



**KAYUGA**  
SOLUTION



## **Community Asset Management Program (CAMP) Committee**

Building Management System

October 17, 2016

# Recap of Risk Based Decision-Making Methodology



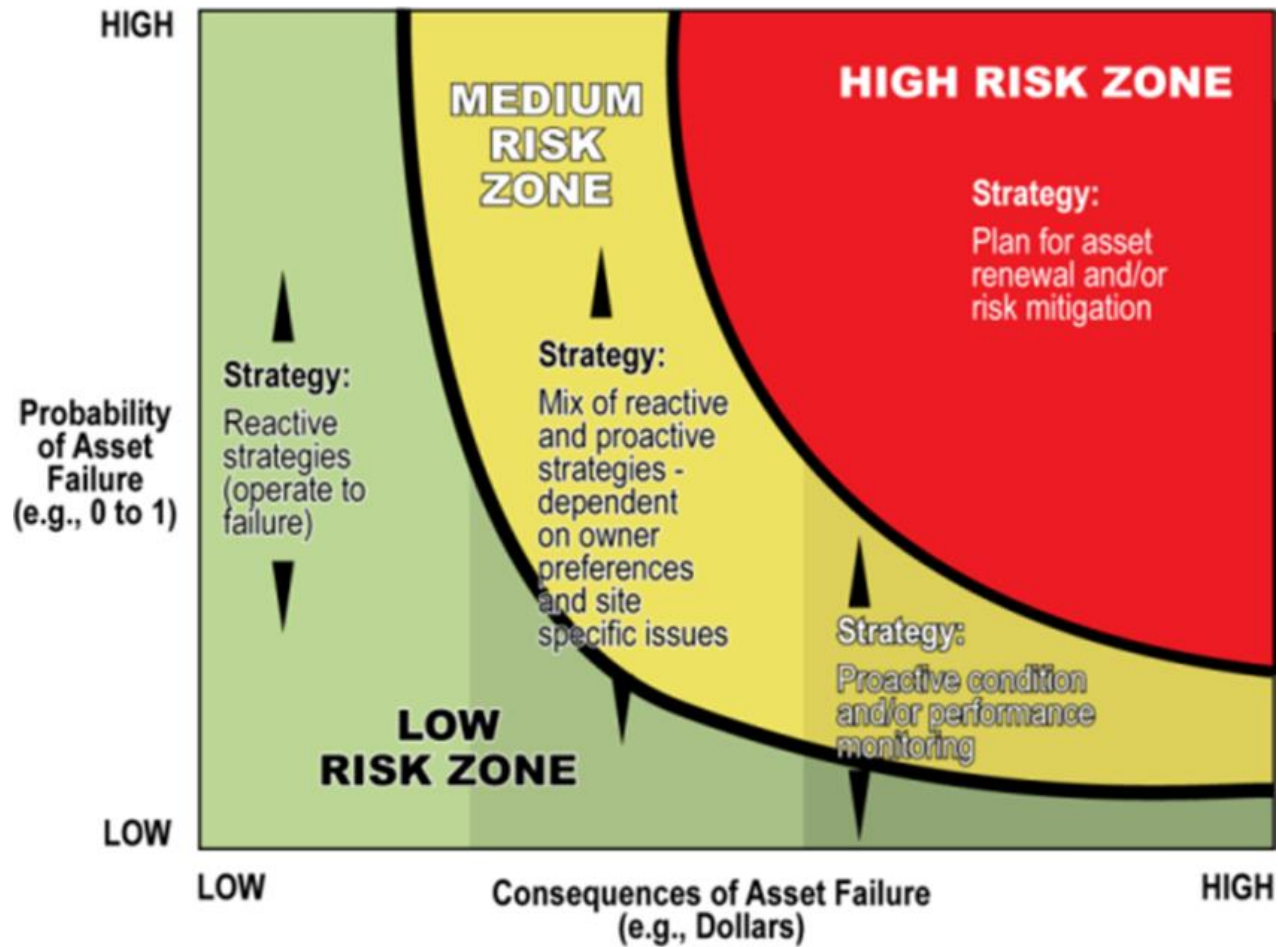
## Probability of Failure (Timing to Failure)

