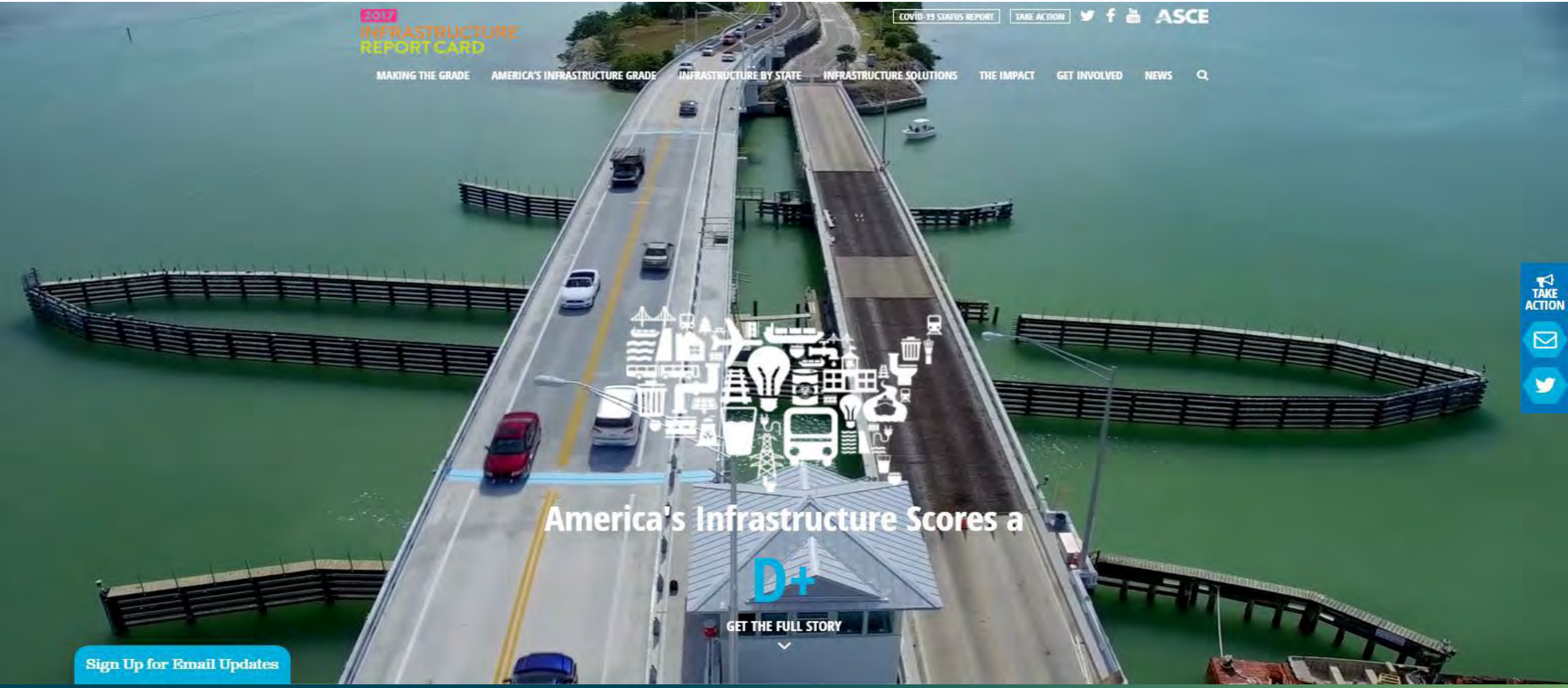
EDDIE STALEY PLS, GISP
Chief Experience & Innovation Officer
estaley@withersravenel.com

WithersRavenel
Our People. Your Success.

Life Cycle Modeling & Strategic Asset Management

How Can We Do Better?



Strategic Asset Management Planning

(AWWA Asset Management Definitions Guidebook, 2018)

WHAT IS THE CURRENT STATE OF MY ASSETS?

- What assets do I own?
- Where are they?
- What condition are they in?
- What are their remaining useful lives?
- What is their remaining economic value?

WHAT IS MY REQUIRED LEVEL OF SERVICE?

- What is the demand for my services by my stakeholders?
- What do regulators require?
- What is my actual performance?

WHAT ARE MY BUSINESS RISKS?

- How do assets fail? How can they fail?
- What is their likelihood of failure?
- What are their consequences of failure?
- What assets are critical to sustained performance?

WHAT ARE MY BEST O&M AND CIP INVESTMENT STRATEGIES?

- What alternative management options exist?
- Which are the most feasible for my organization?

WHAT IS MY BEST LONG-TERM FUNDING STRATEGY?

Managing Assets vs Asset Management

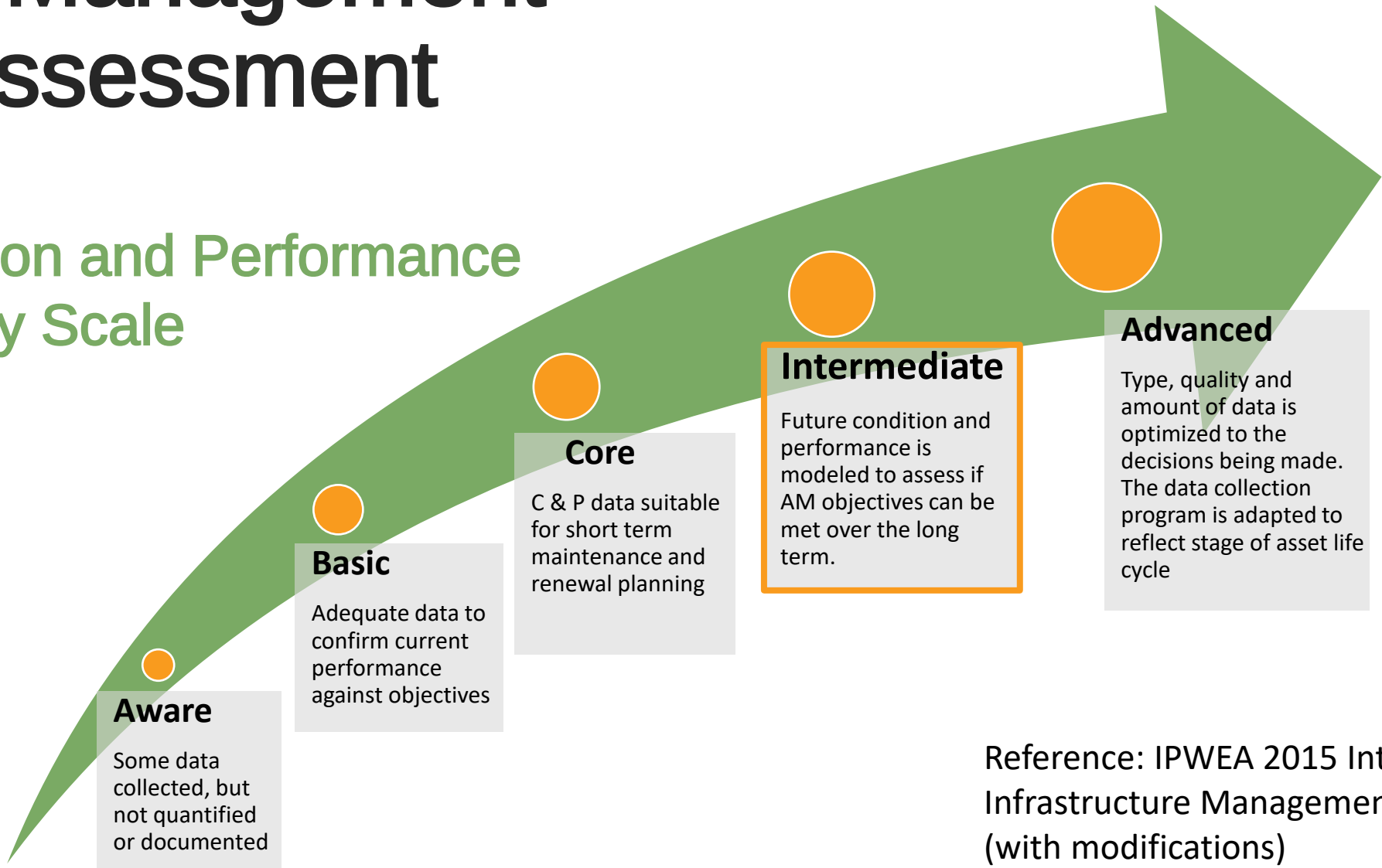
Managing Assets	Asset Management
Your **colleagues** are focused on: • Asset data, location and condition assessment • Current KPIs • Department budget	Your **colleagues** are focused on: • Information supported decisions (strategic context and related to customer needs) • Strategies to select and exploit assets over their lifecycles to support business aims • Collaboration across departments to optimise resources allocated and activities
Your **stakeholders** are focused on: • Costs • Current performance • Response to failures / maintaining function	Your **stakeholders** are focused on: • Triple bottom line and value • Clarity of purpose of the organization • Focus on impact of activities on organization's objectives

Managing Assets vs Asset Management

Managing Assets	Asset Management
Your **top management** is focused on: • Short term gain / loss • Departmental / individual performance • Savings, especially OPEX	Your **top management** is focused on: • Long term value for the organization • Developing competence and capability across workforce • Business risks understood and mitigated
Your **suppliers** are focused on: • Short term contracts and performance • Service level agreements are focused on contract specifications	Your **suppliers** are focused on: • Long term contracts and/or partnering relationships in support of client value and objectives • Understanding client strategy and needs in 5-10 years

Asset Management Self Assessment

Condition and Performance Maturity Scale

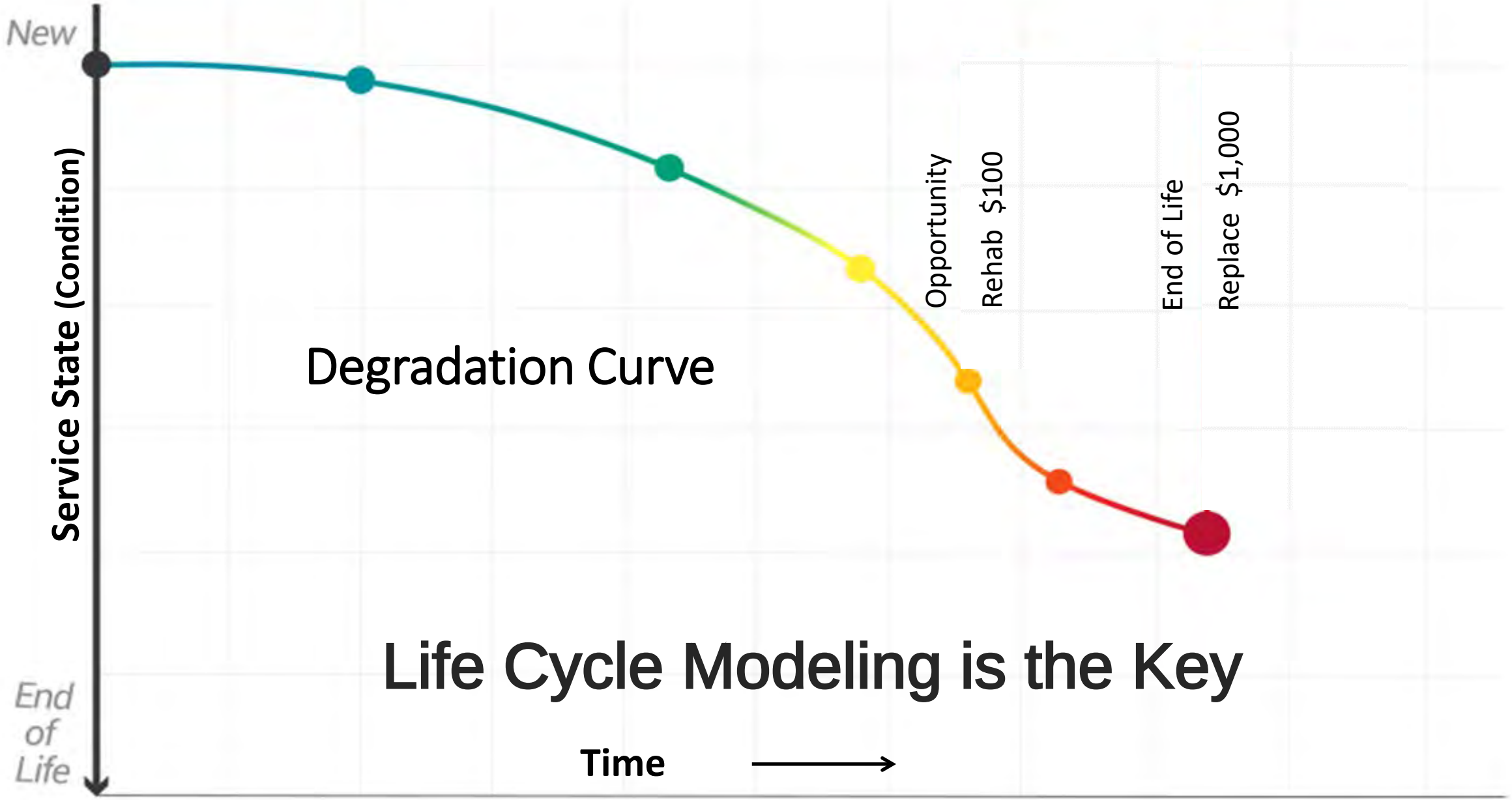


Reference: IPWEA 2015 International Infrastructure Management Manual (with modifications)

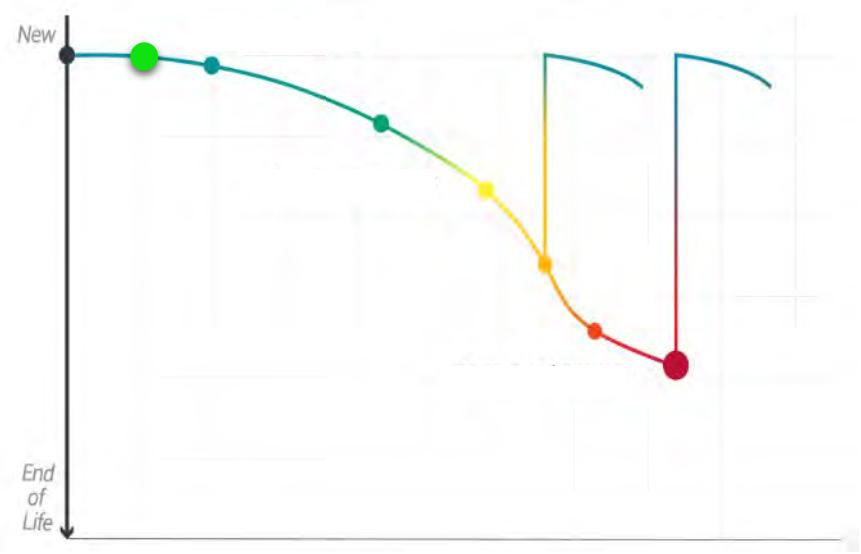
Life Cycle Modeling is a Key Component of AM

Life Cycle Modeling helps answer strategic questions, such as…

- What is the **predicted future service level** if we maintain current funding?
- **How much funding is required** to maintain my current level of service?
- **How much funding is required** to achieve a target performance level and in how many years?
- **How much funding is required** to support growth and new development?

