Wastewater Enterprise Asset Management Presentation

Strategic Asset Management at the San Francisco Public Utilities Commission – Wastewater Enterprise

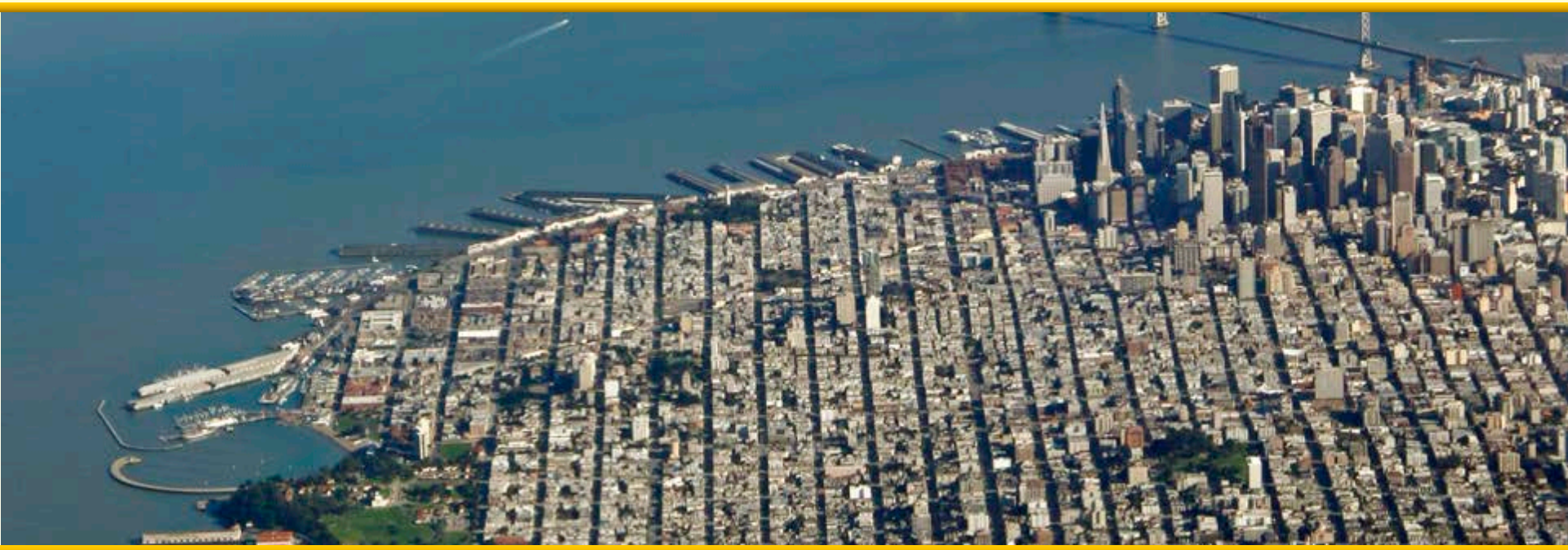
April 22, 2015

Overview of Presentation

1. **Collection System**
   a. Background of Collection System
   b. Asset Management Methods for Collection System
   c. GIS Methods for Collection System Data

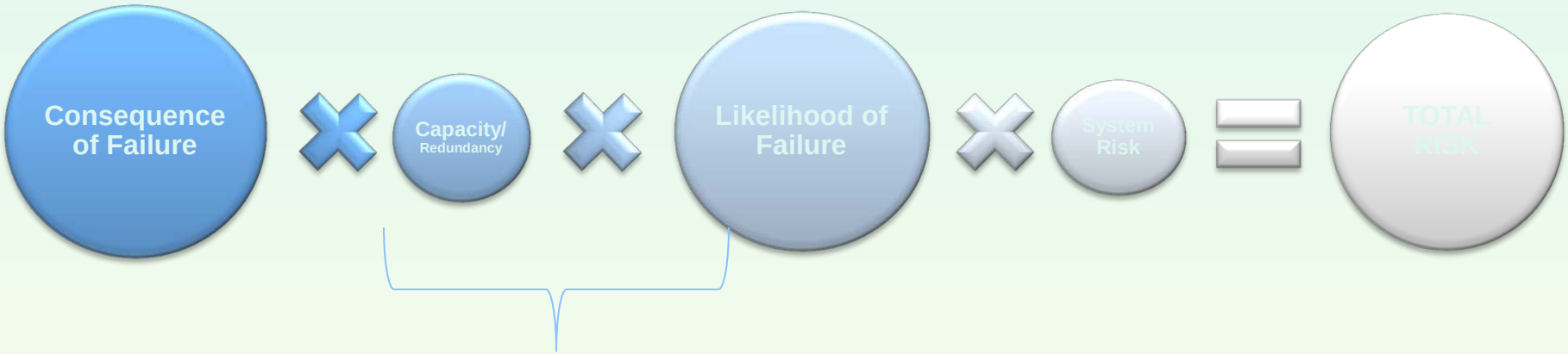
2. **Treatment Facilities**
   a. Background of Treatment Facilities
   b. Asset Management Methods for Treatment Facilities
   c. Graphical Methods for Treatment Plants

The WWE defines Asset Management as minimizing life cycle costs of wastewater enterprise assets, at an acceptable level of risk, while continuously delivering established levels of service.



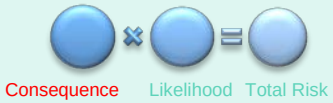
Relationship of Various SFPUC and WWE Plans

Risk Based Approach to Asset Management



Start with Establishing Levels of Service

Establish Levels of Service from WWE Mission



Mission

"To provide our customers with high quality, efficient and reliable water, power and wastewater services in a manner that is inclusive of environmental and community interests and sustains the resources entrusted to our care"

Vision

"We strive to be the utility leader, delivering superior results in service, sustainability and innovation"

Values

Service: We focus on customer satisfaction, health and safety.

Excellence: We strive for personal and professional excellence. We recognize exemplary performance as we seek continuous improvement.

Trust: We act with honesty, integrity and fairness.

Respect: We understand and appreciate the inherent value of our staff, customers and community.

Teamwork: We support a cooperative work environment. Our team is strengthened by the diversity and contributions of its members.

Equal Opportunity: We provide opportunities to all staff to contribute and reach their potential. To achieve this, we must be a learning organization.

Communication: We listen and communicate honestly and openly.

Stewardship: We responsibly manage the resources entrusted to our care.

Safety: We take the health and safety of all of our employees seriously and strive to maintain a safe work environment at all times.

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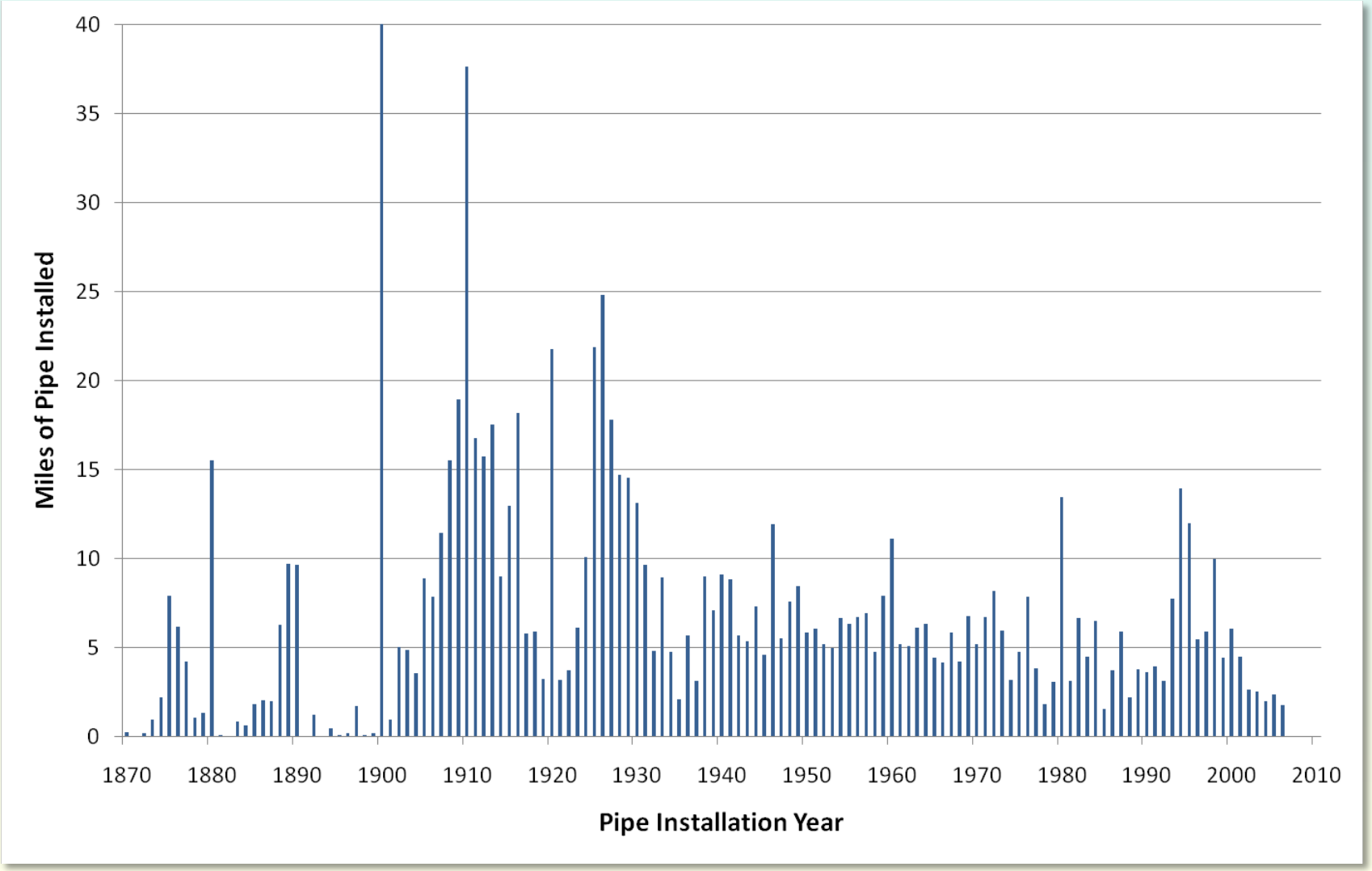
COLLECTION SYSTEM – COF SCORING

Construction History of San Francisco Sewer System



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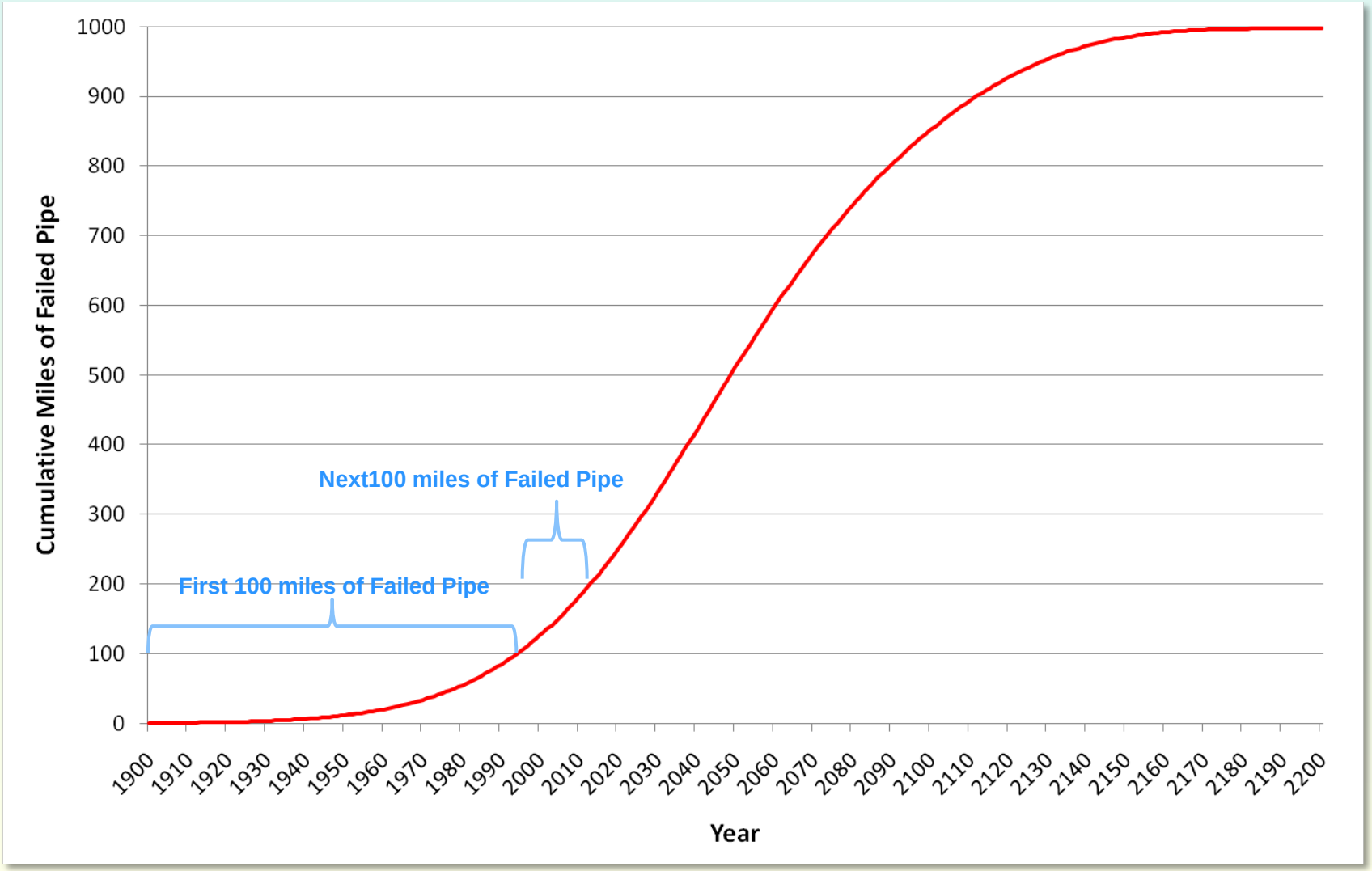
Sewer System in Crisis