- Mortality
- Capacity
- Level of Service
- Financial Efficiency

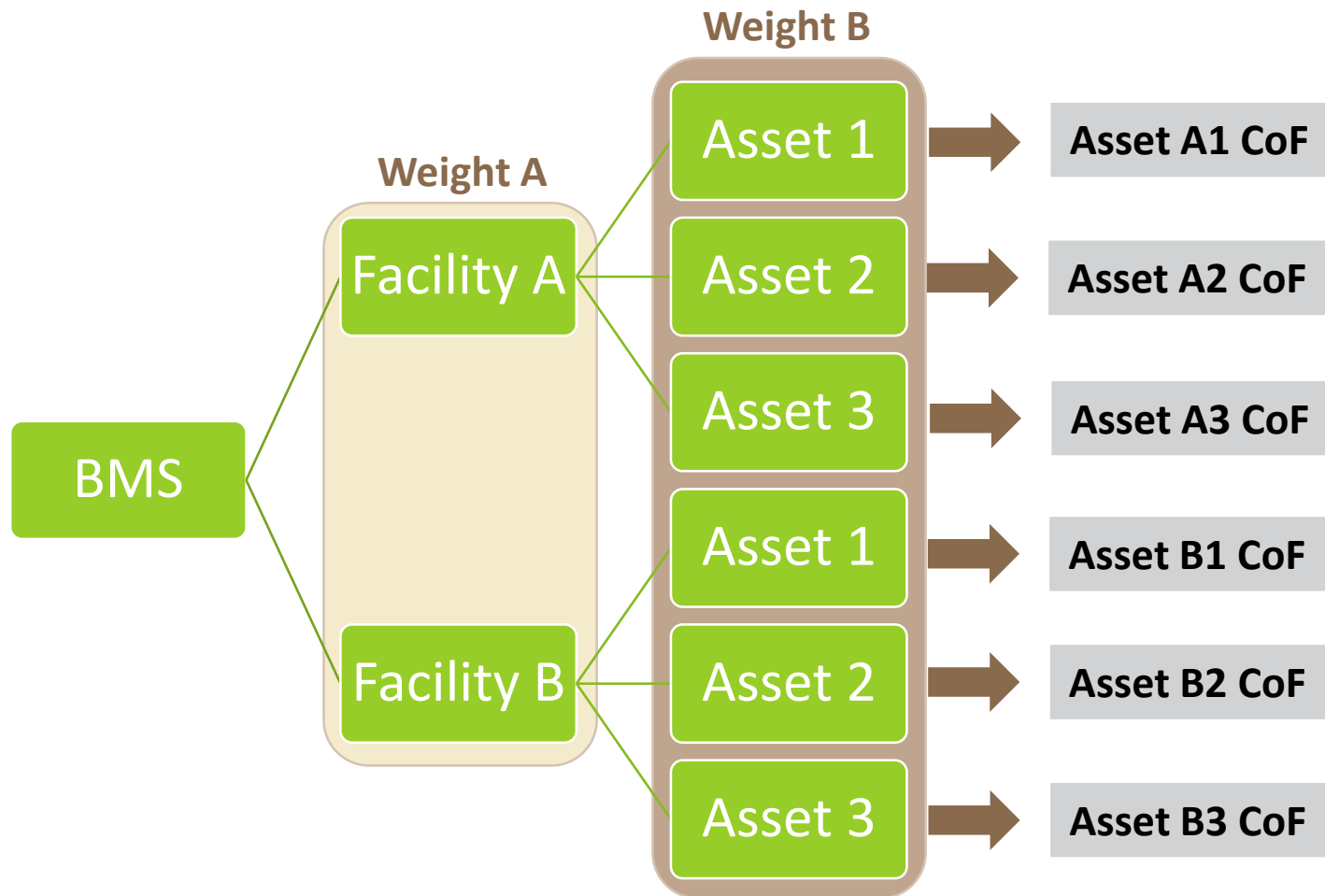
## Consequence of Failure (Impact of a failure)

- Economic
- Environment
- Social

# Risk-Based Strategy



# Building Management System – Multi-Tiered Approach



# Facility Level Criticality – Three Categories

Facility Category
Essential Facility / Core City Service
Significant Enrichment Facility / General Usage
Enrichment Facility / Specific Usage

- **Essential Facility / Core City Service** – These facilities are required in order for the City to provide its essential services. The City will not be able to properly function without these services. These facilities provide infrastructure for safety, mobility, and public participation in the governing process.
- **Significant Enrichment Facility / General Usage** – These facilities serve functions that enrich the quality of life for residents. These facilities are highly utilized and serve a large portion of the community. These facilities closely align with the City’s vision and image and are an important component of the City’s character and well-being.
- **Enrichment Facility / Specific Usage** – These facilities serve functions that enrich the quality of life for the citizens. However, these facilities provide benefit to a limited number of people within the community.