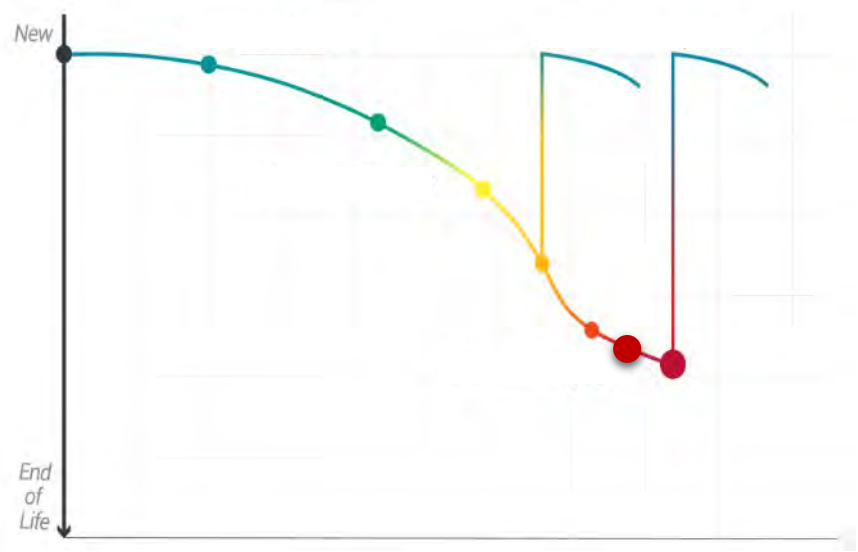

New
Service State (Condition)
End of Life
Degradation Curve
Opportunity
Rehab $100
End of Life
Replace $1,000
Life Cycle Modeling is the Key
Time

Life Cycle Modeling is the Key



Degradation Curve

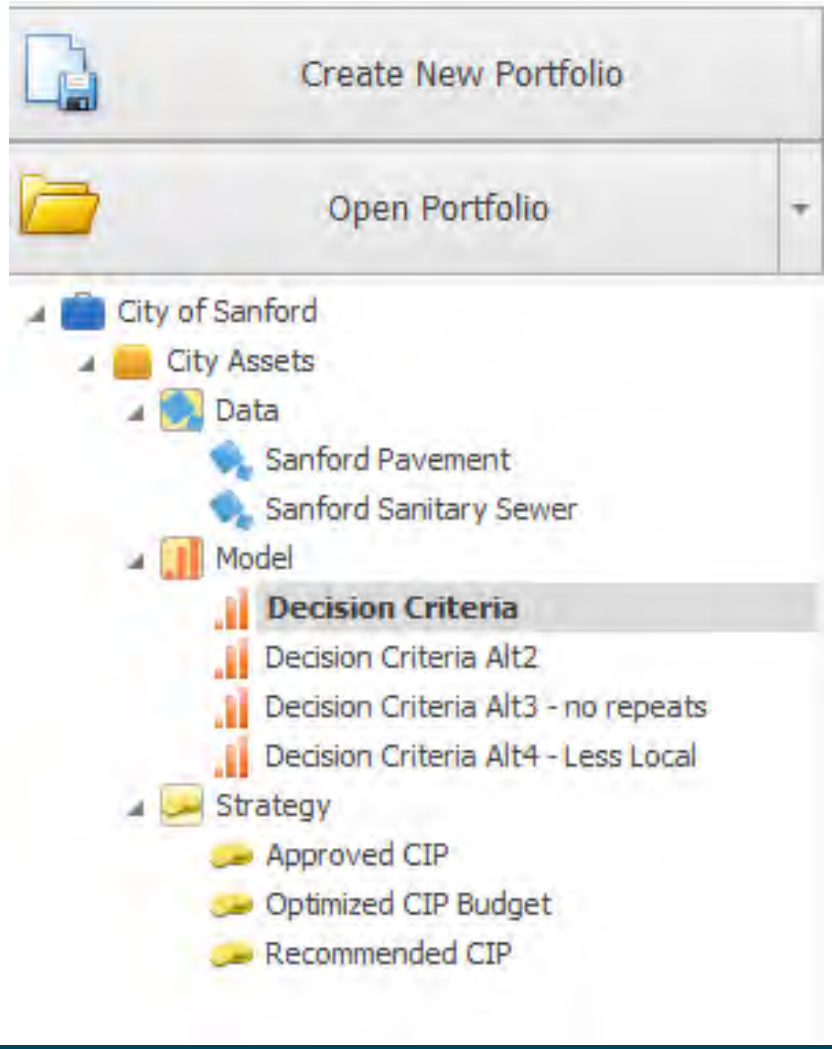
Life Cycle Modeling is the Key



Degradation Curve

You Can’t Manage What You Don’t Measure

What is Required to Develop a Life Cycle Model?



Data

Inventory of **ASSETS** to be modeled. What do you own? Where is it located? What condition is it in?

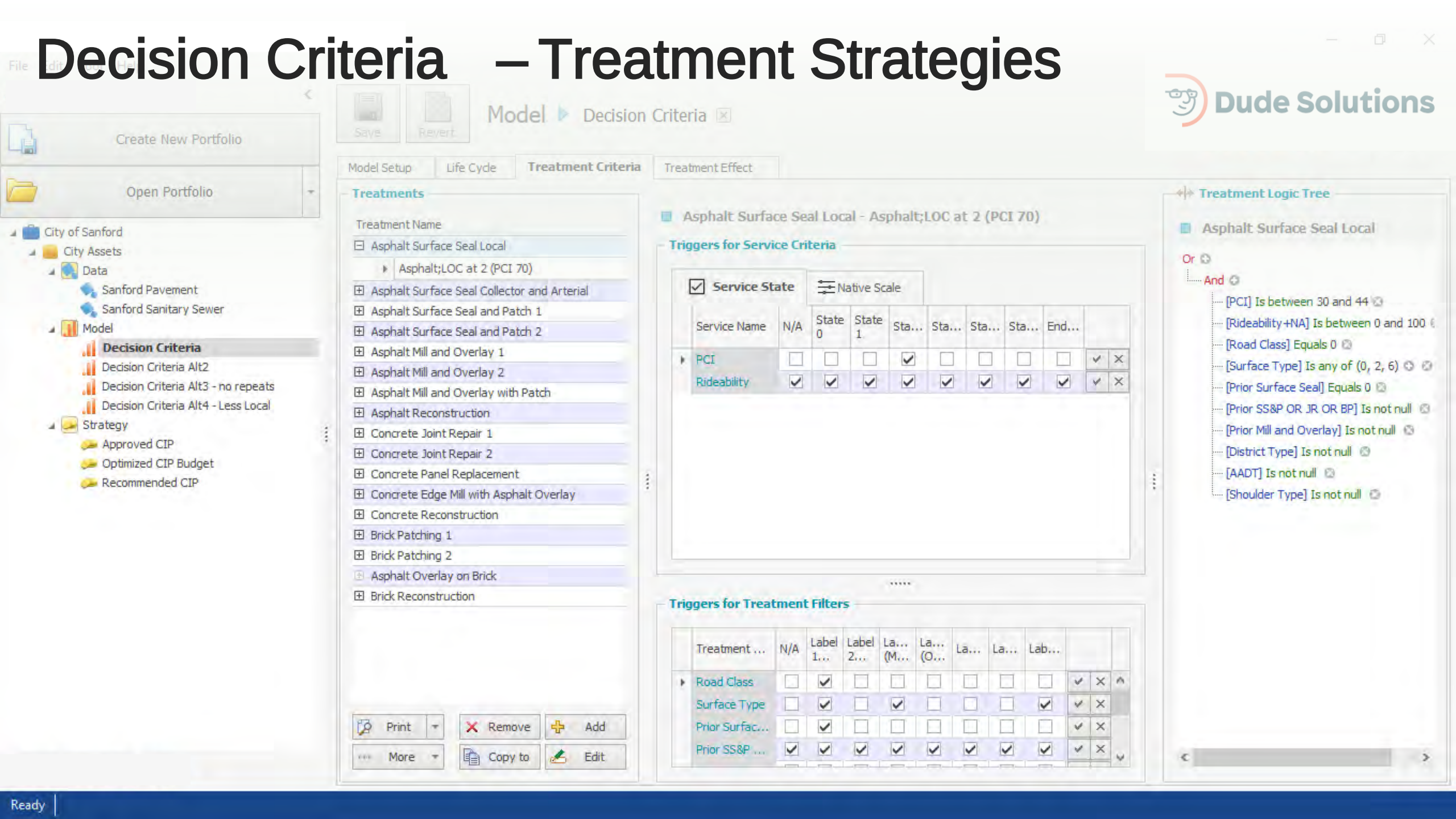
Model

What is your **DECISION CRITERIA**? What are your **TREATMENT** strategies? What are the **EFFECTS** of these strategies?

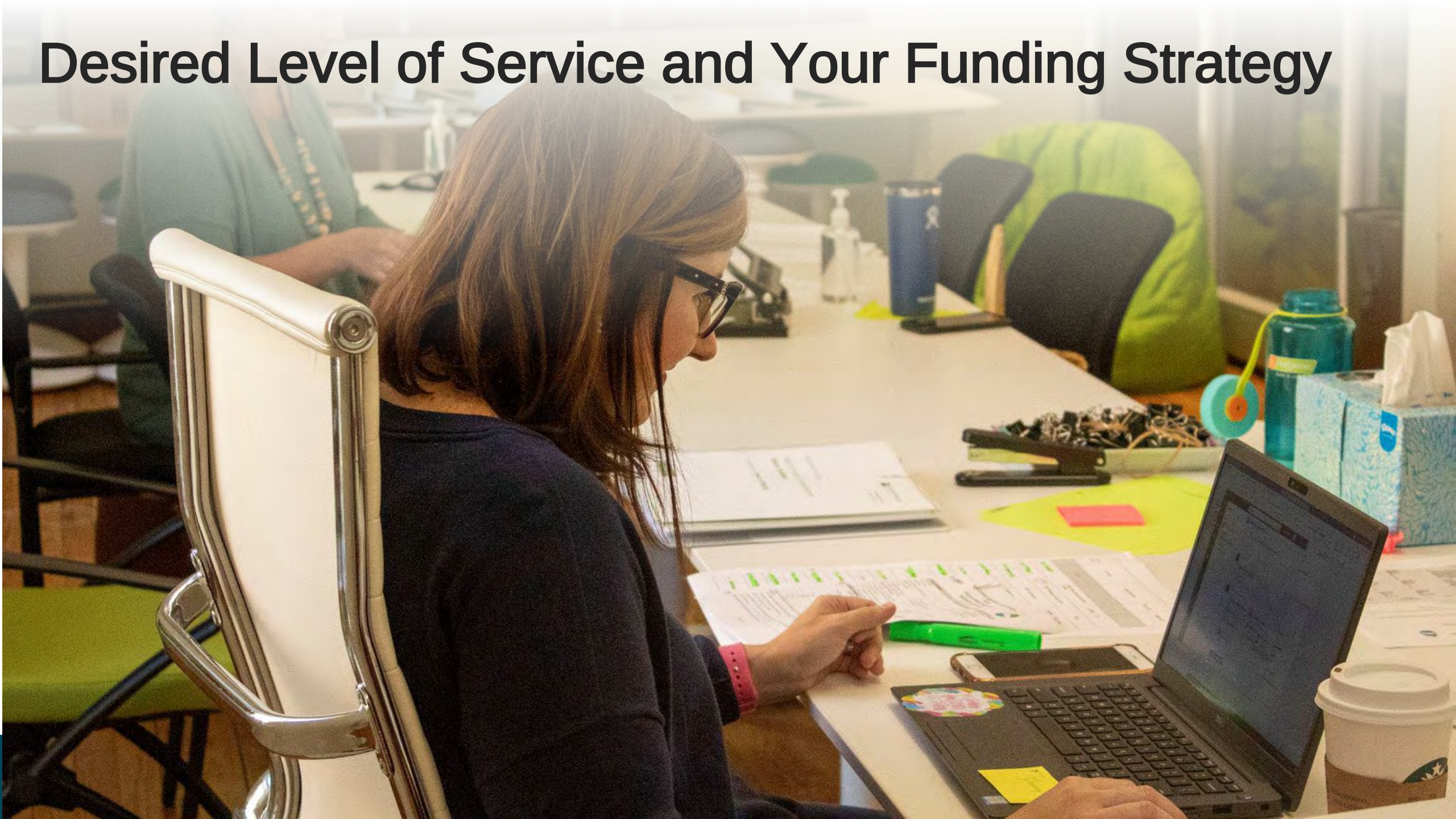
Strategy

The combination of the different **BUDGET**, **SERVICE LEVEL**, and **RISK** scenarios to be modeled and analyzed.

Decision Criteria – Treatment Strategies



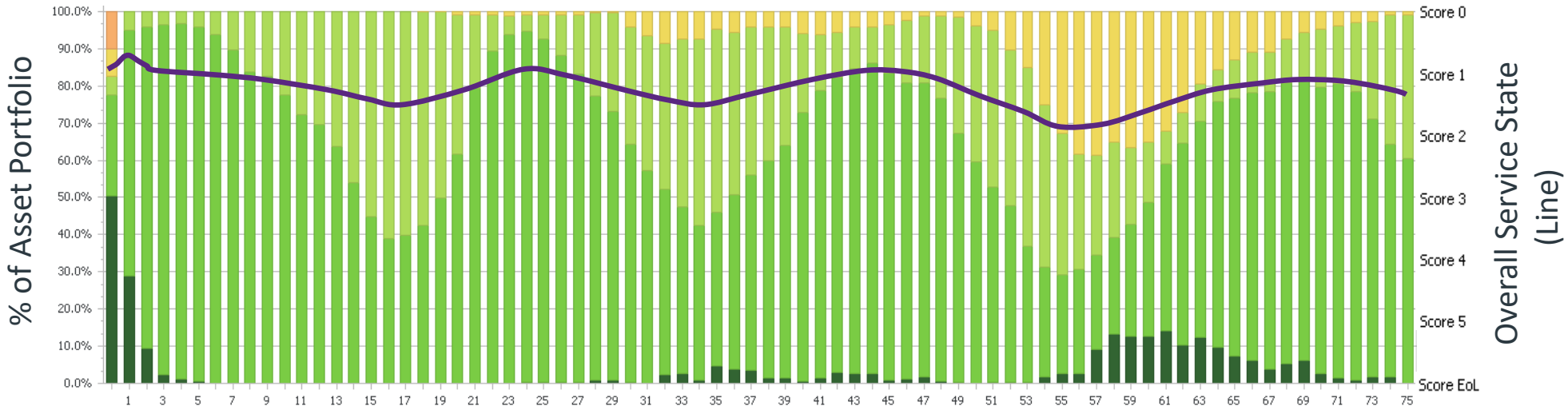
Desired Level of Service and Your Funding Strategy



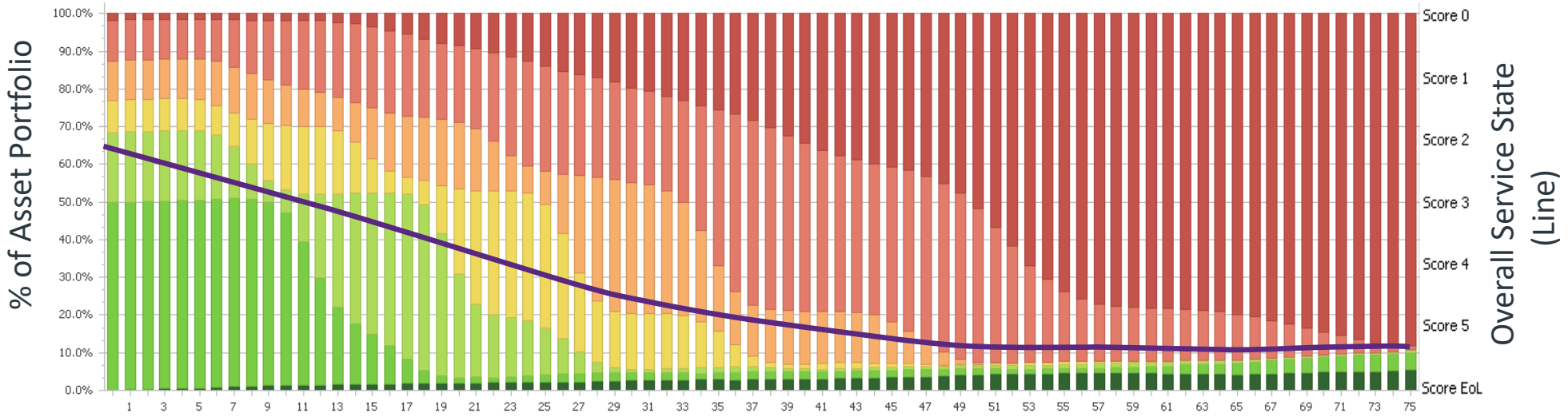
Your Future State of the Asset Portfolio?