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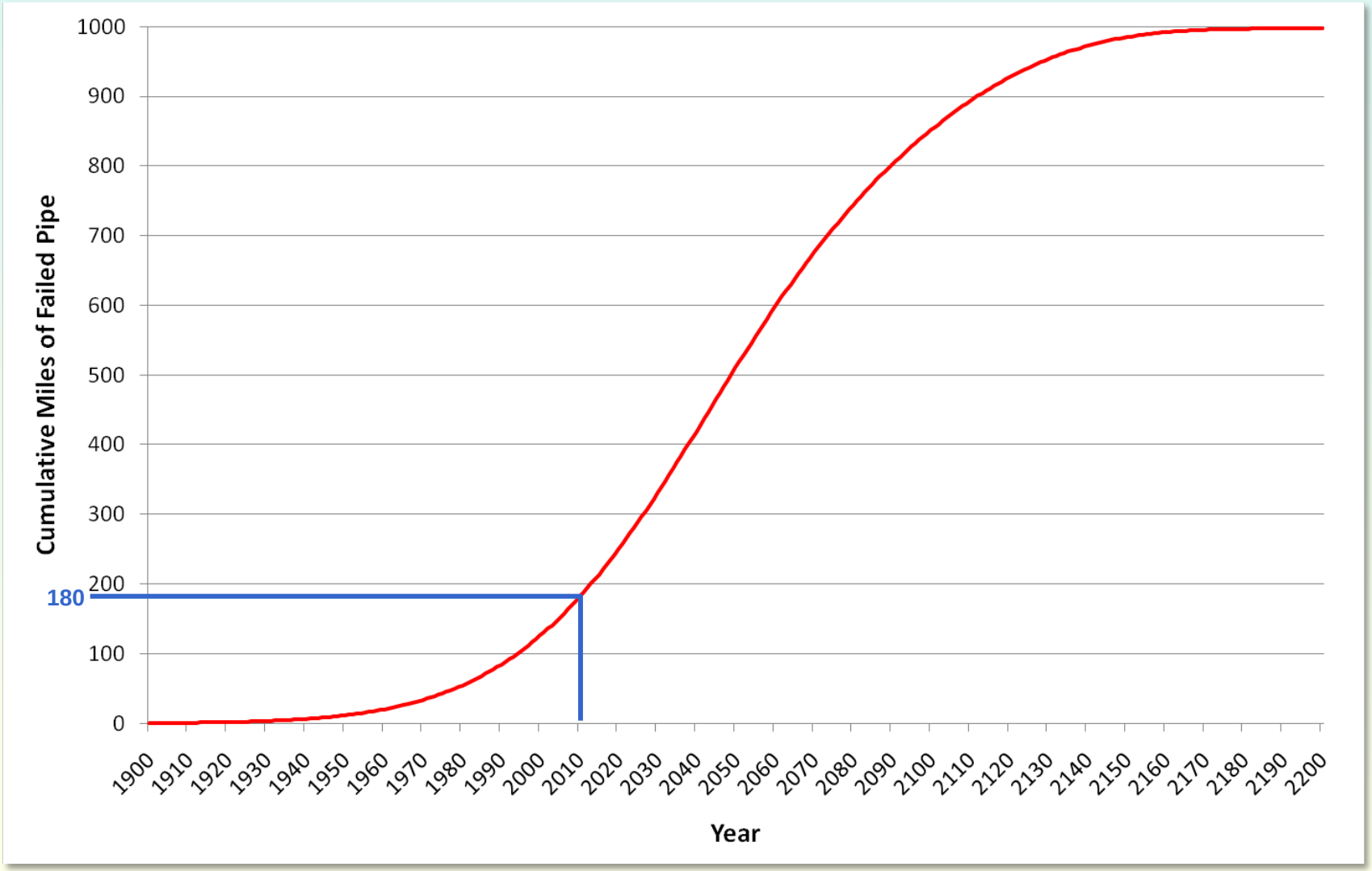

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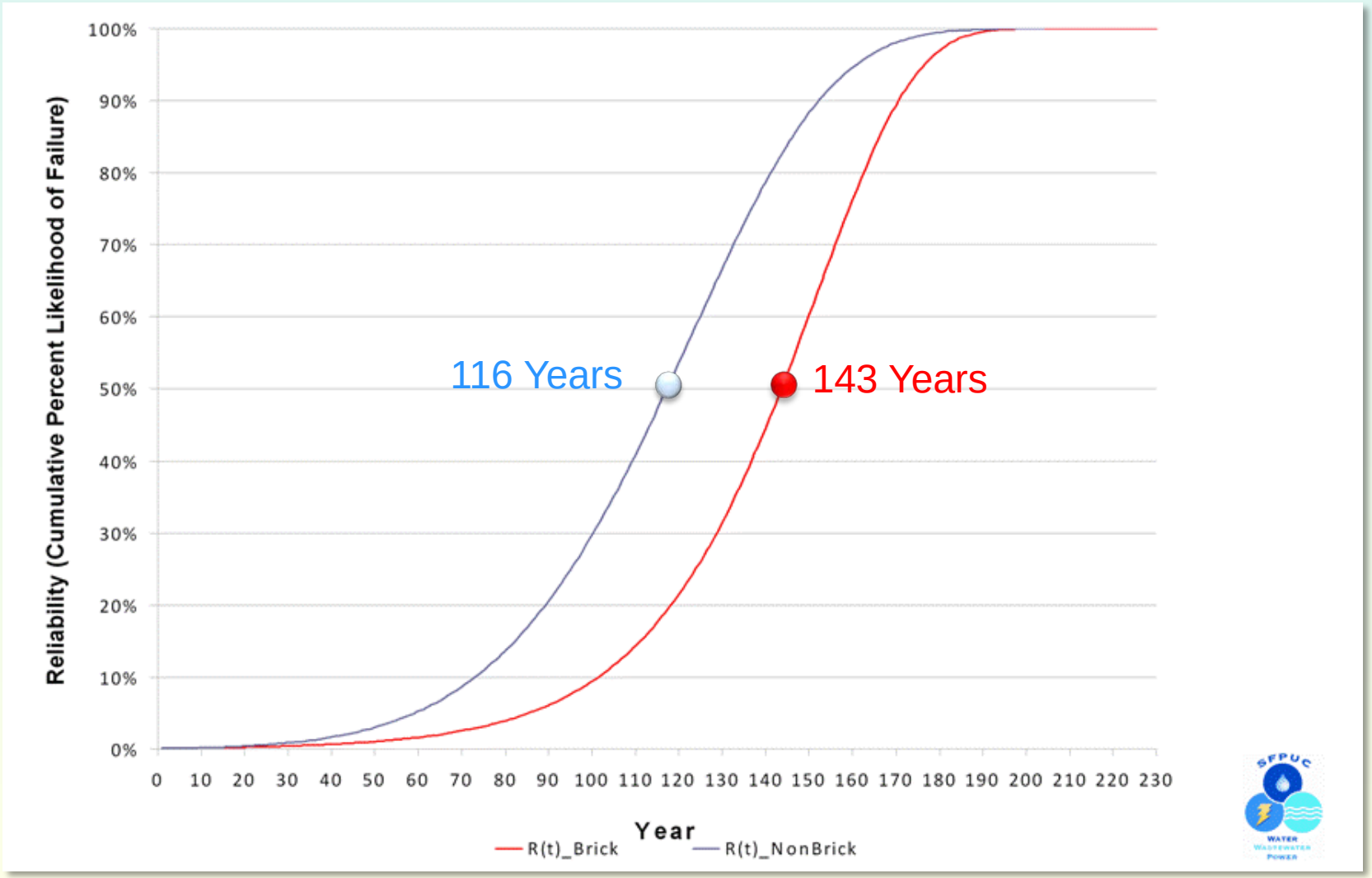
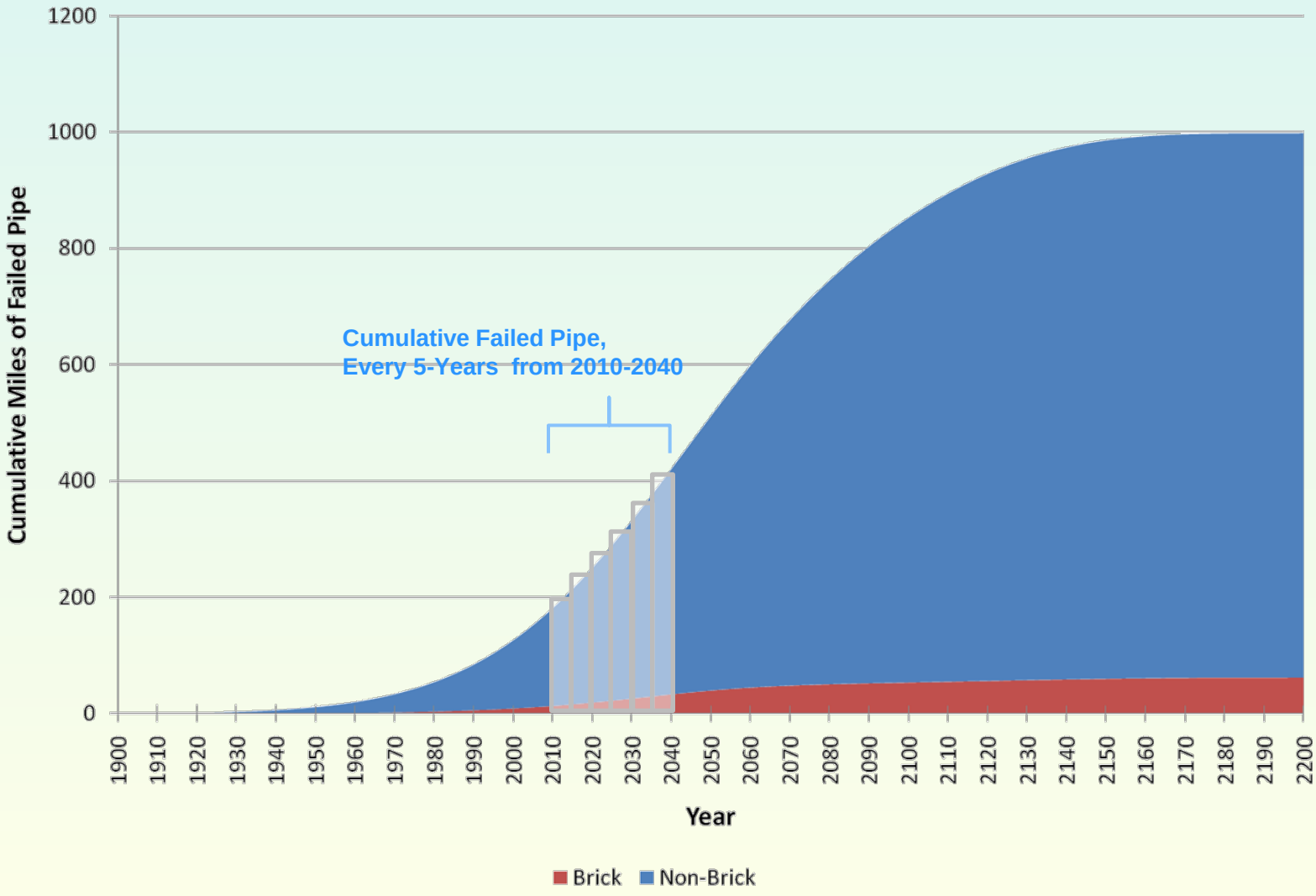
Cumulative Likelihood of Failure Comparison – Brick Versus Non-Brick



