



SUSTAINABLE
RUNOFF SOLUTIONS

Routine Maintenance Always Saves Money: How to be Pro-Active

Agenda

Condition Scoring Terms

Cost-Saving Case Studies

1 Permeable Interlocking Concrete Pavers (PICP)

Client Profile A

Client Profile B

2 Never-Ending Detention Pond Restoration

3 Design (and hand-off!) with the End in Mind

Client Profile A

Client Profile B

Client Profile C

4 Organized Assets Multifamily

Questions



Routine Maintenance Always Saves Money: How to be Pro-Active

Goal:

Consider all elements of stormwater management through the lens of post-construction maintenance



Routine Maintenance Always Saves Money: How to be Pro-Active

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Driving Principle: Prevention

Routine Maintenance Always Saves Money: How to be Pro-Active

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Driving Principle: Prevention

Condition Scoring Terms	Case Study 1	Case Study 2	Case Study 3	Case Study 4	Questions
	Permeable Interlocking Concrete Pavers (PICP)	Never-Ending Detention Pond Restoration	Design (and hand-off!) with the End in Mind	Organized Assets Multifamily	

Routine Maintenance Always Saves Money: How to be Pro-Active

Goal:

Consider all elements of stormwater management through the lens of post-construction maintenance

Driving Principle: Prevention

Condition Scoring Terms	Case Study 1	Case Study 2	Case Study 3	Case Study 4	Questions
	Permeable Interlocking Concrete Pavers (PICP)	Never-Ending Detention Pond Restoration	Design (and hand-off!) with the End in Mind	Organized Assets Multifamily	

Condition Scoring Terms Life/Maintenance Cost

Horizontal Asset Condition Score

Failing 1-2

Poor 3-4

Fair 5-6

Good 7-8

New 9-10

Condition Scoring Terms

Case Study 1

Case Study 2

Case Study 3

Case Study 4

Questions

Condition Scoring Terms Life/Maintenance Cost

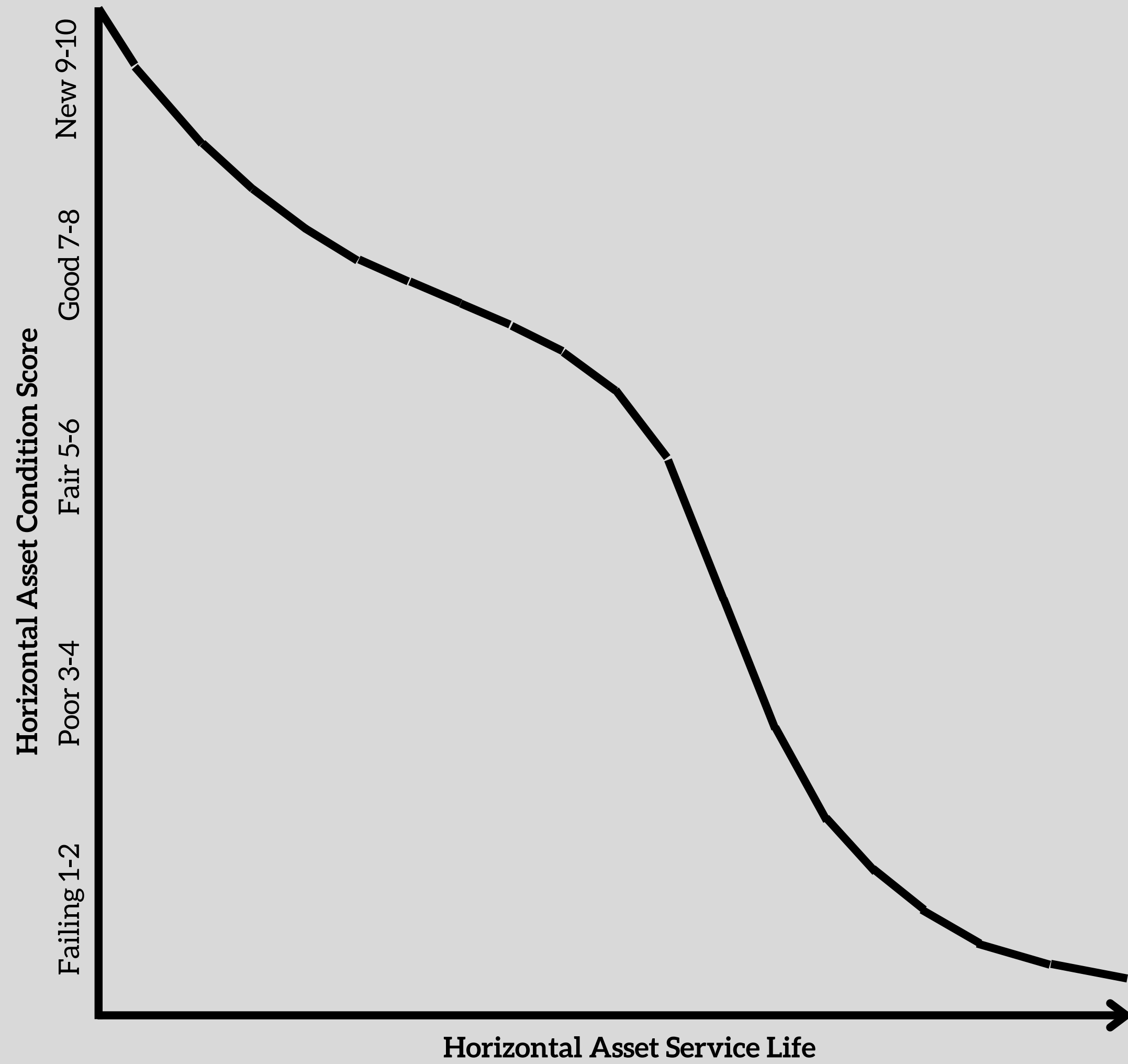
Horizontal Asset Condition Score

Failing 1-2 Poor 3-4 Fair 5-6 Good 7-8 New 9-10

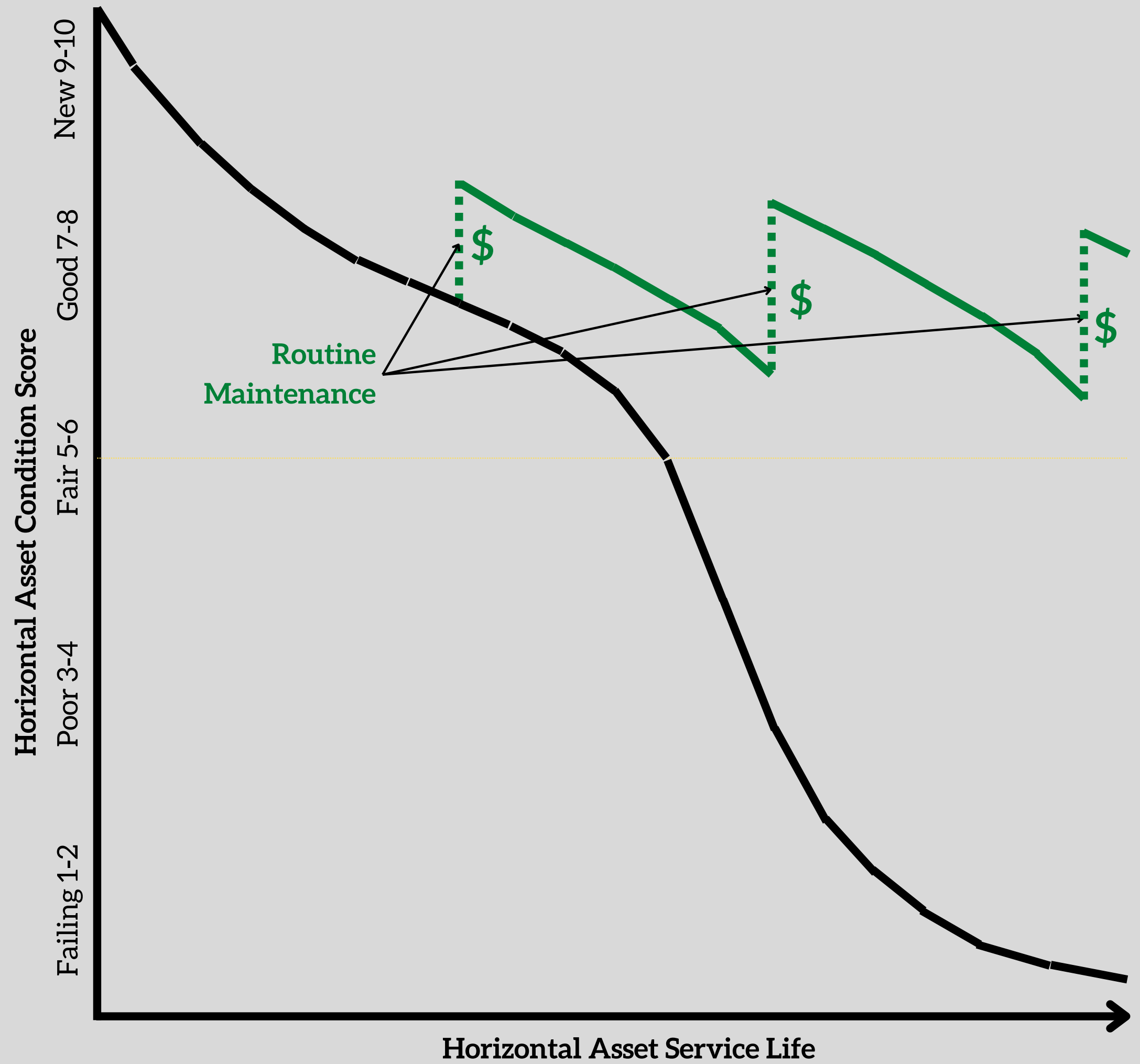
Horizontal Asset Service Life



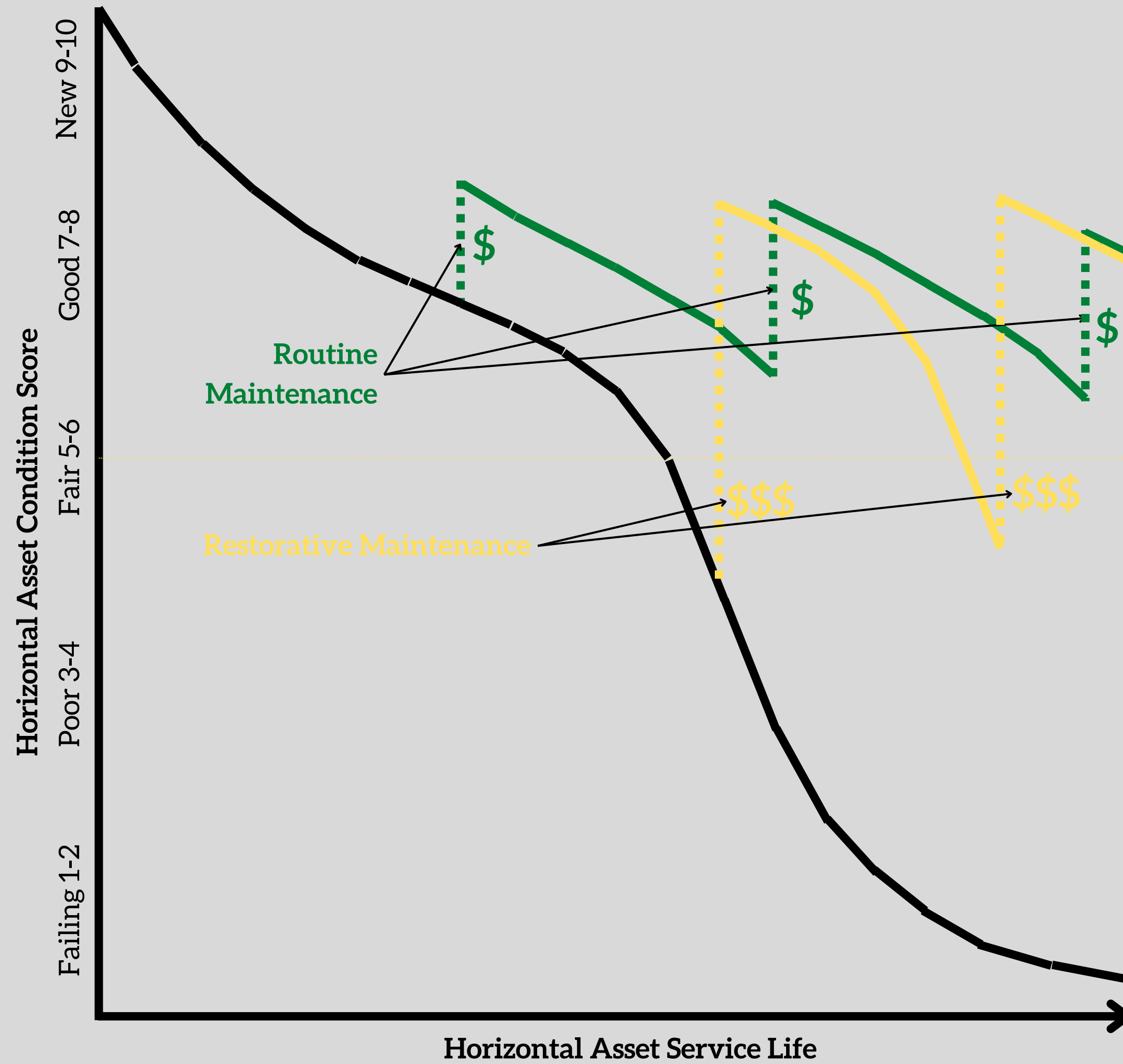
Condition Scoring Terms Life/Maintenance Cost



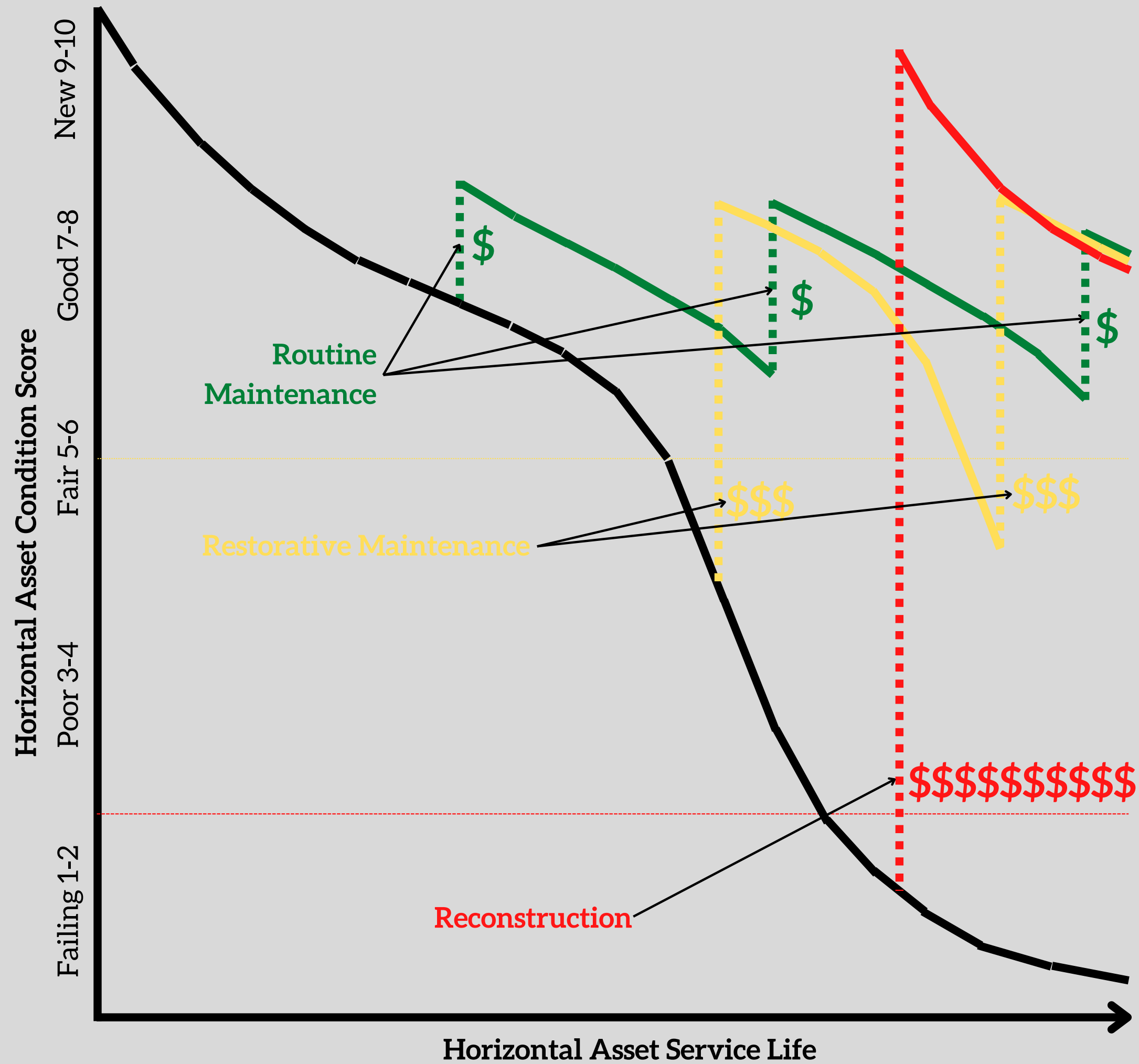
Condition Scoring Terms Life/Maintenance Cost