# Facility Level Criticality – Essential Facility / Core City Service

Facility	Facility Function
Police HQ	<ul style="list-style-type: none"> <li>• Police headquarters</li> <li>• Life safety</li> </ul>
Fire Station 10	<ul style="list-style-type: none"> <li>• Life safety</li> <li>• Essential Services Building</li> </ul>
Fire Station 6	<ul style="list-style-type: none"> <li>• Life safety</li> <li>• Essential Services Building</li> </ul>
Fire Station 7	<ul style="list-style-type: none"> <li>• Life safety</li> <li>• Essential Services Building</li> </ul>
Fire Station 8	<ul style="list-style-type: none"> <li>• Life safety</li> <li>• Essential Services Building</li> </ul>
Fire Station 9	<ul style="list-style-type: none"> <li>• Life safety</li> <li>• Essential Services Building</li> </ul>
City Hall	<ul style="list-style-type: none"> <li>• Core City services are provided (engineering, permits, planning, finance, administration)</li> <li>• Essential Services Building</li> </ul>
Civic Center Library	<ul style="list-style-type: none"> <li>• Enrichment of education and cultural value</li> <li>• Essential Services Building</li> </ul>
Council Chambers	<ul style="list-style-type: none"> <li>• Facilitates the public participation in the governing of the City</li> <li>• Essential Services Building</li> </ul>
Maintenance Service Center (Bldg 1)	<ul style="list-style-type: none"> <li>• Provides maintenance service for City’s infrastructure and facilities</li> </ul>
Maintenance Service Center (Bldg 2)	<ul style="list-style-type: none"> <li>• Provides maintenance of landscape, trails, parks, and recreation centers</li> </ul>
Maintenance Service Center (Bldg 3)	<ul style="list-style-type: none"> <li>• Police Storage</li> </ul>
Maintenance Service Center (Bldg 5)	<ul style="list-style-type: none"> <li>• Landscape / Facilities / Signals / LARPD</li> </ul>
Maintenance Service Center (Bldg 6)	<ul style="list-style-type: none"> <li>• Maintenance of all City vehicles and equipment</li> </ul>
Maintenance Service Center (Bldg 8)	<ul style="list-style-type: none"> <li>• Street maintenance</li> <li>• Street Sign Maintenance</li> </ul>
Downtown Parking Structure	<ul style="list-style-type: none"> <li>• Provides parking for residents and visitors in the downtown area</li> </ul>

## Facility Level Criticality – Significant Enrichment Facility / General Usage

Facility	Facility Function
Bankhead Theatre	<ul style="list-style-type: none"> <li>• Cultural rental facility</li> <li>• Currently occupied by Livermore Valley Performing Arts Center</li> </ul>
Multi Service Center	<ul style="list-style-type: none"> <li>• Provides a variety of health and human services</li> </ul>
Rincon Library	<ul style="list-style-type: none"> <li>• Branch Library</li> </ul>
Ravenswood	<ul style="list-style-type: none"> <li>• Historical building</li> <li>• Rental facility / social engagement</li> </ul>
Railroad Depot	<ul style="list-style-type: none"> <li>• Historical building</li> <li>• Future LAVTA ticket office</li> </ul>
Carnegie Library	<ul style="list-style-type: none"> <li>• Historical building</li> <li>• Museum / art gallery</li> </ul>
The Barn	<ul style="list-style-type: none"> <li>• Historical building</li> <li>• Rental facility / special events</li> </ul>

# Facility Level Criticality – Enrichment Facility / Specific Usage

Facility	Facility Function
Hagemann Farm	<ul style="list-style-type: none"> <li>• Historical</li> <li>• Human services</li> </ul>
Duarte Garage / Caretaker’s House	<ul style="list-style-type: none"> <li>• Historical</li> </ul>
141 N. Livermore Ave.	<ul style="list-style-type: none"> <li>• Rental Facility</li> <li>• Currently occupied by ECHO Housing</li> </ul>
145-149 N. Livermore Ave.	<ul style="list-style-type: none"> <li>• Rental Facility</li> <li>• Currently occupied by various business tenants</li> </ul>
241 N. M St.	<ul style="list-style-type: none"> <li>• Rental Facility</li> <li>• Currently occupied by a machine shop</li> </ul>
Maintenance Service Center (Bldg 4)	<ul style="list-style-type: none"> <li>• Covered parking</li> </ul>
Maintenance Service Center (Bldg 7)	<ul style="list-style-type: none"> <li>• Covered parking with solar panels</li> </ul>
Maintenance Service Center (Bldg 9)	<ul style="list-style-type: none"> <li>• Storage</li> </ul>
Southern Bell	<ul style="list-style-type: none"> <li>• Historical</li> <li>• Rental Facility. Currently occupied by iGate / SWITCH</li> </ul>
Shea Plaza Bathrooms	<ul style="list-style-type: none"> <li>• Public Bathrooms for Shea Plaza</li> </ul>
Springtown Library	<ul style="list-style-type: none"> <li>• Branch Library and storage facility</li> </ul>