Cumulative Miles of Failed Pipe by Year Brick verses Non-Brick



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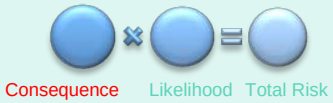
Establish Levels of Service from WWE Mission



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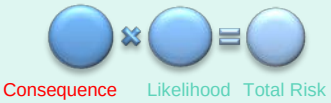
Level of Service (LOS) Category	Goals
Protect the Public	Protect the public from exposure to pathogens and toxins
Preserve and Improve Quality of Life	Minimize public impacts
Be Cost Effective	Deliver levels of service at lowest long term cost (or competitive with other agencies)
Provide Excellent Customer Service	High level of customer satisfaction
Be Environmentally Responsible	Protect the environment and meet regulations

Levels of Service & Risk Score



LOS Category	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
Protect the Public	•Low likelihood of public exposure	•Low to moderate likelihood of public exposure (near BART station, MUNI, etc)	•Moderate likelihood of public exposure (high foot traffic area, etc)	•Located next to public facility (school, hospital, etc)
	<15 inches in diameter	15 ≤ 36 inches in diameter	36 ≤ 60 inches in diameter	>60 inches in diameter
Preserve and Improve Quality of Life	•Minimal to no commercial impacts or public annoyance	•Impact to cable car, MUNI Diesel, highway approach, or neighborhood commercial district	•Impact to major arterial, primary transportation route, MUNI electric, or major commercial district	•Impact to emergency transportation route, bridge approach roadway, MUNI Rail, or downtown core
	•Impact to residential street	•Within potential or known slide area or liquefaction zone	•Known subsidence area	•Connection between pile-supported and non-pile supported sewer
Be Cost Effective	•Under asphalt street, not under moratorium	•Under concrete street	•Opportunity to coordinate with other infrastructure projects •Easement sewers	•Under moratorium street •Easement sewer near building or a steep slope
	•No history of repairs	•1 point repair per 300 feet in maintenance history	•2 point repairs per 300 feet in maintenance history	•≥3 point repairs per 300 feet
Provide Excellent Customer Service	•Can restore service in <4 hours	•Can restore service in 4 to <8 hours	•Can restore service in 8 to < 24 hours	•More than 24 hours to restore service
Be Environmentally Responsible	•Flows back to combined system	•Flows to surface water	•Flows to MS4 facility or CDS structure	•Impacts emergency drinking water supply
	•100% compliance with permits and regulations	•Technical violation without an enforcement action	•Violation with potential for enforcement action	•Past history of violations and/or potential for enforcement action and fines

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Sewer Failure - Example

LOS Category	Goals	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
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	Protect the Public from Exposure to Pathogens and toxins	•Size Class I sewers (<15 inches in diameter)	•Size Class II sewers (15 ≤ 36 inches in diameter)	•Size Class III sewers (36 ≤ 60 inches in diameter)	•Size Class IV sewers (>60 inches in diameter)
Preserve and Improve Quality of Life	Minimize commercial impacts or public annoyance	•Minimal to no commercial impacts or public annoyance	•Impact to cable car, MUNI Diesel, highway approach, or neighborhood commercial district	•Impact to major arterial, primary transportation route, MUNI electric, or major commercial district	•Impact to emergency transportation route, bridge approach roadway, MUNI Rail, or downtown core
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Market at Embarcadero

LOS Category	Goals	Negligible = 1	Low = 4	Moderate = 7	Severe = 10
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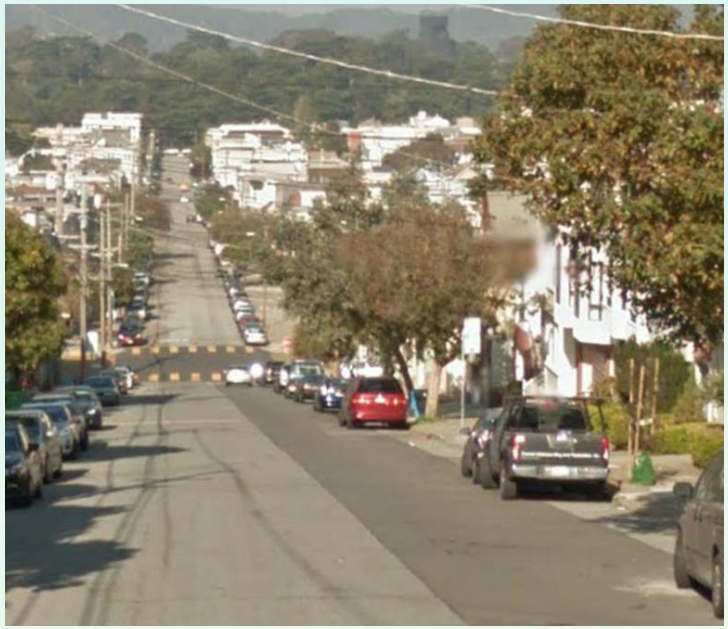
Sunset District (12th Avenue)



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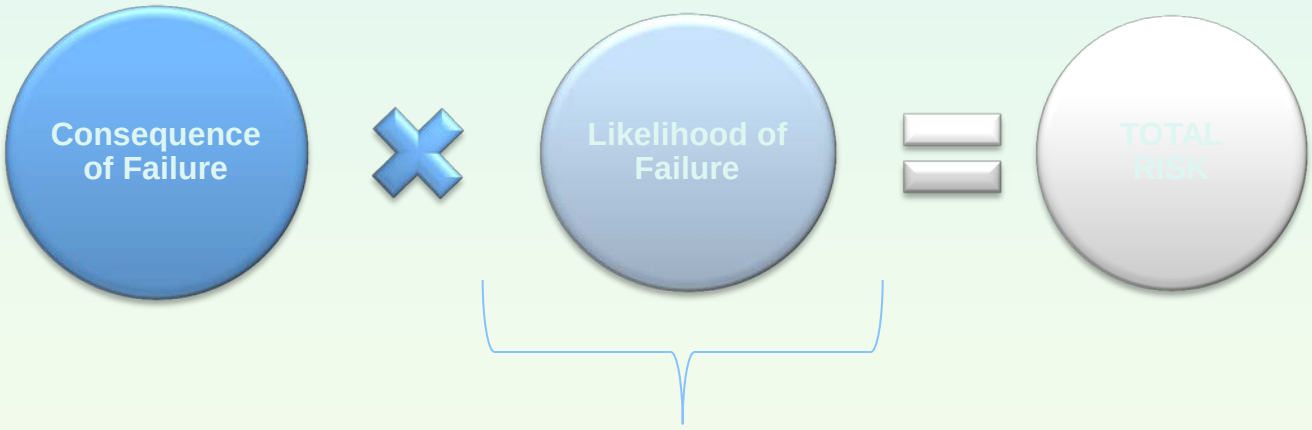
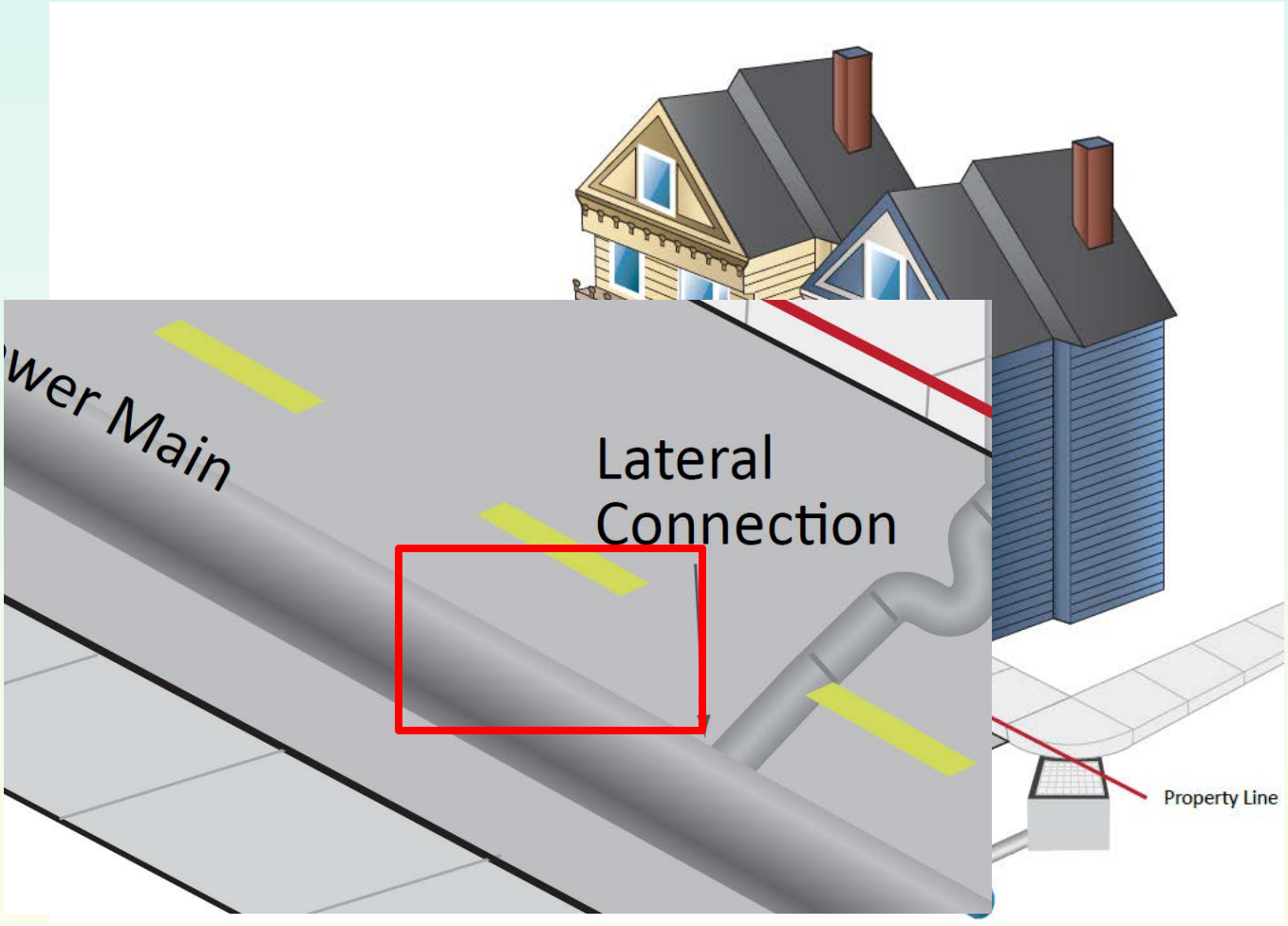
Risk Based Approach to Asset Management