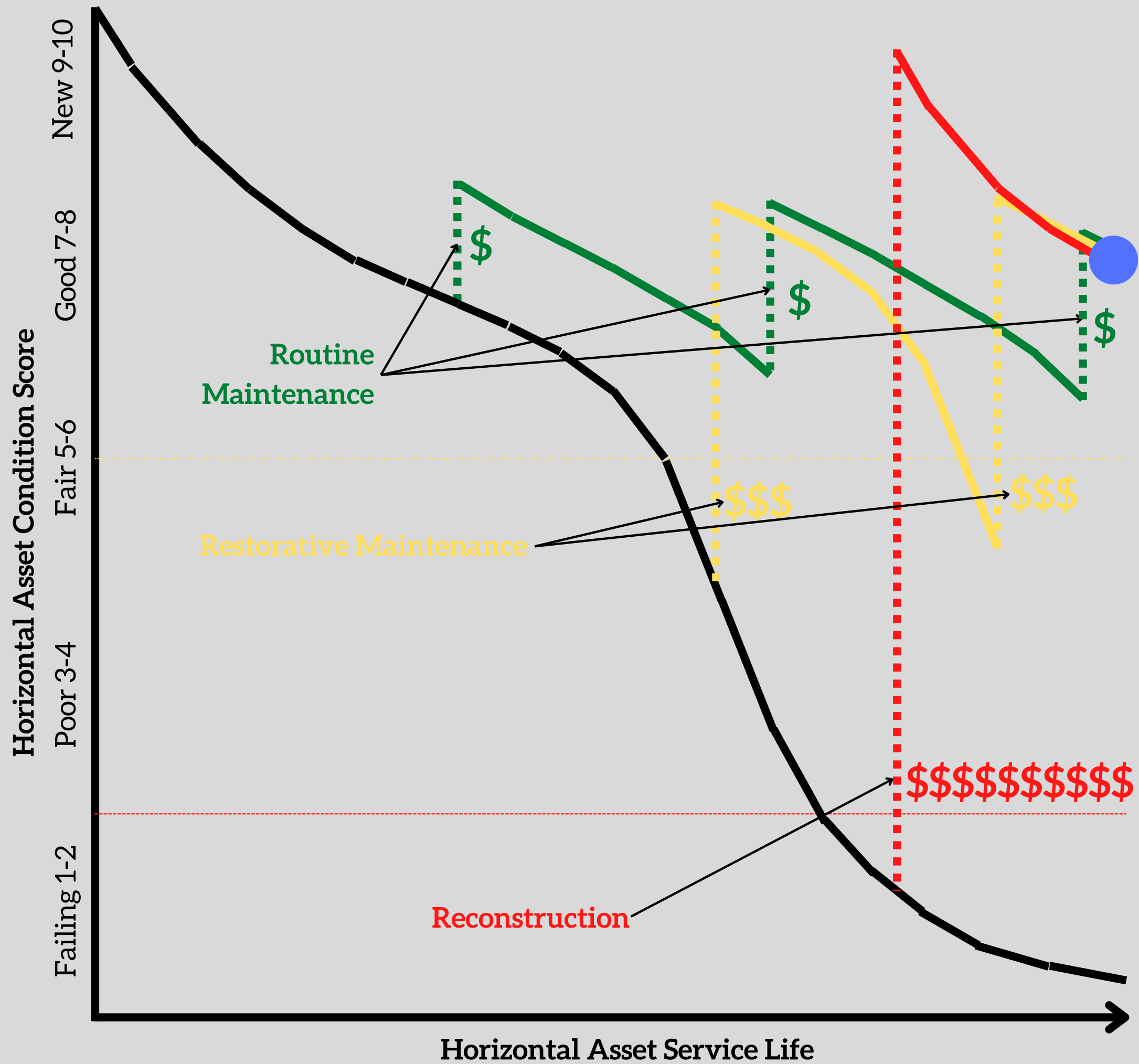
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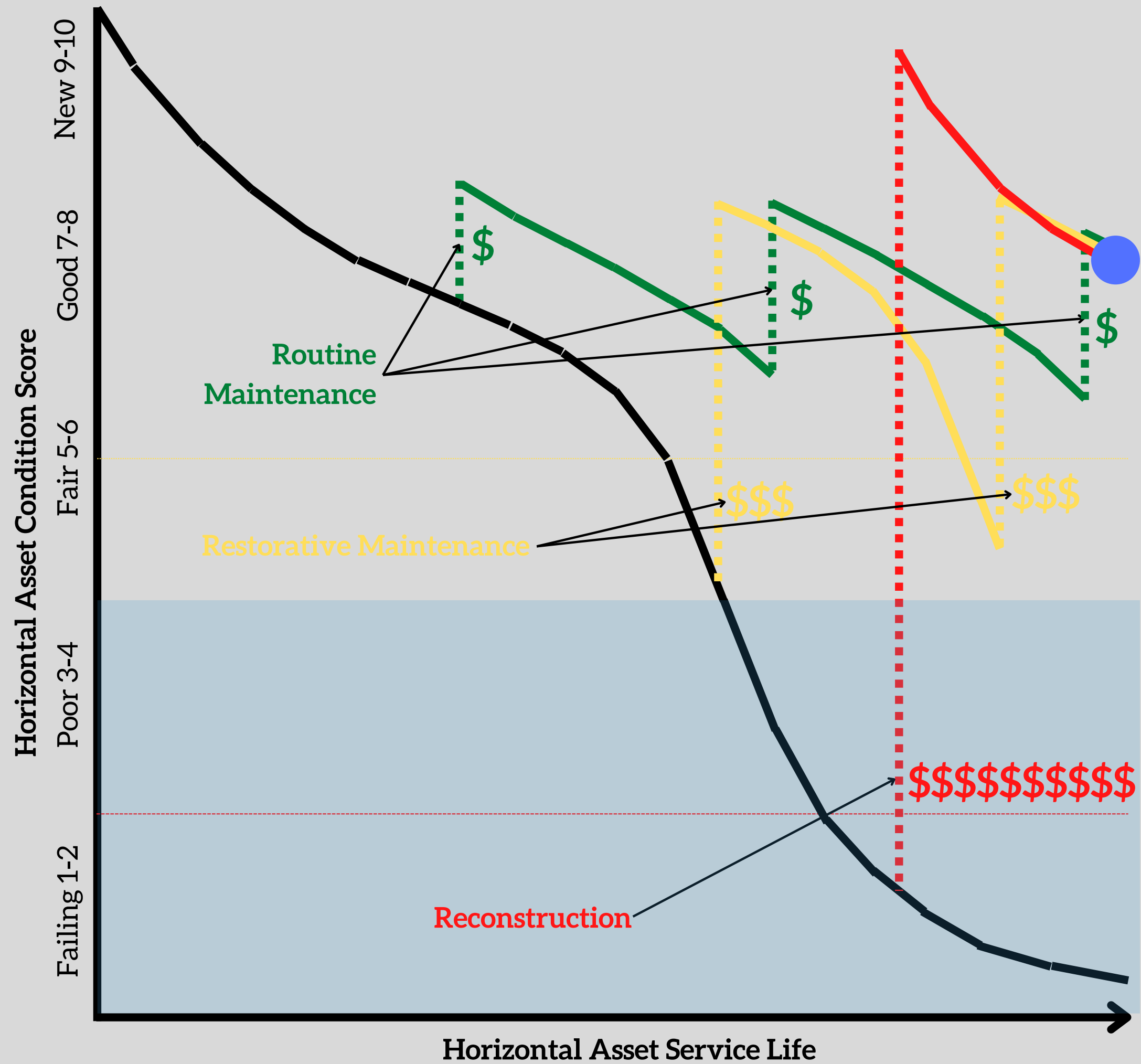
Condition Scoring Terms Life/Maintenance Cost



Condition Scoring Terms Life/Maintenance Cost



Condition Scoring Terms Life/Maintenance Cost

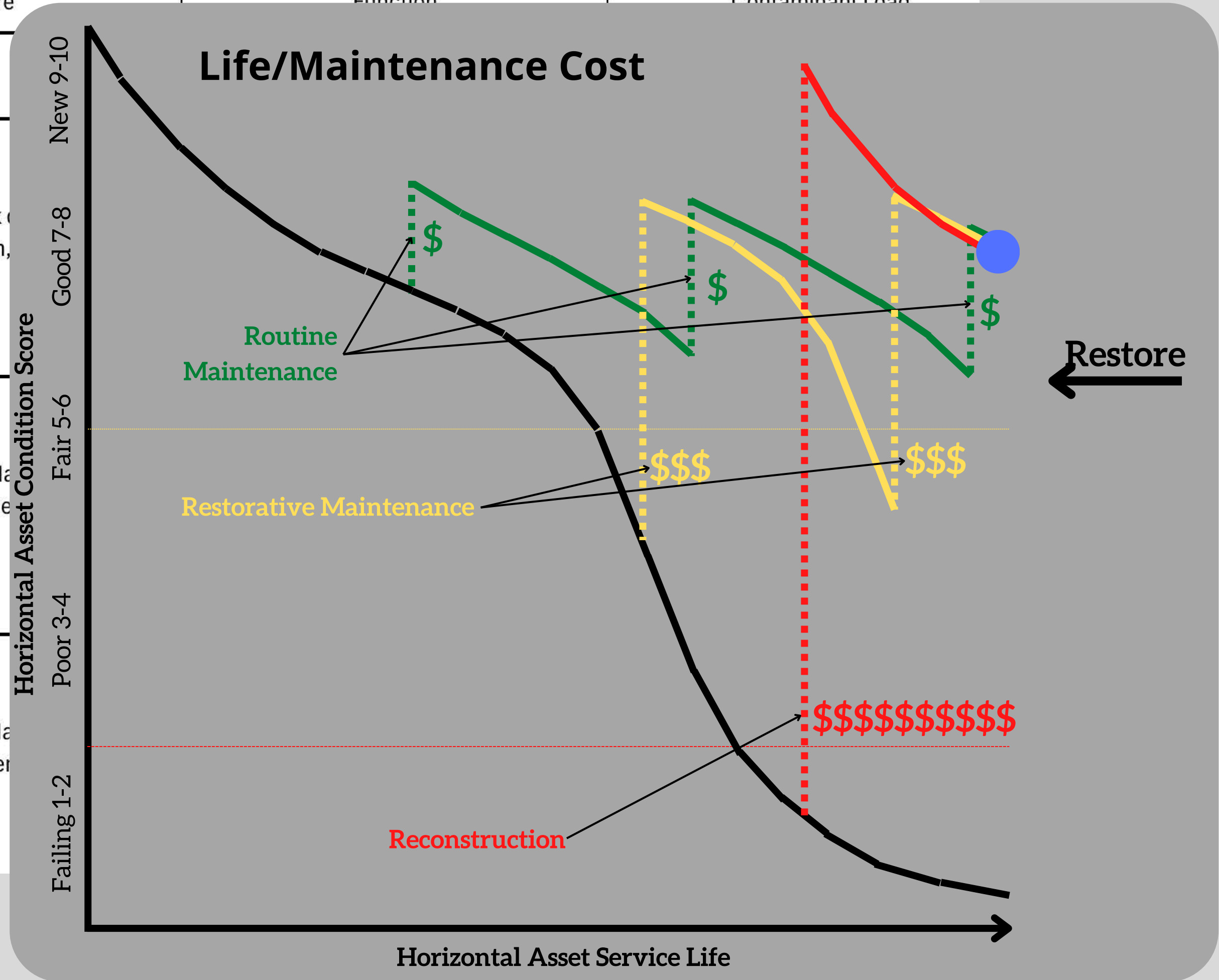


	Condition Score	Permeable Interlocking Concrete Pavers (PICP)		
		Structure	Function	Contaminant Load
Routine Maintenance	10	New Infrastructure		
	9	Limited to no paver block degradation, block settlement < 1-inch, minor boarder cracking	Wetted area infiltration testing with flow spread less than 6-feet and only minor loss of filter aggregate within joints	Limited sediment and leaf litter observed within paver joints. Little to no vegetation observed within paver joints. No sediment observed within underdrain.
	8			
	7			
Restorative Maintenance	6	Some paver block degradation, block settlement < 1-inch, some boarder cracking	Wetted area infiltration testing with flow spread less than 10-feet and significant loss of filter aggregate within joints	Paver joints are mostly clogged with leaf litter and sediment. Vegetation growing within paver joints. No sediment observed within underdrain.
	5			
	4			
Reconstruction	3	Major paver block degradation and missing paver blocks, block settlement > 1-inch, major boarder cracking	Wetted area infiltration testing with flow spread greater than 10-feet and flow spread can't be reduced with restorative maintenance procedure	Paver joints mostly clogged with leaf litter and sediment. Vegetation growing within paver joints. Some sediment observed within underdrain.
	2			
	1			

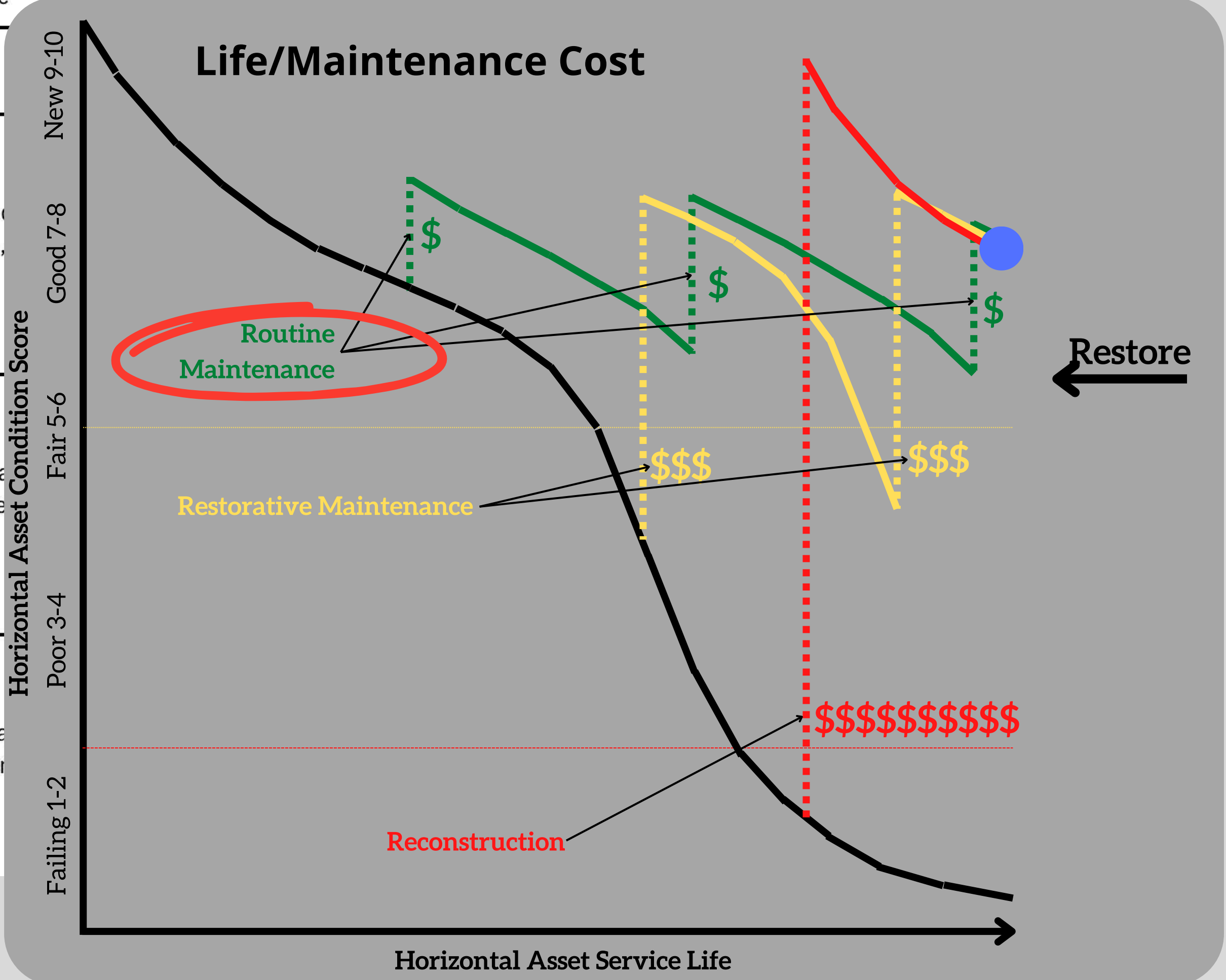
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Restorative Maintenance	6	cracking	loss of filter aggregate within joints	within paver joints. No sediment observed within underdrain.
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Reconstruction	3	Major paver block degradation and missing paver blocks, block settlement > 1-inch, major boarder cracking	Wetted area infiltration testing with flow spread greater than 10-feet and flow spread can't be reduced with restorative maintenance procedure	Paver joints mostly clogged with leaf litter and sediment. Vegetation growing within paver joints. Some sediment observed within underdrain.
	2			
	1			

holly@sustainable runoff.com

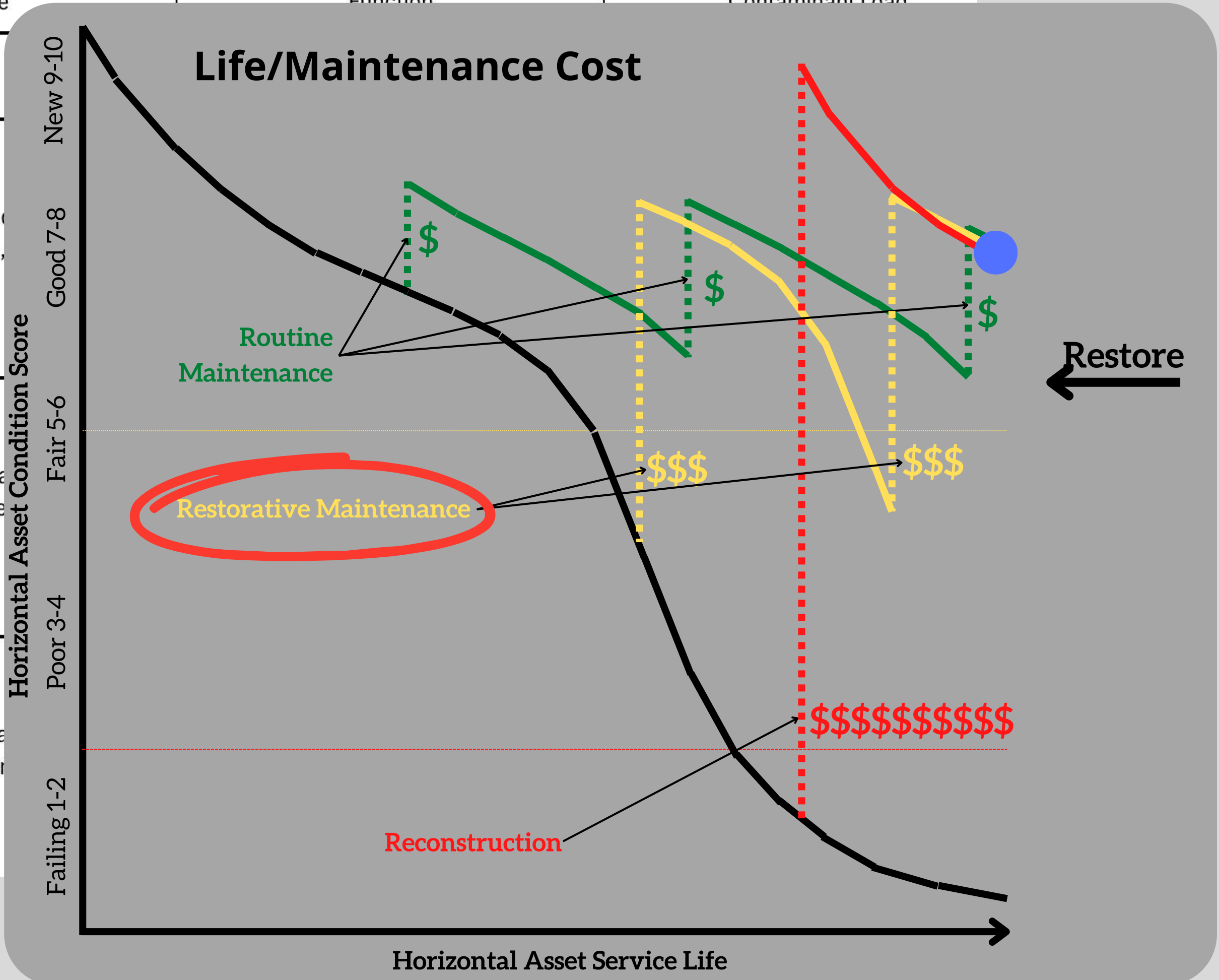
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	8	Limited to no paver block		
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Restorative Maintenance	6			
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	4	settlement < 1-inch, some cracking		
Reconstruction	3			
	2	Major paver block degradation		
	1	paver blocks, block settlement, major boarder cracking		