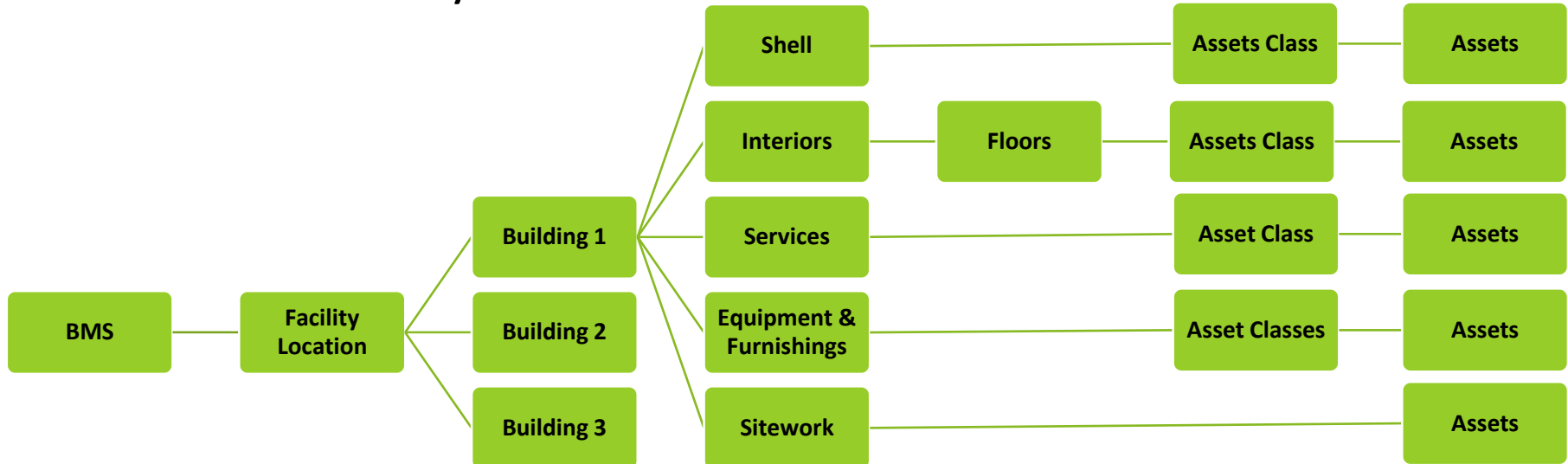
# Asset Level Prioritization

# Asset Level Criticality

Criticality – 5	Criticality - 4	Criticality - 3	Criticality - 2	Criticality - 1
Mission Critical				Non-Essential
<ul style="list-style-type: none"> <li>• Roofing</li> <li>• Structure</li> <li>• AC / Heating</li> <li>• Electrical</li> <li>• Security and communications</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Exterior doors</li> <li>• Exterior windows</li> <li>• Gate</li> <li>• Exterior lights</li> <li>• Water heater</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Interior doors</li> <li>• Flooring</li> <li>• Interior walls</li> <li>• Interior windows</li> <li>• Sinks</li> <li>• Toilet / Urinal</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Drinking fountain</li> <li>• Parking lot</li> <li>• Driveway</li> <li>• Car wash</li> <li>• Etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Cabinets</li> <li>• Bike rack</li> <li>• Bollards</li> <li>• Picnic table</li> <li>• Trash bin</li> <li>• Etc.</li> </ul>

# BMS Asset Register

- Total number of facilities – 51 facilities
- Asset Inventory – 8347 assets
- Asset Hierarchy

