Asset Sustainability



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Common Challenges

- On-going building deterioration (aging infrastructure)
- Capital Budgets are constrained
- Operating costs continue to grow
- Carbon footprint reduction
- Changing functional demands





Quality of Space- Metrics





Decision Development Framework



Asset Optimization & Decision Development







Asset Optimization





Data Development Process

Unique Data Development : Best Practices

 Quickly establish Life Cycle cost profiles for all assets utilizing data modeling techniques

✓ Consistency and Standardization



Basic Asset Details

Basic Asset Details Required:

- Facility Name
- Facility Age
- Facility Size
- Number of Floors
- Facility Type:
 - Classroom
 - Laboratories
 - Athletics
 - Administration
 - Residence



Etc.





Component Inventory

Mechanical

- Heating Systems
- Ventilation Systems
- Air Conditioning
- Plumbing / Drainage
- Building Controls
- Fire Prevention



Electrical

- Power & Distribution
- Interior Lighting
- Exterior Lighting
- Emergency Power
- Fire Alarm System
- Comm / IT Systems
- Security Systems
- Clock Systems

Property / Site

- Roadways / Driveways
- Paving & Walkways
- Retaining Walls
- Landscaping
- Fencing
- Underground Utilities



Architectural / Structural

- Roofing, Windows, Exterior Doors
- Foundation & Exterior Walls
- Flooring & Ceilings
- Interior Walls / Doors / Millwork
- Painting & Window Coverings
- Accessories & Equipment





Life Cycle Report

Component	Component : Replacement Value	Last Major Action Year	Component : Brief Description	Overall Condition	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
A10 Foundations	\$ 5,096	1902	The foundation walls appear to	Good							
A20 Basement Construction	\$ 48,256	1902	Poured concrete basement floor.	Good							
B2010 Exterior Walls	\$ 20,000	1986	Aluminum siding.	Good							
B2020 Exterior Windows	\$ 9,454	1996	Windows and caulking.	Good							\$ 9,800
B2030 Exterior Doors	\$ 20,467	1902	The majority of doors were	Good							
B30 Roofing	\$ 2,846	2002	Asphalt shingle roof.	Good							
C1020 Interior Doors	\$ 23,774	1902	Doors.	Poor	\$ 23,774						
C1030 Fittings	\$ 15,844	2005	Kitchen.	Good	. ,						
C3010 Wall Finishes	\$ 19,500	2005	Wall finishes.	Good					\$ 3,400	\$ 3,400	\$ 3,400
C3020 Floor Finishes	\$ 9,815	2005	Hardwood flooring.	Good							
C3020 Floor Finishes	\$ 9,815	2005	Ceramic tile.	Good							
C3020 Floor Finishes	\$ 9,815	2005	Carpet.	Good					\$ 245		
C3030 Ceiling Finishes	\$ 13,790	2005	Paint on plaster ceilings.	Good					\$ 1,720	\$ 1,720	\$ 1,720
D2010 Plumbing Fixtures	\$ 44,834	2005	Plumbing fixtures.	Good							
D2020 Domestic Water Distribution	\$ 24,461	1995	Water supply piping.	Good							
D2030 Sanitary Waste	\$ 22,968	1902	Sanitary Waste Piping	Fair			\$ 22,968				
D2040 Rain Water Drainage	\$ 2,220	1967	Eaves troughs, downspouts, soffit, and fascia.	Poor	\$ 1,560						
D2095 Domestic Water Heaters	\$ 2,941	2003	Gas fired water tank.	Fair							
D3023 Furnaces	\$ 2,434	1997	Forced air gas furnace.	Good							\$ 12,400
D3045 Exhaust Ventilation Systems	\$ 2,517	2005	Exhaust fans.	Good					\$ 900		
D5010 Electrical Service And Distribution	\$ 11,830	1902	Electricity is distributed to all	Good							
D5021 Branch Wiring	\$ 44,845	1902		Good							
D5022 Lighting Equipment	\$ 9,937	2005	Lighting fixtures.	Good							
D5037 Fire Alarm System	ire Alarm System \$2,772 2003 Simoke detectors and pull stations.		Good								
D5091 Exit & Emergency Light Systems	\$ 1,200	2001	Emergency lighting.	Poor	\$ 2,550						
D5098 Electric Baseboard Heat		1902		Good							
E1041 Residential Appliances	\$ 8,580	2001	Refrigerators, freezers, and	Poor	\$ 1,200						
E1042 Laundry Room Equipment	\$ 10,000	1902	Washers and dryers.	Good					\$ 600		
G2010 Roadways	\$ 1,200	1902	Driveway.	Poor		\$ 1,200					
G2020 Parking Lots	\$ 9,500	1902	Parking Lot.	Poor		\$ 9,500					
G2030 Pedestrian Paving	\$ 1,217	2004	Concrete pad.	Good							
G2040 Site Development	\$ 1,529	1991	Fencing.	Good							
G2050 Landscaping	\$ 1,200	1902	Plantings and landscaping. The	Good							\$ 1,200
G3030 Storm Sewer	\$ 3,000	1902	Surface drainage. The property is	Good							
G4020 Site Lighting	\$ 1,000	1986	Site Lighting	Good							
					\$ 29.084	\$ 10,700	\$ 22,968	\$0	\$ 6,865	\$ 5,120	\$ 28,520