Key

- New
- Very Good
- Good
- Fair
- Poor
- Very Poor
- End of Life



or



Asset Heat Map

Predictor

Asset Class
All

Asset Sub Class
All

Asset Type
All

Asset Sub Type
All

Asset Criticality
All

Asset Hierarchy
All

Location
All

Asset Name
All

Asset ID
All

Unique Asset ID
All

Year
0 25

Service Criteria
- Age Counter
- Last Paved Age
- Model Year
- RQI
- SR
- OSI
- Pavement Condition

$3MM with REST - Rev 6 - Combined

Service State by Year

Asset Name	Unique Asset ID	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1
CR 111	188	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	5.00	5.00	5.
CR 117	311	3.00	3.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.
	312	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.00	6.00	6.
CR 122	190	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	1.00	1.
	191	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.
CR 123	254	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	1.00	1.00	1.
	255	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	1.00	1.00	1.
	256	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.
CR 127	193	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.
	194	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.
CR 131	195	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.
CR 133	196	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.
CR 135	197	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.
	198	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	1.00	1.
CR 140	199	2.00	3.00	3.00	3.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.
CR 141	233	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.
	303	2.00	3.00	3.00	3.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.
CR 151	206	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.
CR 152	208	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.
CR 153	209	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.
	210	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.
	211	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.
CR 155	212	2.00	2.00	2.00	2.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.
CSAH 10	1	2.00	2.00	3.00	3.00	3.00	4.00	4.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.
	1022	3.00	3.00	3.00	3.00	4.00	4.00	4.00	5.00	5.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.
	1023	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	4.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.
	1024	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	4.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	1.00	1.
	1025	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	1.00	1.00	1.
	1026	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.
	11	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.
	12	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.
	13	3.00	3.00	3.00	4.00	4.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.
	2	2.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	6.
	21	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.
	215	2.00	2.00	2.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00	5.00	5.
	22	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.
	228	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00	4.00	5.00	5.00	5.

v12

Asset Life Cycle

Predictor

$3MM with REST - Rev 6 - Combined

Asset Class: All

Asset Sub Class: All

Asset Type: All

Asset Sub Type: All

Asset Criticality: All

Asset Hierarchy: All

Location: All

Asset Name: All

Asset ID: All

Unique Asset ID: All

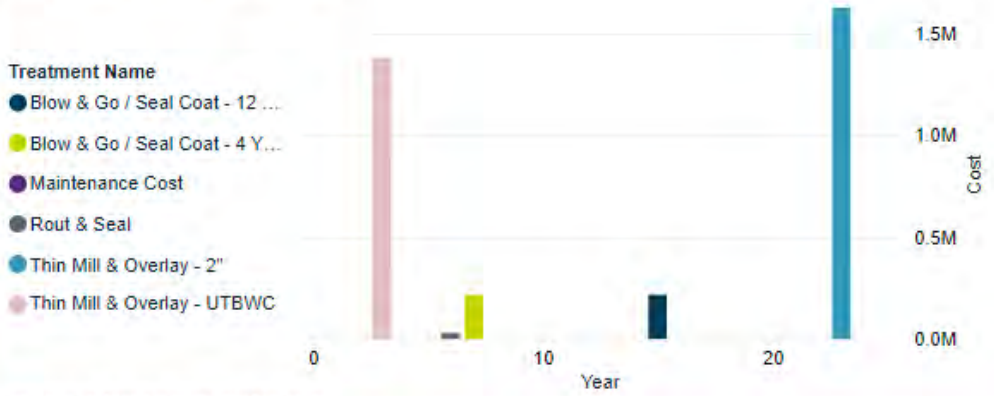
Treatment Cost | Service State | Service Potential | Native Scale | Risk | Environmental Cost

List of Assets

Unique Asset ID	Asset Name	Network Measure	Applied Treatment	Total Cost	Average Annual Cost
9	CSAH 10	1,500.10K	5	3,466,728.03	138,669.12

Treatment Name: All

Total Cost by Year and Treatment Name



Treatment/ Maintenance Cost by Year

Year	Blow & Go / Seal Coat - 12 Year	Blow & Go / Seal Coat - 4 Year	Maintenance Cost	Rout & Seal	Thi
0	0.00	0.00	0.00	0.00	
1	0.00	0.00	0.00	0.00	
2	0.00	0.00	0.00	0.00	
3	0.00	0.00	0.00	0.00	
4	0.00	0.00	0.00	0.00	
5	0.00	0.00	0.00	0.00	
6	0.00	0.00	0.00	28,501.87	
7	0.00	216,014.21	0.00	0.00	
8	0.00	0.00	0.00	0.00	
9	0.00	0.00	0.00	0.00	
10	0.00	0.00	0.00	0.00	
11	0.00	0.00	0.00	0.00	
Total	216,014.21	216,014.21	0.00	28,501.87	