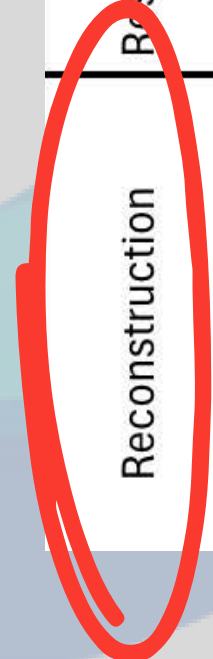
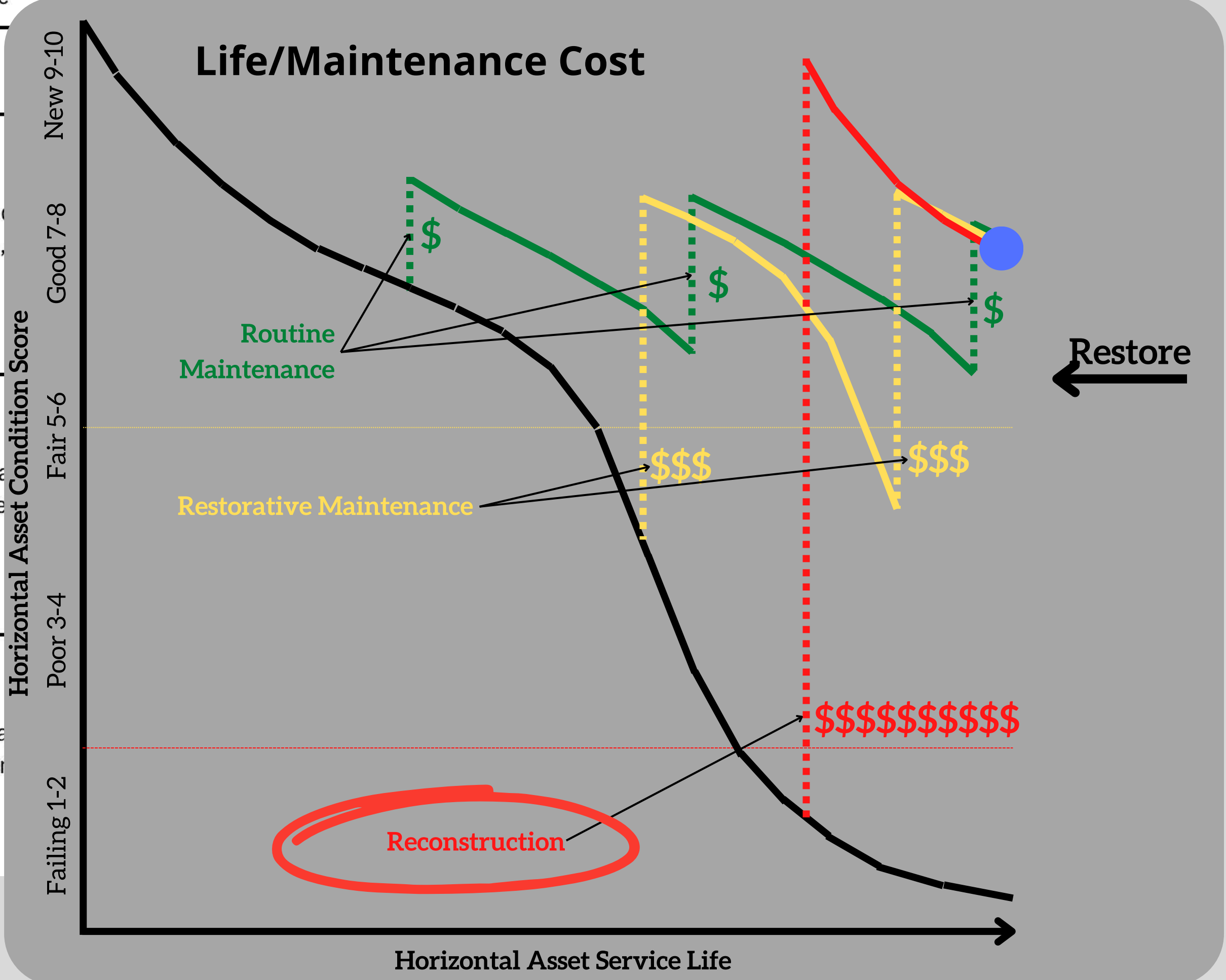
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Reconstruction	3			
	2	Major paver block degradation		
	1	paver blocks, block settlement, major boarder cracking		



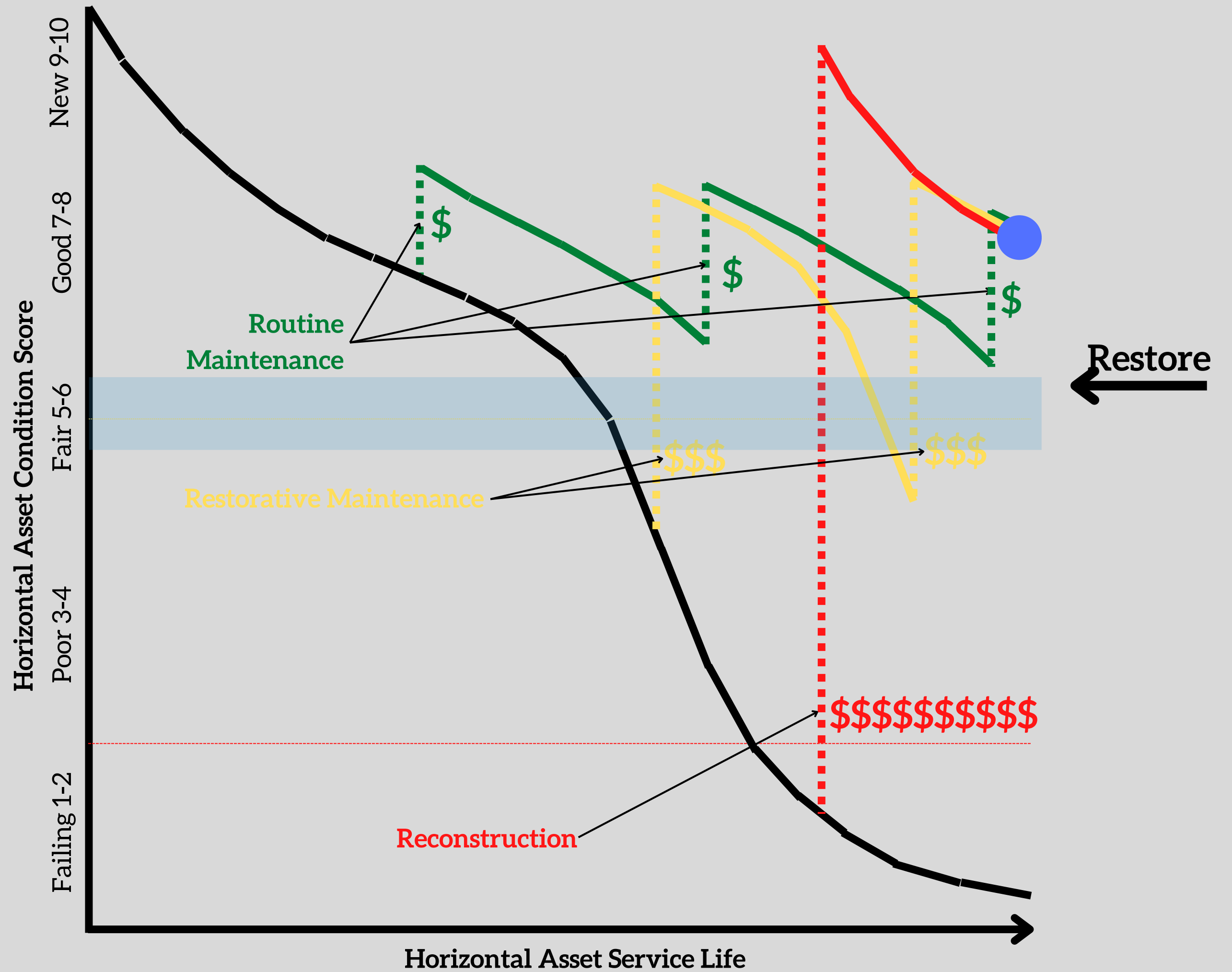
Case Study 1: Permeable Interlocking Concrete Pavers

Client A
Pavers Noncompliant
Restoration Complete
Pavers Compliant
Routine maintenance will keep pavers compliant

Client B
Pavers Noncompliant
Restoration Complete
Pavers Noncompliant
Pavers must be reconstructed to be compliant

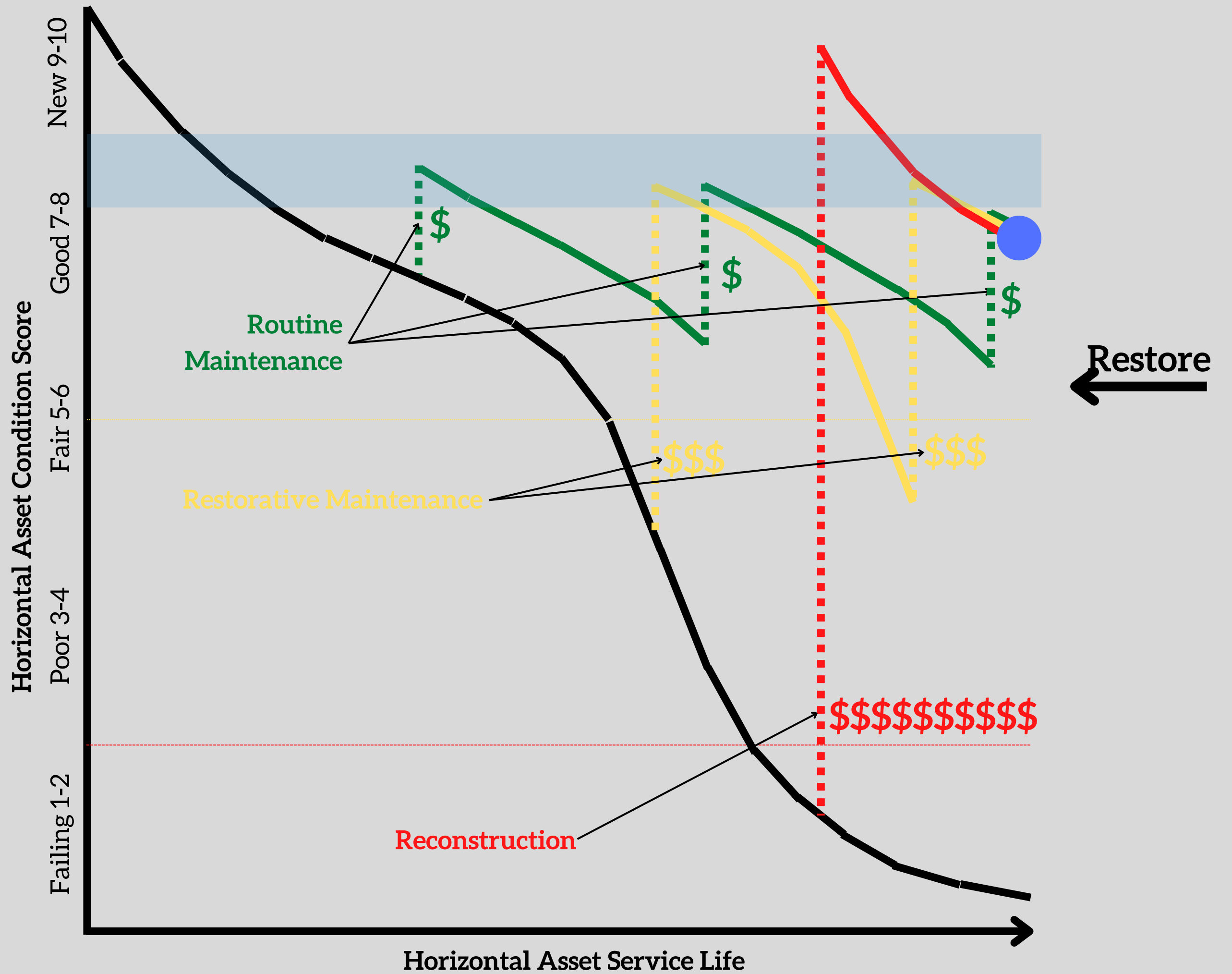
Client A: Permeable Interlocking Concrete Pavers

Client A
Pavers Noncompliant
Restoration Complete
Pavers Compliant
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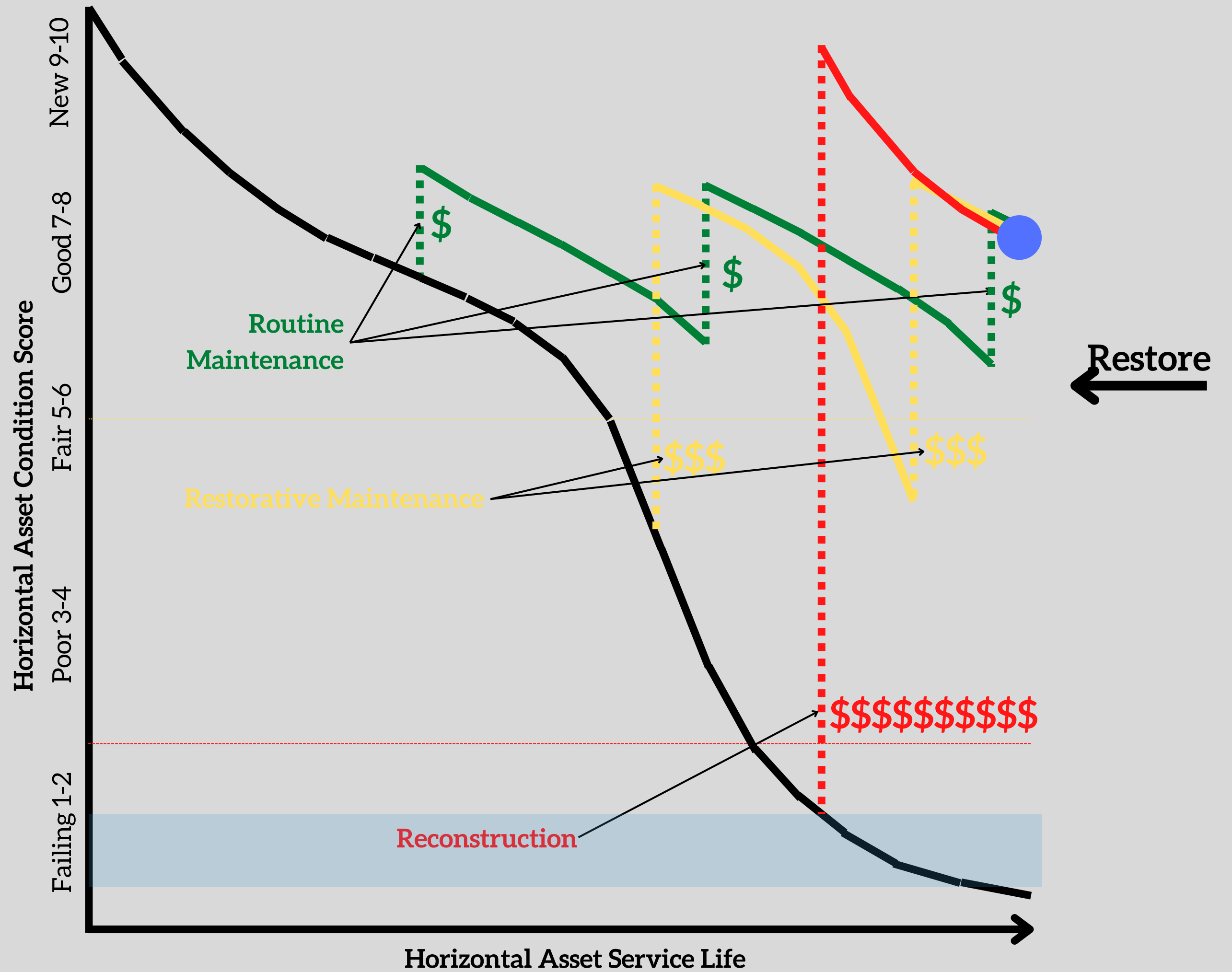
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Client A	
Pavers Noncompliant	
Restoration Complete	
Pavers Compliant	
Routine maintenance will keep pavers compliant	