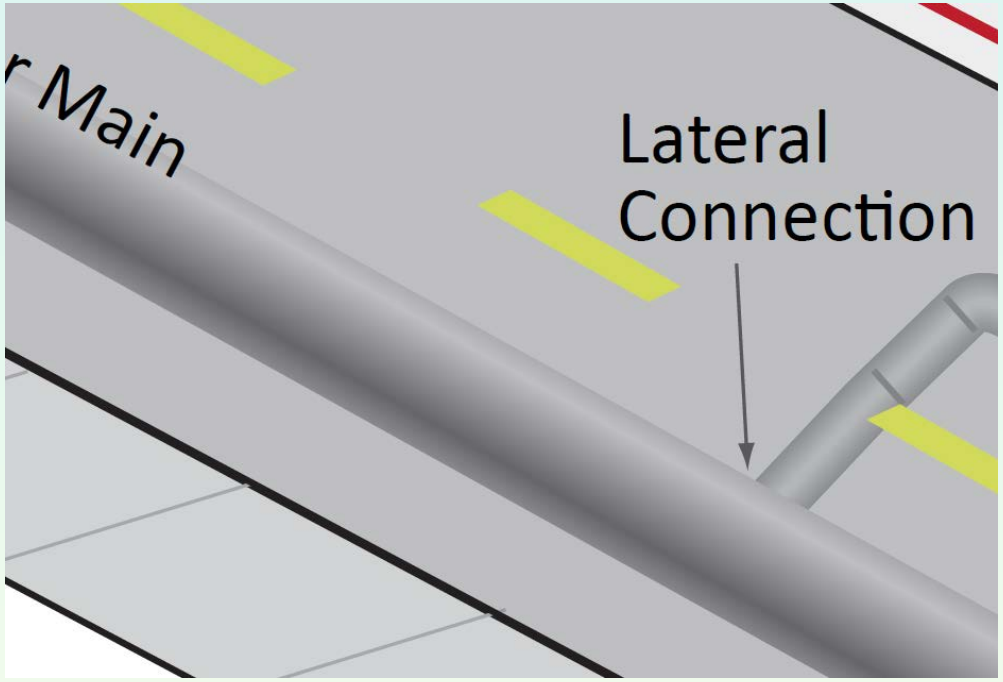
Likelihood of Failure

Consequence Likelihood Total Risk



Likelihood of Failure

Consequence × Likelihood = Total Risk



PACP SCORE	1	2	3	4	5
Likelihood of Failure (CSAMP)	1	2	4	7	10

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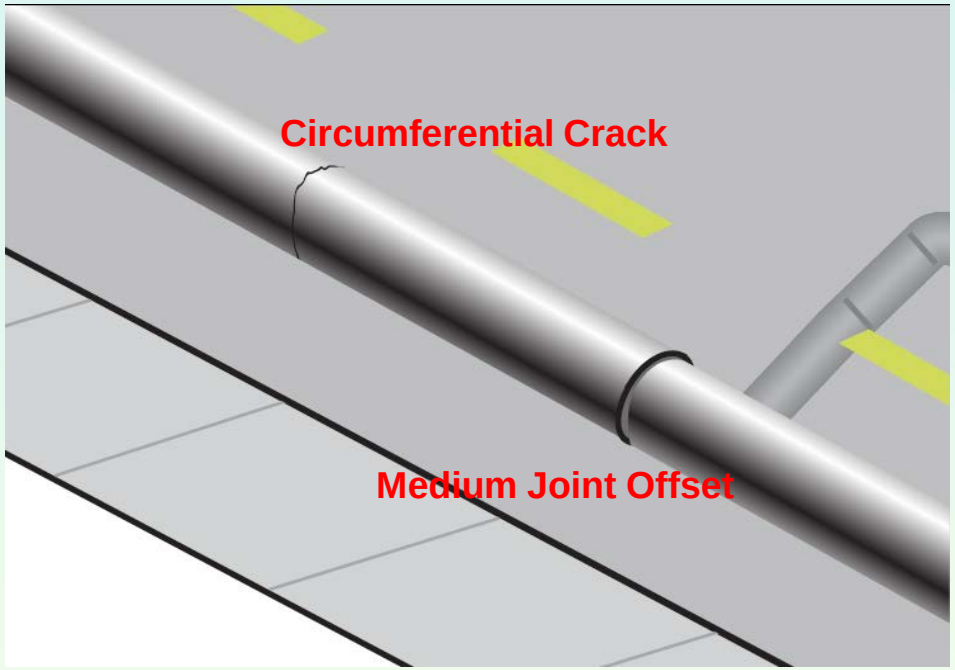
Likelihood of Failure



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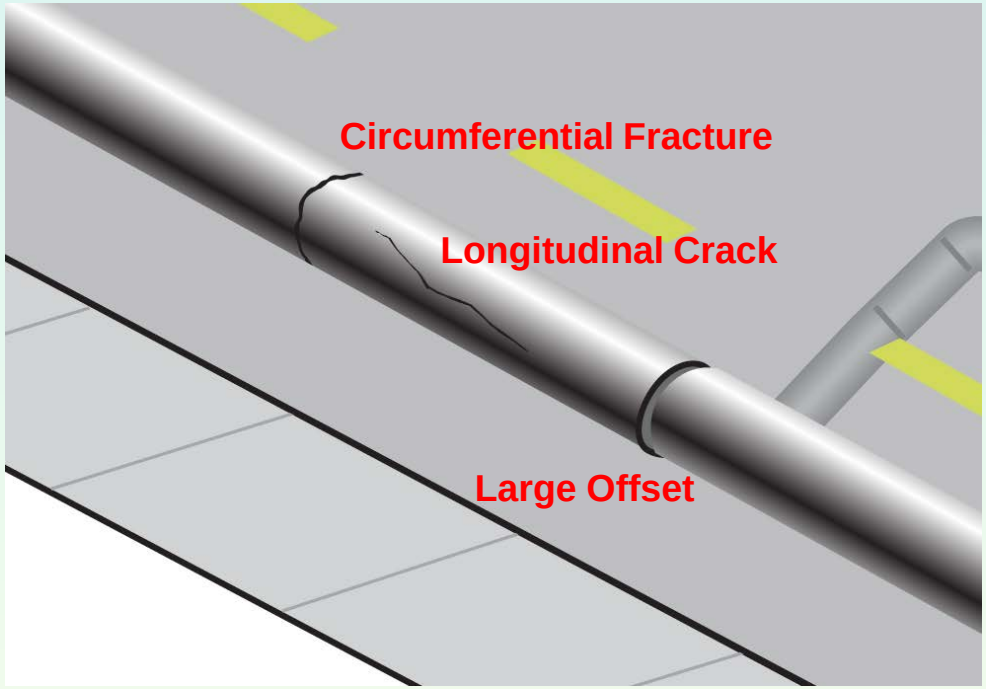
Likelihood of Failure (CSAMP)	1	2	4	7	10

Likelihood of Failure



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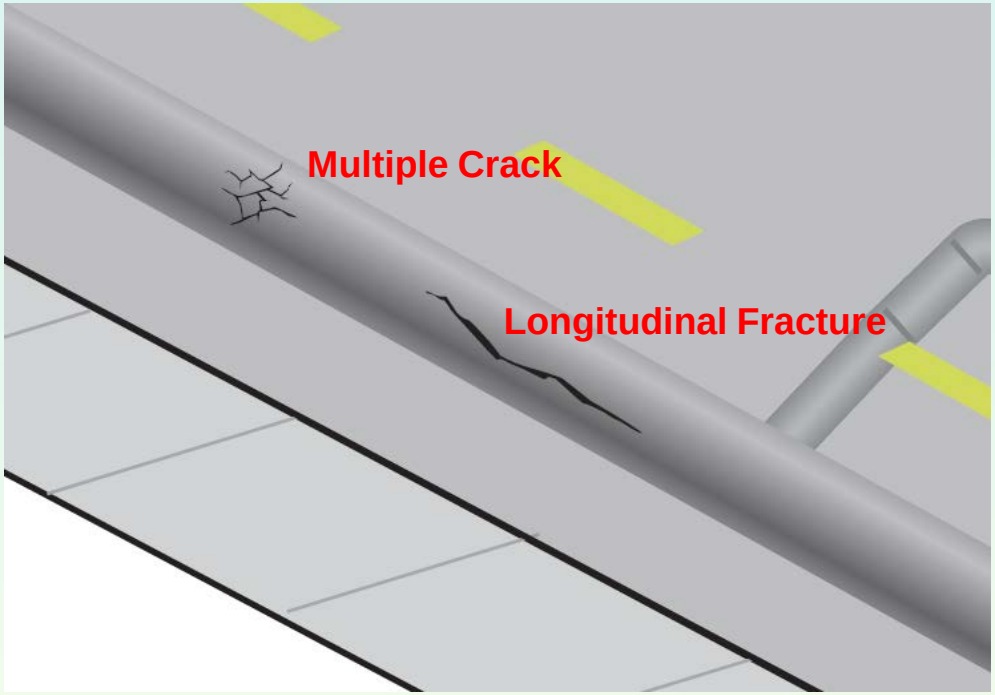
Likelihood of Failure

Consequence × Likelihood = Total Risk



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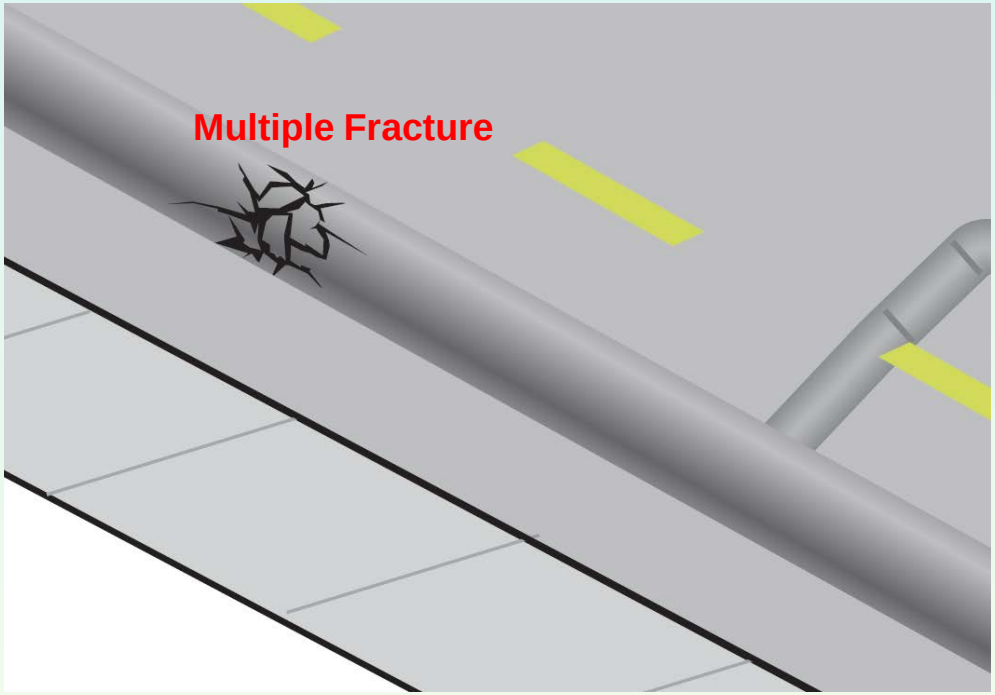
Likelihood of Failure

Consequence × Likelihood = Total Risk



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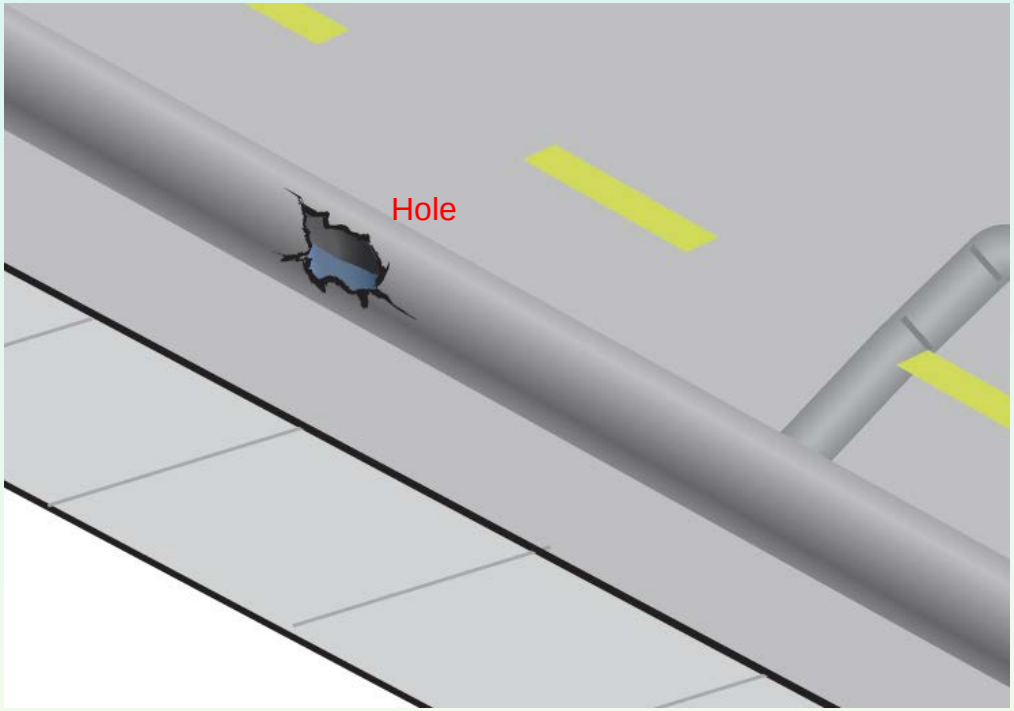

