	7 - AF	Replace Plumbing	\$4,605.98	\$6,466.01	0 - Active - Pre Work Reception Board	1
General District Court House	Storage Items	2009	8.00	8.25	3 - AE	Renovate for ADA	\$91.44	\$109.73	0 - Active - Pre Work Reception Board	1
5th Street County Office Building	Open panels	2010	8.00	4.40	2 - AA	Improve Electrical Safety	\$315.00	\$393.12	0 - Active - Pre Work Reception Board	1
McIntire County Office Building	Panel covers	2010	8.00	3.60	1 - AA	Improve Electrical Safety	\$275.00	\$343.20	0 - Active - Pre Work Reception Board	1
General District Court House	Fire doors held open	2010	8.00	6.00	3 - AG	Repair Hardware	\$73.16	\$91.30	0 - Active - Pre Work Reception Board	1

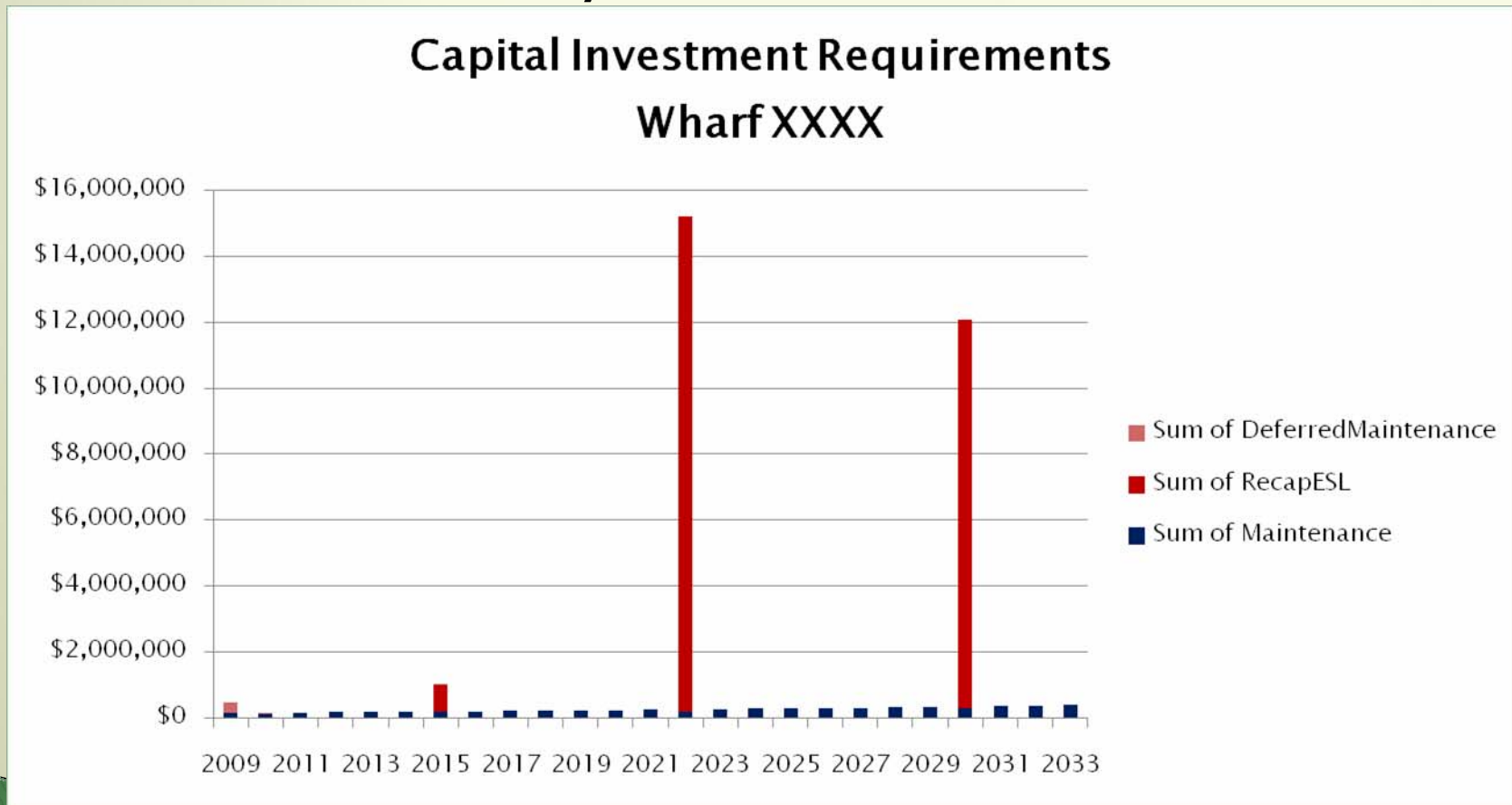
AM Planning Tools – Output

▶ Investment Analysis



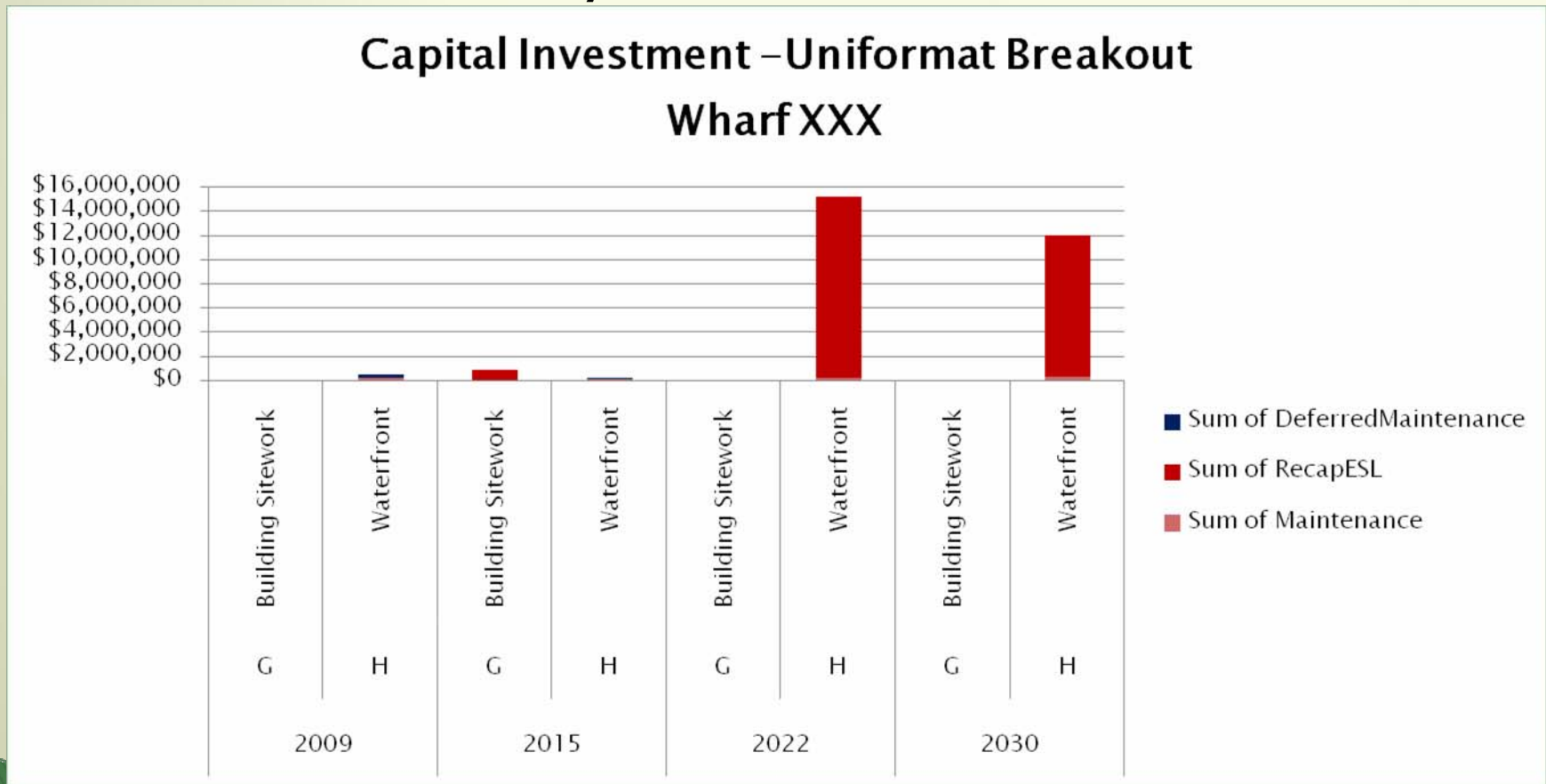
AM Planning Tools – Output

▶ Investment Analysis

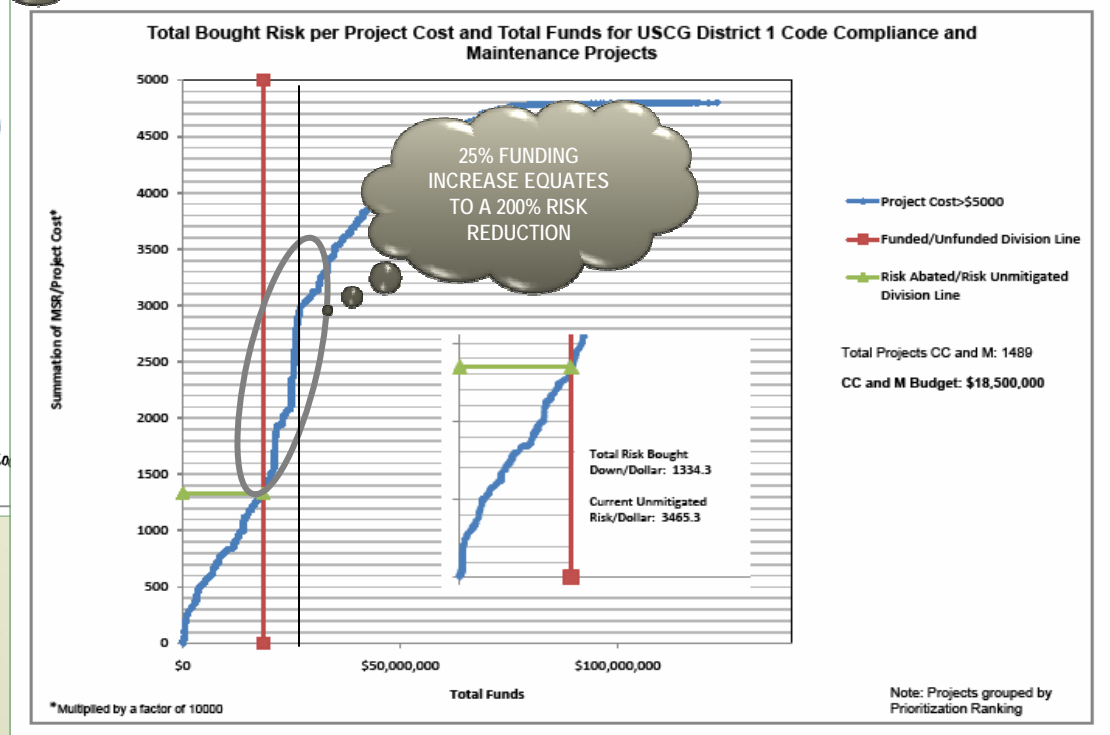
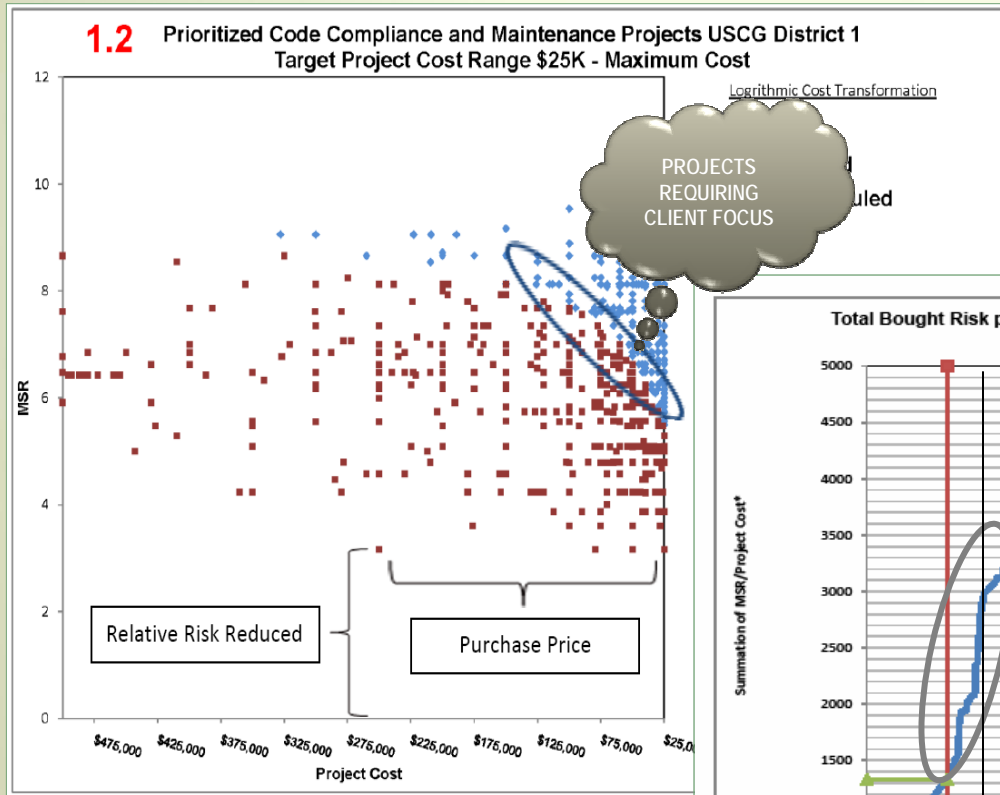