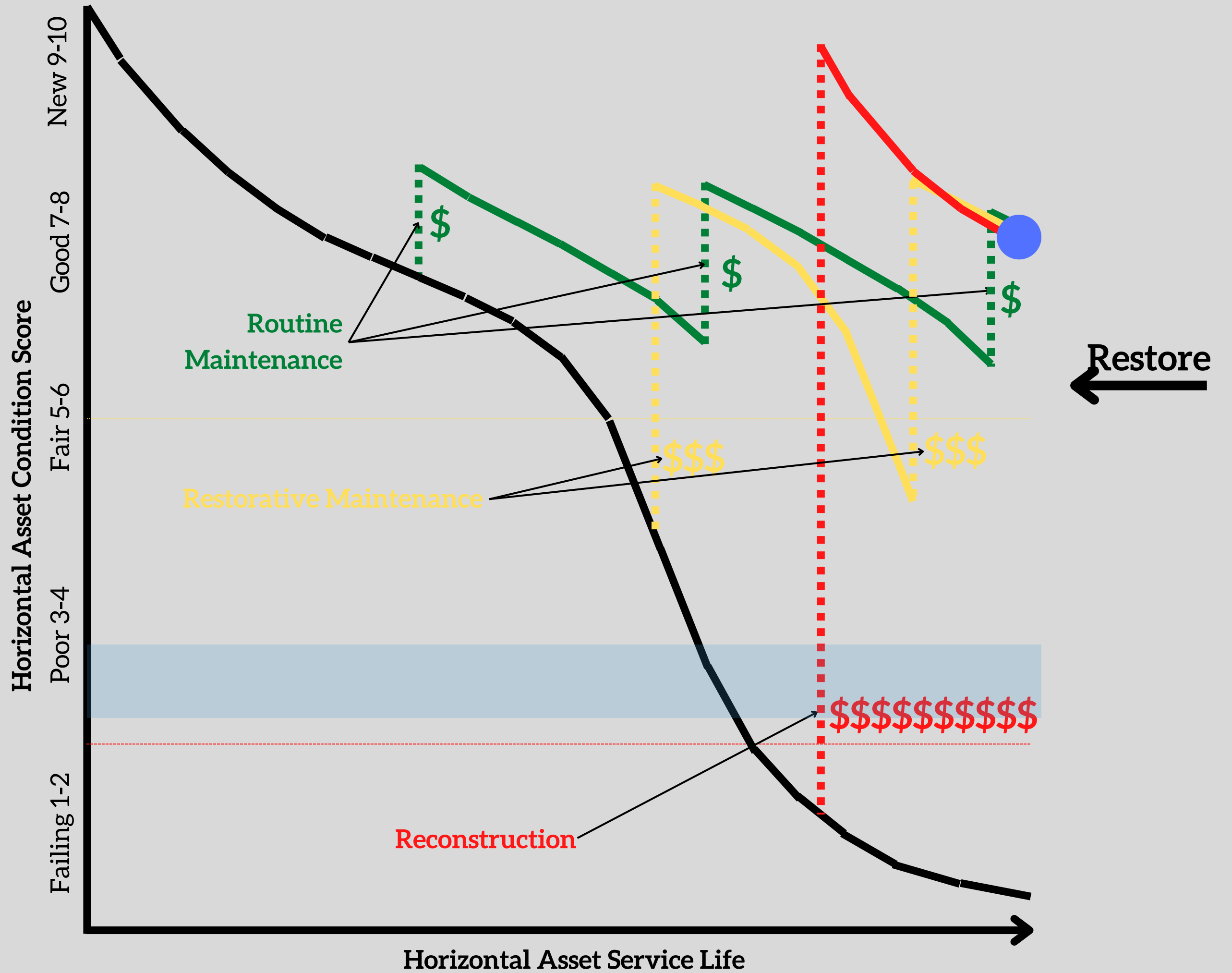
Client B: Permeable Interlocking Concrete Pavers

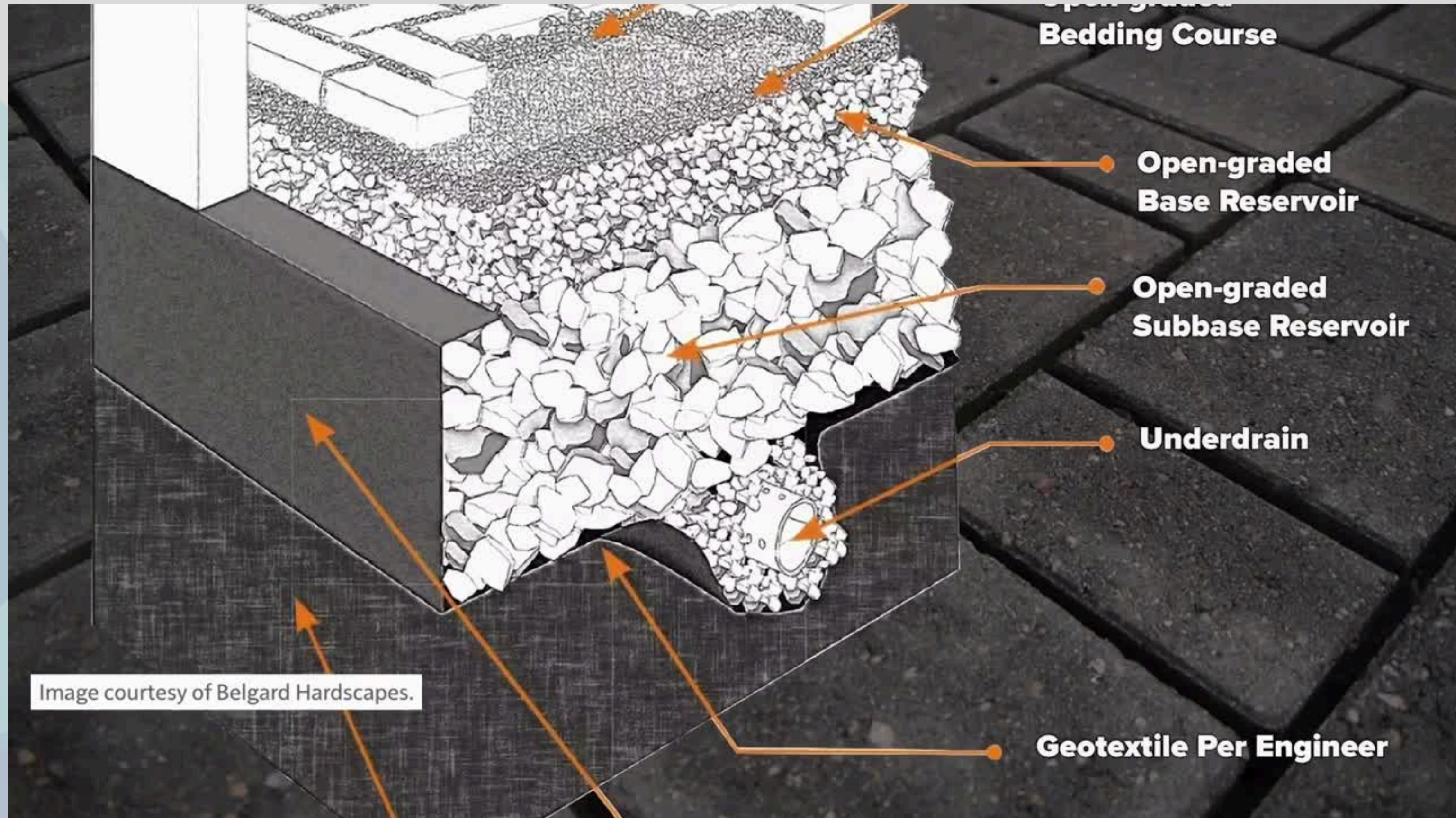
Client B	
Pavers Noncompliant	
Restoration Complete	
Pavers Noncompliant	
Pavers must be reconstructed to be compliant	



Client B: Permeable Interlocking Concrete Pavers

Client B	
Pavers Noncompliant	
Restoration Complete	
Pavers Noncompliant	
Pavers must be reconstructed to be compliant	





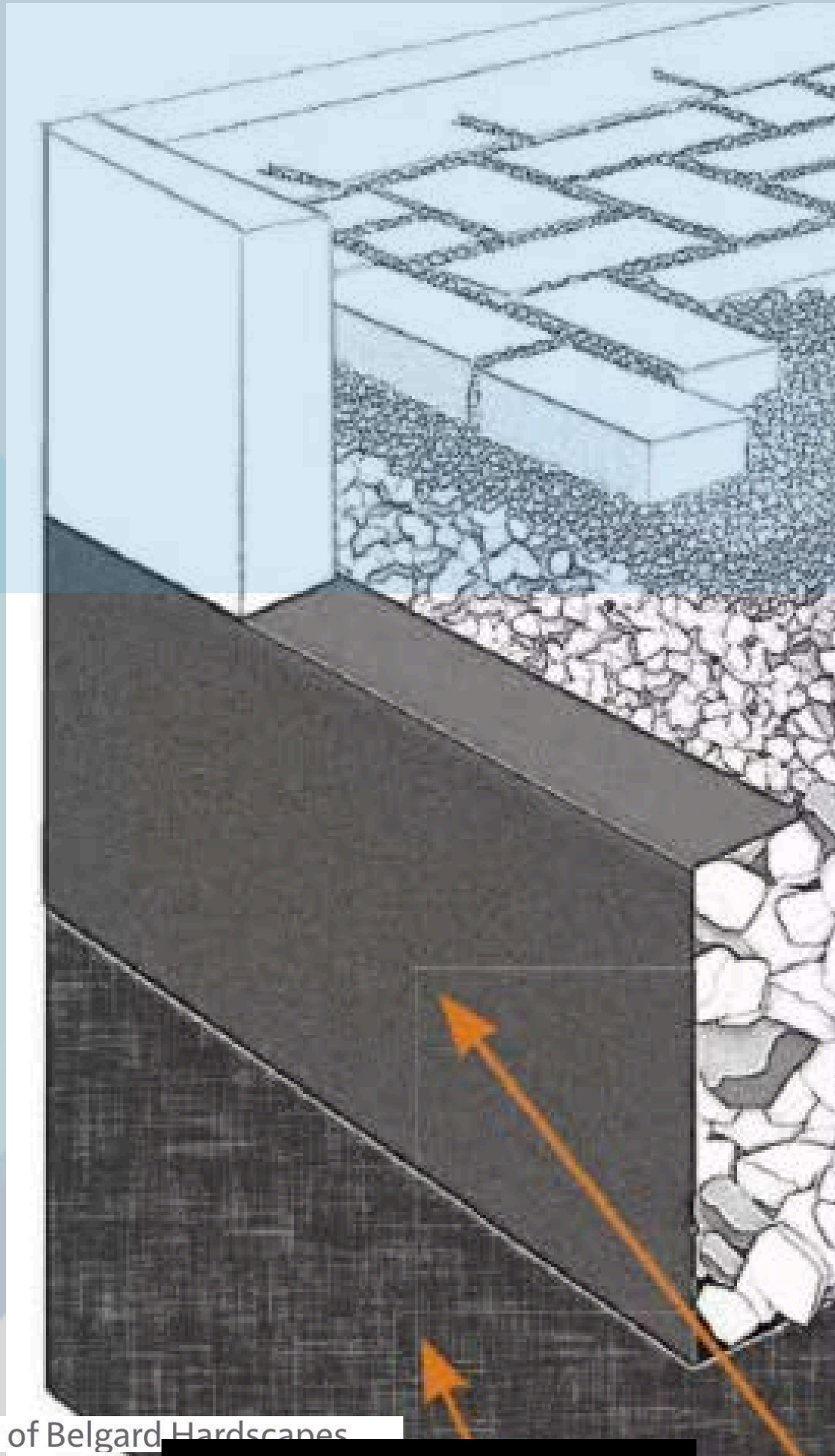
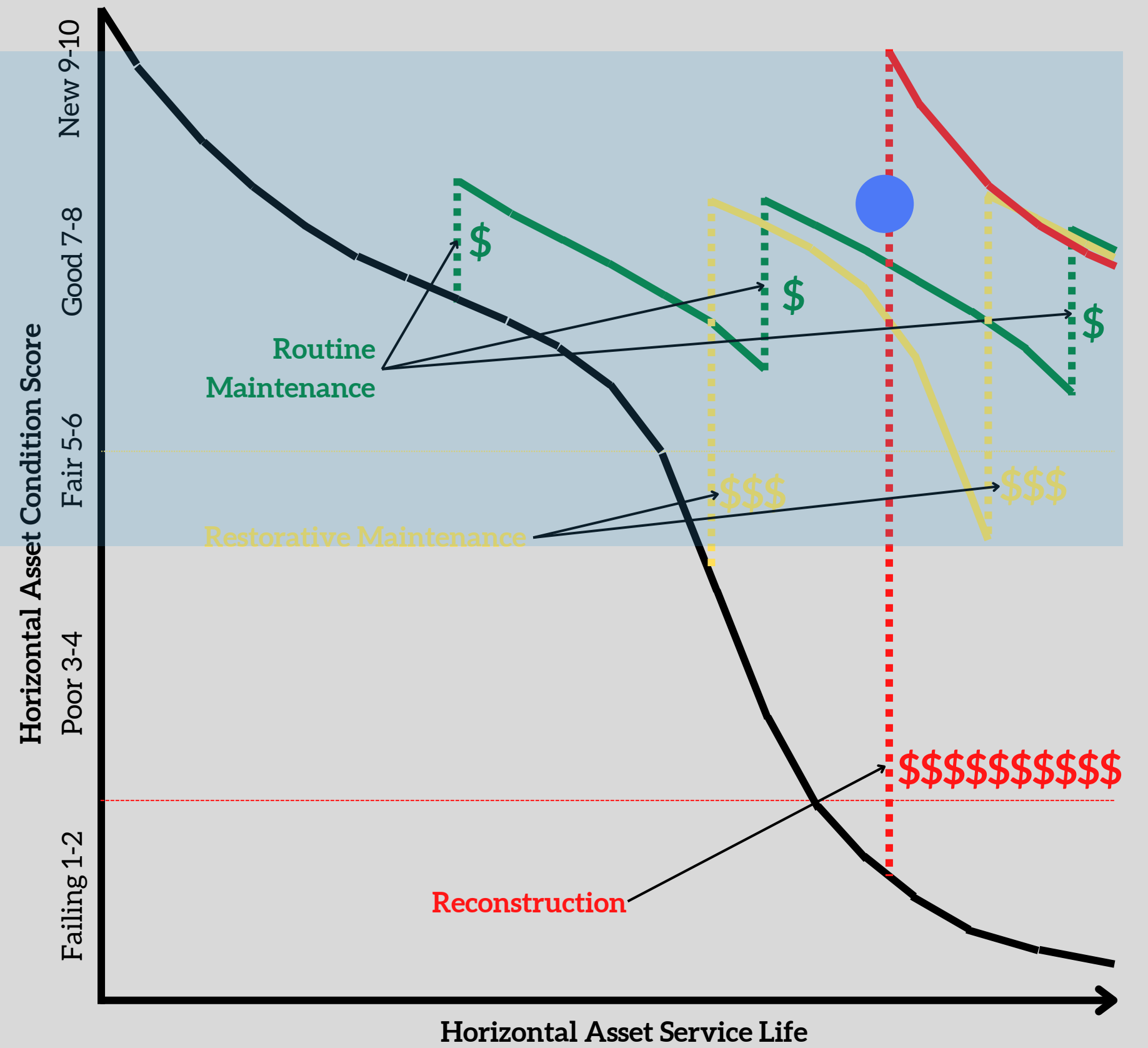