Cumulative Renewal Requirement =	\$ 29,384	\$ 39,785	\$ 62,753	\$ 62,753	\$ 69,618	\$ 74,738	\$ 103,258
Funding : Cumulative =	\$ 3,025	\$ 6,050	\$ 9,074	\$ 12,099	\$ 15,124	\$ 18,149	\$ 21,174
Unfunded Liability =	\$ 26,359	\$ 33,735	\$ 53,679	\$ 50,654	\$ 54,494	\$ 56,589	\$ 82,085
(Benchmark Cost based on Template) FCI =	7.91%	14.65%	20.74%	21.98%	23.82%	25.37%	30.24%
FCI without Funding	8.77%	16.38%	23.32%	25.43%	28.13%	30.54%	36.27%





iAuditor[™] - Data Capture and Management







Assess Facilities using iAuditor





FAME Asset Planner[™] Software Suite



Collect Energy Data with <u>iAuditorXD[™]</u>



Energy Savings data

Name plate data

Assemble Energy Measures

Optimize investment decisions

- Blend energy savings
- Address life cycle needs



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Link Photo's and Audit Findings



Validated Condition Report

Component	Component Replacement Value	Component What & Where	Component Commentary (Condition, etc.)	Component Data Source	Overall Condition	Action Brief Description	Action Commentary	Action Type	Action Cost	Photos
B2010 Exterior Walls	\$1,231,780	The principal exterior cladding at the building consists of brick veneer. Certain areas of the buildings structural concrete frame also acts as the exterior wall assembly.	The condition of the exterior wall assembly is good at this time. No areas of masony cracking or spalling were identified. The concrete wall areas are in good condition with no areas of spalling identified. The exterior cladding system underwent rehabilitation in 2006 to repair problem	Validated	Good	Repair exterior walls	This item is a cyclical allowance towards major repairs of the exterior masonry walls and the concrete shear walls. It is our experience that, while these components typically last for the life of the building, however, fairly major repairs are required from time to time. It is difficult to establish exactly	Repair	\$225,400	
B2020 Exterior Windows	\$558,000	These components are constructed of good quality thermal glazing with aluminum frames. These components are very durable and should provide a service life of at least 40 years. However, less durable components (e.g., hardware weatherstripping.)	The window frames are in good condition with no significant problems noted. No major work is anticipated with these components within the time frame of this study.	Validated	Good	Replace entire window system	No failed thermal panes were observed at the areas reviewed. Weatherstripping generally appeared intact and in sufficiently good condition to serve its intended function	Replacement	\$558,000	
B2030 Exterior Doors	\$9,800	These doors are typically constructed of steel and are usually very durable.	All exterior doors are functional and in satisfactory condition.	Validated	Good	Replace or refurbish the exterior doors and their hardware.		Replacement	\$9,800	<u>y</u> .E
B30 Roofing	\$204,000	The main flat roof consists of an inverted membrane. The membrane is concealed by the overlaying thermal insulation and gravel ballast. Terrace areas at the north end of the building exist at the 6th, 5th and 4th floors.	No significant problem areas were noted other than weed growth beneath/between the pavers at some of the terrace areas that should be removed as a maintenance Item. No reports were given with respect to suspected water leakage. No significant work requirements are	Validated	Fair	Remove the existing ballast and thermal insulation, remove the existing waterproofing membrane, install new roofing and replace the existing insulation and ballast.		Replacement	\$204,000	
C20 Stairs	\$616,616	Stairs		Life Cycle Model	Good					