v12

Tell Your Asset Management Story

Predict

Optimize

Sustain

Compare

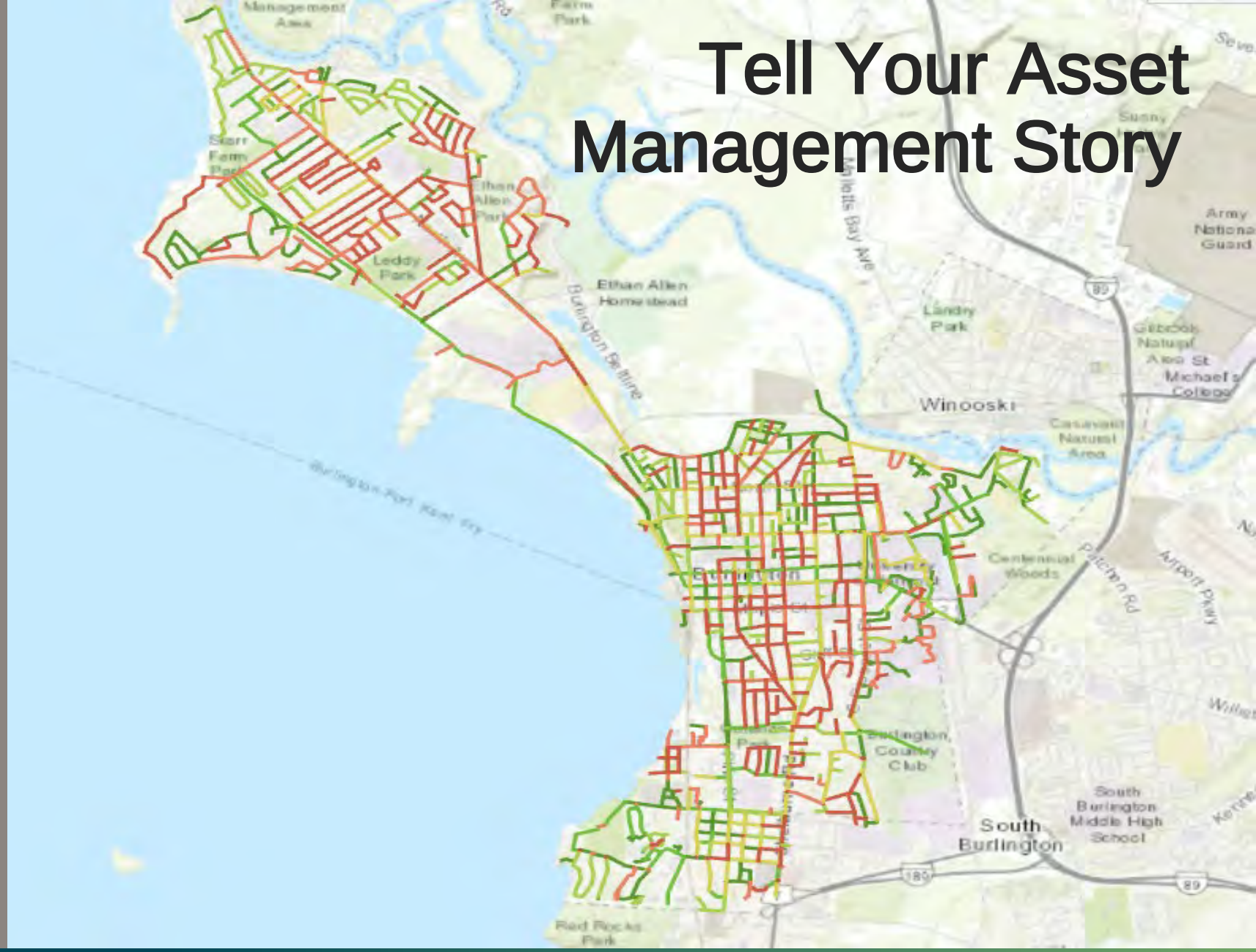
Capital Works

Service-driven

Communicate

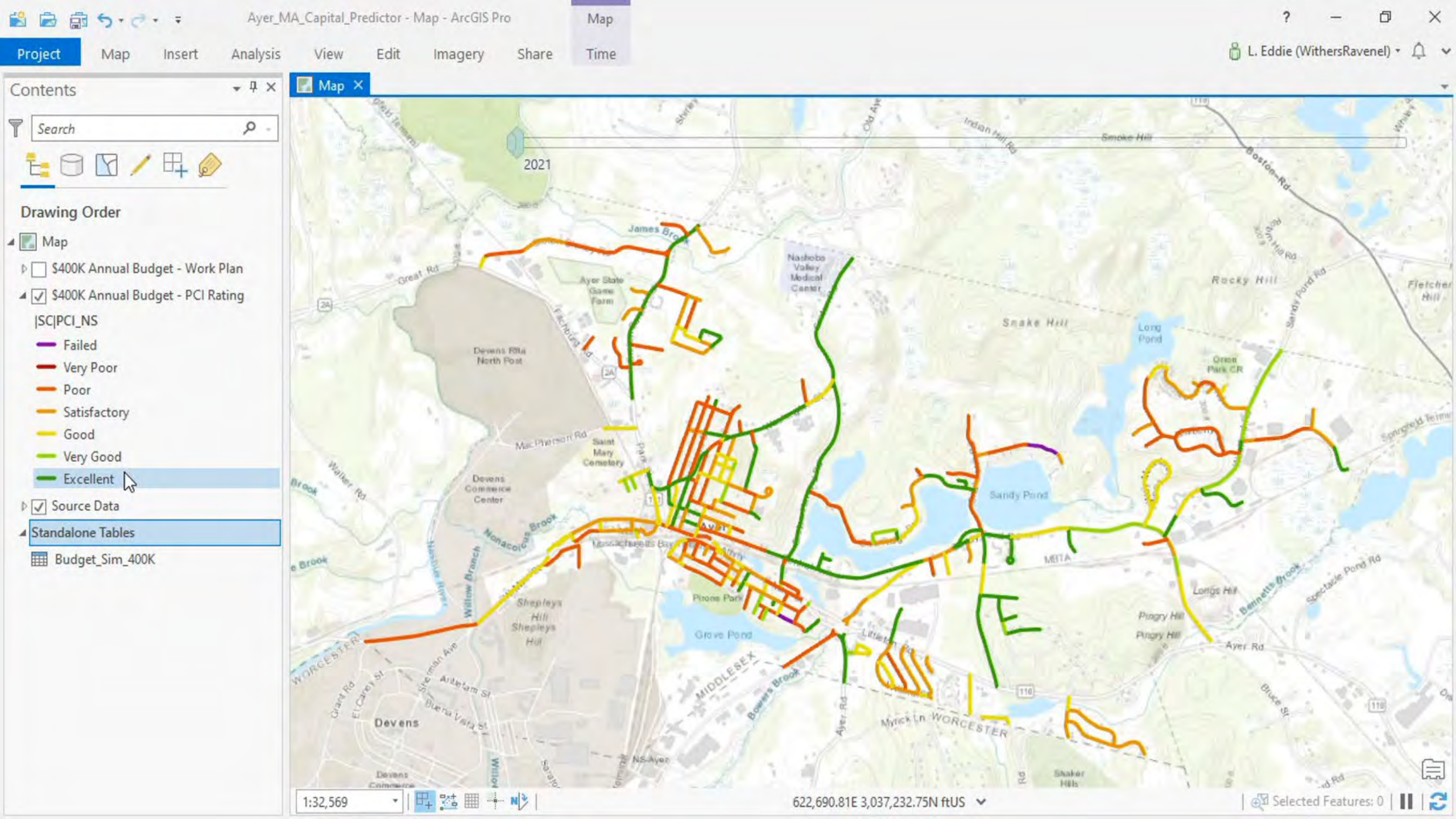
Integrate

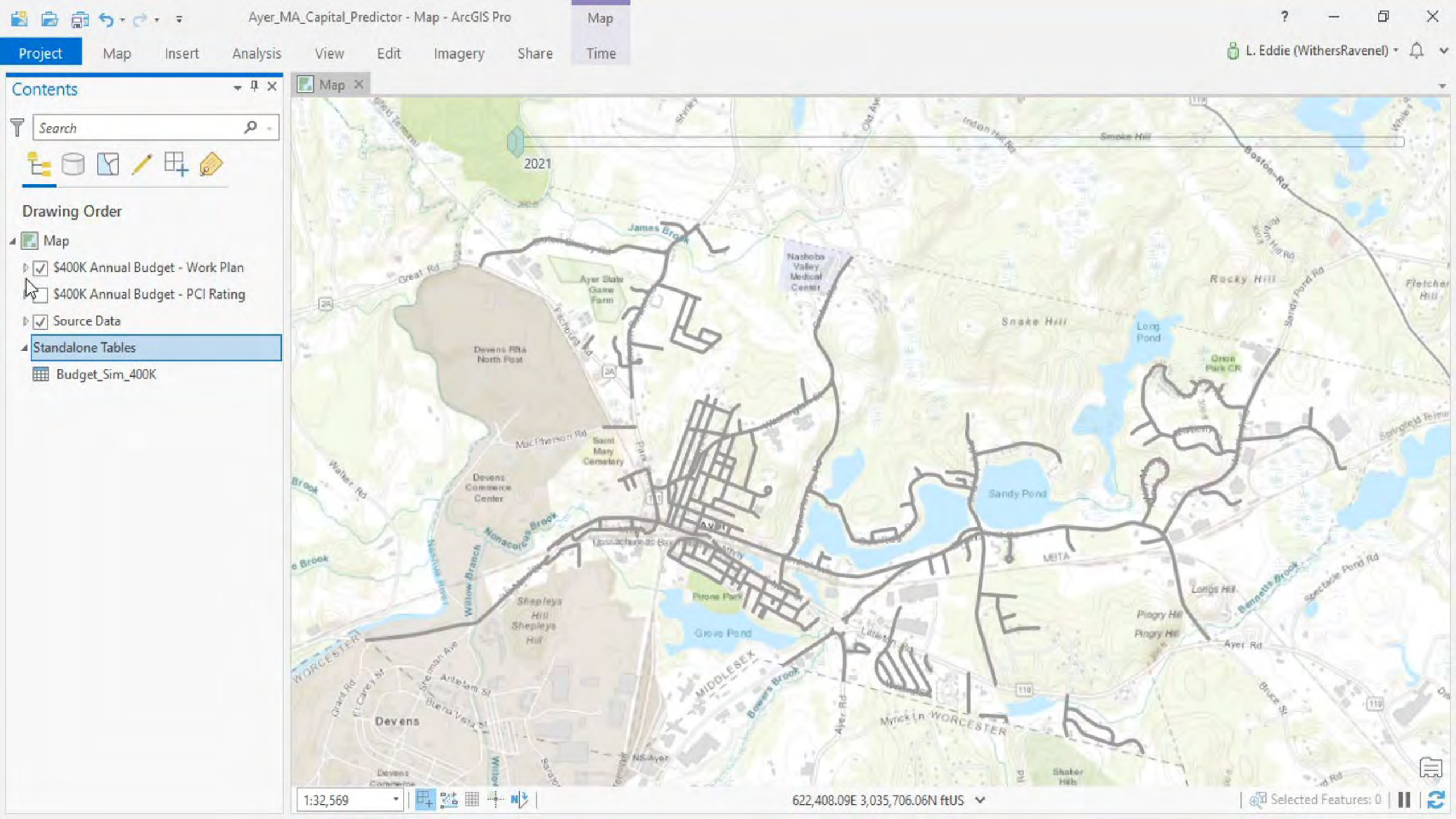
Empower

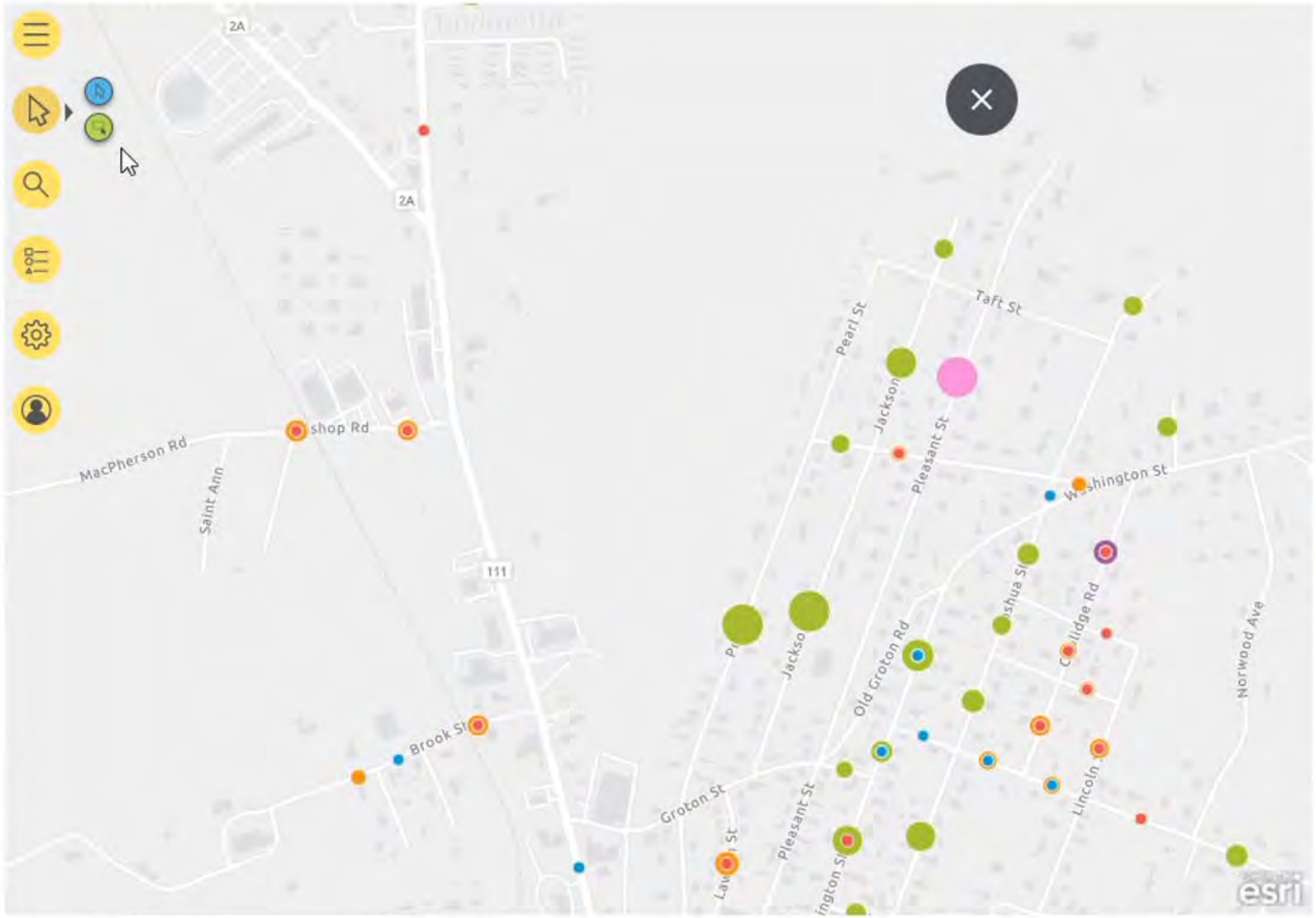


Town of Ayer, MA Pavement Management

Town of Ayer, Massachusetts


Ayer_MA_Capital_Predictor - Map - ArcGIS Pro
Map
Project
Map
Insert
Analysis
View
Edit
Imagery
Share
Time
L. Eddie (WithersRavenel)
Contents
Search
Drawing Order
Map
$400K Annual Budget - Work Plan
$400K Annual Budget - PCI Rating
|SC|PCI_NS
Failed
Very Poor
Poor
Satisfactory
Good
Very Good
Excellent
Source Data
Standalone Tables
Budget_Sim_400K
Map
2021
1:32,569
622,690.81E 3,037,232.75N ftUS
Selected Features: 0


Ayer_MA_Capital_Predictor - Map - ArcGIS Pro
Map
Project
Map
Insert
Analysis
View
Edit
Imagery
Share
Time
L. Eddie (WithersRavenel)
Contents
Search
Drawing Order
Map
$400K Annual Budget - Work Plan
$400K Annual Budget - PCI Rating
Source Data
Standalone Tables
Budget_Sim_400K
Map
2021
James Brook
Nashoba Valley Medical Center
Ayer State Game Farm
Great Rd
Fitchburg Rd
Devens Rita North Post
Saint Mary Cemetery
MacPherson Rd
Devens Commerce Center
Walker Rd
Nonacoicus Brook
Willow Branch
Nashua River
Shepleys Hill
Shepleys Hill
Pirone Park
Grove Pond
Sandy Pond
Long Pond
Snake Hill
Rocky Hill
Smoke Hill
Boston Rd
Sandy Pond Rd
Green Park CR
MBTA
Longs Hill
Pingry Hill
Pingry Hill
Bennetts Brook
Spectacle Pond Rd
Ayer Rd
Bruce St
Myrick Ln
WORCESTER
MIDDLESEX
Bowers Brook
Devens
Grant Rd
El Carey St
Sherman Ave
Arsenal St
Buena Vista St
N S Ayer
Shaker Hills
1:32,569
622,408.09E 3,035,706.06N ftUS
Selected Features: 0



Year	Crack Seal	Crack Seal 2	Level and Overlay	Total
1	$1,939	$541	$51,277	**$53,757**
2			$80,571	**$80,571**
3			$92,257	**$92,257**
Total	**$1,939**	**$541**	**$224,105**	**$226,585**

Asset Name	Crack Seal	Crack Seal 2	Level and Over
WINTHROP AVENUE			$26,0
WILLIAM STREET			$55,2
NORWOOD AVENUE	$263		
NASHUA STREET			$27,6
Total	**$1,939**	**$541**	**$224,1**

Asset Name	Average of ISC|PCI_NS
NASHUA STREET	85.82
WINTHROP AVENUE	85.82
HOLMES STREET	86.60
LINCOLN STREET	86.92
NORWOOD AVENUE	87.00
Total	**87.79**

Total Capital Need

$227K

Maintenance

$2,480

Overlay

$224K

Recons

(Blank)

Year

0

6

Filters

Go back

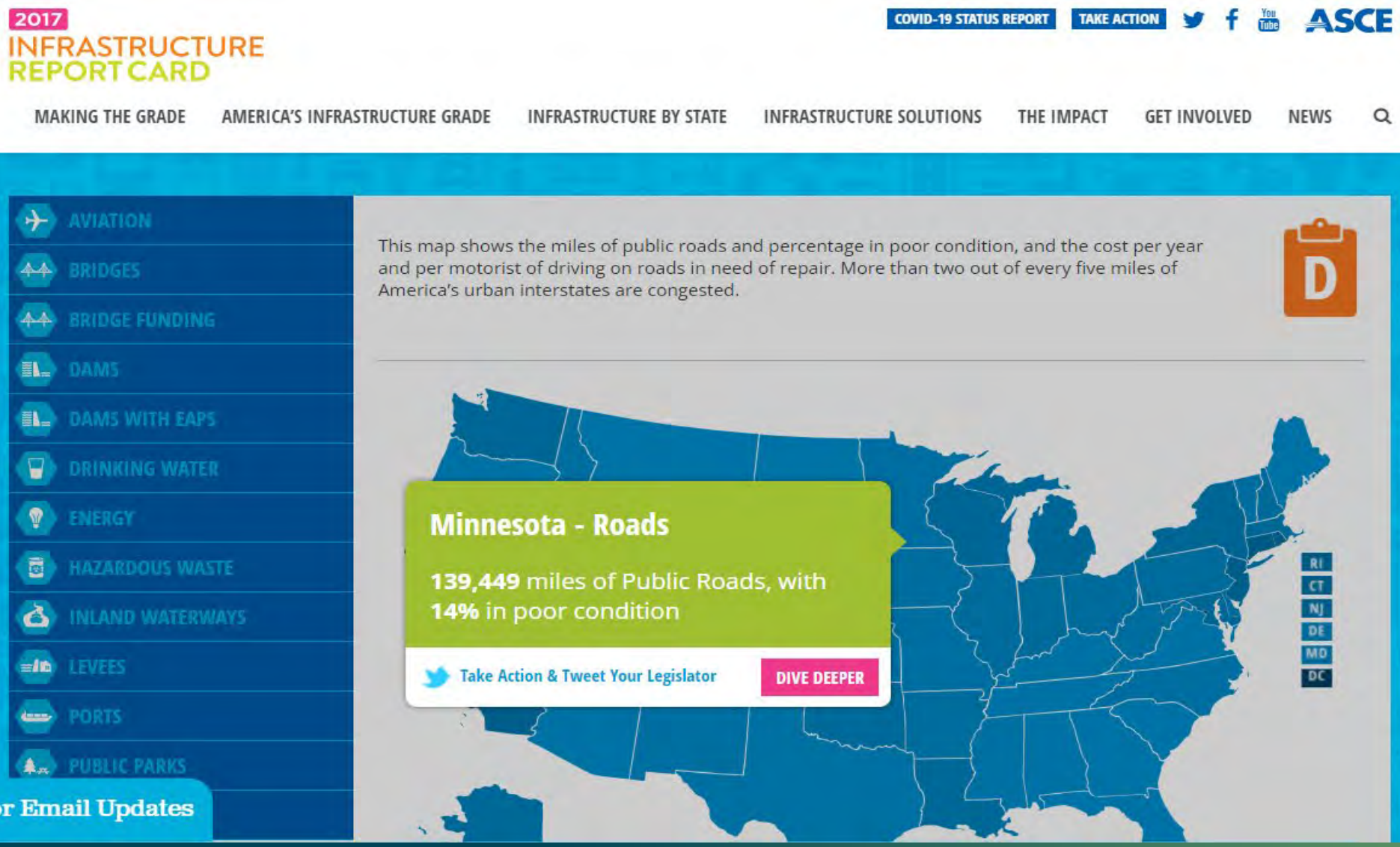
Ayer, MA - Capit...