Image courtesy of Belgard Hardscapes



New 9-10

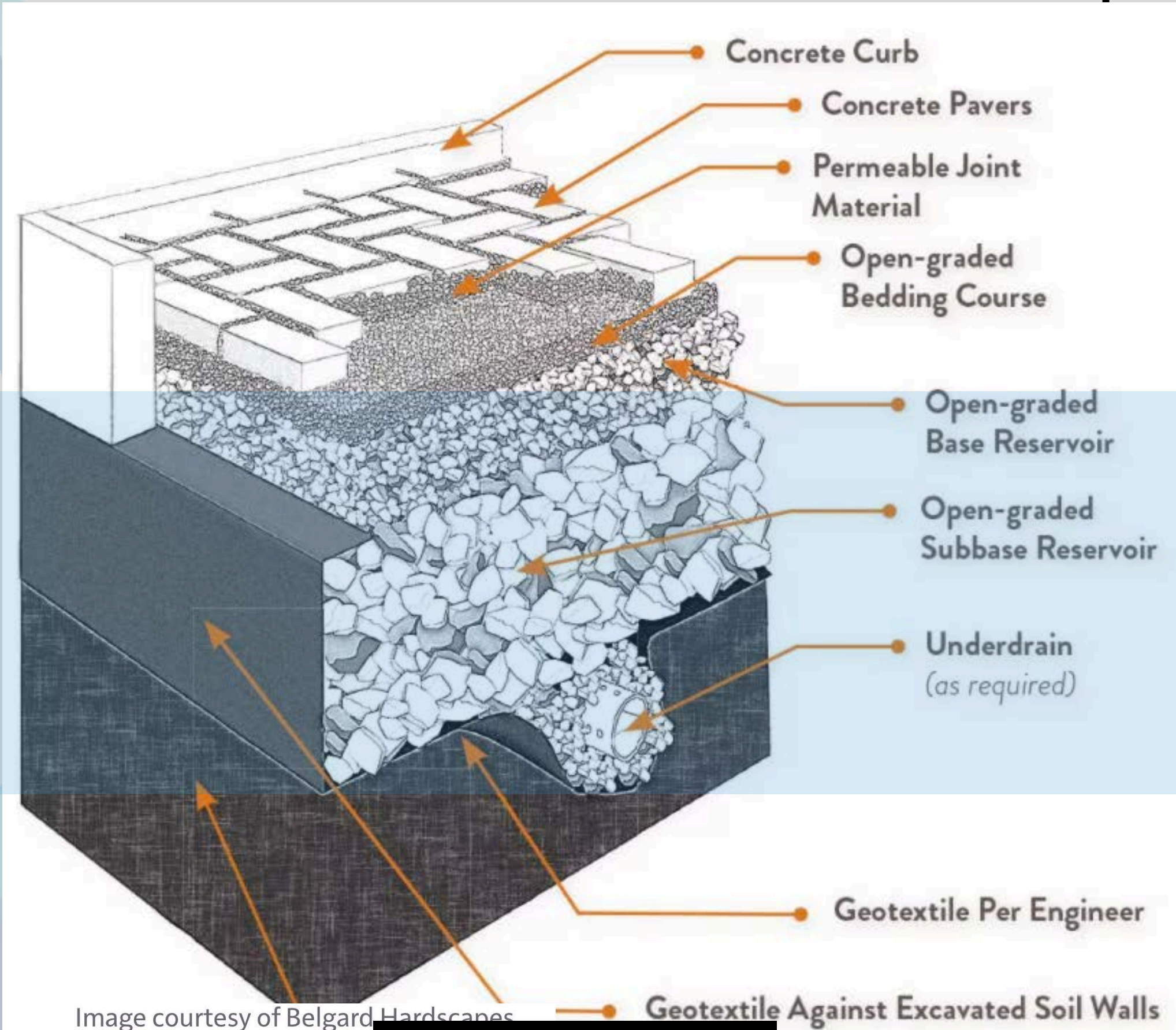
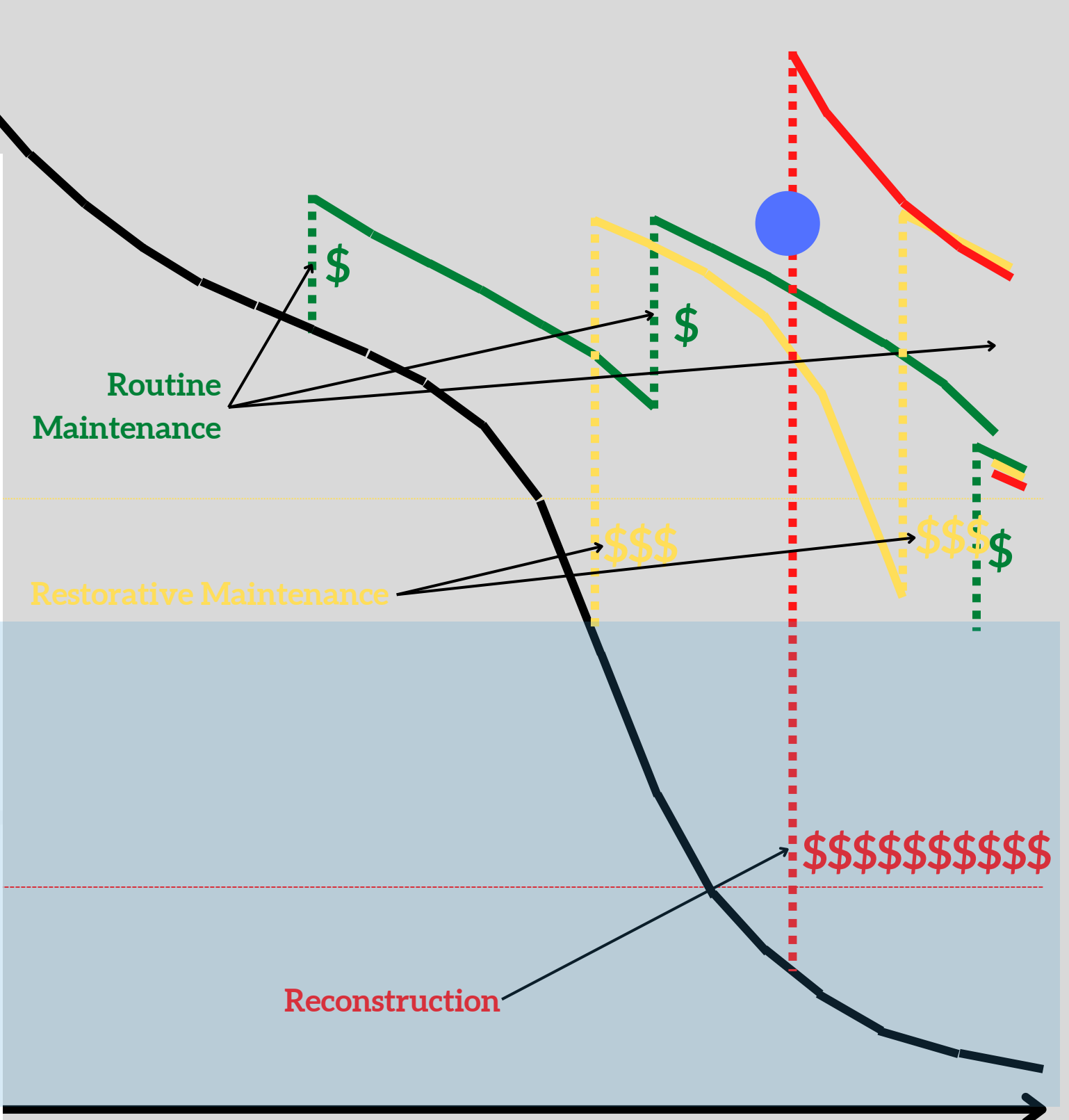
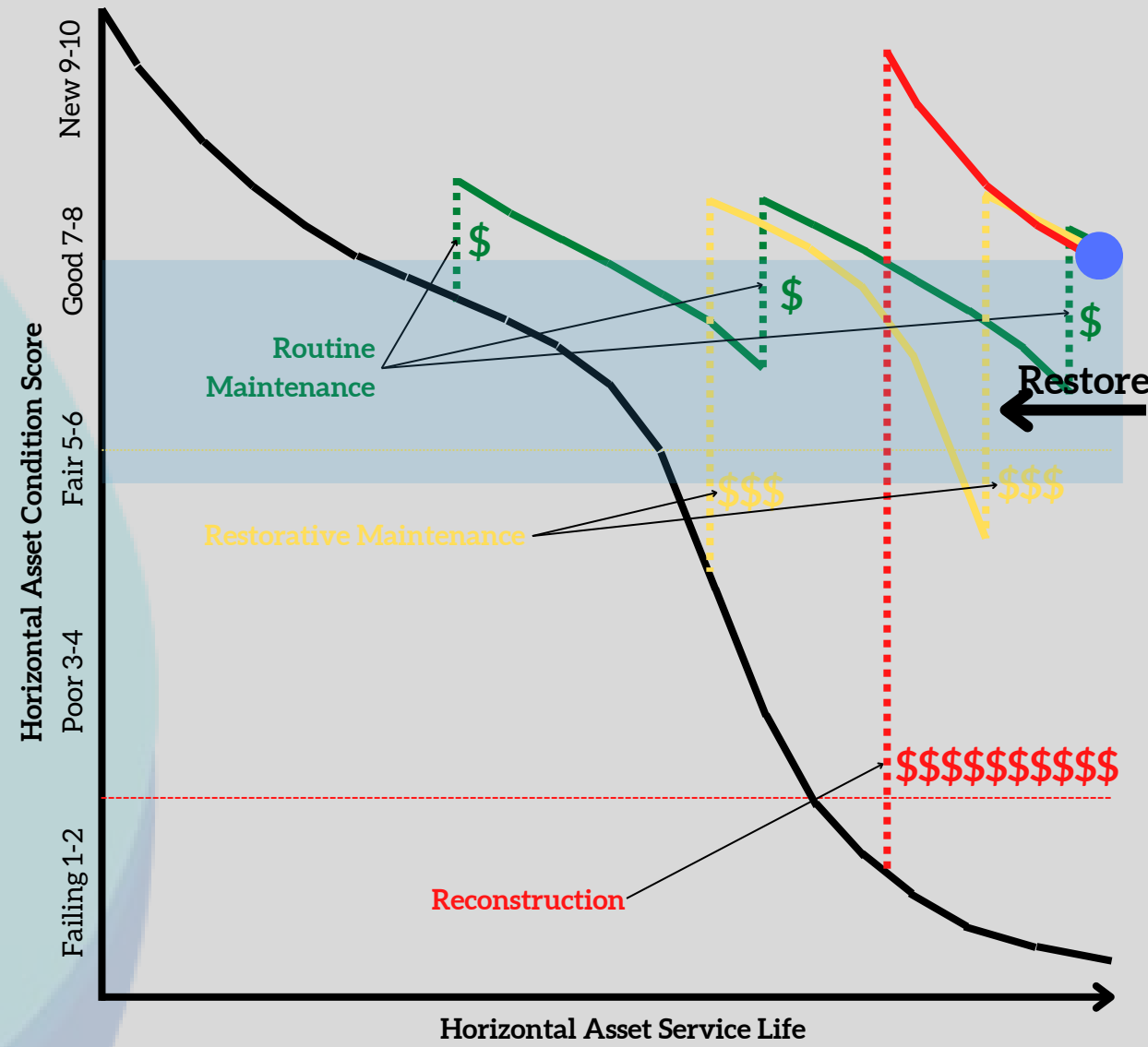


Image courtesy of Belgard Hardscapes



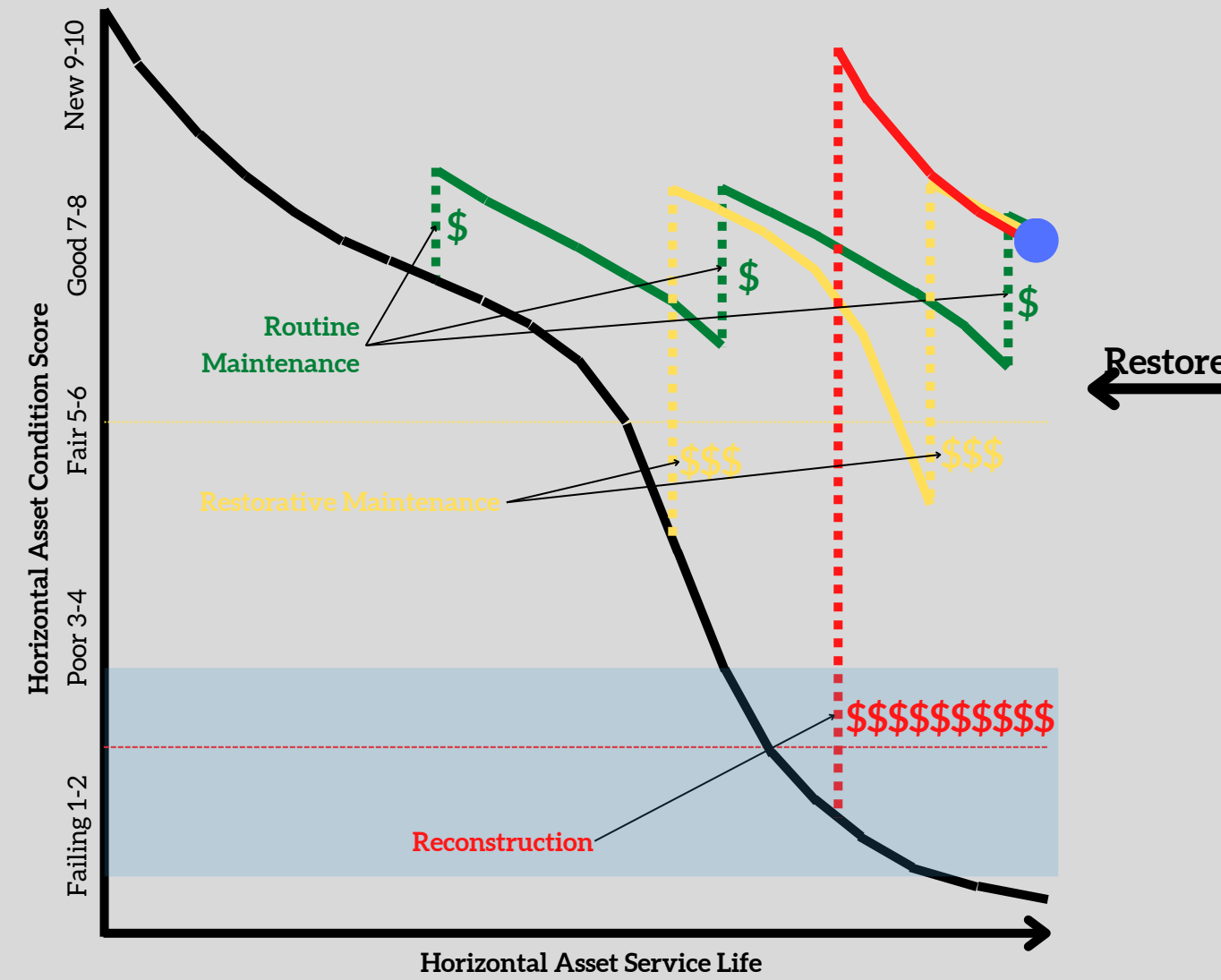
Client A: Permeable Interlocking Concrete Pavers

Client A
Pavers Noncompliant
Restoration Complete
Pavers Compliant
Routine maintenance will keep pavers compliant



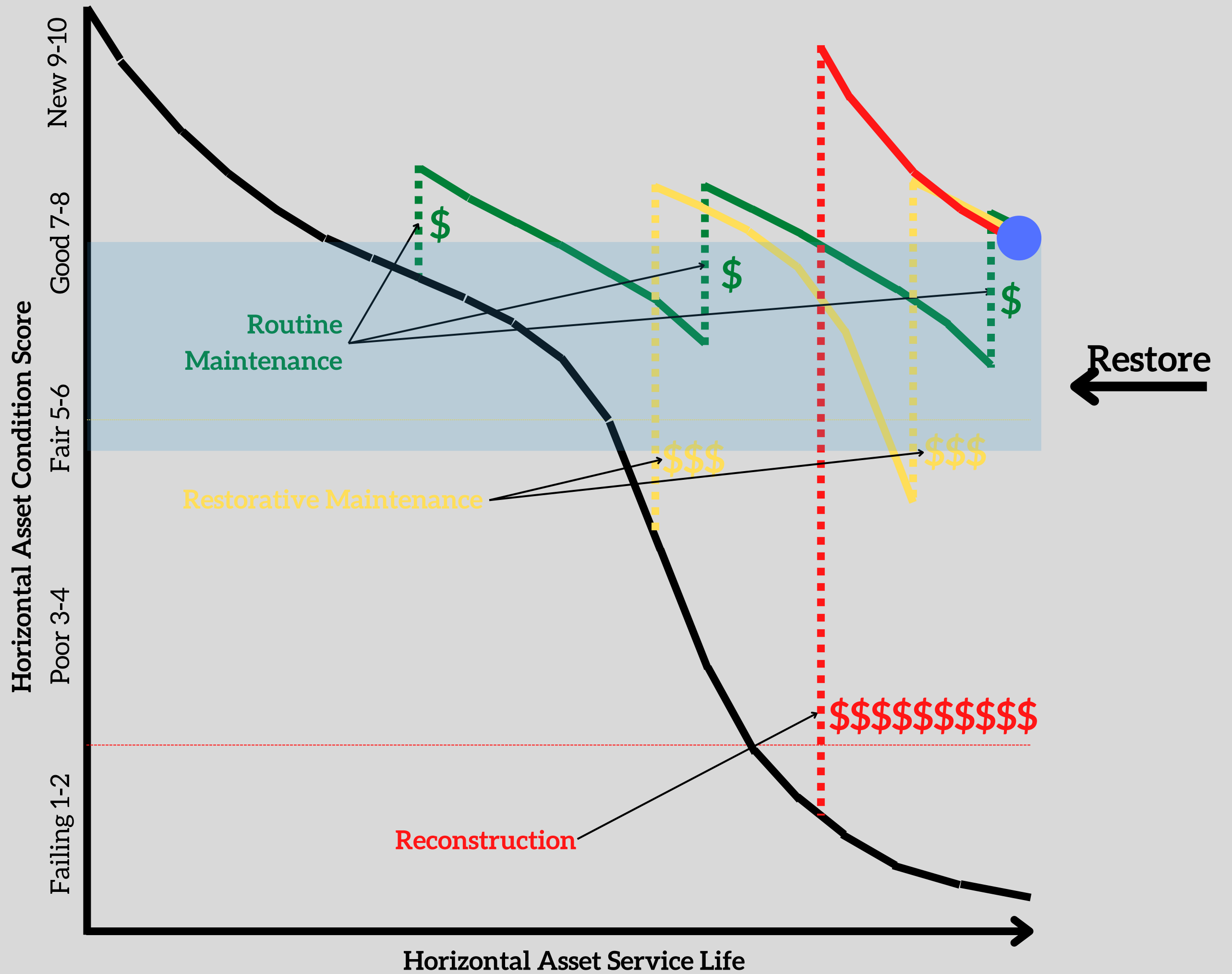
Client B: Permeable Interlocking Concrete Pavers

Client B
Pavers Noncompliant
Restoration Complete
Pavers Noncompliant
Pavers must be reconstructed to be compliant