D1010 Elevators & Lifts	\$30,000	The existing elevator cabs had been completely refurbished with new tile flooring, mirrored panels, and stainless steel trims in approximately 1999. The building is provided with 2 Northern geared traction elevators.	The finishes are in acceptable condition and no remedial work is anticipated during the study period. As per the work program, the service provider for elevator maintenance was contacted to discuss the condition of the devices and the requirements for any expected remedial work within the	Validated	Good	Modernization of elevator motors and controls.		Repair	\$30,000	
D2020 Domestic Water Distribution	\$300,000	The units are aging and failing on a regular basis. The capital plan should allow for a replacement of at least 15 Units per year which allows for a 10% replacement factor. Domestic hot water is circulated continuously through the building.	The building is at the age where domestic water lines typically experience pinholing particularly at the hot water riser line and replacement needs to be planned. Various leaks and repairs of pin-holes has been reported to have commenced at the building. The pumps were not	Validated	Fair	Replace domestic hot and cold water risers to the suites in a phased approach coordinated with suite bathroom work.		Replacement	\$60,000	
D2030 Sanitary Waste	\$200,000	Drainage piping consists of cast iron stacks that convey waste-water from the suites and common areas to the municipal sewer system. Duplex sump pump systems are located in the sub-basement area below the commercial kitchen area.	Drainage piping is not under pressure and generally lasts for the life of the building except for isolated repair. No significant repair requirements are anticipated. The pumps are located in pits and cannot be directly reviewed. There was no alarm condition and the pumps operated satisfactorily in the	Validated	Good	Allowances to replace or repair sections of the drainage piping as needed.	Includes both sanitary and rain water drainage piping	Replacement	\$8,000	
D2095 Domestic Water Heaters	\$25,000	Domestic hot water for the building is provided by 2 Teledyne Laars Model PW 1010 boilers with an input of 1000 MBH each. The domestic hot water is stored in a vertical tank adjacent to the boiler installation in the mechanical combinue of the building	The domestic water boilers are known to be a quality product and no problems were observed or reported to Enerplan during our reviews. Replacement of the boilers is not anticipated to be required within the time frame of this study. No problems	Validated	Good	Replace domestic water heaters		Replacement	\$40,000	





Needs Review (Dashboards)



- Develop Decision Mapping
 Asset Planning Framework
- Quantify Capital Renewal Needs
 - Data Development & Management
- 5 & 30 Year Capital Plan
 - Life Cycle Profiles
 - On-site assessments
- Capital Creation Strategies
 - Benchmark High level savings opportunities







Renewal Costs Per Year



Life Cycle Output



FCI Targets & Capital Needs



Projected Capital Needs



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Projected Total Liability



Cumulative Cost Cumulative Funding : Action Data Source



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Projected Unfunded Liability





Facility Condition Index (FCI)

Industry Standard Index Used to Track Condition
 Performance of Facilities / Portfolios

FCI = Renewal and Repair Costs Replacement Cost





Projected Facility Condition Index



Cumulative FCI - Needs Analysis

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Projected Funding Target





Asset Optimization







Strategy / Solution Development

NEEDS STRATEGIES & SOLUTIONS

- Capital Creation Strategies
 - Cost Savings Opportunities
- Redevelopment Strategies
 - Disposition/Closure
 - New Construction
 - Financial Leveraging
- Energy Management
 - Conservation Measures
 - Environmental
- Operational Savings Strategies
 Maintenance Management
 Life Cycle Offsets