Ayer_MA | Data updated 2/5/21

Carver County, MN Pavement Management

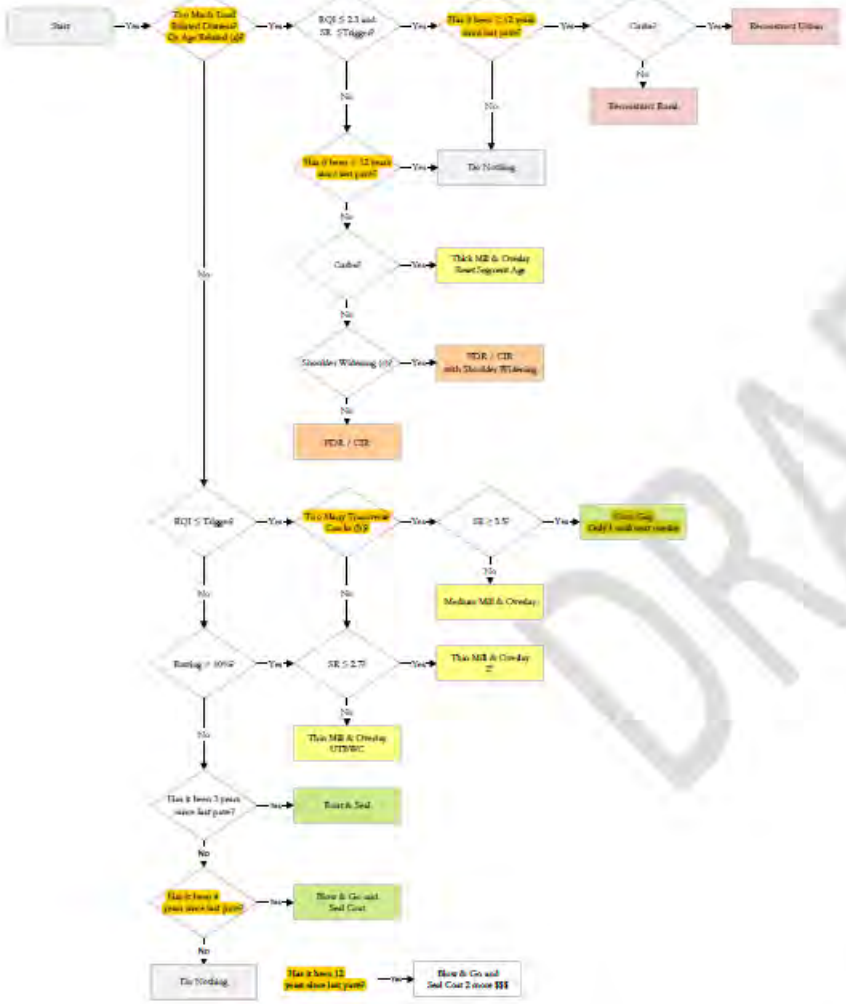
Carver County, Minnesota

Asset Management is How We Do Better



Decision Tree for Carver County

Carver County Bituminous Decision Tree Rev. 5



List of Treatments on the Bituminous Decision Tree

Preventative Maintenance Treatments

- Crack Seal
  - Blow & Go
  - Rout & Seal
  - Nuro Gap
- Sealcoat

Surface Rehabilitation Treatments

- Thin Mill & Overlay (thickness ≤ 2 inches) (UTBWC, 2")
- Medium Mill & Overlay (thickness > 2 inches & < 4 inches) (3")
- Thick Mill & Overlay (thickness ≥ 4 inches) (4")

Full Depth Rehabilitation Treatments

- Full Depth Reclamation (FDR)
- Cold-in-Place Recycle (CIR)

Reconstruction Treatments

- Reconstruction

Trigger Values by Functional Classification and Speed

Functional Class and Speed	RQI	SR
Rural Minor Arterial	3.0	2.7
Rural Major Collector	3.0	2.7
Rural Minor Collector and Below	3.0	2.7
Urban Minor Arterial > 45 mph	3.0	2.7
Urban Minor Arterial <= 45 mph	2.9	2.6
Urban Collector and Below > 45 mph	3.0	2.7
Urban Collector and Below <=45 mph	2.8	2.5

RQI = Ride Quality Index (the roughness of the road correlated to the collected IRI; a 0.0 to 5.0 scale with 5.0 being perfectly smooth)

SR = Surface Rating (the index describing the amount, type and severity of surface defects on a 0.0 to 4.0 scale, with 4.0 being without defects)

(a) **Too Much Load Related Distress? Or Age Related?** = (Alligator Cracking > 4%, or Multiple Cracking > 20%, or Longitudinal Cracking High Severity > 20%, or Transverse Cracking High Severity > 20%) or (Pavement Segment Age ≥ 70 years and ADT ≤ 750) or (Pavement Segment Age ≥ 60 years and ADT > 750)

(b) **Too Many Transverse Cracks?** = Total of Low, Moderate, and High Severity Transverse Cracks ≥ 60%

(c) **Shoulder Widening?** = 2040 ADT > 2500 and ((Functional Classification < Minor Arterial and Total Shoulder Width < 6 ft) or (Functional Classification = Minor Arterial and Total Shoulder Width < 8 ft))

Questions?

Decision Tree for Carver County

List of Treatments on the Bituminous Decision Tree

Preventative Maintenance Treatments

- Crack Seal
  - Blow & Go
  - Rout & Seal
  - Nuvo Gap
- Sealcoat

Surface Rehabilitation Treatments

- Thin Mill & Overlay (thickness ≤ 2 inches) (UTBWC, 2")
- Medium Mill & Overlay (thickness > 2 inches & < 4 inches) (3")
- Thick Mill & Overlay (thickness ≥ 4 inches) (4")

Full Depth Rehabilitation Treatments

- Full Depth Reclamation (FDR)
- Cold-in-Place Recycle (CIR)

Reconstruction Treatments

- Reconstruction

Trigger Values by Functional Classification and Speed

Functional Class and Speed	RQI	SR
Rural Minor Arterial	3.0	2.7
Rural Major Collector	3.0	2.7
Rural Minor Collector and Below	3.0	2.7
Urban Minor Arterial > 45 mph	3.0	2.7
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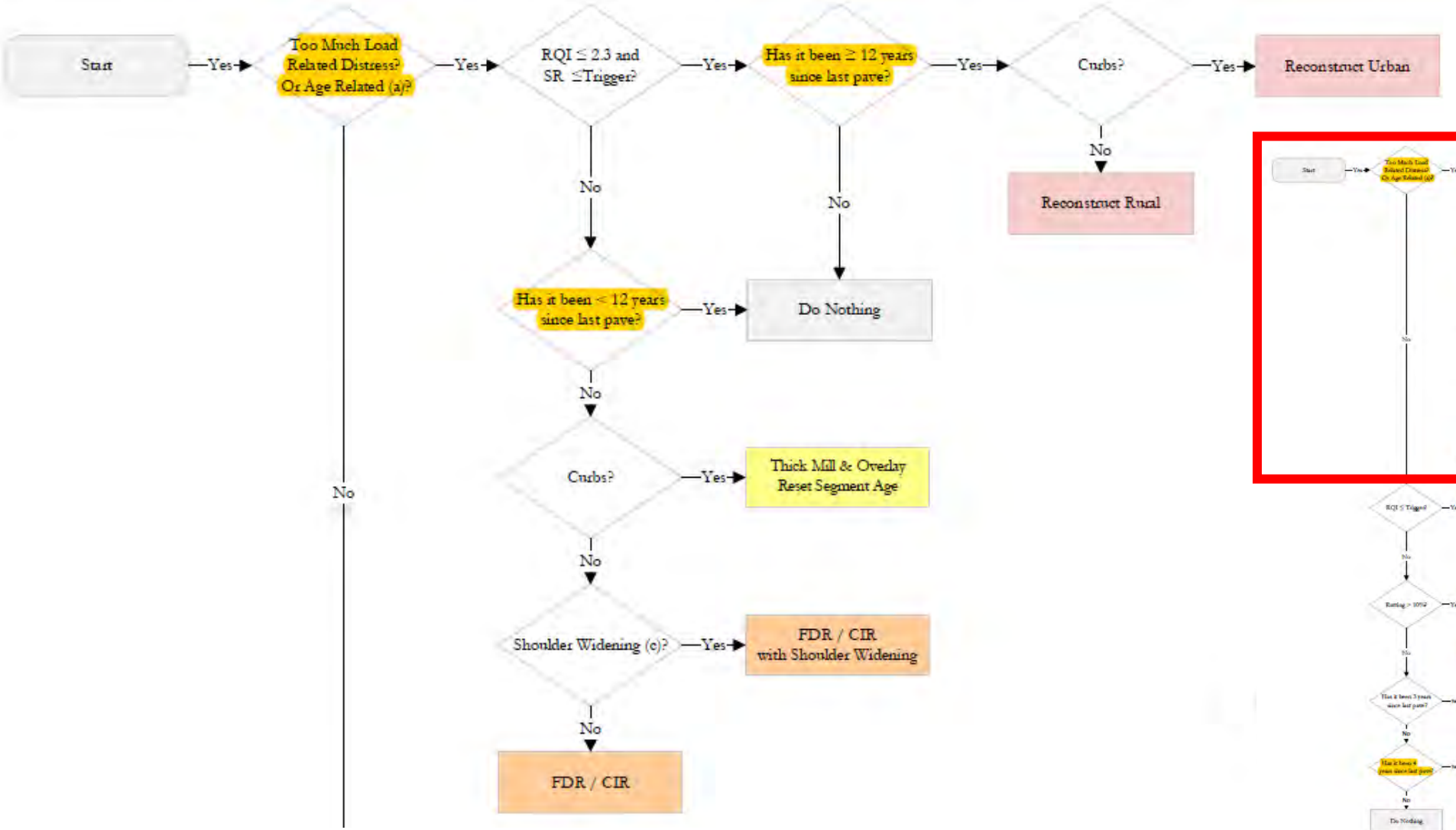
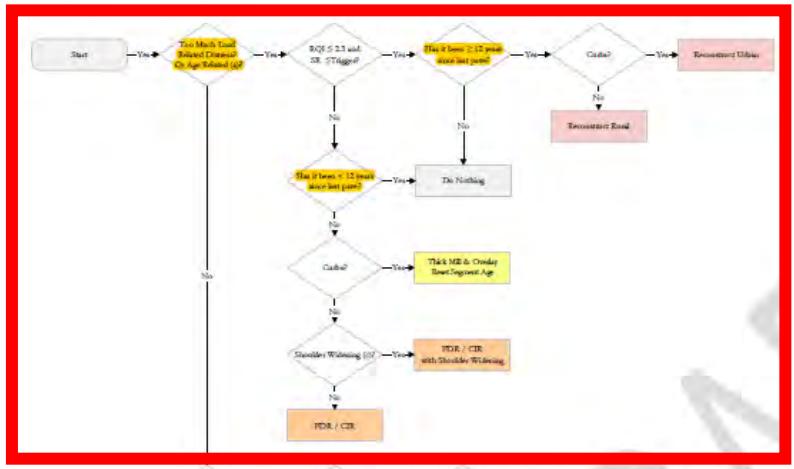
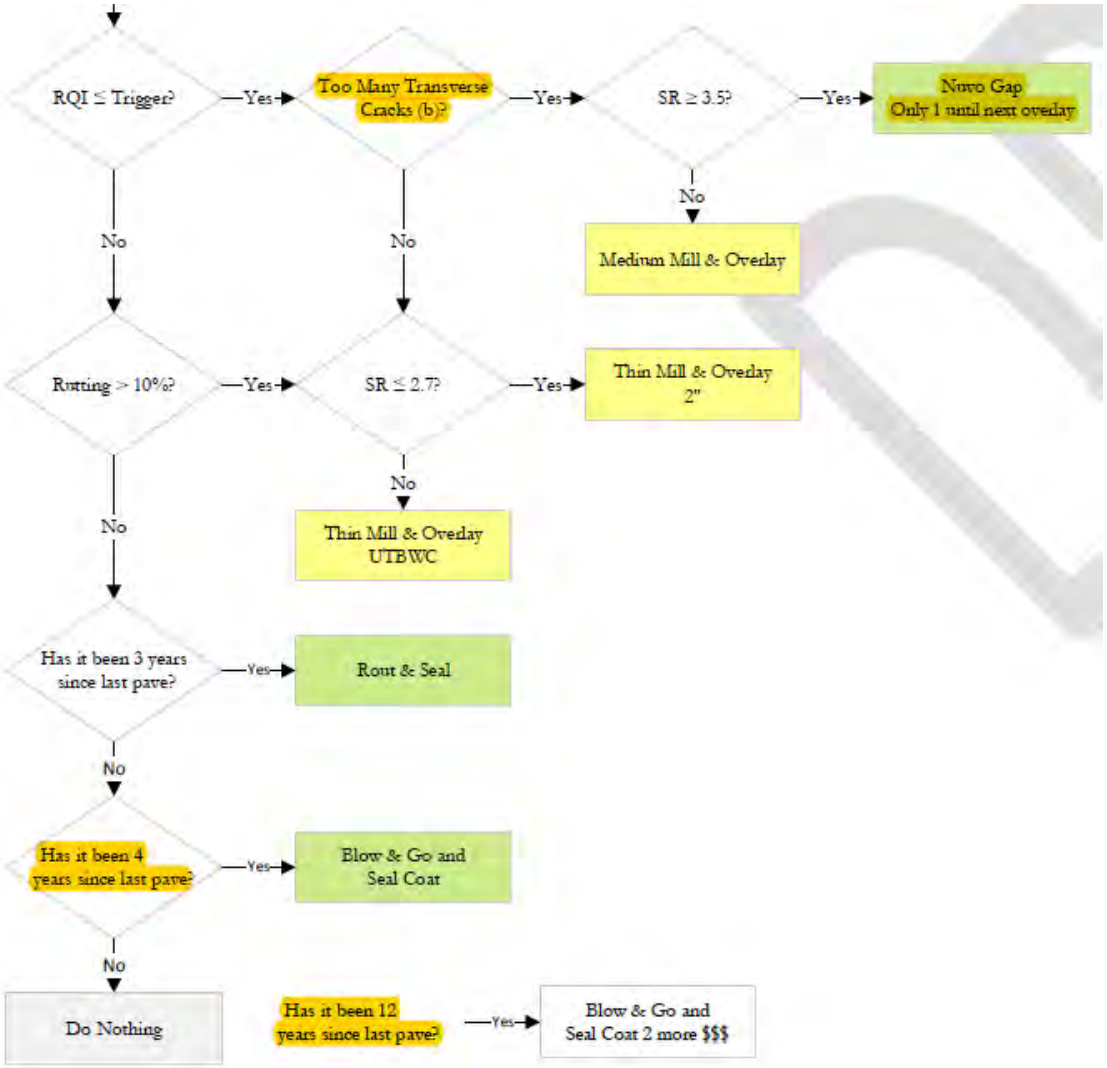
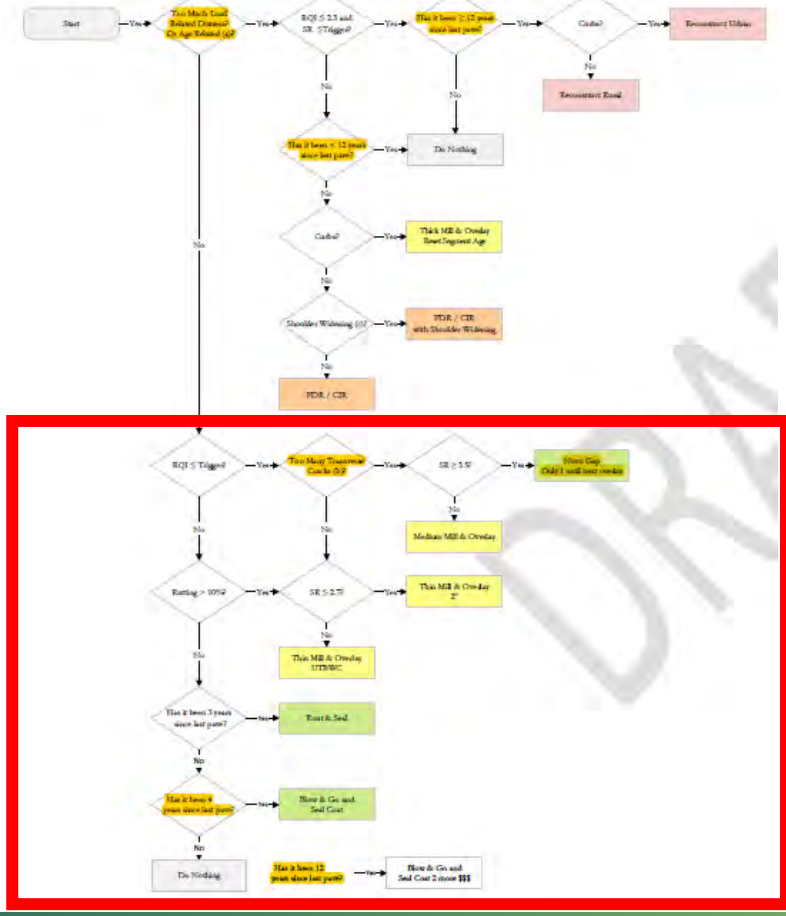
Decision Tree for Carver County