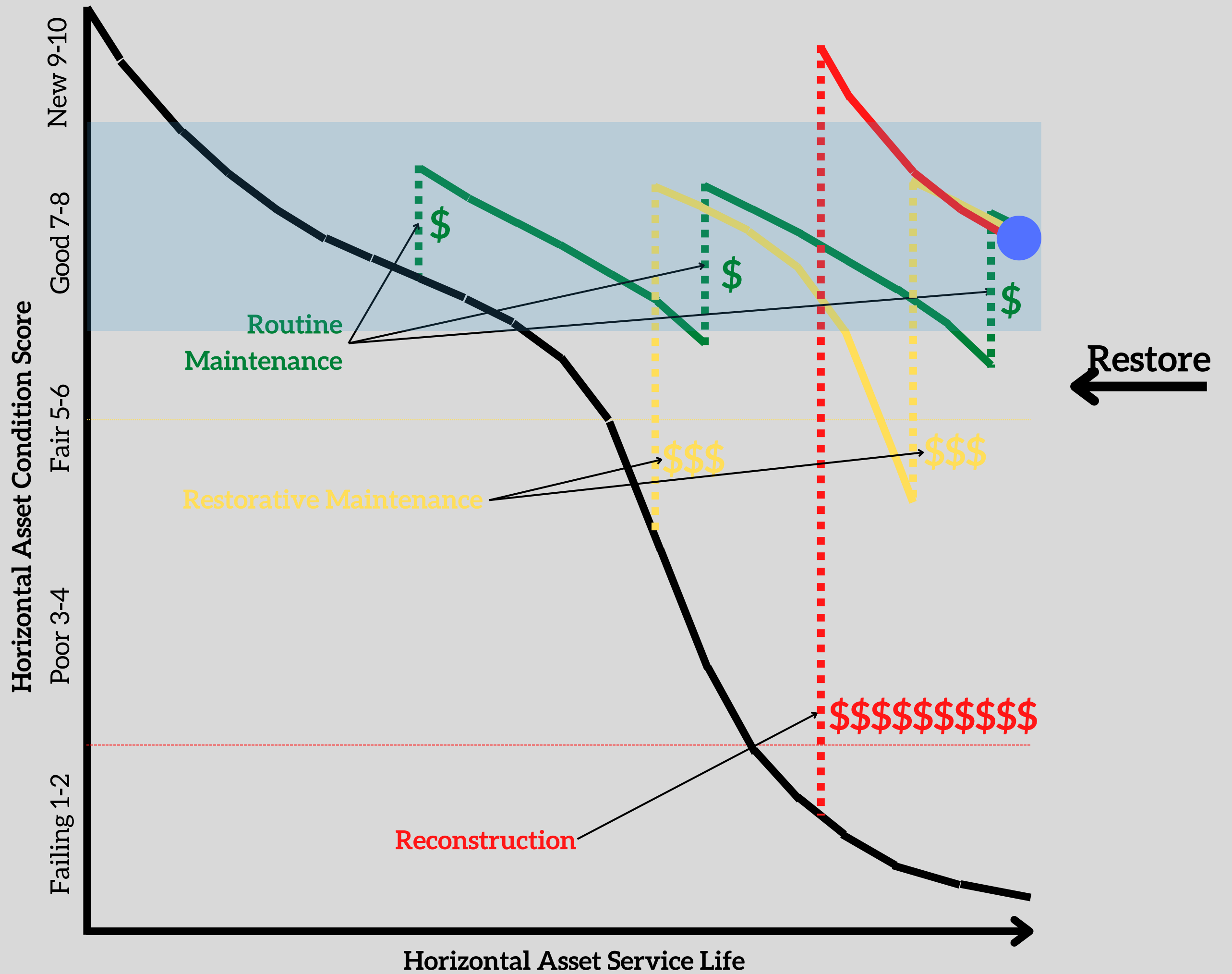
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Pavers Noncompliant
Restoration Complete
Pavers Compliant
Routine maintenance will keep pavers compliant



Client A: Permeable Interlocking Concrete Pavers

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Restoration Complete
Pavers Compliant
Routine maintenance will keep pavers compliant



Reconstruction

Restorative Maintenance

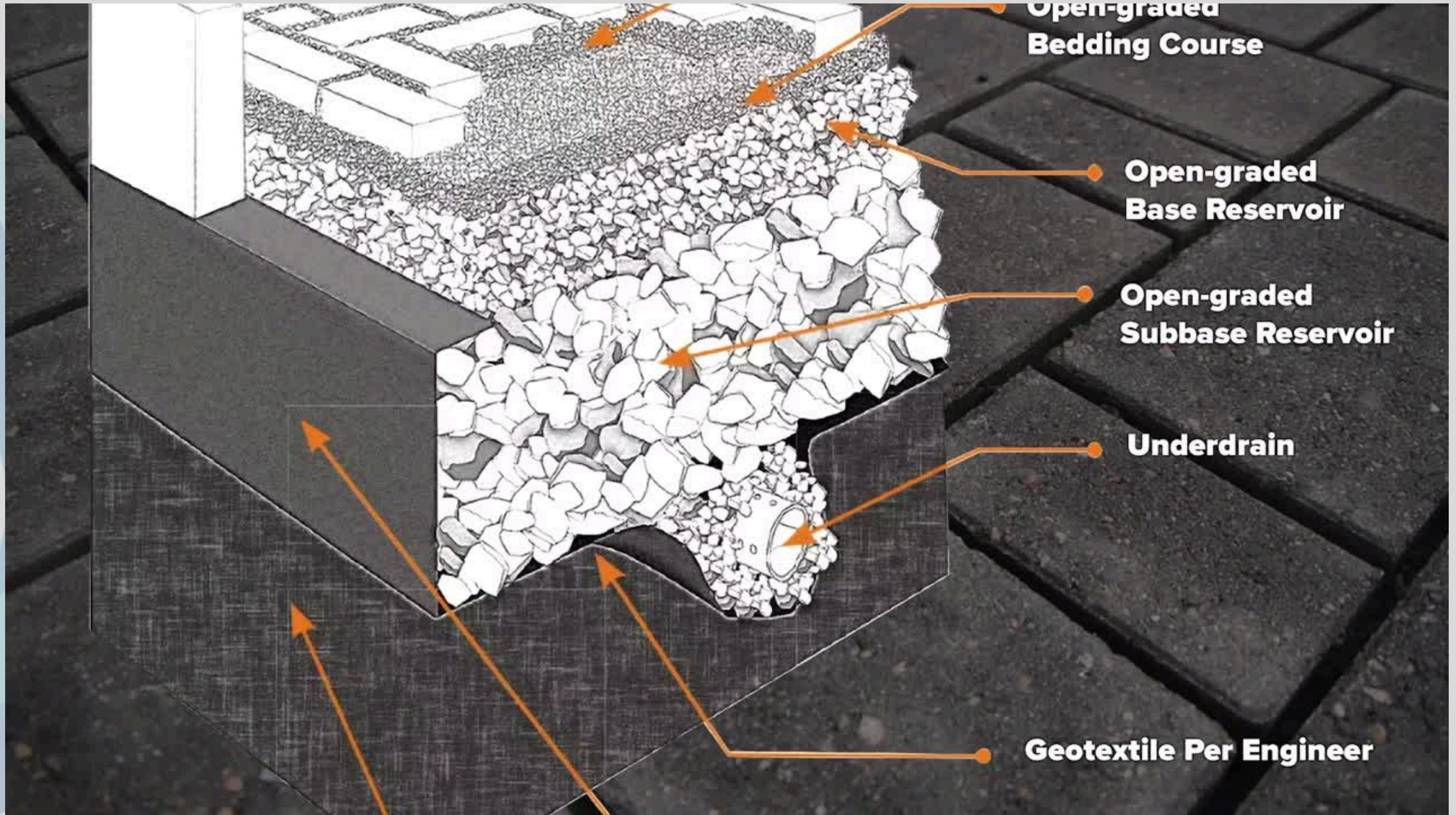
Routine Maintenance



Routine Maintenance

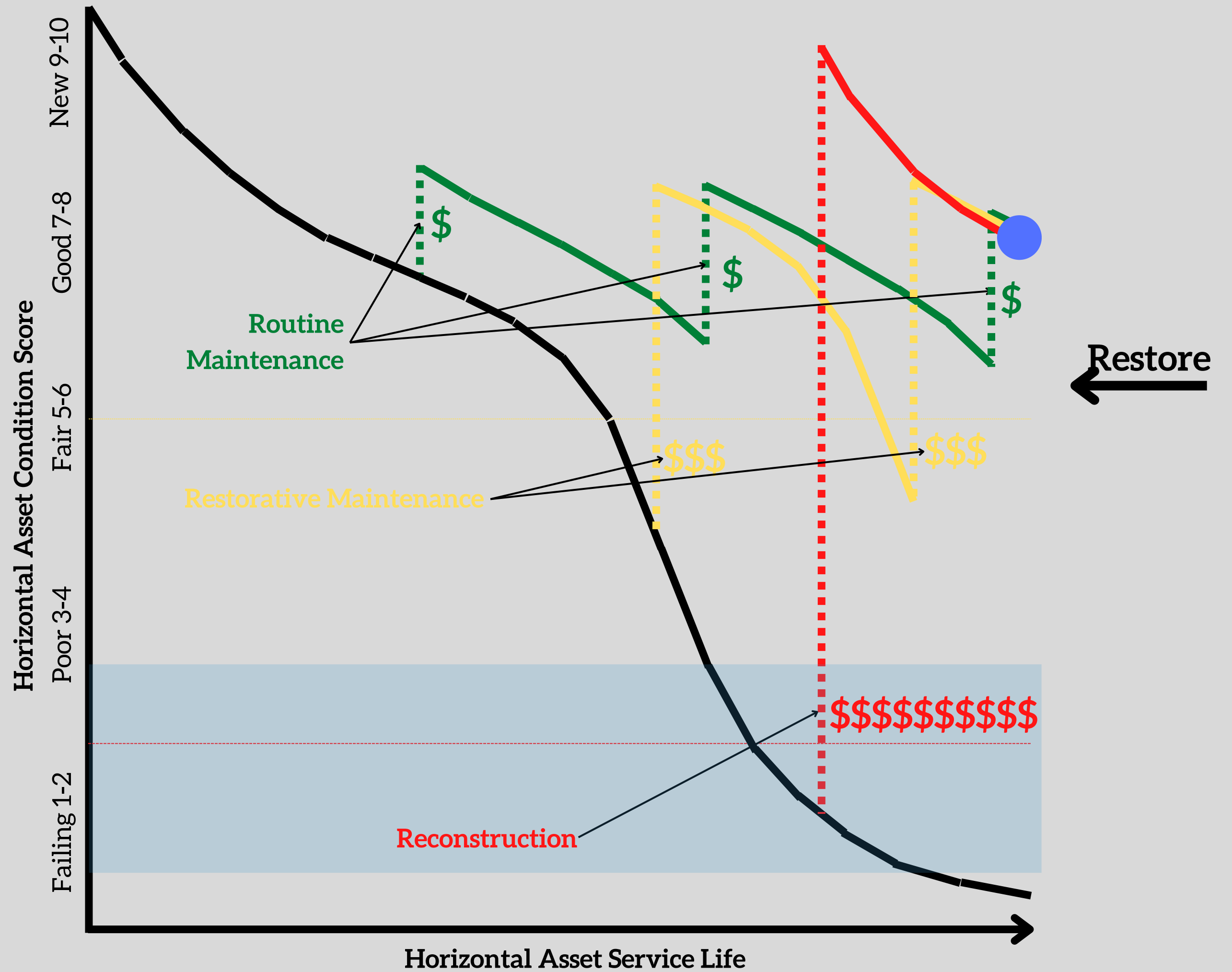
Restorative Maintenance

Reconstruction



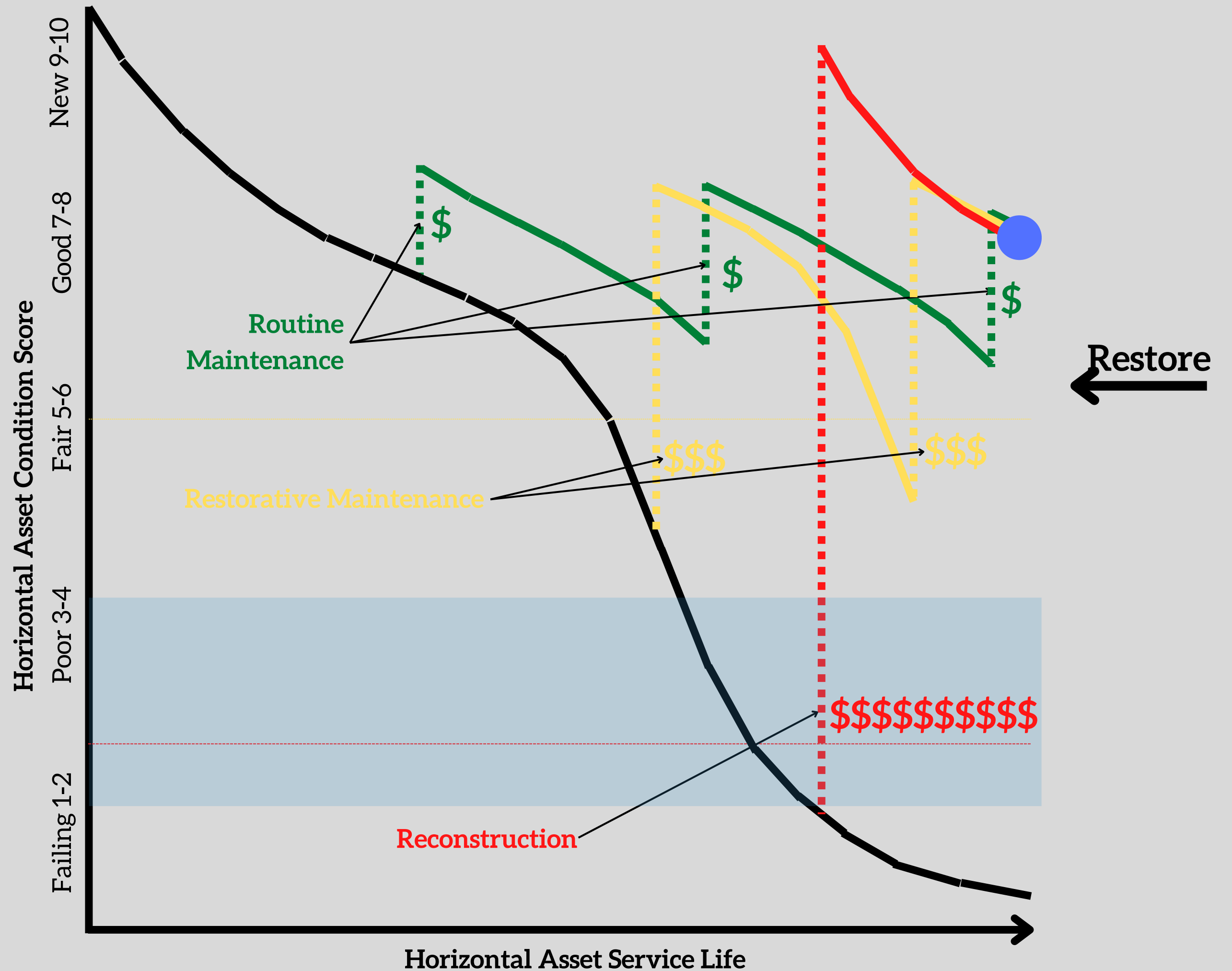
Client B: Permeable Interlocking Concrete Pavers

Client B	
Pavers Noncompliant	
Restoration Complete	
Pavers Noncompliant	
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Client B: Permeable Interlocking Concrete Pavers

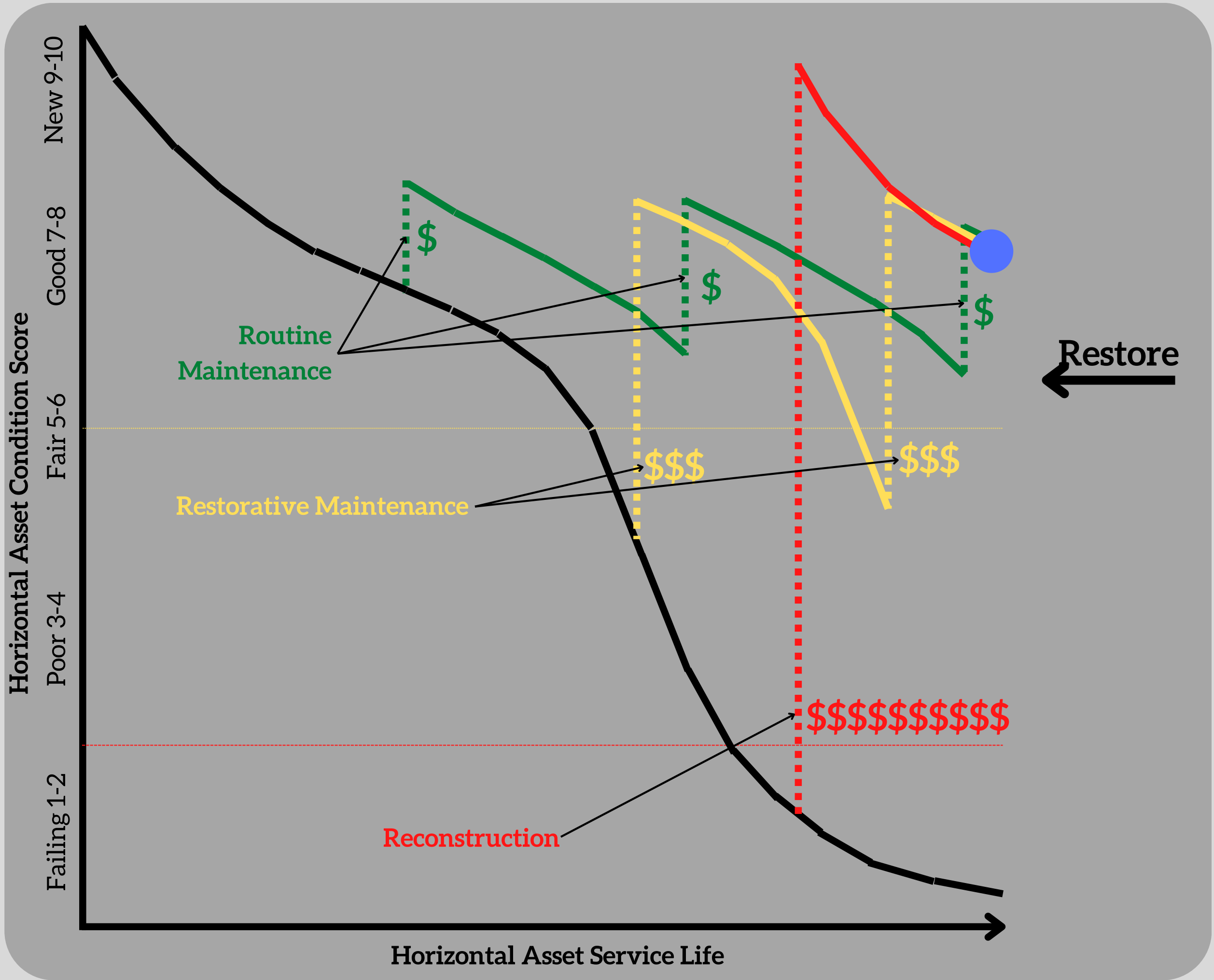
Client B	
Pavers Noncompliant	
Restoration Complete	
Pavers Noncompliant	
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Reconstruction

Restorative Maintenance

Routine Maintenance





City of Boulder Utilities

Pearl Pkwy Permeable Pavement Maintenance Trial Results

The purpose of this fact sheet is to explain permeable pavement maintenance trials and infiltration testing conducted at City of Boulder permeable pavement sites to inform future designs and maintenance efforts. Prior to the 2023 maintenance trial, the Pearl Pkwy permeable pavement facilities had received limited maintenance and were found to be substantially clogged. The goals of the maintenance trial are to (1) determine the effectiveness of maintenance approaches, (2) plan for ongoing maintenance costs, and (3) determine maintenance steps for right-of-way installations.