PACP SCORE	1	2	3	4	5
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Total Risk Score

Total Risk Score

Let's say the likelihood of failure score for each of our two examples is "7"

Example 1 "Market/Embarcadero"

Example 2 "Sunset"

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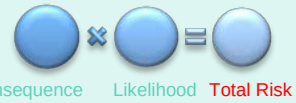
Risk Class Matrix



	1	2	4	7	10
10	10	20	40	70	100
7	7	14	28	49	70
4	4	8	16	28	40
1	1	2	4	7	10

RISK CLASS	RISK SCORE	MILES
Very High	≥100	160
High	≥70<100	171
Medium	≥10<70	566
Low	<10	62

⇦ First 10 Years

⇦ Next 20 Years

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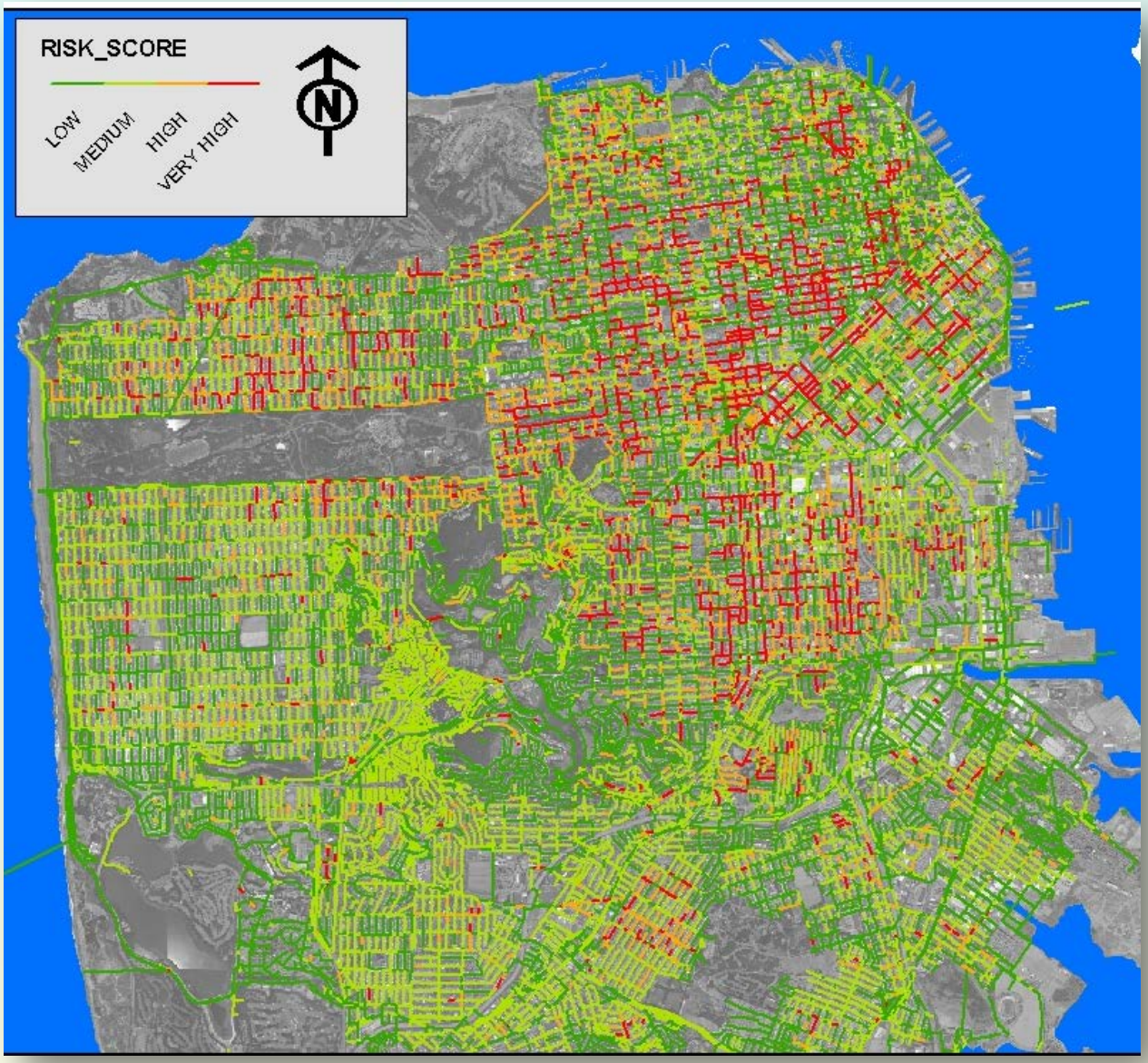
Total CSAMP Risk Score



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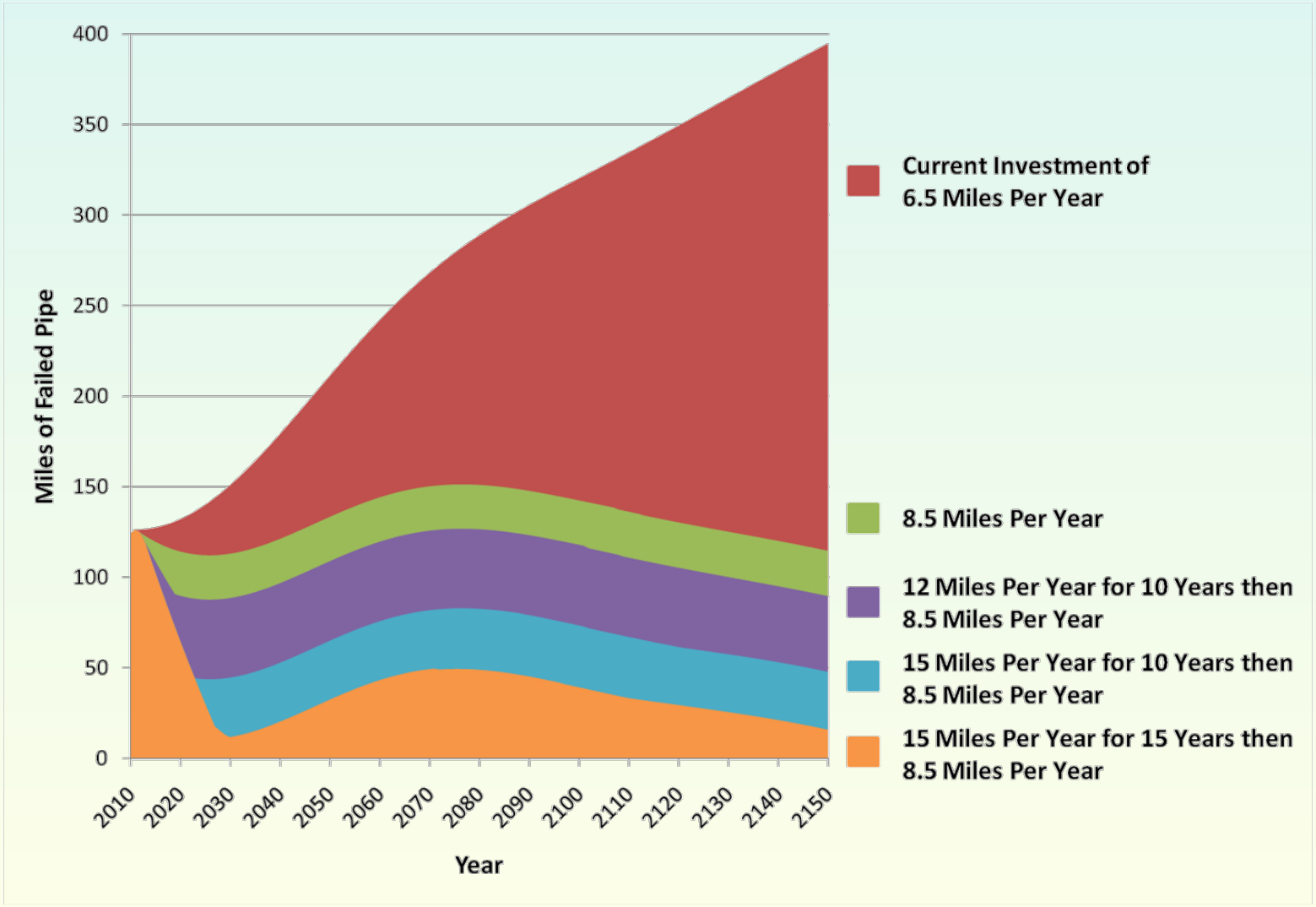
Cumulative Miles of Failed Pipe for Various Investment Scenarios



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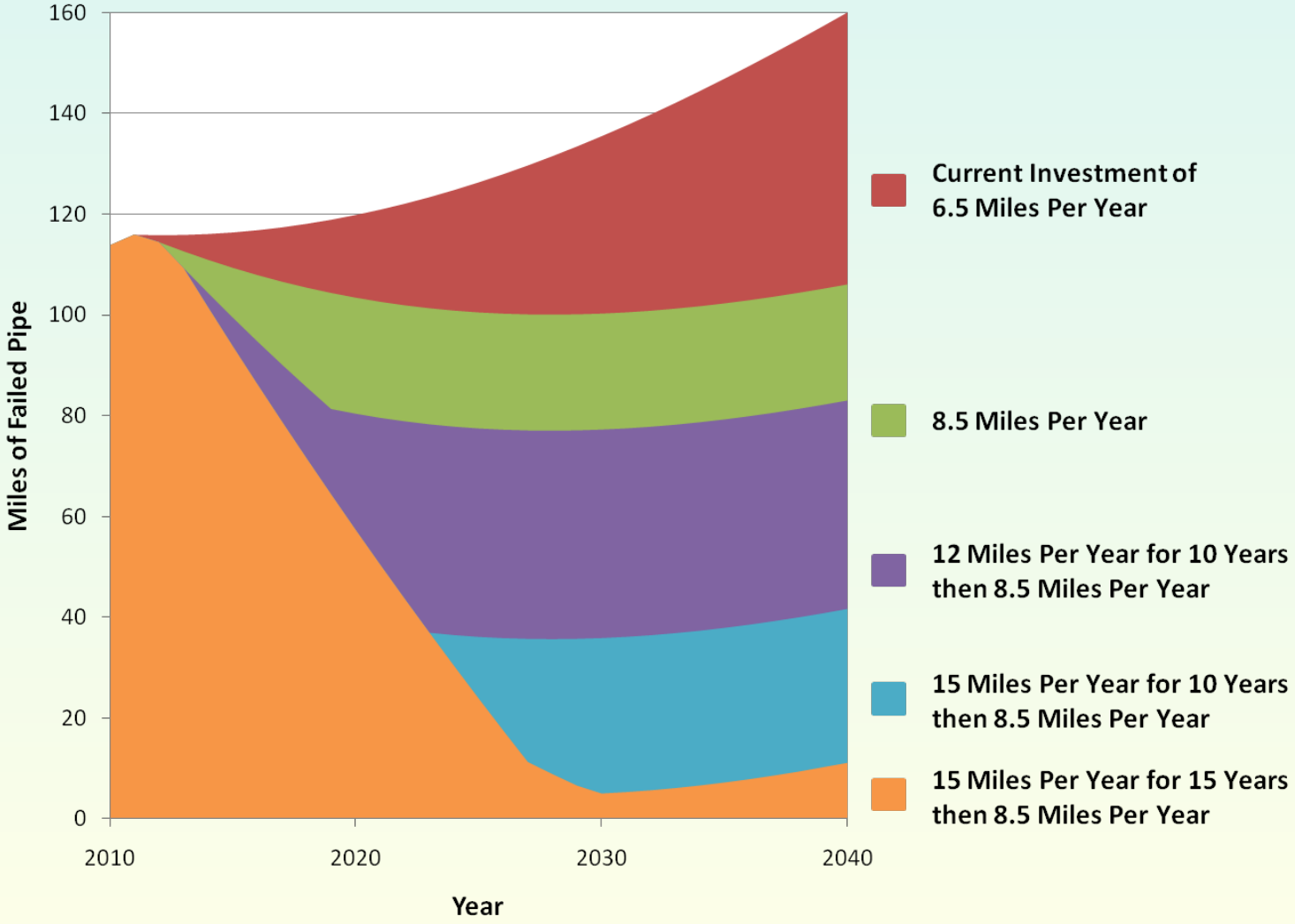