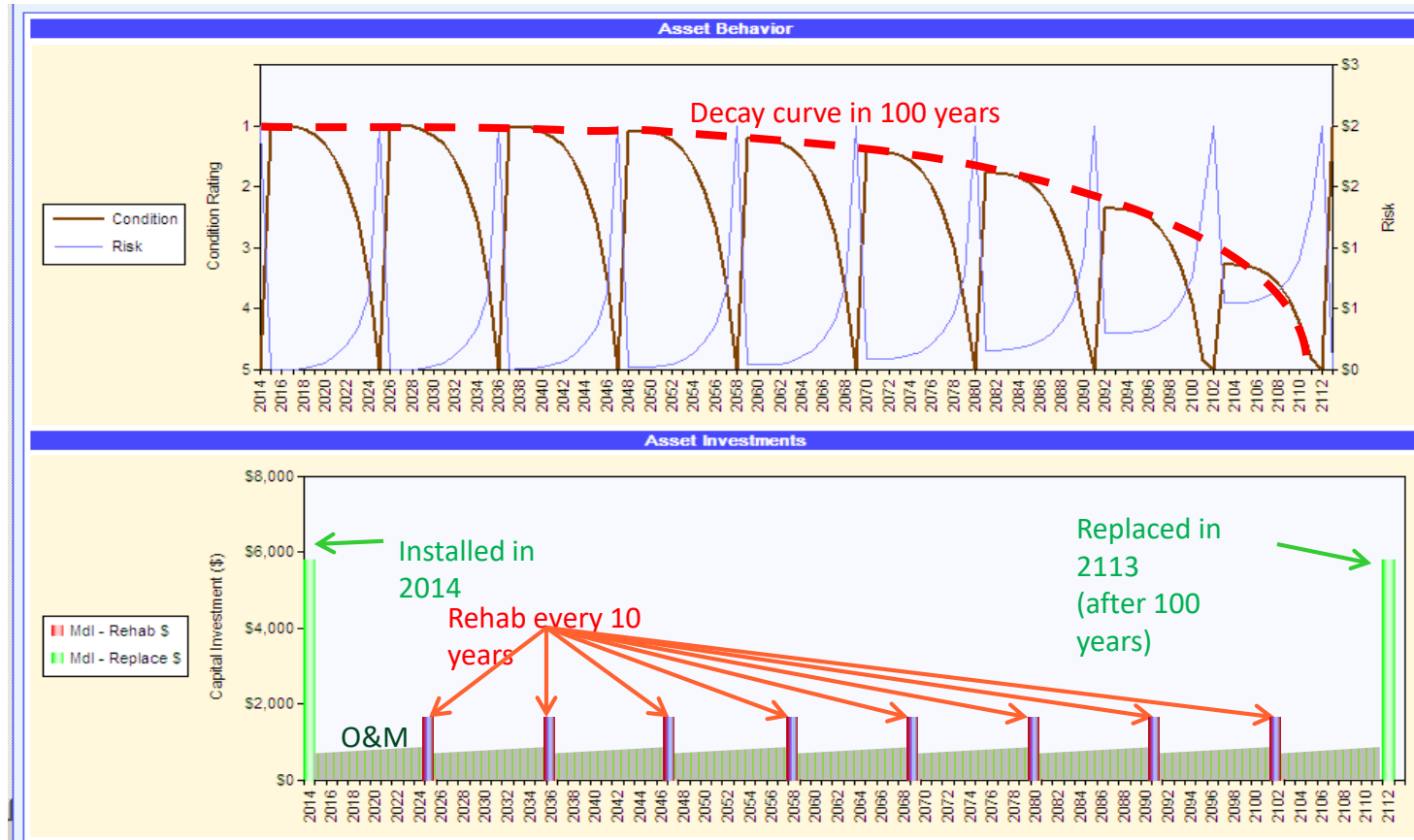


# Asset Register

MainHierarchy_2	MainHierarchy_3	MainHierarchy_4	MainHierarchy_5	MainHierarchy_6	ID	Name	Class	Type	InstallYr	Material	Structur	Quantit	Size_1	Unit_1	UsefulL	PoF	CoF	BRE
Civic Center Library	B - Shell	General	Exterior Enclosure	Exterior Doors	CCL007	Exterior Door	Exterior Door	Vista Series 500	2004			1	8		75	0	4.09091	0.00
Civic Center Library	B - Shell	General	Exterior Enclosure	Exterior Windows	CCL008	Windows	Exterior Windows		2004			2	600		40	0.5	4.09091	2.05
Civic Center Library	B - Shell	General	Exterior Enclosure	Exterior Windows	CCL009	Windows	Interior Windows		2004			2	128		60	0.5	3.18182	1.59
Civic Center Library	B - Shell	General	Exterior Enclosure	Exterior Wall	CCL010	Exterior Wall	Exterior Wall	EIFS	2004			1	6200 SF		75	0.16	5.00000	0.80
Civic Center Library	B - Shell	General	Exterior Enclosure	Exterior Wall	CCL011	Exterior Wall	Exterior Wall	Stone Wainscoat	2004			1	3986 SF		75	0.16	5.00000	0.80
Civic Center Library	B - Shell	General	Exterior Enclosure	Exterior Wall	CCL012	Exterior Wall	Exterior Wall	CMU Wall w/ Stone Veneer Both Side	2004			1	512 SF		75	0.16	5.00000	0.80
Civic Center Library	B - Shell	General	Exterior Enclosure	Exterior Wall	CCL013	Exterior Wall	Exterior Wall	CMU Wall w/ Stone Veneer One Side	2004			1	768 SF		75	0.16	5.00000	0.80
Civic Center Library	B - Shell	General	Roofing	Roof Coverings	CCL014	Built Up Roof	Roofing		2004			2	1	28850 SF	30	0.5	5.00000	2.50
Civic Center Library	B - Shell	General	Roofing	Roof Coverings	CCL015	Dormer Roof	Roofing	Dormer Roof	2014			1	12		30	0	5.00000	0.00
Civic Center Library	B - Shell	General	Roofing	Roof Coverings	CCL016	Concrete Tile	Roofing	Pitched Roof	2004			2	1	26618 SF	75	0.5	5.00000	2.50
Civic Center Library	B - Shell	General	Superstructure		CCL209	Structural Content	Structural Content		2004			1			75	0.16	5.00000	0.80
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL017	Interior Door	Interior Door	Blind Door	2004			1	1		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL018	Interior Door	Interior Door	Frame/Sliding Door with Tackable Fa	2004			1	3		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL019	Interior Door	Interior Door	Hollow Metal Tempered Glass	2004			1	3		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL020	Interior Door	Interior Door	Hollow Metal, Fire Rated	2004			1	4		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL021	Interior Door	Interior Door	Metal Rolling Grille	2004			1	3		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL022	