	FCI (Current Year)	FCI (Year 5)	FCI (Year 10)	FCI (Year 15)	FCI (Year 20)	FCI (Year 25)
Asset A	0.0%	10.0%	9.7%	29.0%	49.3%	54.1%
Asset B	0.3%	7.4%	13.5%	19.9%	48.0%	51.2%
Asset C	17.5%	31.6%	42.0%	50.9%	53.5%	55.4%
Asset D	4.5%	8.5%	22.0%	33.8%	45.8%	49.4%
Asset E	5.3%	5.0%	15.4%	37.1%	42.9%	48.2%
Asset F	0.0%	0.0%	3.4%	6.3%	9.5%	30.5%
Asset G	2.9%	7.0%	25.2%	37.0%	42.1%	46.0%
Asset H	20.6%	29.5%	34.2%	44.5%	64.1%	68.1%
Asset I	6.6%	14.4%	24.7%	25.6%	44.1%	55.5%
Asset J	7.0%	8.0%	24.4%	30.6%	38.5%	55.9%
Asset K	26.1%	30.9%	37.4%	42.8%	47.9%	49.9%
Asset L	0.0%	0.0%	1.4%	17.9%	33.6%	40.6%

Renewal Liability Comparison



FCI Reduction Strategy



FCI Migration

Unfunded Liability Reduction



FCI Migration Analysis

	FCI (Current Year)	FCI (Year 5)	FCI (Year 10)	FCI (Year 15)	FCI (Year 20)	FCI (Year 25)
Asset A	0.0%	10.0%	9.7%	29.0%	49.3%	54.1%
Asset B	0.3%	7.4%	13.5%	19.9%	48.0%	51.2%
Asset C	17.5%	31.6%	42.0%	50.9%	53.5%	55.4%
Asset D	4.5%	8.5%	22.0%	33.8%	45.8%	49.4%
Asset E	5.3%	5.0%	15.4%	37.1%	42.9%	48.2%
Asset F	0.0%	0.0%	3.4%	6.3%	9.5%	30.5%
Asset G	2.9%	7.0%	25.2%	37.0%	42.1%	46.0%
Asset H	20.6%	29.5%	34.2%	44.5%	64.1%	68.1%
Asset I	6.6%	14.4%	24.7%	25.6%	44.1%	55.5%
Asset J	7.0%	8.0%	24.4%	30.6%	38.5%	55.9%
Asset K	26.1%	30.9%	37.4%	42.8%	47.9%	49.9%
Asset L	0.0%	0.0%	1.4%	17.9%	33.6%	40.6%

Asset



Strategies / Solutions

Establish Renewal "Reduction" Strategies to Reduce Risk and Capital Renewal Liabilities

- Establish strategies that <u>reduce renewal liability</u>
- Present full range of <u>fully leveraged & bundled solutions</u> combining capital creation strategies with operational savings
- Create effective <u>business plan</u>
- Develop <u>communication plan</u>





Leveraged and Bundled Capital Creation Strategies[™]:

- Energy Conservation
 Deep Retrofits
 Renewable Solutions
 Maintenance Optimization
 Consolidation Strategies
 Redevelopment Strategies:
 - New Facilities
- Existing Facilities





Projected Unfunded Liability









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FCI Reduction Strategy



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Strategic Outcomes

Outcomes Enhancing "Quality of Teaching & Learning"

- 1. Understanding and *quantifying* capital replacement needs
- 2. <u>Data management</u> methods and accountability reporting
- 3. Enhanced <u>decision making framework</u> utilizing <u>best practices</u>
- 4. Enhanced asset value
- 5. <u>Asset</u> sustainability
- 6. Optimal use of capital dollars
- 7. Provides <u>leveraged</u> and bundled solutions





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Decision Development Framework



Asset Planner[™] Software Solutions

Five Standalone Modules, One Seamless Platform

Strategic Capital Asset Management

- 1. Asset Planning Module
- 2. Project Planning Module

Tactical Maintenance Management

- 3. Preventative Maintenance Module
- 4. Service Request Module

Proactive Energy Management

Pochy Mountain

5. Energy & Sustainability Module





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