Refer to the [City of Boulder Owners Guide to SCM Maintenance](#) for further information.

Location: Pearl Parkway in Boulder, CO

Pearl Parkway between 30th St and the BNSF railroad was reconstructed in 2014 to integrate a multi-use path and improved access to the Boulder Junction development sites by incorporating off street multiway boulevards. The 24 parking stalls of the boulevard lanes are permeable pavement systems designed to capture stormwater runoff.

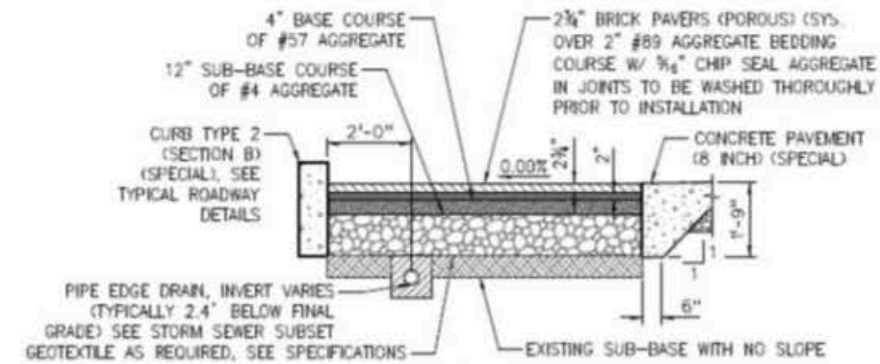


Figure 1. Pearl Pkwy Permeable Pavement Cross Section

Maintenance Actions

The Pearl Pkwy permeable pavement maintenance trial is evaluating three levels of maintenance intervention:

1. **Removal and Reinstallation:** Remove existing pavers, clean underlying debris buildup, reinstall 2" of clean bedding layer, and replace pavers and joint aggregate. Unit Cost Range: \$8-\$10/ft².
2. **Restorative:** Remove debris buildup from joints by pressure washing and using a high-pressure vacuum, then replace joint aggregate. Unit Cost Range: \$3-\$4/ft².
3. **Routine:** Sweep and vacuum using a regenerative air street sweeper and lawn/debris vacuum in tighter areas at 6-month intervals in 2024 and 2025 following initial maintenance actions. Unit Cost Range: \$0.50-\$1/ft².



City of Boulder Utilities

Pearl Pkwy Permeable Pavement Maintenance Trial Results

The purpose of this fact sheet is to explain permeable pavement maintenance trials and infiltration testing of Boulder permeable pavement sites to inform future designs and maintenance efforts. Prior to the 2014 reconstruction, the Pearl Pkwy permeable pavement facilities had received limited maintenance and were found to be in poor condition. The goals of the maintenance trial are to (1) determine the effectiveness of maintenance approaches, (2) determine maintenance costs, and (3) determine maintenance steps for right-of-way installations.

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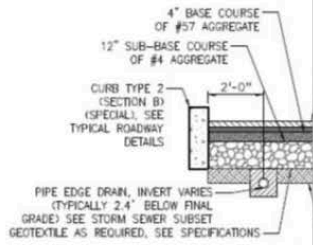


Figure 1. Pearl Pkwy Permeable Pavement Cross-Section

Maintenance Actions

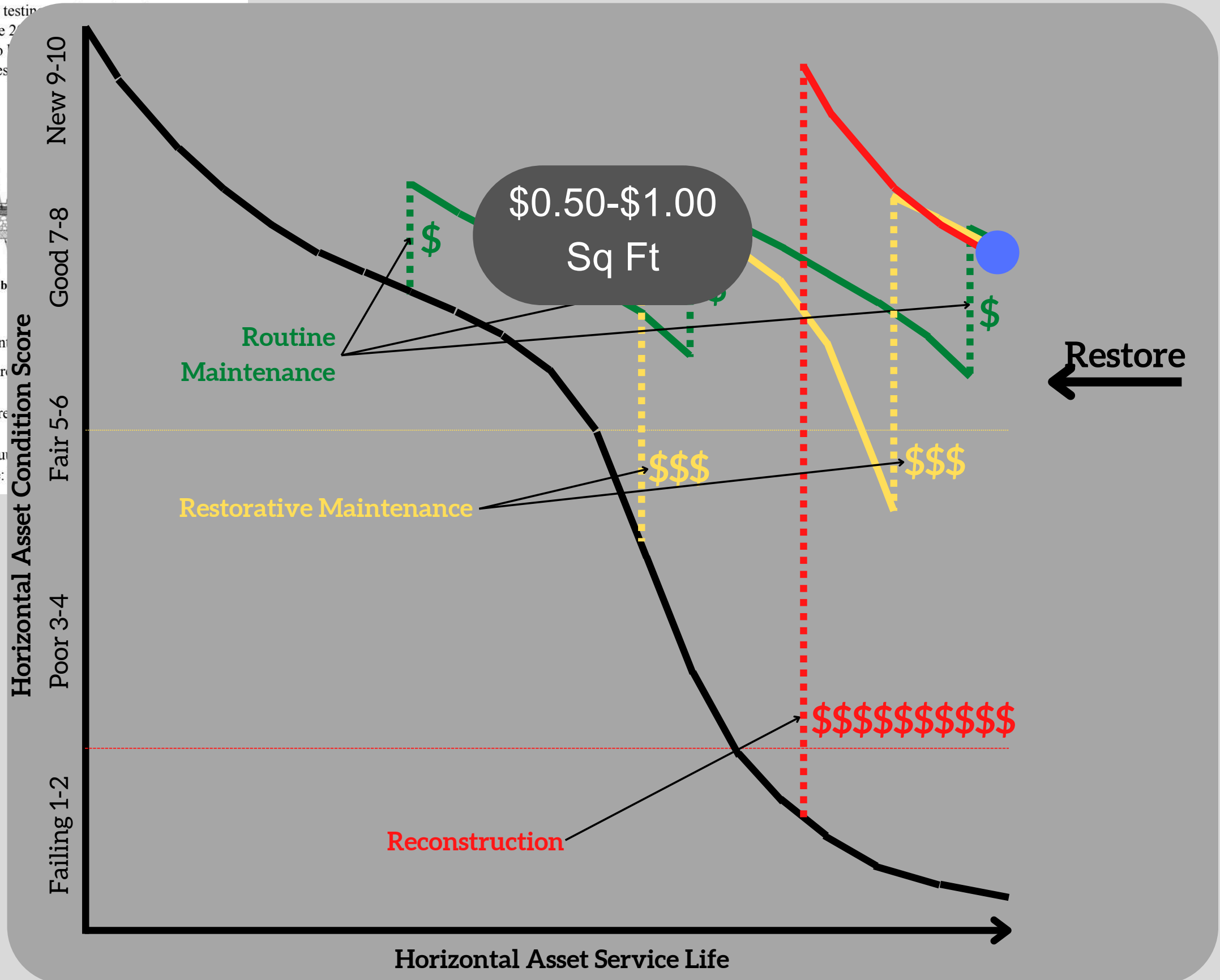
The Pearl Pkwy permeable pavement maintenance trial is evaluating three levels of maintenance in 2024 and 2025 following initial maintenance actions. Unit Cost Range:

- 1. Removal and Reinstallation:** Remove existing pavers, clean underlying debris buildup, re-prepare bedding layer, and replace pavers and joint aggregate. Unit Cost Range: \$8-\$10/ft².
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Routine Maintenance

Restorative Maintenance

Reconstruction



Routine Maintenance

Restorative Maintenance

Reconstruction



City of Boulder Utilities

Pearl Pkwy Permeable Pavement Maintenance Trial Results

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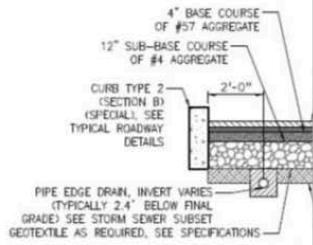
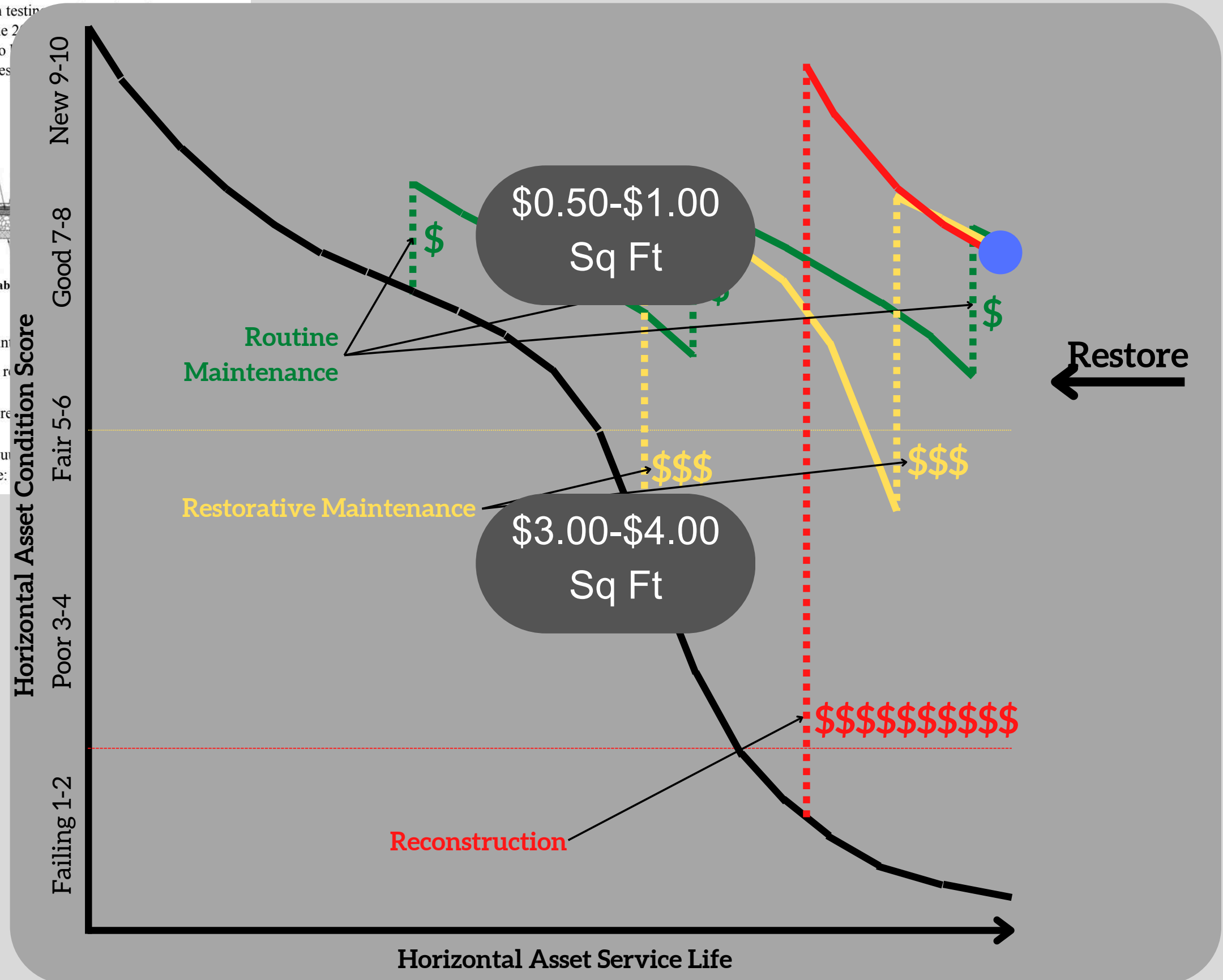


Figure 1. Pearl Pkwy Permeable Pavement Cross-Section

Maintenance Actions

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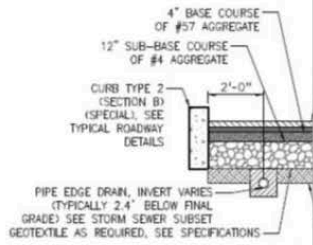
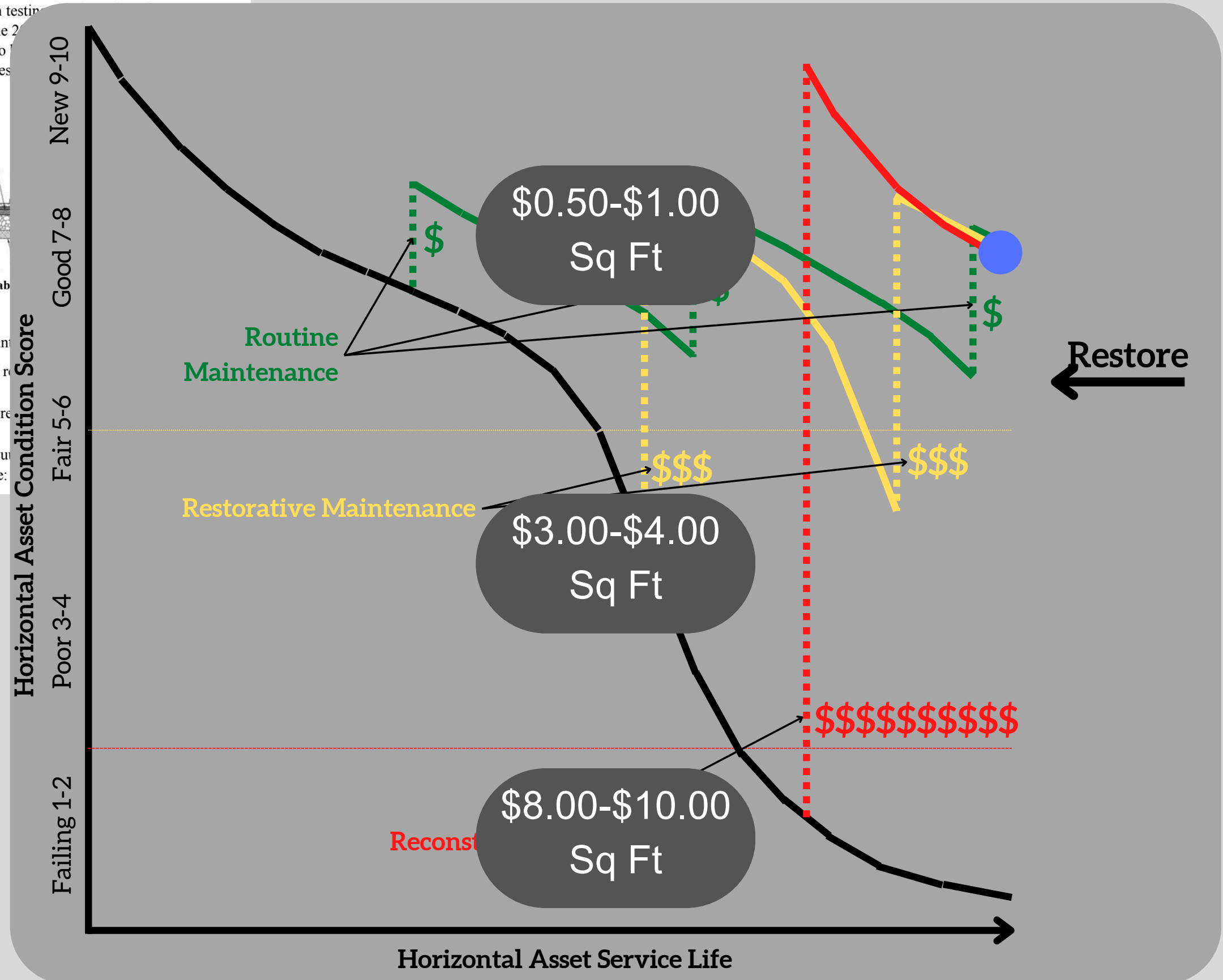


Figure 1. Pearl Pkwy Permeable Pavement

Maintenance Actions

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Timeline

Routine Maintenance

Restorative Maintenance

Reconstruction

Client A
Pavers Noncompliant
Restoration Complete
Pavers Compliant
Routine maintenance will keep pavers compliant
Pavers Compliant
Routine maintenance will keep pavers compliant

Client B
Pavers Noncompliant
Restoration Complete
Pavers Noncompliant
Pavers must be reconstructed to be compliant
Reconstruct Pavers
Defer Maintenance
Pavers Noncompliant
Defer Maintenance
Reconstruct Pavers

Timeline

Routine Maintenance

Client A
Pavers Noncompliant
Restoration Complete
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Routine maintenance will keep pavers compliant
Pavers Compliant
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Restorative Maintenance