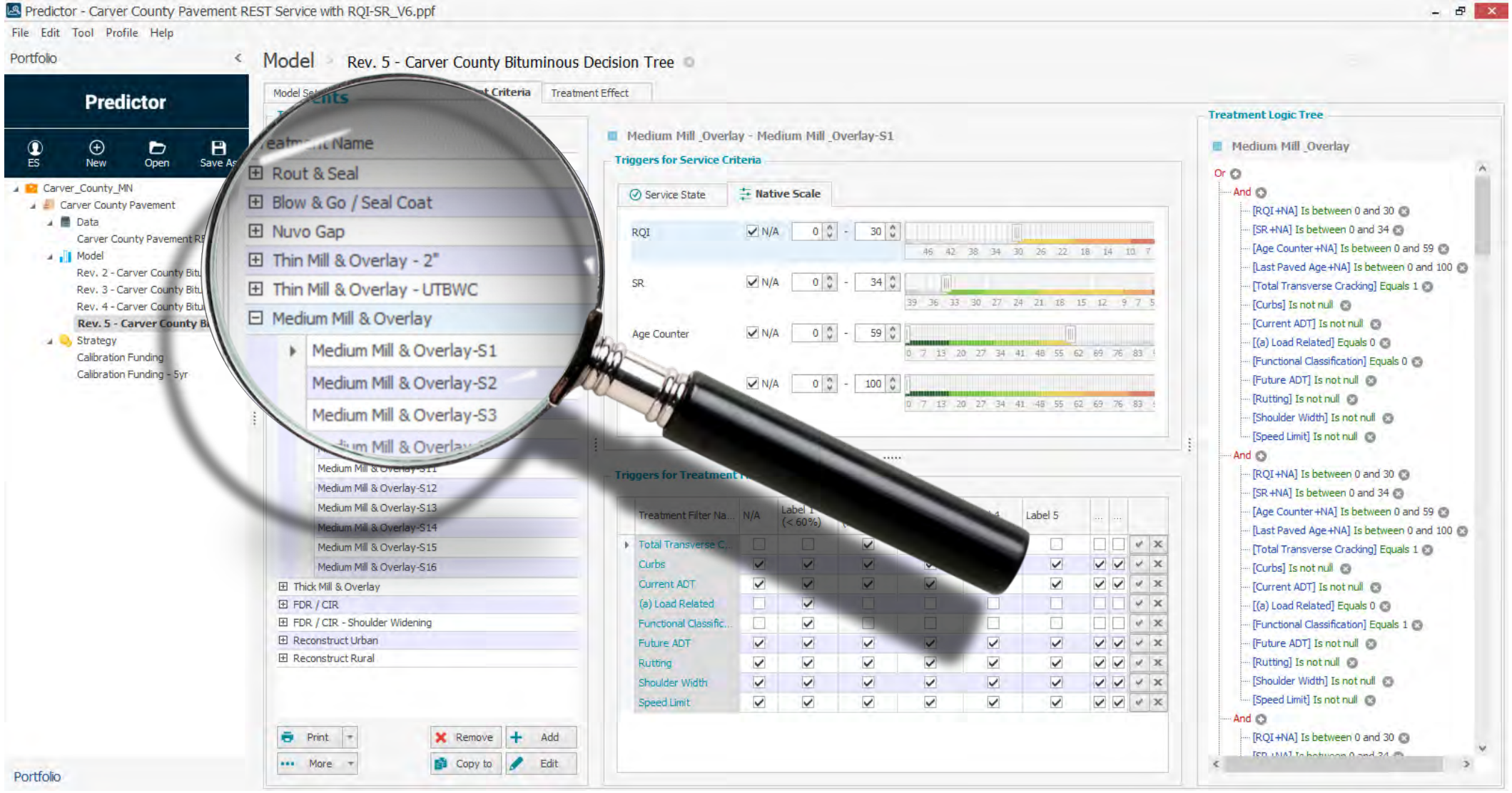


Decision Tree for Carver County

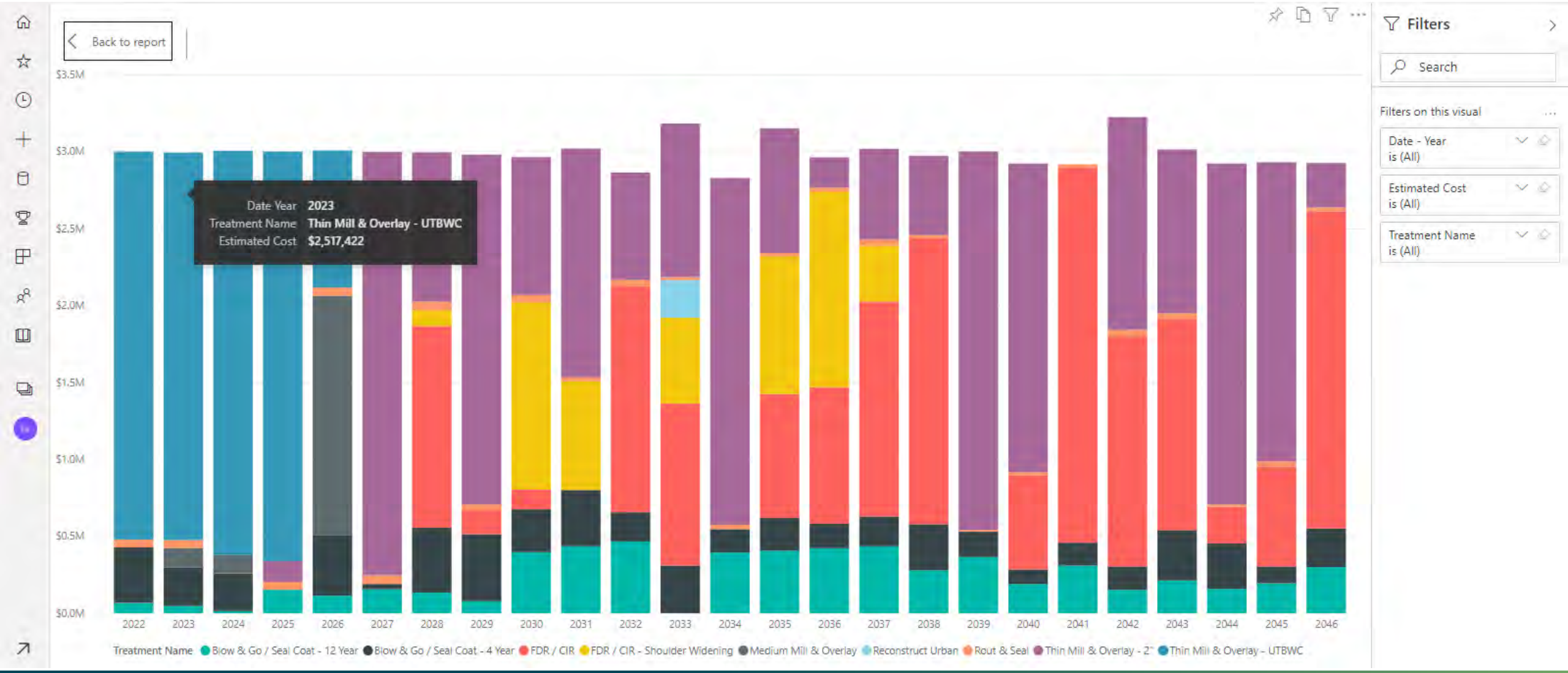




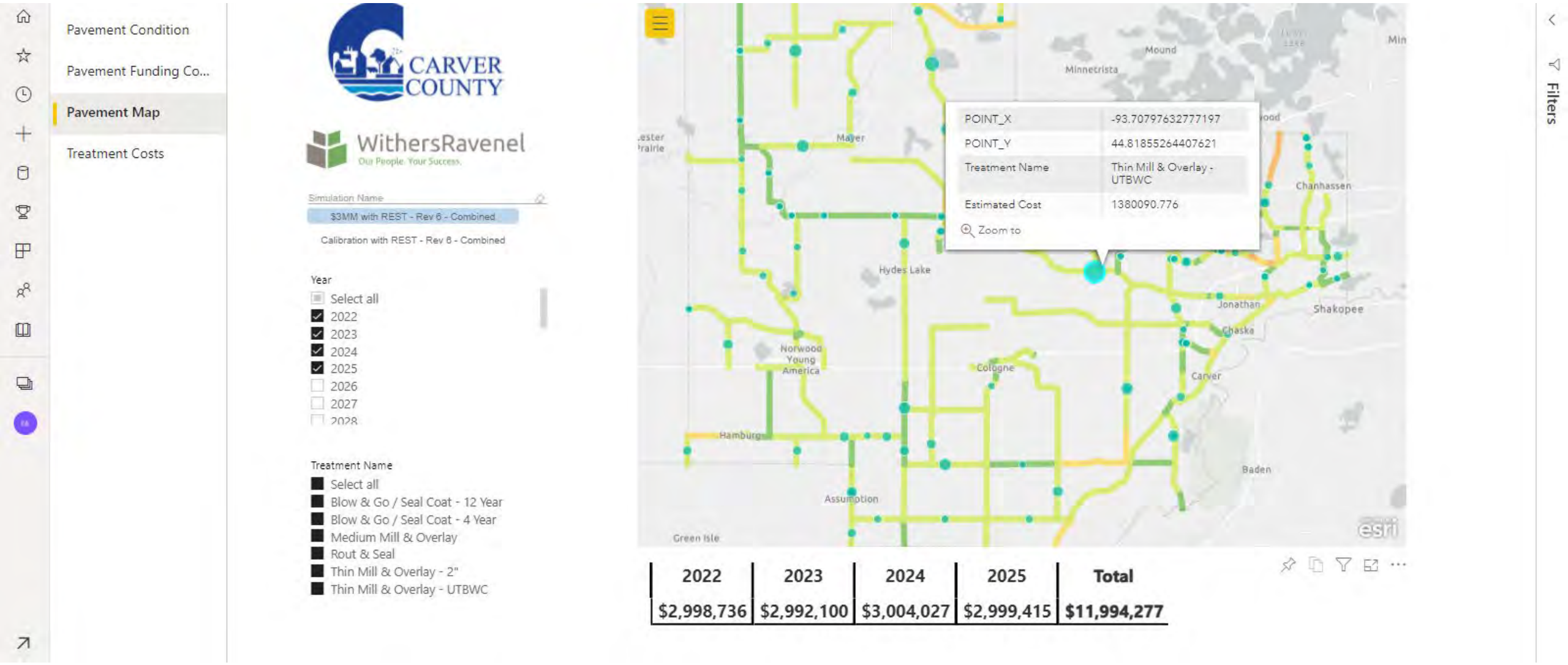
Life Cycle Model for Carver County



Life Cycle Model Output for Work Activities



Life Cycle Model Map in Microsoft PowerBI



2022	2023	2024	2025	Total
$2,998,736	$2,992,100	$3,004,027	$2,999,415	$11,994,277

Life Cycle Model Output – Capital Improvement Plan

Back to report

Year	Blow & Go / Seal Coat - 12 Year	Blow & Go / Seal Coat - 4 Year	FDR / CIR	FDR / CIR - Shoulder Widening	Medium Mill & Overlay	Reconstruct Urban	Rout & Seal	Thin Mill & Overlay - 2"	Thin Mill & Overlay - UTBWC	Total
2022	**$66,872**	**$360,300**					**$50,893**		**$2,520,670**	**$2,998,736**
2023	**$47,180**	**$250,054**			**$126,222**		**$51,222**		**$2,517,422**	**$2,992,100**
2024	**$14,134**	**$242,871**			**$120,498**				**$2,626,525**	**$3,004,027**
2025	**$152,068**						**$52,057**	**$134,641**	**$2,660,649**	**$2,999,415**
2026	**$113,643**	**$394,540**			**$1,554,209**		**$53,484**		**$889,774**	**$3,005,650**
CR 123							$2,995			**$2,995**
CR 127		$6,785								**$6,785**
CR 140					$1,217,835					**$1,217,835**
CR 141					$84,049					**$84,049**
CR 151									$123,712	**$123,712**
CR 153							$3,550			**$3,550**
CSAH 10		$63,950			$52,087		$27,226			**$143,264**
CSAH 11	$41,300	$68,406					$2,380		$141,250	**$253,336**
CSAH 14		$41,221			$156,214		$1,913			**$199,347**
CSAH 15		$41,932								**$41,932**
CSAH 23		$17,723							$106,097	**$123,820**
CSAH 27		$37,304								**$37,304**
CSAH 32		$7,467								**$7,467**
CSAH 33	$72,342	$38,926							$30,904	**$142,173**
CSAH 34		$1,496							$487,811	**$489,307**
CSAH 40					$44,024					**$44,024**
CSAH 41							$4,902			**$4,902**
CSAH 43		$56,754								**$56,754**
CSAH 50							$3,440			**$3,440**
CSAH 51							$5,312			**$5,312**
CSAH 61		$12,574					$1,767			**$14,341**
2027	**$155,316**	**$34,914**					**$55,670**	**$2,751,025**		**$2,996,925**
CR 117							$1,187			**$1,187**
Total	**$5,873,615**	**$5,836,784**	**$17,926,310**	**$5,109,714**	**$1,800,928**	**$242,677**	**$835,300**	**$25,928,910**	**$11,215,039**	**$74,769,278**