Interior Door	Interior Door	PairSliding, Tempered Glass	2004			1	1		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL023	Interior Door	Interior Door	Tempered Glass	2004			1	1		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL024	Interior Door	Interior Door	Thick Solid Core, Flush, Maple Veneer	2004			1	5		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL025	Interior Door	Interior Door	Thick Solid Core, Flush, Pearwood Veneer	2004			1	25		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL026	Interior Door	Interior Door	Thick Solid Core, Flush, Pearwood Veneer	2004			1	1		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL027	Interior Door	Interior Door	Thick Solid Core, Flush, Pearwood Veneer	2004			1	23		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Construction	Interior Doors	CCL028	Interior Door	Interior Door		2004			1	1		75	0	3.18182	0.00
Civic Center Library	C - Interiors	1st Floor	Interior Finishes		CCL029	Ceiling - Acoustical Plaster	Ceiling		2004			2	1	1725 SF	30	0.5	3.18182	1.59
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Ceiling Finishes	CCL030	Ceiling - Gypsum Board	Ceiling		2004			2	1	35133 SF	30	0.5	3.18182	1.59
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Ceiling Finishes	CCL031	Ceiling - Slate Wood Acoustical Panels	Ceiling		2004			2	1	888 SF	30	0.5	3.18182	1.59
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Ceiling Finishes	CCL032	Ceiling - Acoustical	Ceiling		2004			2	1	10296 SF	30	0.5	3.18182	1.59
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Floor Finishes	CCL033	Flooring - Carpet	Flooring		2004			5	1	37724 SF	10	1	3.18182	3.18
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Floor Finishes	CCL034	Flooring - Ceramic Tile	Flooring		2004			2	1	2361 SF	75	0.5	3.18182	1.59
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Floor Finishes	CCL035	Flooring - Concrete	Flooring		2004			2	1	762 SF	75	0.5	3.18182	1.59
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Floor Finishes	CCL036	Flooring - Linoleum Tile	Flooring		2004			2	1	4803 SF	30	0.5	3.18182	1.59
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Floor Finishes	CCL037	Flooring - Slate Tiles	Flooring		2004			2	1	3381 SF	30	0.5	3.18182	1.59
Civic Center Library	C - Interiors	1st Floor	Interior Finishes	Wall Finishes	CCL038	Interior Wall - Drywall	Interior Walls		2004			2	1	0 SF	50	0.5	3.18182	1.59
Civic Center Library	D - Services	General	Electrical	Lighting and Branch	CCL039	Light Fixtures	Lighting and Branch Wiring	2x4 Blade Troffer	2004			3	6		20	0.73	4.09091	2.99