AM Planning Tools – Output

▶ Investment Analysis



AM Planning Tools – Output



AM What Are Others Using?

▶ Terminal Operators

- ▶ Planning
 - ▶ TECfms™

▶ USMC

- ▶ Planning
 - ▶ Builder™
 - ▶ TECfms™
- ▶ Work Execution
 - ▶ USMCMMax

▶ USAF

- Planning
 - Builder™
 - VERTEX™
- Work Execution
 - IWIMS

▶ US Navy

- Planning
 - Builder™
 - VERTEX™
- Work Execution
 - IBMmaximo

▶ USCG

- Planning
 - TECfms™
 - VERTEX™
 - VFAFacility™
 - TEC ARMR™
- Work Execution
 - IBMmaximo

Asset Management

»» Discussion / Questions

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TEC Capabilities

TEC Services

- ▶ AM System Consulting
- ▶ Condition Assessments
- ▶ Information Management
 - TECfms™
 - TEC ARMRTM
- ▶ LEED® EBOM Certification
- ▶ Energy Studies
- ▶ EBCx
- ▶ Facilities and Master Planning
- ▶ Building Information Modeling (BIM)
- ▶ A/E Design
 - Architecture
 - Mechanical / Electrical / Plumbing
- ▶ Construction Phase Services

Asset Management Drivers

- ▶ 5 Guiding Principles Federal Leadership in High Performance and Sustainable Buildings
 - Employ Integrated Design Principles
 - Optimize Energy Performance
 - Protect and Conserve Water
 - Enhance Indoor Environmental Quality
 - Reduce Environmental Impact of Materials