Filters

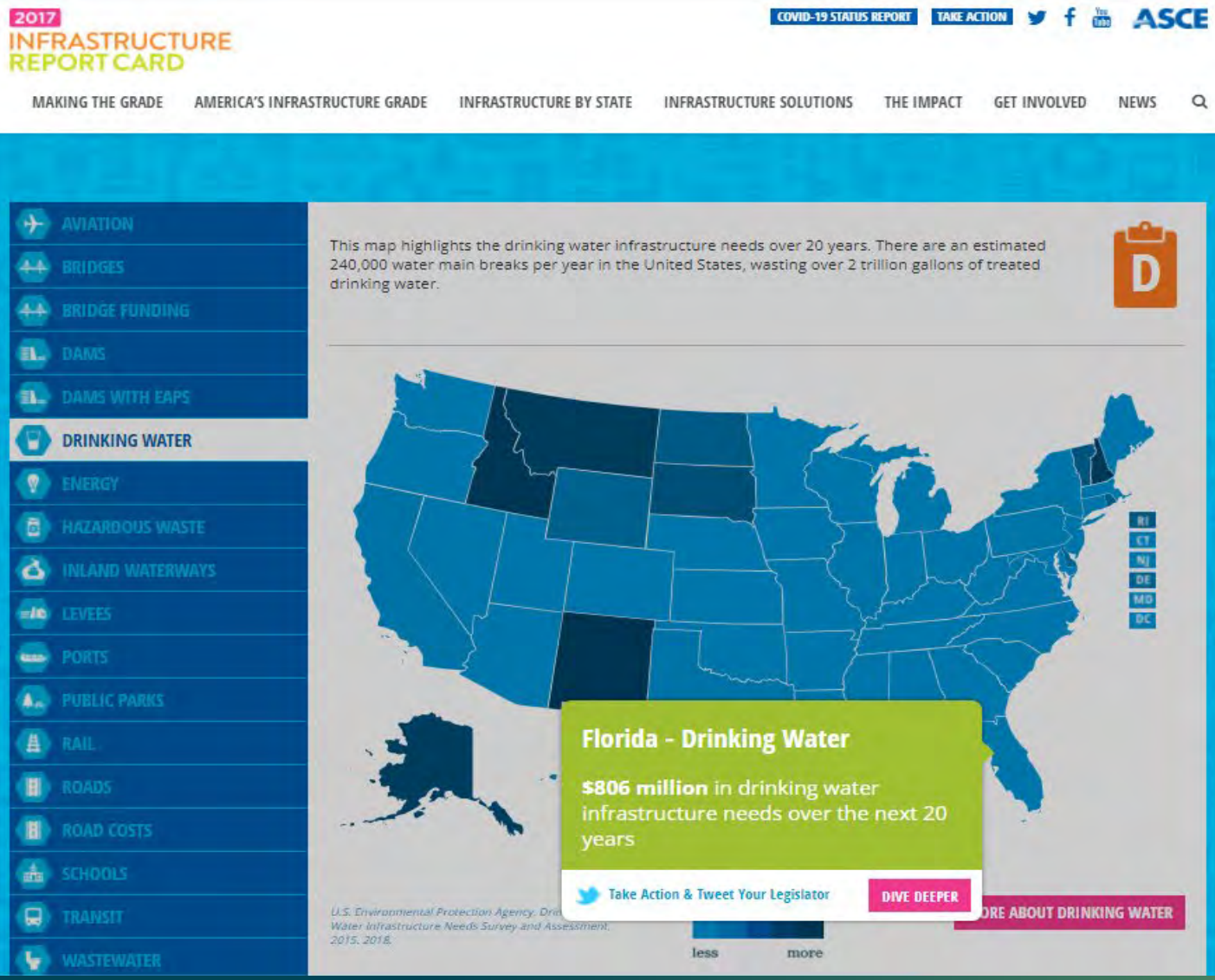
The “Triple Bottom Line” for Carver County, MN

- **Improved Stakeholder Communication *(Elected Officials & Public)***
- **Long-Range View of the Capital Improvement Plan *(CIP)***
- **Alignment of all Capital Projects**
- **Effective Use of Available Funding**
- **Defensible Case for Additional Funding**
- **Align External Funding Opportunities**
- **Achieve the Sustainable Desired Level of Service**

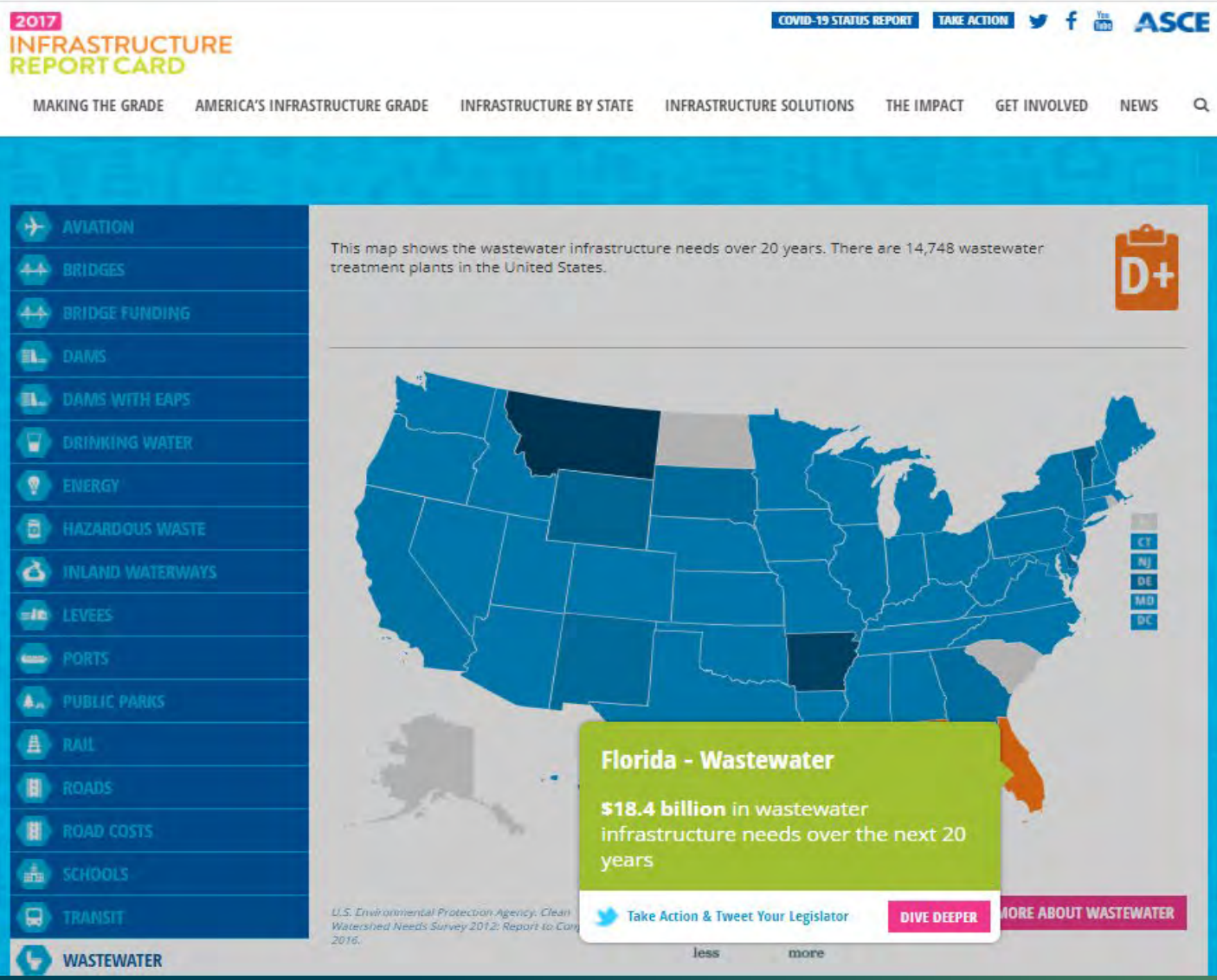
Southwest Florida Utility Water & Wastewater

Southwest Florida Utility

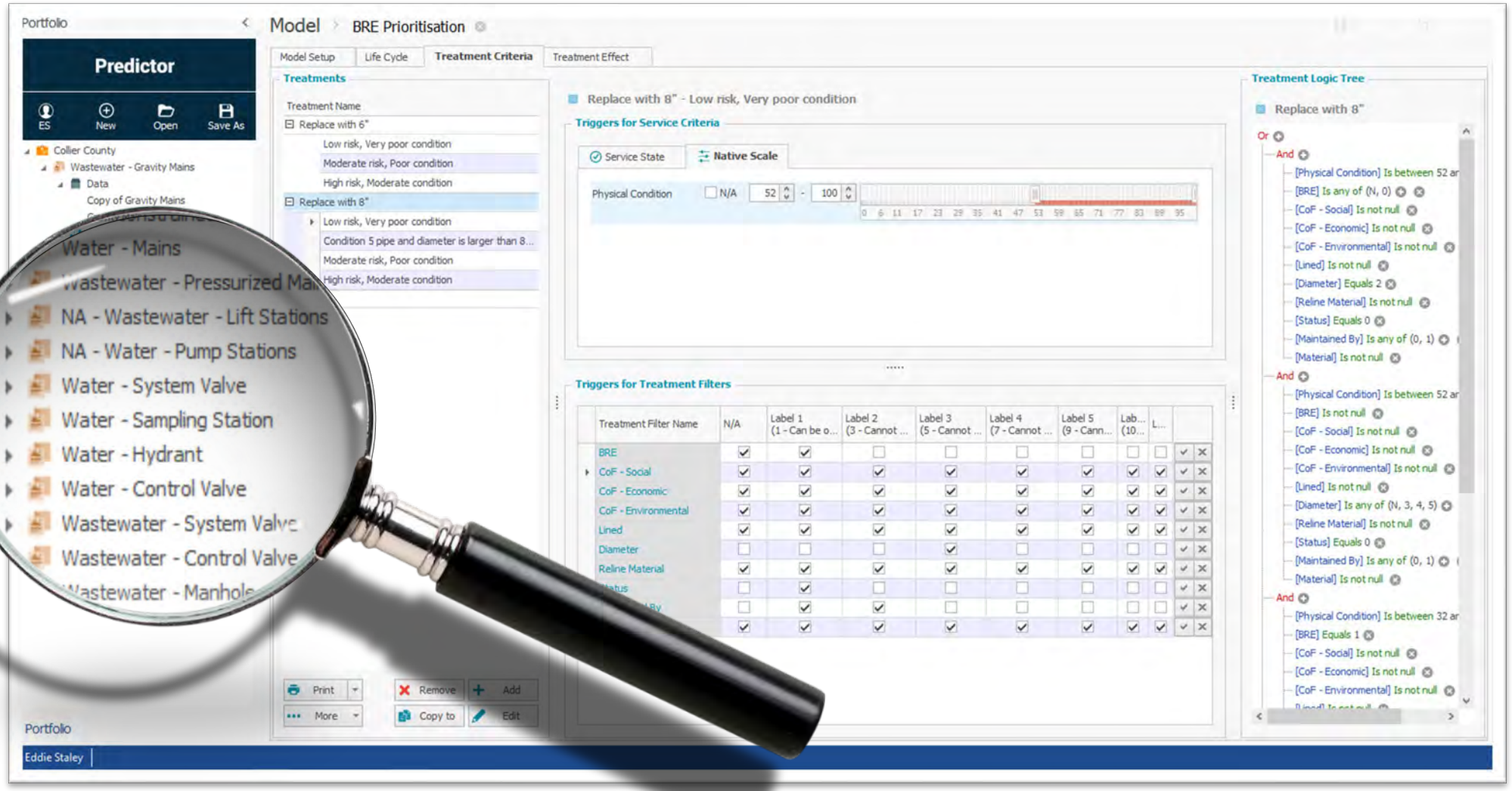
Asset Management is How We Do Better



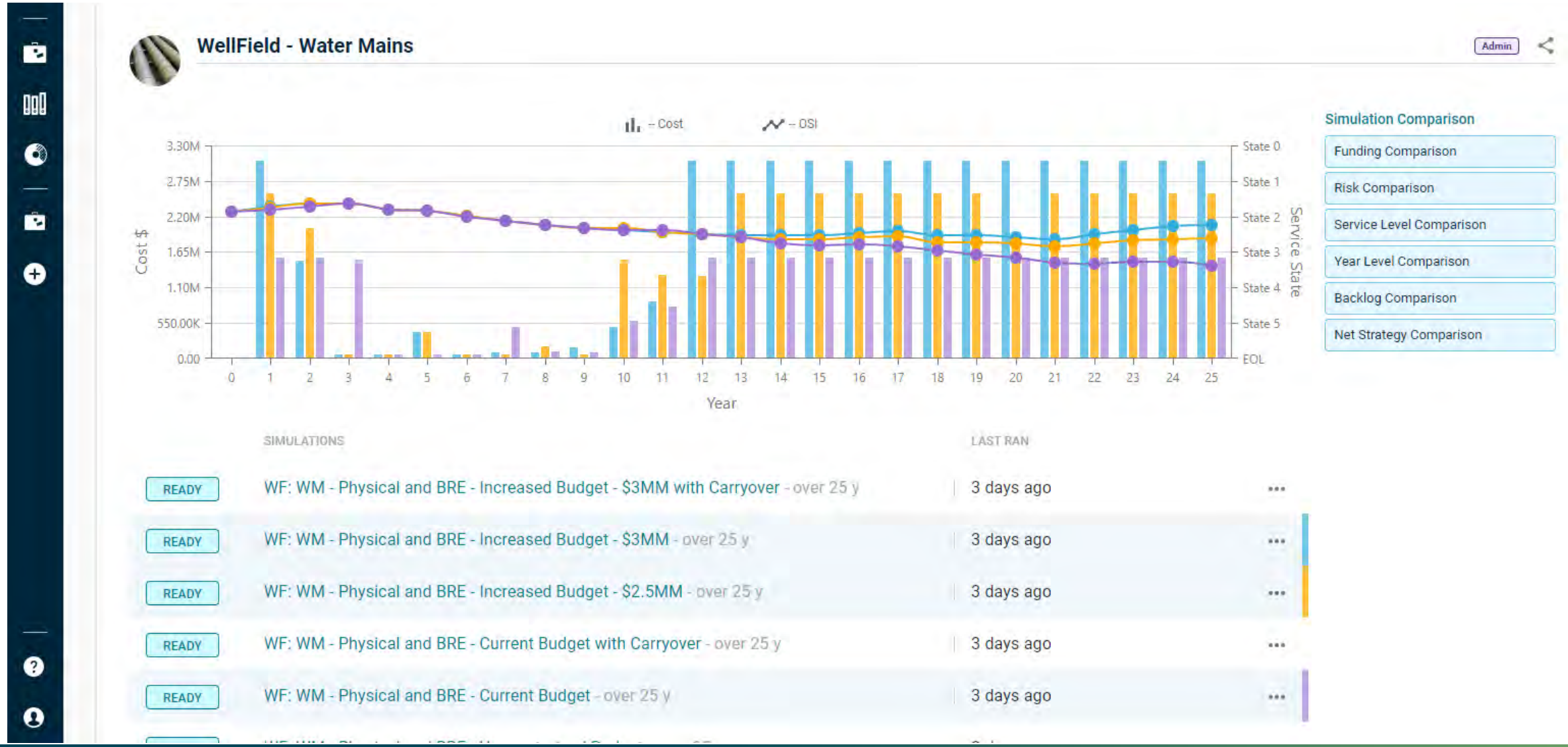
Asset Management is How We Do Better



Life Cycle Model for Southwest Florida Utility



Life Cycle Model for Southwest Florida Utility



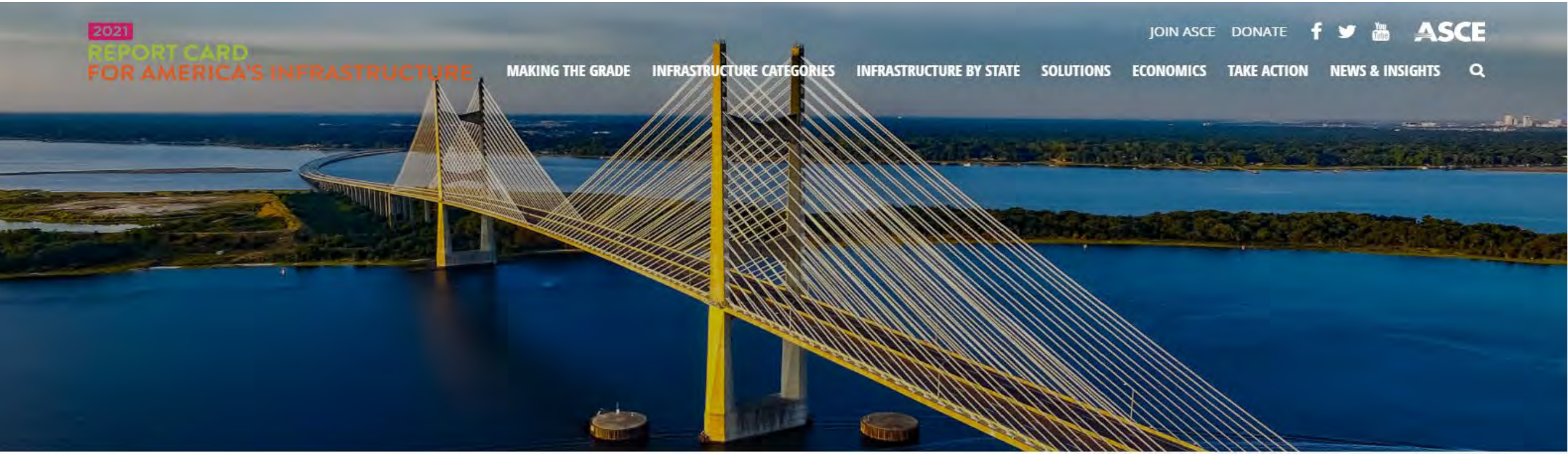
Life Cycle Model for Southwest Florida Utility