# Understanding the Cost of Ownership

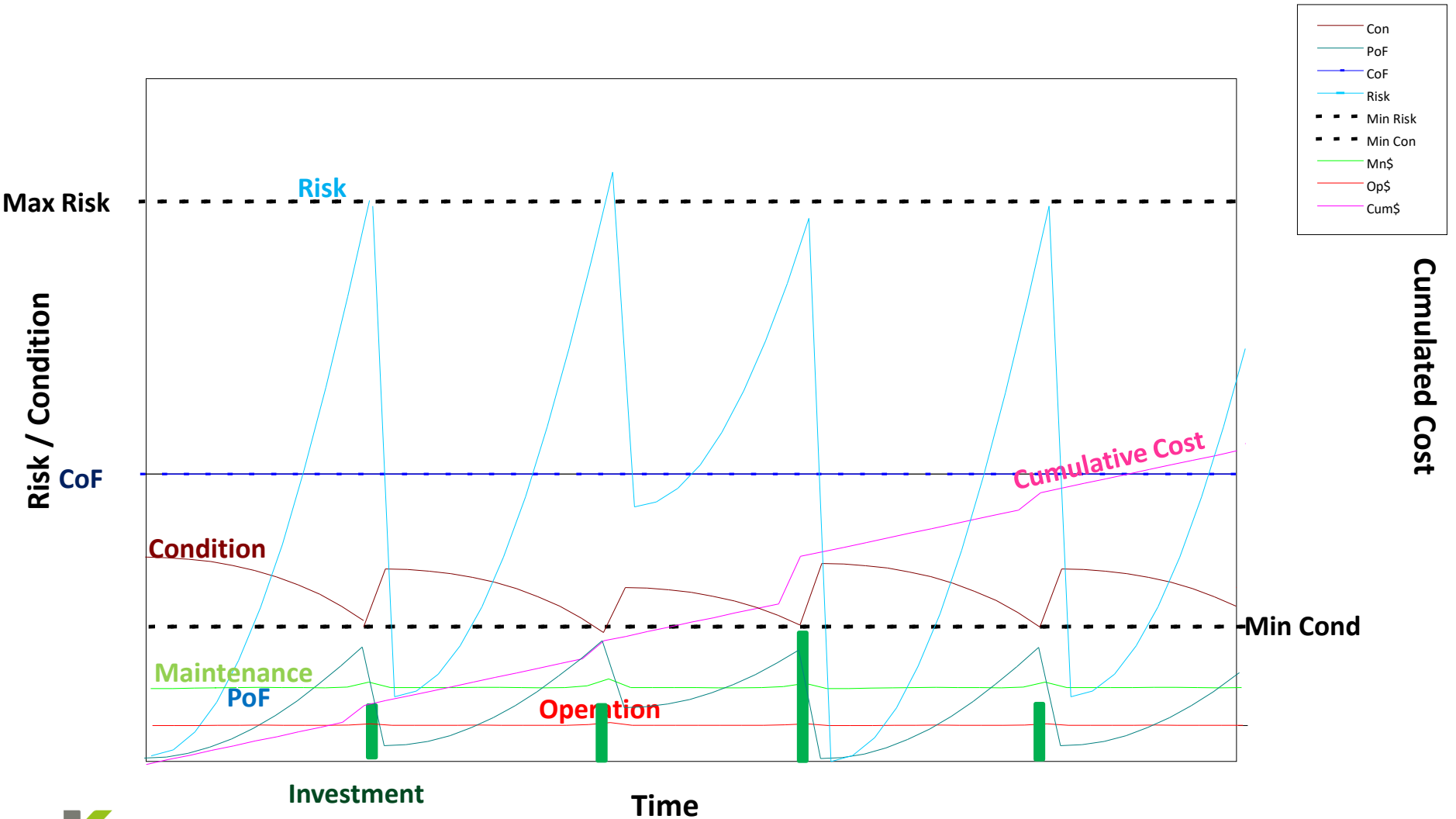
- Single asset example



# Management Strategies

Management Strategy	Useful Life	ActivityType	Activity Type	Frequency	Cost
Automatic Sliding Glass Door	15	Rehabilitation	Rehab door opening mechanism	5	20% of replacement cost
Exterior Columns-Concrete	75				
Exterior Columns-Wood	50	Rehabilitation	Paint	8	15% of replacement cost
Exterior Awning	10				
Exterior Columns-Concrete;Wood; Painted	50	Rehabilitation	Paint	8	10% of replacement cost
Exterior Door - Metal	75	Rehabilitation	Paint	8	10% of replacement cost
Exterior Door - Wood	25	Rehabilitation	Paint	8	10% of replacement cost
Exterior Door-Folding-Metal-Small	15				
Exterior Door-Roll Up	30	Rehabilitation	Replace door opener	10	35% of replacement cost
Exterior Lighting - Security	15				
Exterior Walls-Stucco	75	Rehabilitation	Rehab and/or repaint	15	25% of replacement cost
Exterior Walls-Tilt Ups	75				
Exterior Windows	40				
Roof Ladder	50	Rehabilitation	Paint	10	20% of replacement cost
Roof Railing	50	Rehabilitation	Paint	10	20% of replacement cost
Roofing-Built-Up Gravel Roof	30	Rehabilitation	Rehab - waterproofing	10	30% of replacement cost
Roofing-Built-Up Roof	30	Rehabilitation	Rehab - waterproofing	10	30% of replacement cost
Trellis	30	Rehabilitation	Paint	10	30% of replacement cost
Tuff Shed Unit	40	Rehabilitation	Paint	10	25% of replacement cost
Ceiling-Drywall	30	Rehabilitation	Paint	15	25% of replacement cost
Ceiling-Hardlid	30	Rehabilitation	Paint	15	25% of replacement cost
Floor Drain	75				
General Flooring Finishes	50				
Flooring-Carpet	10				
Flooring-Ceramic Tile	75				
Flooring-Expoy Flooring	75	Rehabilitation	Minor rehab	15	20% of replacement cost
Flooring-Sealed Concrete Flooring	75	Rehabilitation	Reseal	15	20% of replacement cost
Flooring-Sheet Vinyl	15				
Air Conditioning Unit	15	Rehabilitation	Rehab	7	15% of replacement cost
Elevator	50	Rehabilitation	Rehab	10	50% of replacement cost
Emergency Generator	30				
Exhaust Fan	15				
Exhaust Vent	35				
Expansion Tank	35				
Eyewash	10				
Fan Coil Unit	15				
Filtration System	20				
Fire Alarm Systems	15				