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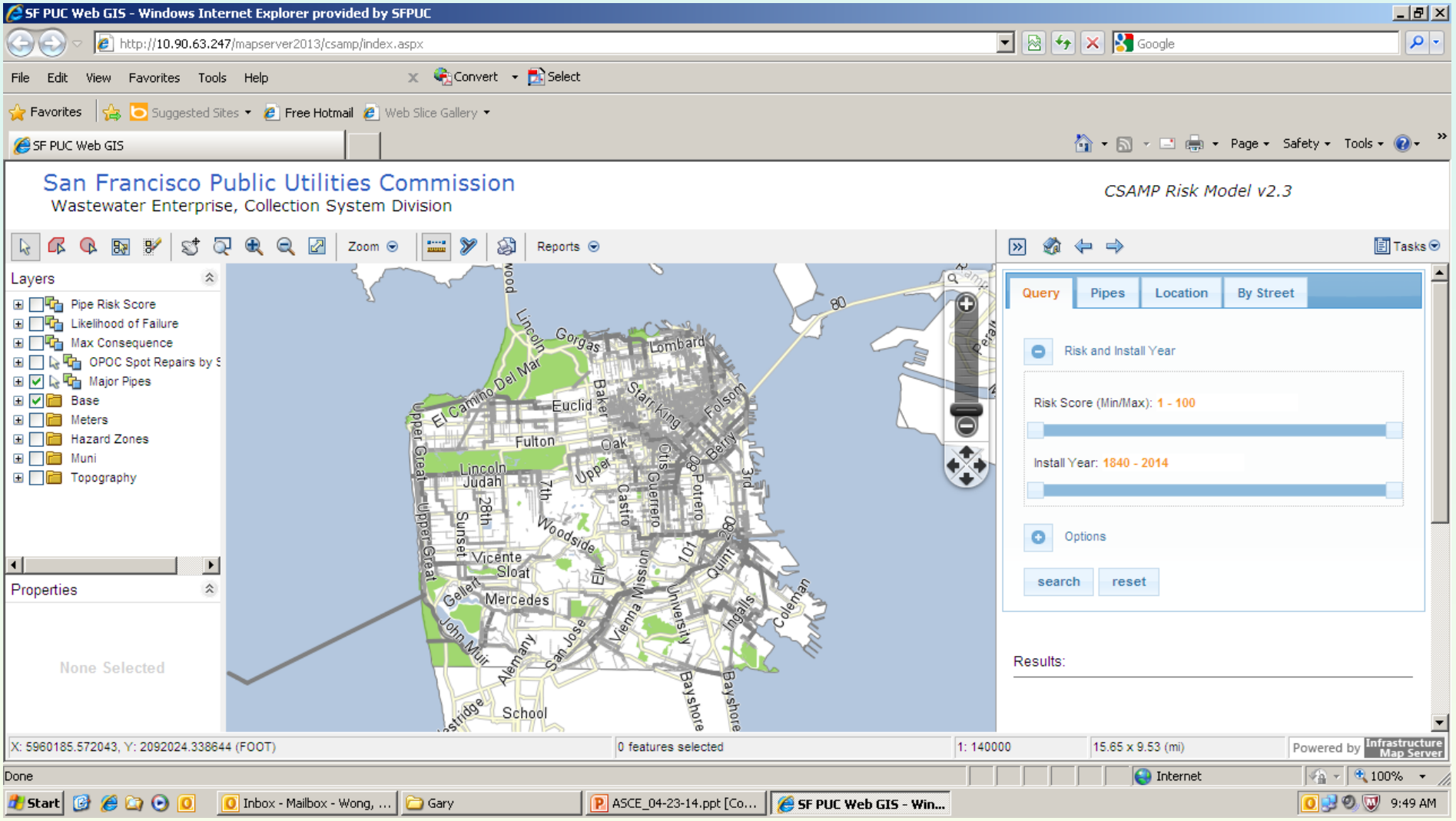
CSAMP – USER INTERFACE

http://10.90.63.247/mapserver2013/csamp/index.aspx



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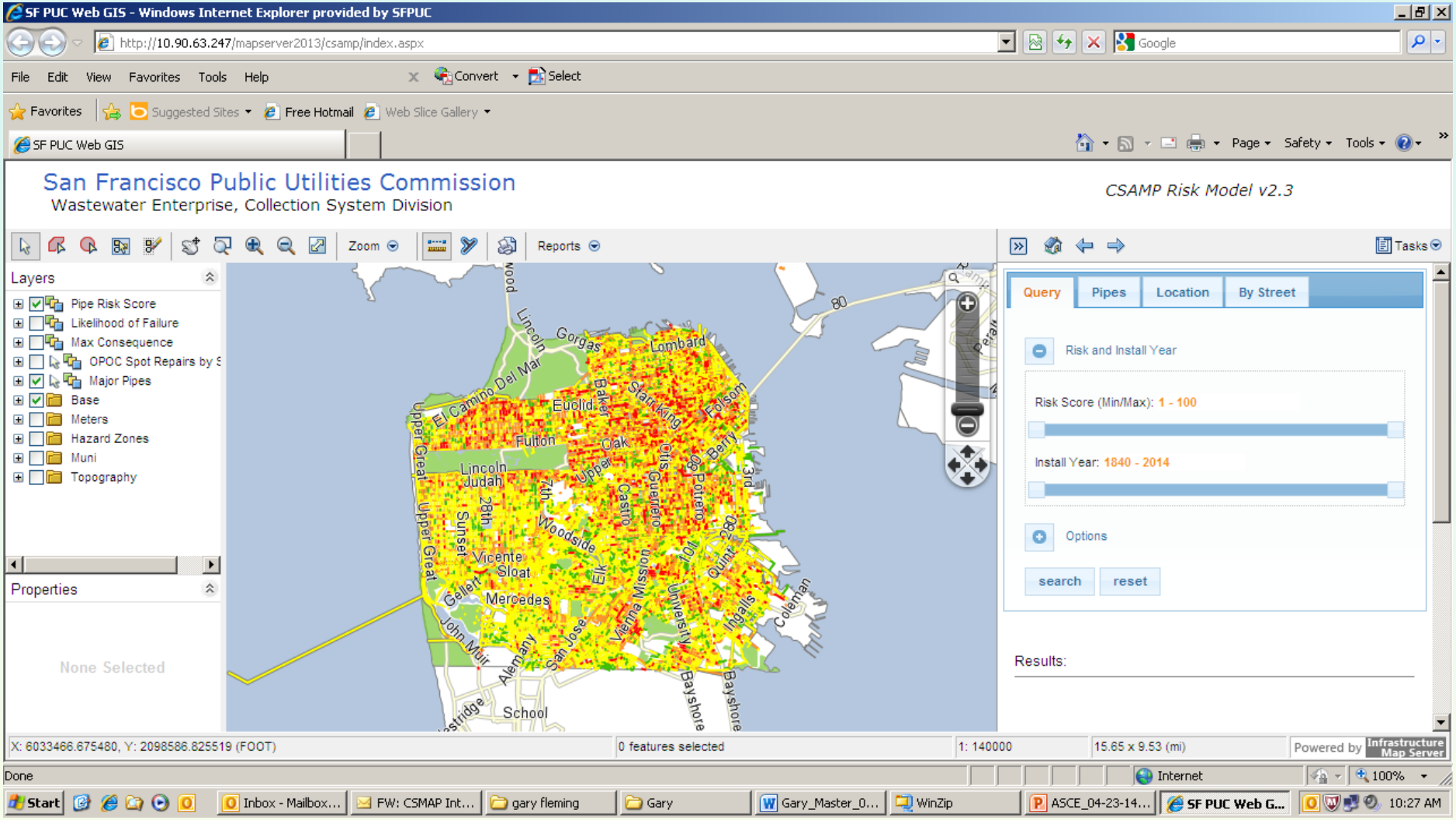
SF PUC Web GIS - Windows Internet Explorer provided by SFPUC
http://10.90.63.247/mapserver2013/csamp/index.aspx
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Wastewater Enterprise, Collection System Division
CSAMP Risk Model v2.3
Zoom
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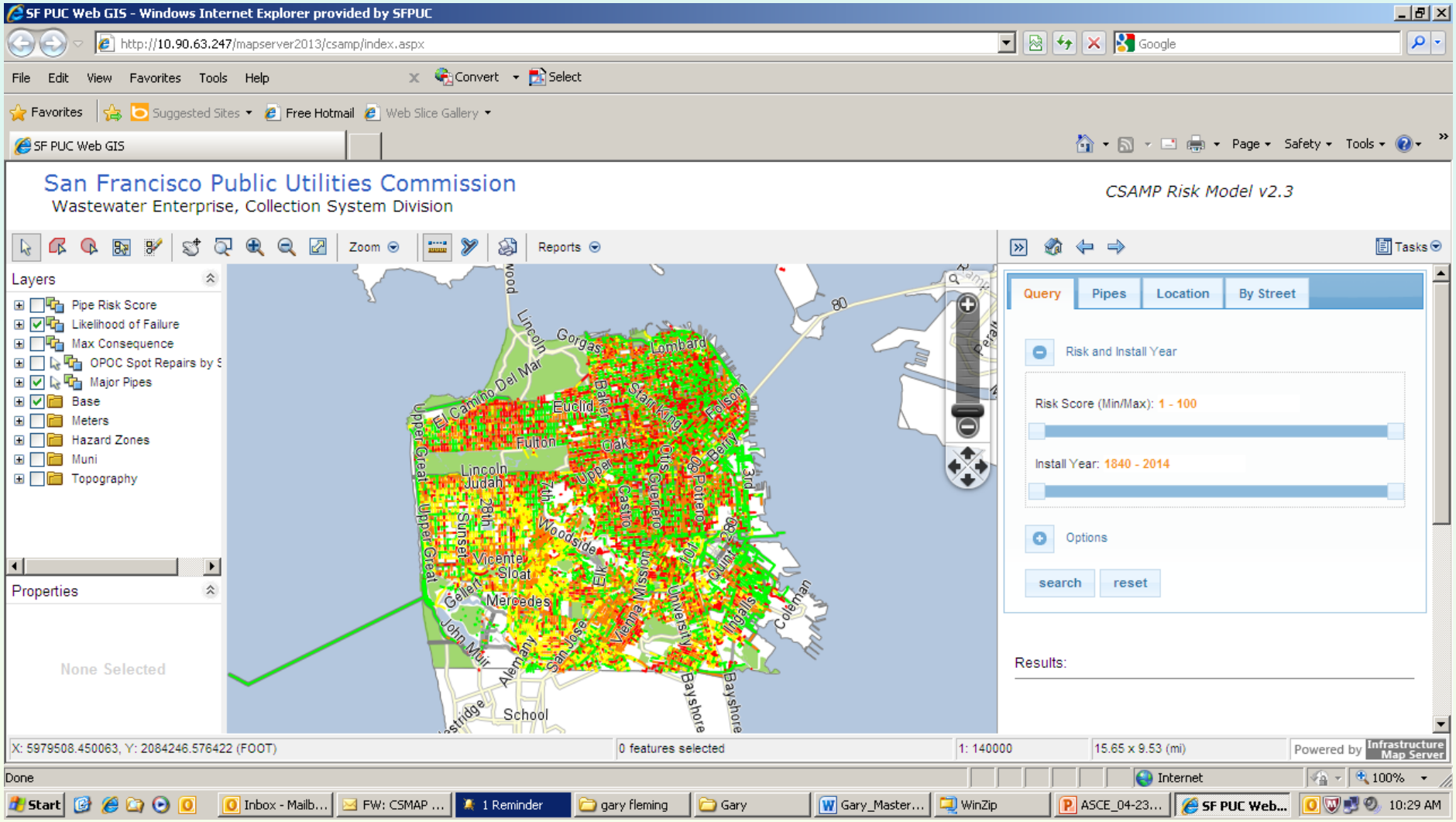
Max Consequence
OPOC Spot Repairs by S
Major Pipes
Base
Meters
Hazard Zones
Muni
Topography
Properties
None Selected
Query
Pipes
Location
By Street
Risk and Install Year
Risk Score (Min/Max): 1 - 100
Install Year: 1840 - 2014
Options
search
reset
Results:
X: 6033466.675480, Y: 2098586.825519 (FOOT)
0 features selected
1: 140000
15.65 x 9.53 (mi)
Powered by Infrastructure Map Server
Done
Internet
100%
Start
10:27 AM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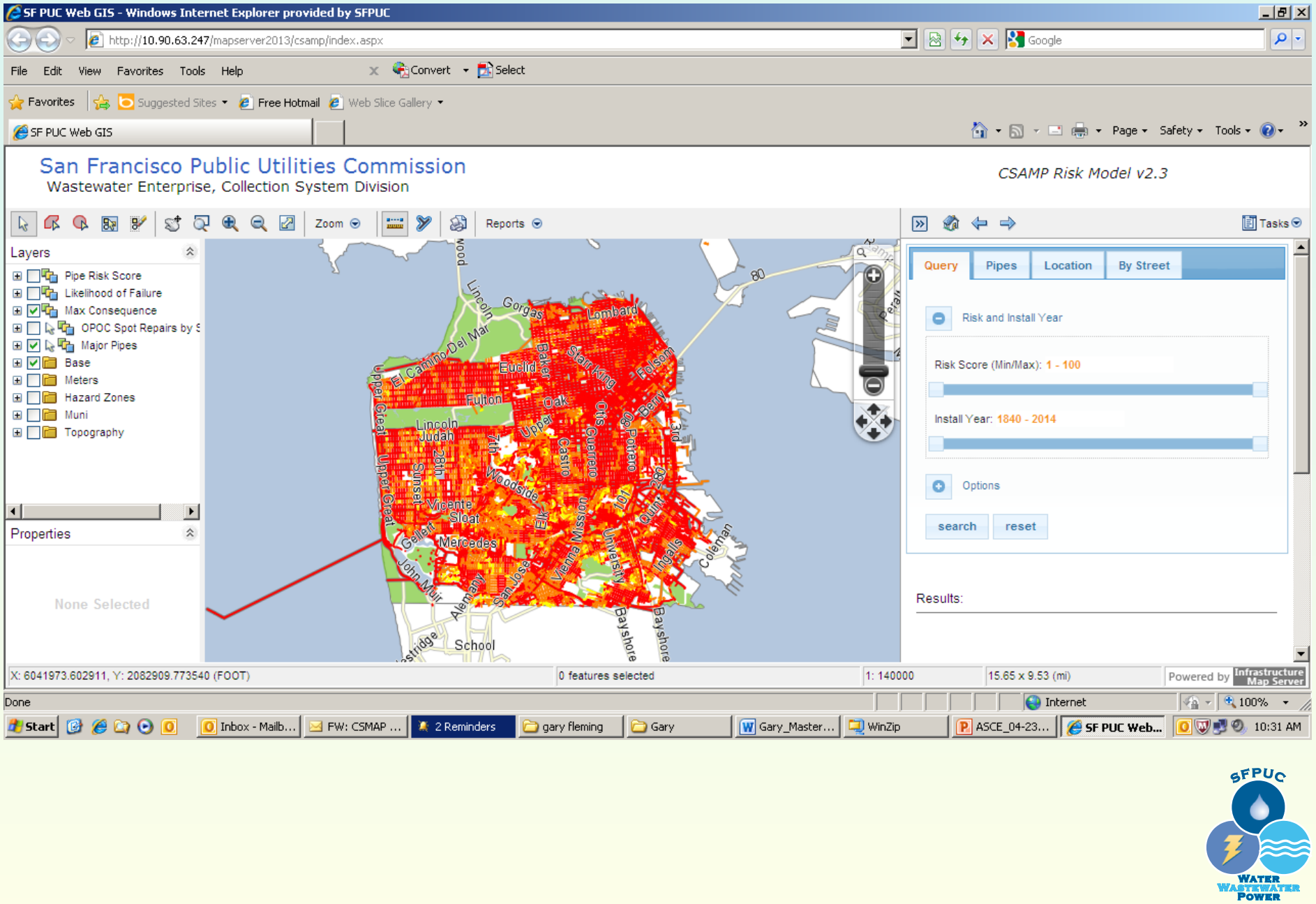
Topography
Properties
None Selected
Query
Pipes
Location
By Street
Risk and Install Year
Risk Score (Min/Max): 1 - 100
Install Year: 1840 - 2014
Options
search
reset
Results:
X: 5979508.450063, Y: 2084246.576422 (FOOT)
0 features selected
1: 140000
15.65 x 9.53 (mi)
Powered by Infrastructure Map Server
Done
Internet
100%
Start
10:29 AM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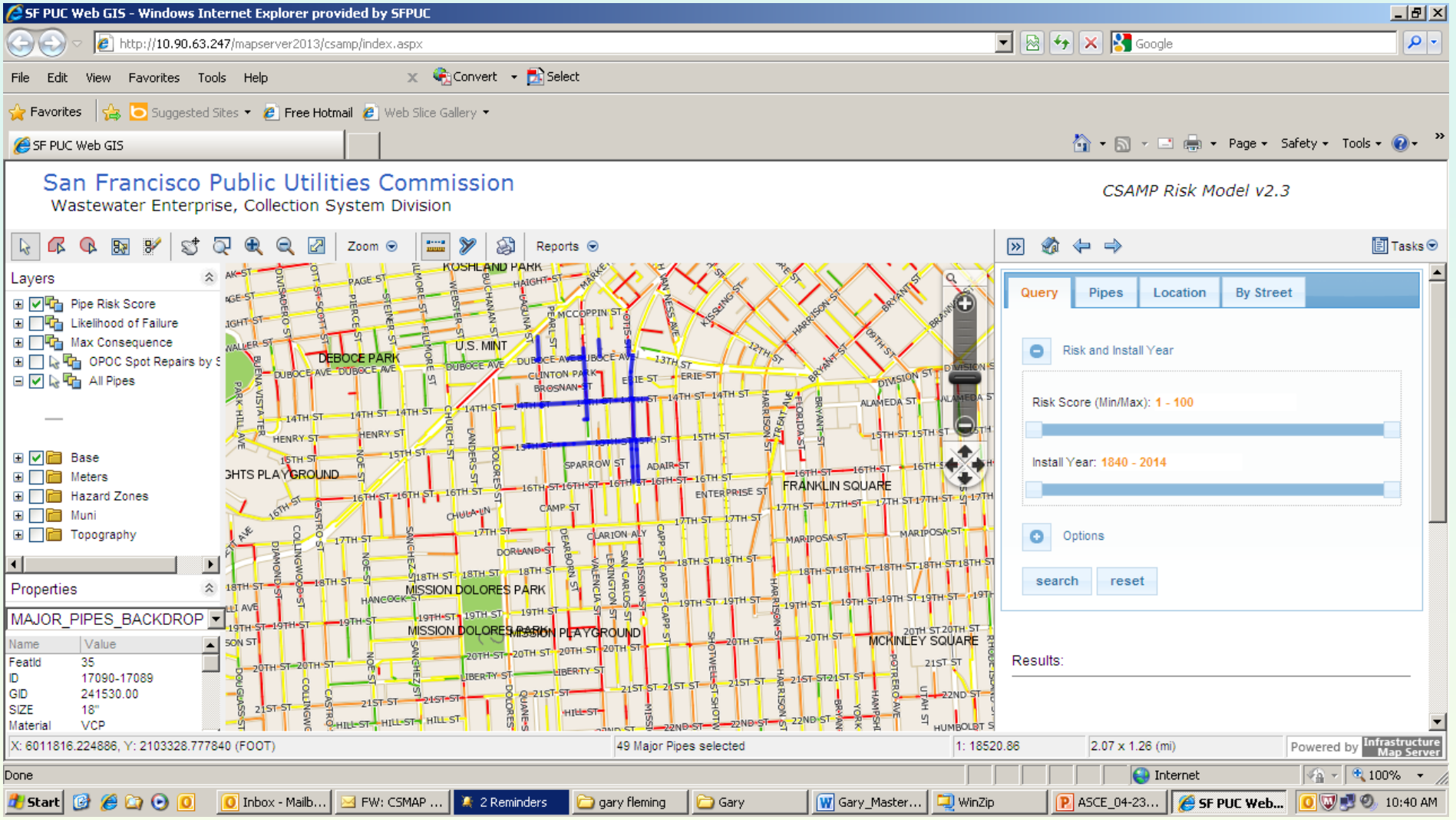
Muni
Topography
Properties
None Selected
Query
Pipes
Location
By Street
Risk and Install Year
Risk Score (Min/Max): 1 - 100
Install Year: 1840 - 2014
Options
search
reset
Results:
X: 6041973.602911, Y: 2082909.773540 (FOOT)
0 features selected
1: 140000
15.65 x 9.53 (mi)
Powered by Infrastructure Map Server
Done
Internet
100%
Start
10:31 AM