Year	N/A	0	1	2	3	4	5	6
0	1.12%	0.00%	60.32%	0.00%	33.65%	0.00%	4.91%	0.00%
1	1.12%	3.13%	60.32%	0.00%	33.65%	0.00%	1.78%	0.00%
2	1.12%	4.91%	60.31%	0.01%	33.65%	0.00%	0.00%	0.00%
3	1.12%	4.91%	59.13%	1.19%	33.26%	0.38%	0.00%	0.00%
4	1.12%	4.91%	54.11%	6.20%	23.40%	10.25%	0.00%	0.00%
5	1.12%	5.29%	49.67%	10.65%	22.13%	11.14%	0.00%	0.00%
6	1.12%	5.29%	42.89%	17.43%	14.48%	18.79%	0.00%	0.00%
7	1.12%	5.33%	34.60%	25.72%	8.80%	24.43%	0.00%	0.00%
8	1.12%	5.37%	27.57%	32.75%	3.61%	29.58%	0.00%	0.00%
9	1.12%	5.48%	20.89%	39.42%	0.58%	32.49%	0.00%	0.00%
10	1.12%	5.89%	17.12%	43.19%	0.00%	32.67%	0.00%	0.00%
11	1.12%	6.57%	12.59%	46.50%	1.23%	27.18%	4.81%	0.00%
12	1.12%	9.00%	9.25%	42.74%	8.32%	19.98%	9.58%	0.00%

The “Triple Bottom Line” for SW Florida Utility

- **Improved Stakeholder Communication *(Elected Officials & Public)***
- **Long-Range View of the Capital Improvement Plan *(CIP)***
- **Alignment of all Capital Projects *(Water & Sewer)***
- **Effective Use of Available Funding**
- **Defensible Case for Additional Funding**
- **Align External Funding Opportunities *(ARPA)***
- **Strategic Asset Management Plan Alignment**

Asset Management is How We Do Better



Florida Civil Engineers Give the State's Infrastructure a "C" Grade

October 27, 2021 | By: Kevin Longley

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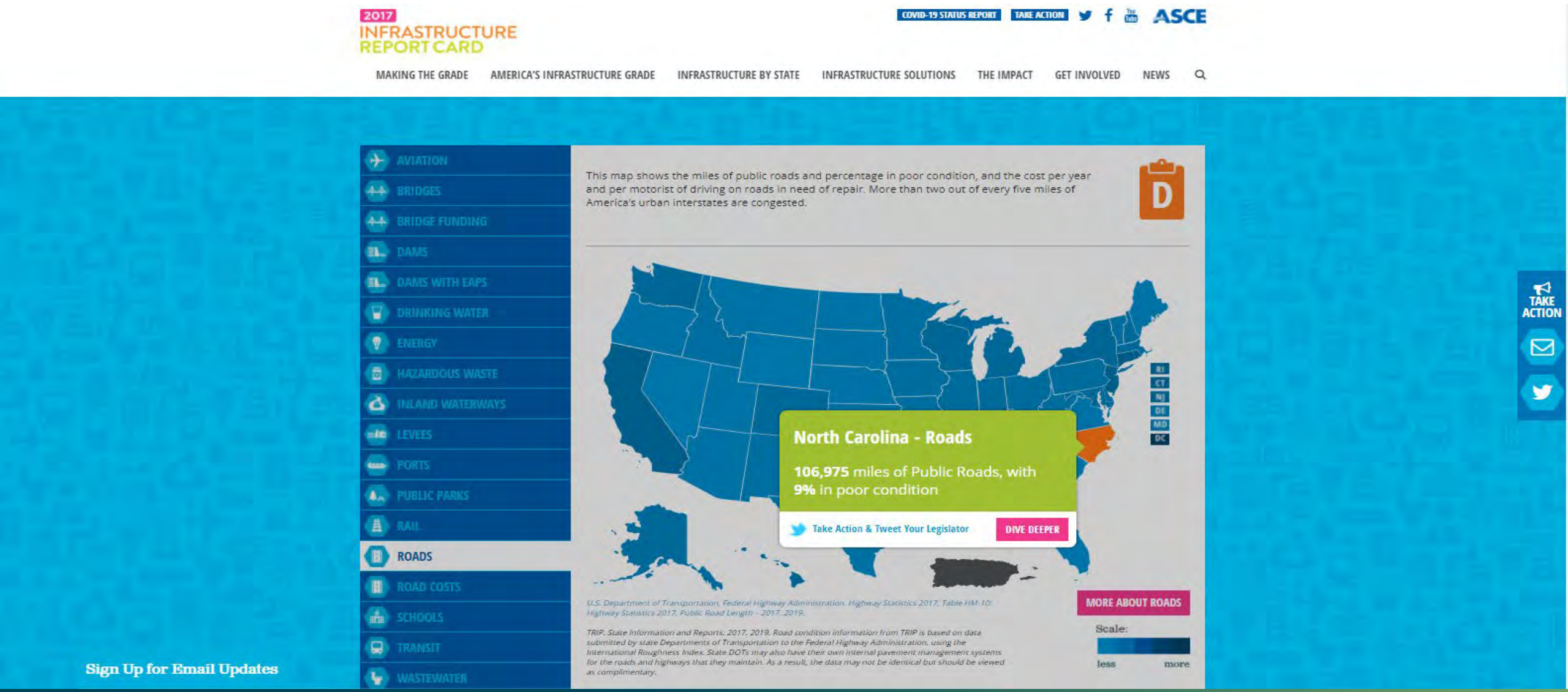
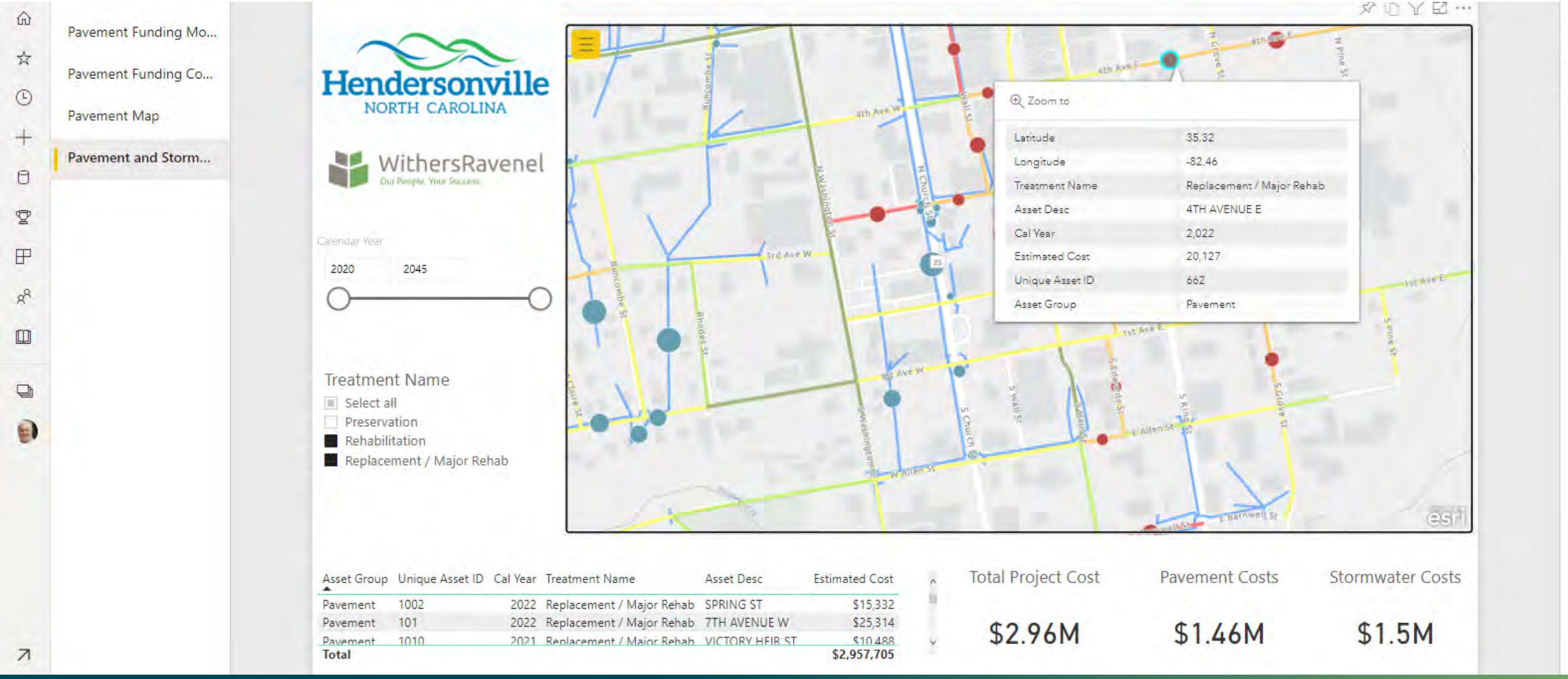
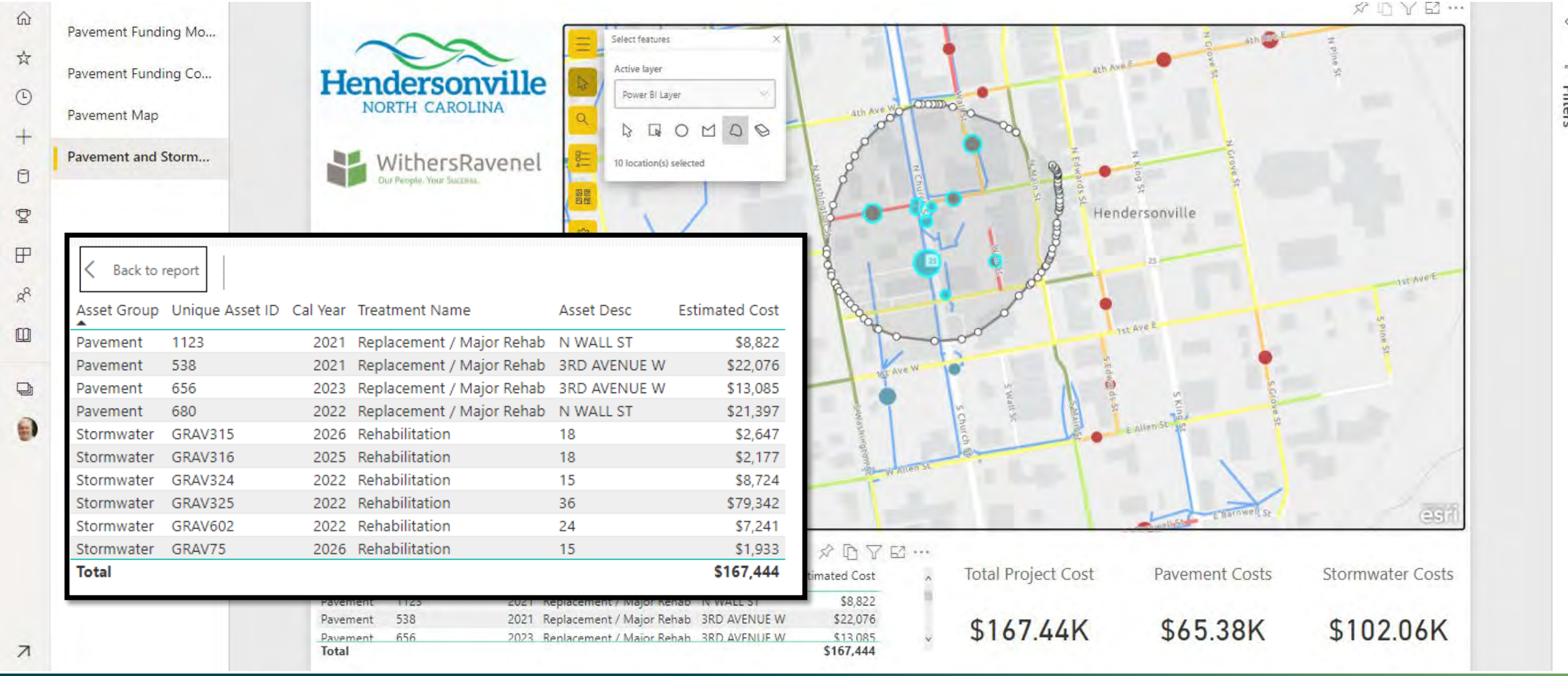
Asset Management is How We Do Better



Life Cycle Modeling in a Common Corridor



Life Cycle Modeling in a Common Corridor



The “Triple Bottom Line” for Hendersonville

- **Improved Stakeholder Communication *(Elected Officials & Public)***
- **Long-Range View of the Capital Improvement Plan *(CIP)***
- **Alignment of all Capital Projects *(Common Corridor)***
- **Effective Use of Available Funding**
- **Defensible Case for Additional Funding**
- **Align External Funding Opportunities *(ARPA)***
- **Strategic Asset Management Plan Alignment**

Telling Our Asset Management Story Is How We Do Better

Contact

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WithersRavenel
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Life Cycle Modeling & Strategic Asset Management