# Asset Life Cycle Investment Logic



# IRIS Demo

IRIS

HOME

Save Calculate Export Asset Register Export Activity Table Run Strategy Matcher

Asset List

Multiple Hierarchy

Asset Hierarchy

Main Hierarchy

- City of Livermore
  - Building Management System**
    - ▶ 141 N Livermore Ave
    - ▶ 145 - 149 N Livermore Ave
    - ▶ Bankhead Performing Arts Theatr
    - ▶ Caretaker's House
    - ▶ Carneige Library
    - ▶ City Hall
    - ▶ Civic Center Library
    - ▶ Council Chambers
    - ▶ Duarte Garage
    - ▶ Fire Station 10
    - ▶ Fire Station 6
    - ▶ Fire Station 7
    - ▶ Fire Station 8
    - ▶ Fire Station 9

Asset Dashboard

Cost Summary Dashboard

Asset Valuation

Install / Consumption Profile

R & R

Risk Matrix

Work Backlog

Activity R & R Cost Table

Asset Register

## Building Management System

Install Range <b>1876 - 2016</b>	Total Annualized R&R <b>\$3,567,366</b>	Total Valuation <b>\$94,650,520</b>	Consumption 
Average % Consumed <b>53 %</b>	Total Replacement Cost <b>\$94,525,177</b>	Total Assets <b>8,366</b>	

### Replacement & Rehabilitation

Year	Value
2016	\$3,567,366
2017	~\$2,500,000
2018	~\$2,500,000
2019	~\$3,500,000
2020	~\$3,500,000
2021	~\$2,500,000
2022	~\$4,500,000
2023	~\$5,500,000
2024	~\$2,500,000
2025	~\$2,500,000

Asset Dashboard Financial Analysis Management Strategy Cost Database ...

Finished Calculating



**Asset Level → Facility Replacement Decision**

# Building Replacement Criteria - Methodology




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- Asset level data rollup to support facility level decisions
- Factors to consider for replacement:
  - Mortality
    - High risk asset replacement cost to total replacement cost
    - Average percent of life consumed for assets
    - Remaining life of structural components
  - Capacity
  - Level of Service
    - Regulations
      - Building codes (e.g., structural, electrical, seismic, fire)
      - Health and Safety (e.g., hazardous material, air quality)
      - ADA
    - Strategic Vision
      - City's image
      - Green/sustainability initiatives
  - Financial Efficiency




# Building Replacement Criteria - Mortality

- Mortality




- High risk asset replacement cost to total replacement cost

$X \geq 50\%$	
$30\% \leq X < 49\%$	
$29\% < X$	

- Average percent of life consumed for assets



$Y \geq 80\%$	
$60\% \leq Y < 79\%$	
$59\% < Y$	

- Remaining life of structural components

$Z \leq 5$ years	
$6 < Z \leq 10$ years	
$Z > 11$ years	

# Building Replacement Criteria - Capacity

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- Capacity
  - Building meets the capacity demand 
  - Building does not meet capacity demand 

# Building Replacement Criteria – Level of Service

- Level of Service

- Building meets all codes (e.g., structural, electrical, fire, seismic)

Full Compliance	
Partial Compliance	
Non-Compliance	




- Building meets all health and safety codes (e.g., HAZMAT, air quality)




Full Compliance	
Partial Compliance	
Non-Compliance	

- Building Meeting ADA requirements

Full Compliance	
Partial Compliance	
Non-Compliance	

- Building aligns with the City’s strategic vision

<b><u>City’s Image</u></b>	
Full Alignment	
Partial Alignment	
Does Not Align	

<b><u>Green Initiative</u></b>	
Full Alignment	
Partial Alignment	
Does Not Align	

# Building Replacement Rating System

Failure Modes	Criteria	The Barn	Council Chambers	Fire Station 9	Fire Station 6
<b>Mortality</b>	High risk asset replacement cost to total replacement cost	●	●	●	●
	Average percent of life consumed for assets	●	●	●	●
	Remaining life of structural components	●	●	●	●
<b>Capacity</b>	Pass or Fail	●	●	●	●
<b>Level of Service</b>	Codes				
	Compliance with building codes (structural, electrical, fire, seismic)	●	●	●	●
	Compliance with Health and safety (HAZMAT, air quality)	●	●	●	●
	Compliance with ADA	●	●	●	●
	City's Strategic Vision				
	City image	●	●	●	●
City's green initiative	●	●	●	●	

Red	≥ 6
Yellow	4 ≤ x ≤ 5
Green	≤ 3

## Next Steps

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- Building Management System going to Council in Nov. 2016
- Next up in January 2017 → sidewalks and street trees
  - Data / methodology / results
- 2017 Discussions
  - Sidewalks / trees / ramps
  - Walls
  - Parks and landscape
  - Artwork
  - Traffic signals / street lights / signage
  - Bridges
  - Stormdrains and waterways
- Prioritization across assets
- Policies across management of assets

Thank you!