SFPUC
WATER WASTEWATER POWER

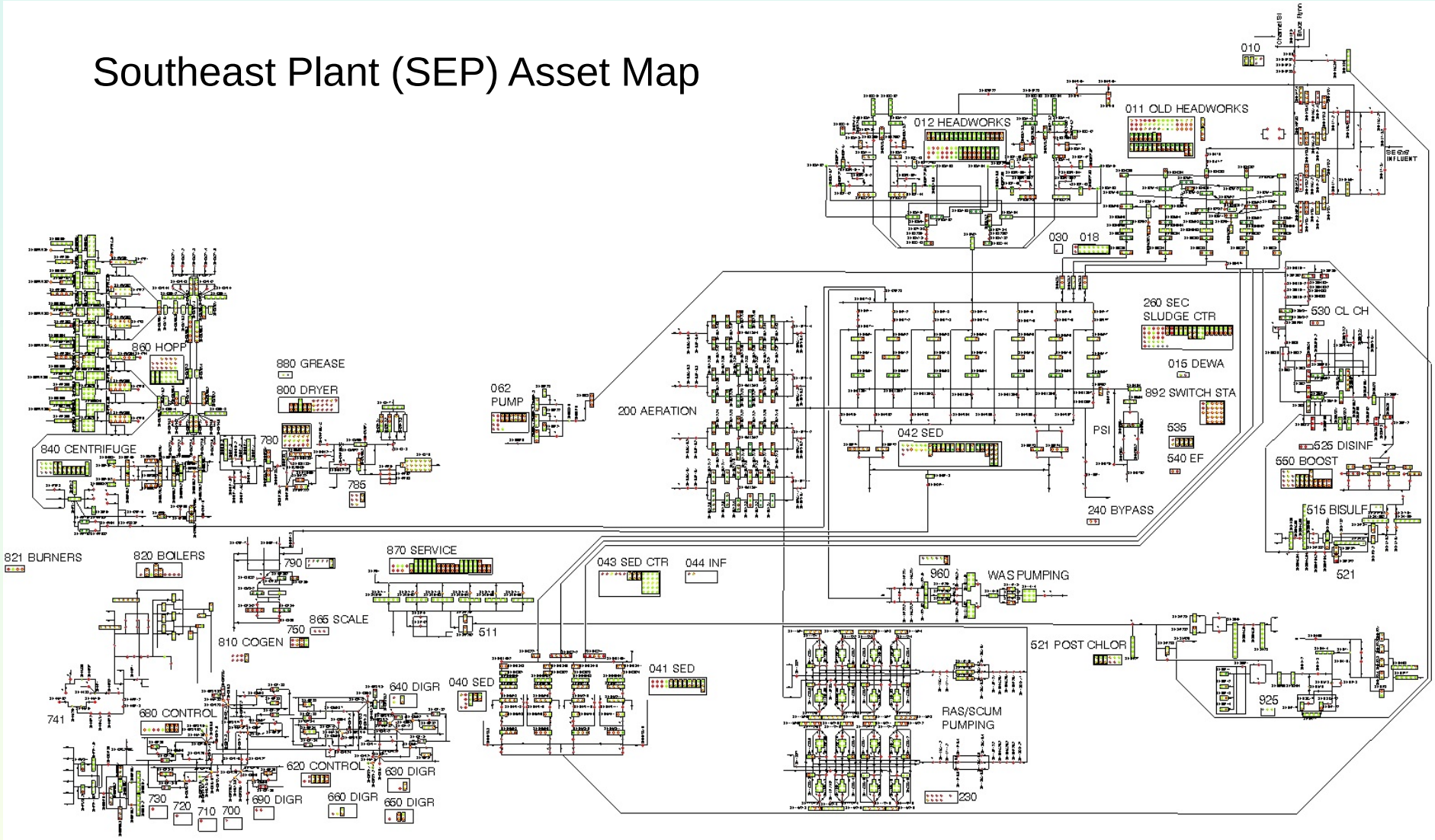
TREATMENT FACILITIES

Southeast Plant (SEP)

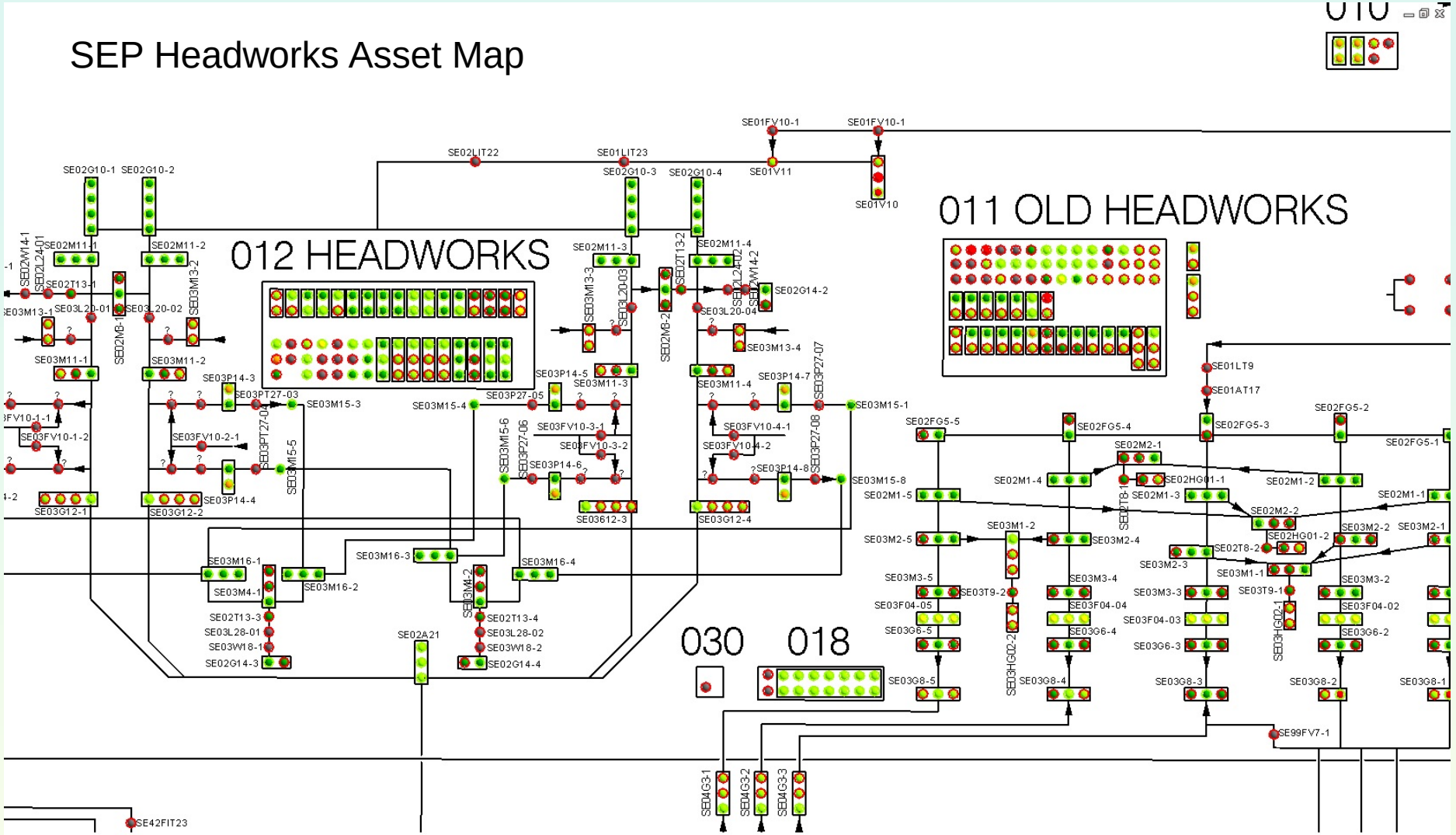
TREATMENT FACILITIES - COF SCORING

RISK IMPACT SCORE						
RATING	**OPERATIONAL**	**FINANCIAL**	**REGULATORY**	**SAFETY**	**PUBLIC IMPACT**	**COF SCORE**
5 - Extreme	0 Hours	>$100,000	100% Probability	Loss of Life	General Flood/Odor	10
4 - Major	< 6 Hours	>$50,000	75% Probability	IDLH	Significant	7
3 - Moderate	< 24 Hours	>$25,000	50% Probability	Significant	Localized Flood/Odor	4
2 - Minor	< 1 Week	>$10,000	25% Probability	Minor	Minor	2
1 - Insignificant	> 1 Week	<$10,000	0% Probability	None	None	1

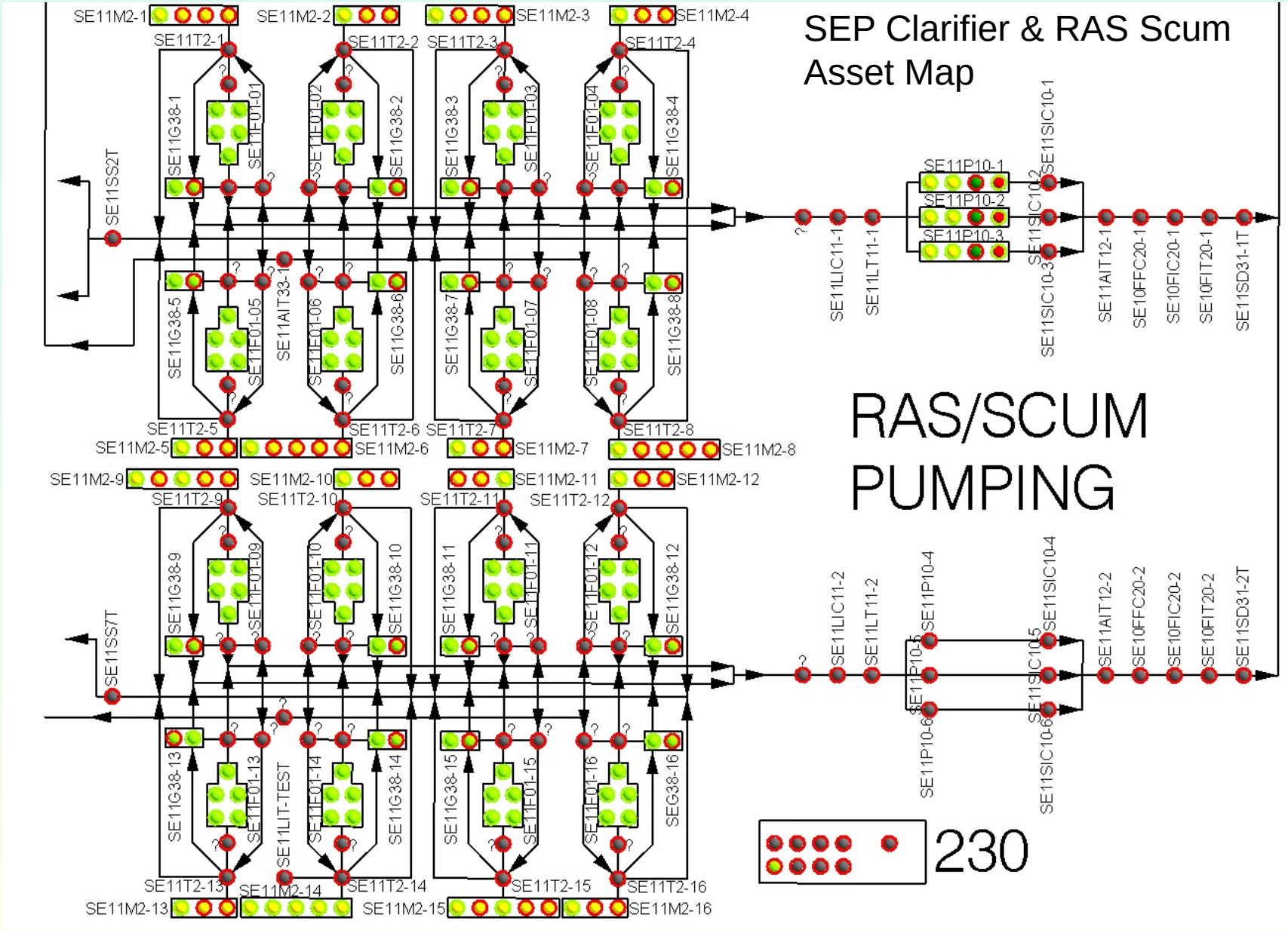
Southeast Plant (SEP) Asset Map



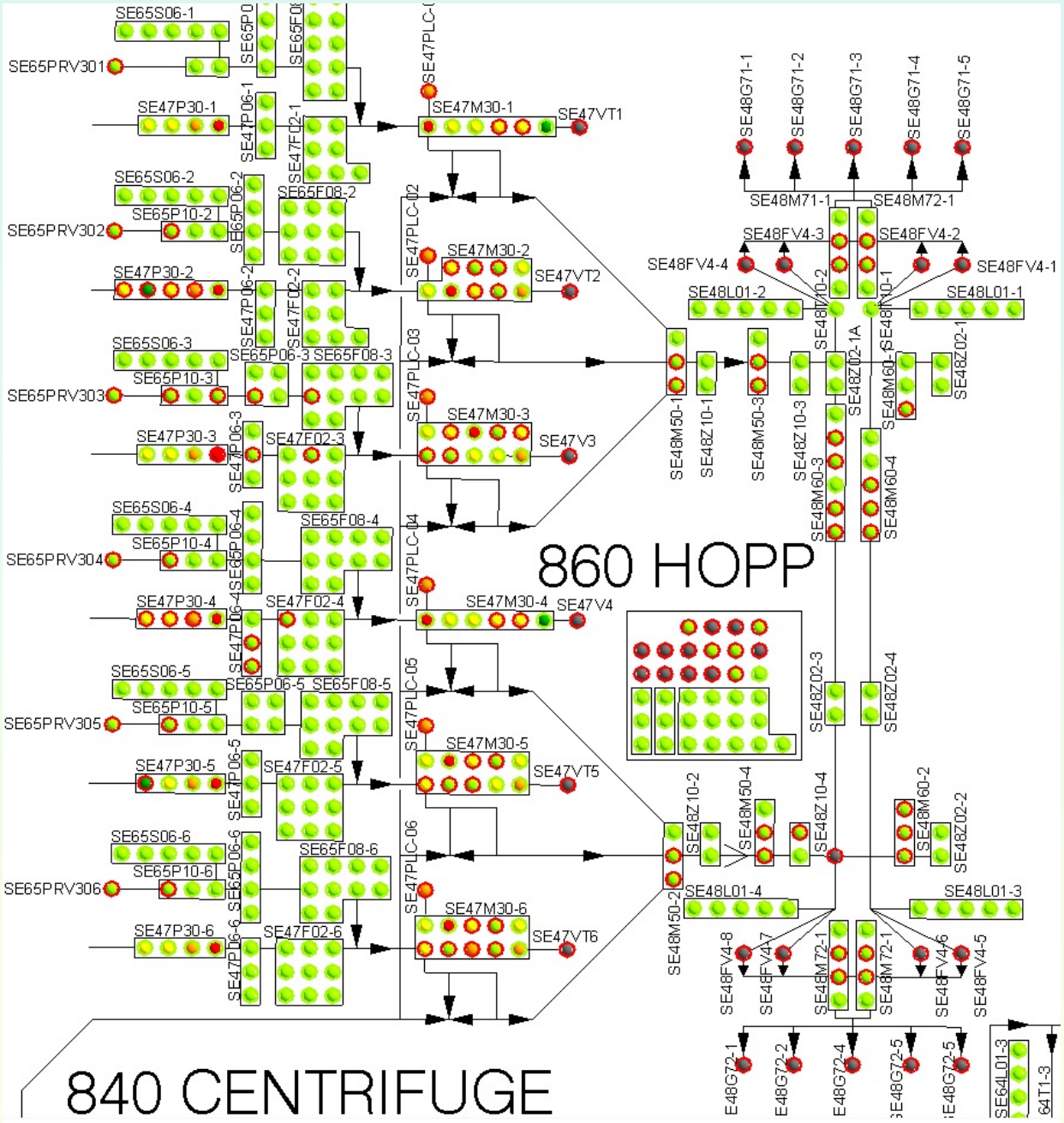
SEP Headworks Asset Map



SEP Clarifier & RAS Scum Asset Map



SEP Centrifuge & Bin Hopper Asset Map



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WASTEWATER
POWER

TREATMENT PLANTS – LIKELIHOOD OF FAILURE SCORING

ASSESS CONDITION OF ASSET			
RATING	CONDITION SIGNATURE		LOF SCORE
0	ABANDONED	NO LONGER IN SERVICE	0
1	EXCELLENT	ROUTINE MAINTENANCE REQ'D	1
2	VERY GOOD	MINOR MAINTENANCE REQ'D	2
3	GOOD	SIGNIFICANT MAINTENANCE REQ'D	4
4	FAIR	RENEWAL/UPGRADE REQ'D	7
5	POOR	REPLACEMENT REQ'D	10

Questions?