Client B
Pavers Noncompliant
Restoration Complete
Pavers Noncompliant
Pavers must be reconstructed to be compliant
Reconstruct Pavers
Defer Maintenance
Pavers Noncompliant
Defer Maintenance
Reconstruct Pavers

Reconstruction

Cost Example (Standardized Paver Area)

Type of Service	Cost/ Sq Ft.	Example Paver Area (Sq Ft)	Total
Routine Maintenance	\$0.75	12,000	\$9,000.00
Restoration	\$3.50	12,000	\$42,000.00
Reconstruction	\$9.00	12,000	\$108,000.00

Case Study 2: Neverending Detention Pond Restoration



Case Study 2: Neverending Detention Pond Restoration

Service	Description	Quantity	Unit Price	Cost
Restorative Maintenance	Spring 2023 Bi-annual detention pond maintenance within the Front Range Village	1	\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Fall 2023 Bi-annual detention pond maintenance within the Front Range Village	1	\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Spring 2024 Bi-annual detention pond maintenance within the Front Range Village	1	\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Fall 2024 Bi-annual detention pond maintenance within the Front Range Village	1	\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Spring 2025 Bi-annual detention pond maintenance within the Front Range Village	1	\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Fall 2025 Bi-annual detention pond maintenance within the Front Range Village	1	\$ 8,280.00	\$ 8,280.00

Case Study 2: Neverending Detention Pond Restoration

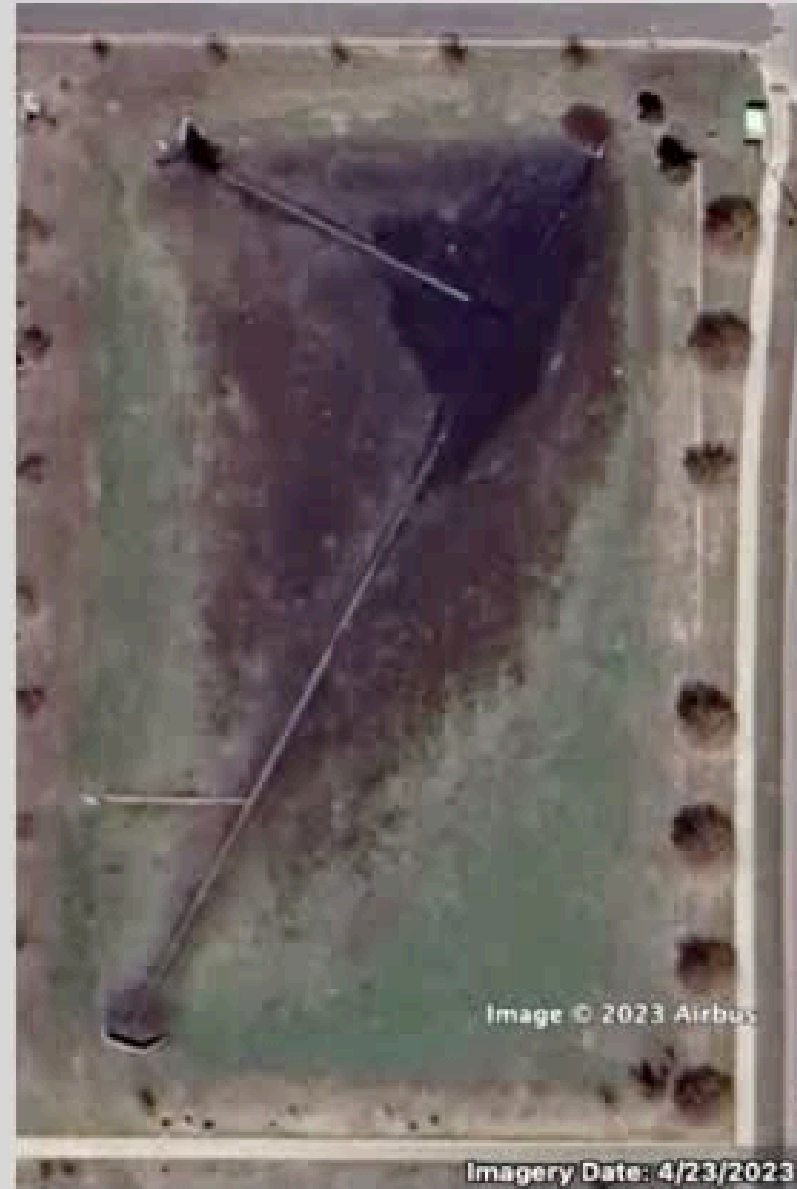
It is likely that the existing sediment within the pond will re-suspend each year, causing clogging issues until the restorative maintenance service is complete

Service	Description			
Restorative Maintenance	Spring 2023 Bi-annual detention pond maintenance at the Front Range Village		\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Fall 2023 Bi-annual detention pond maintenance at Front Range Village		\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Spring 2024 Bi-annual detention pond maintenance at the Front Range Village		\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Fall 2024 Bi-annual detention pond maintenance at Front Range Village	1	\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Spring 2025 Bi-annual detention pond maintenance at the Front Range Village	1	\$ 8,280.00	\$ 8,280.00
Restorative Maintenance	Fall 2025 Bi-annual detention pond maintenance with Front Range Village	1	\$ 8,280.00	\$ 8,280.00
Project Notes:				
1. The basic maintenance service is not intended to create a condition of a dry pond bottom. It is likely that the existing sediment within the pond will re-suspend each year, causing clogging issues until the restorative maintenance service is completed.				
2. Sustainable Runoff Solutions does not take any responsibility for storm drainage infrastructure failure as a result of a deficiency of maintenance over the life span of the infrastructure.				

6/11/21 right before
first SRS
maintenance 7/21



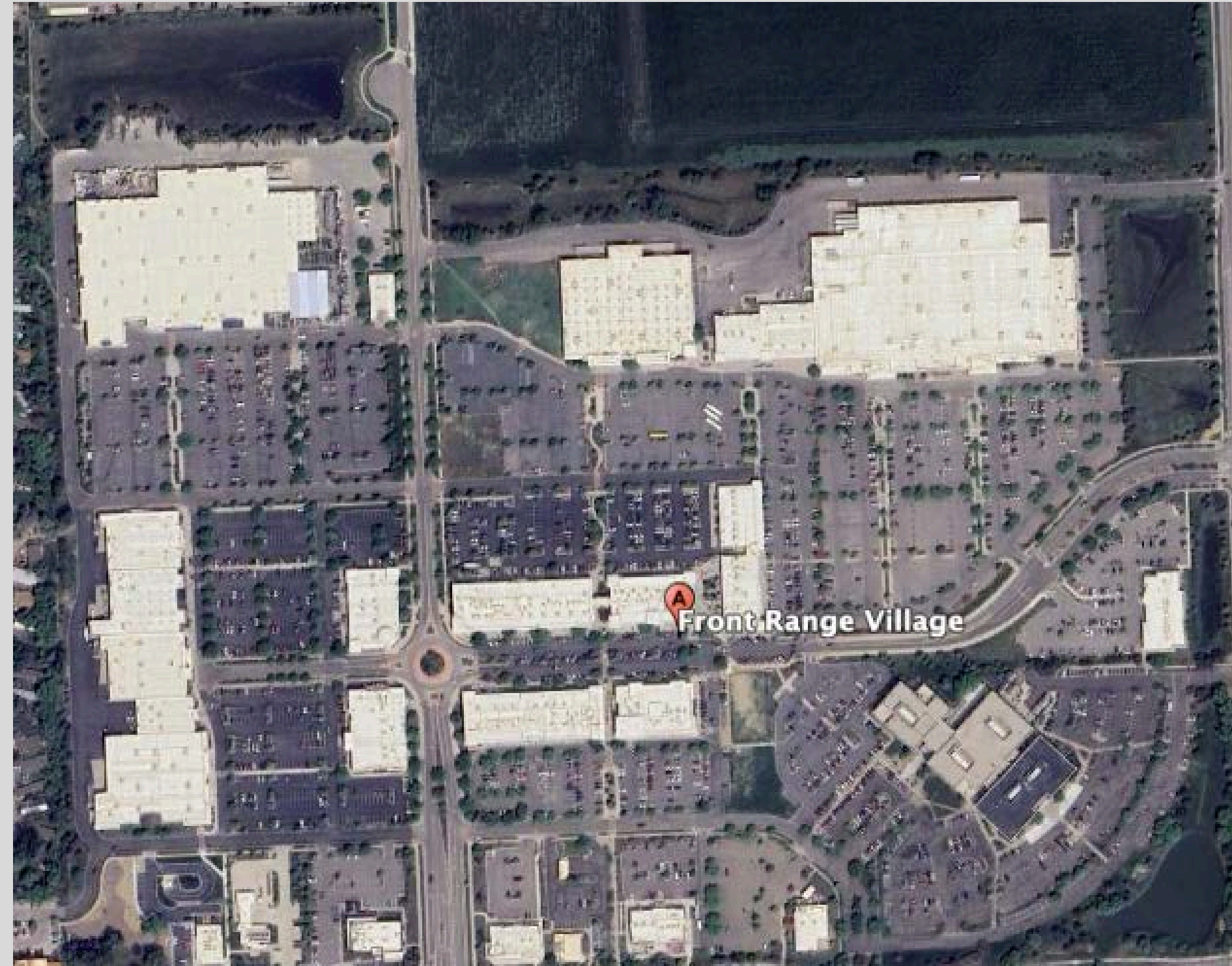
4/23/23 right before
4th SRS
maintenance 5/9



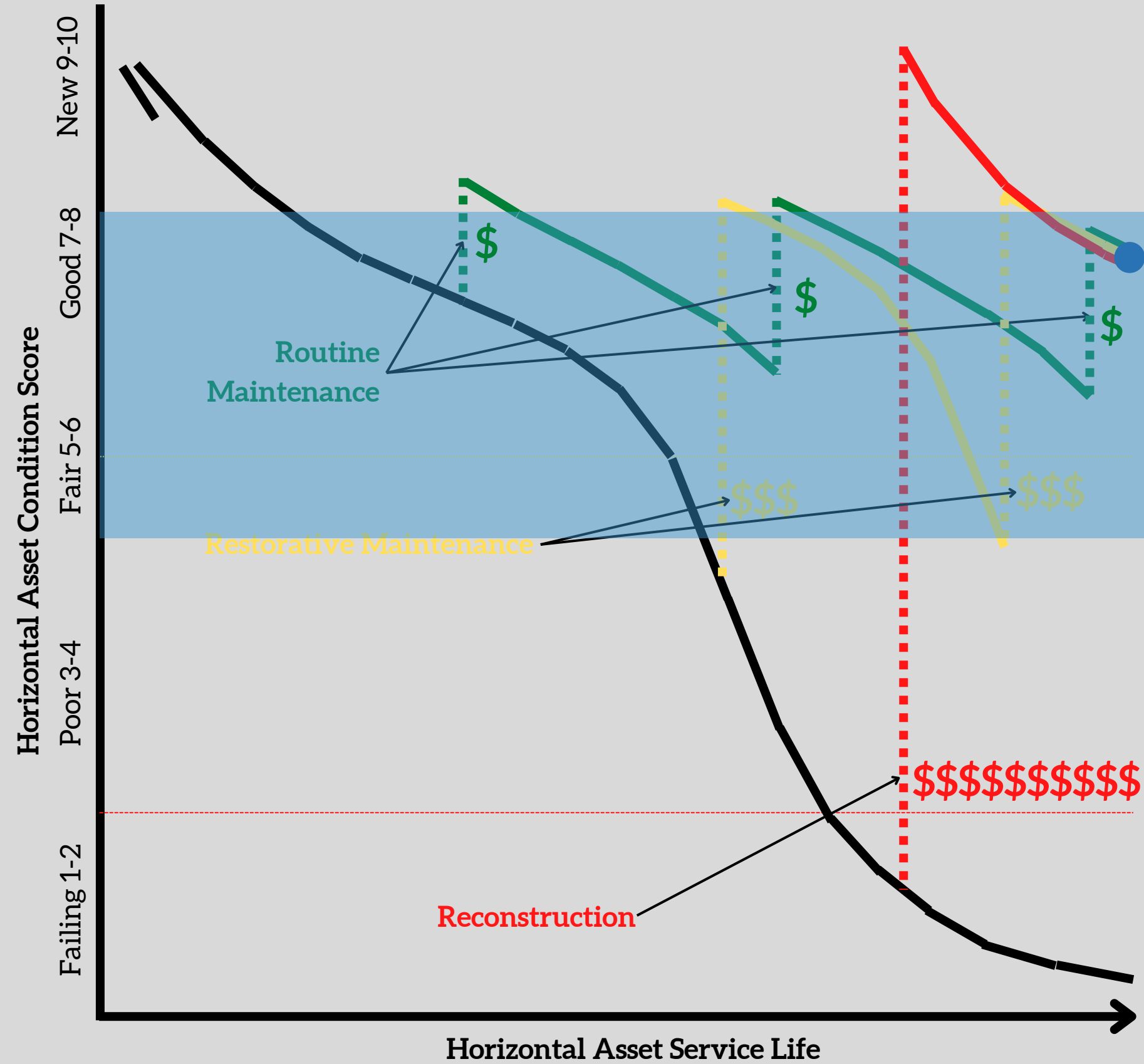
5/22/23 right after
4th SRS
maintenance 5/9



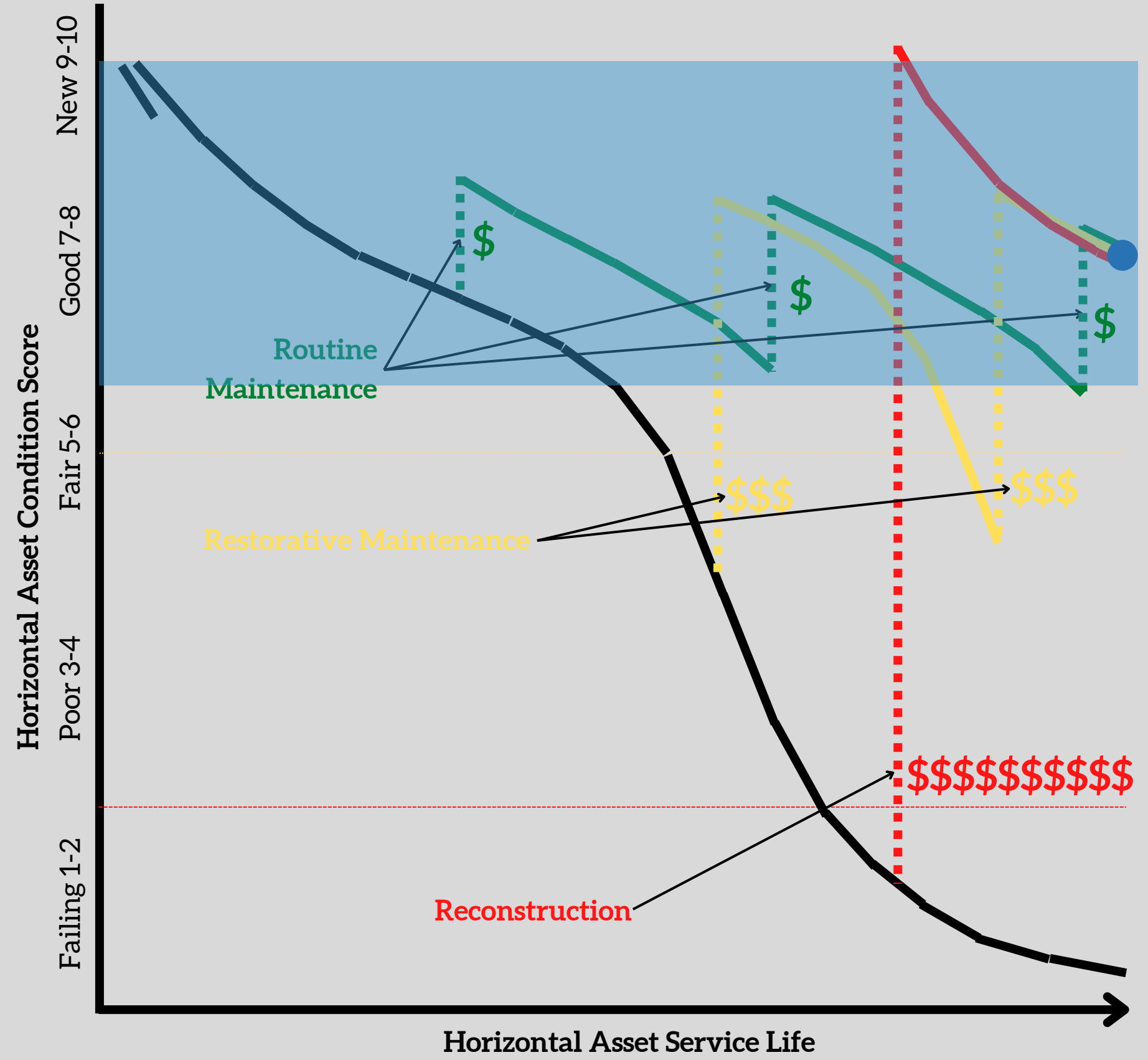
Case Study 2: Neverending Detention Pond Restoration



Case Study 2: Neverending Detention Pond Restoration



Case Study 2: Neverending Detention Pond Restoration



Case Study 2: Neverending Detention Pond Restoration

Strategy	Project	Short term additional costs	Lifetime maintenance costs	Pond Condition
Current maintenance schedule	Bi-Annual pond clean-outs with no pond improvements or source control		Higher due to ongoing <i>restorative</i> maintenance costs	Maintaining current condition

Case Study 2: Neverending Detention Pond Restoration

Strategy	Project	Short term additional costs	Lifetime maintenance costs	Pond Condition
Current maintenance schedule	Bi-Annual pond clean-outs with no pond improvements or source control		Higher due to ongoing restorative maintenance costs	Maintaining current condition
Current maintenance schedule + Improve the ponds	Add compliant Trash Rack to Zeigler Pond	\$\$	Lower after pond is full restored due to ongoing routine maintenance costs	Improved operations, improved aesthetics, more compliant
	Add compliant Trash Rack to Lowe's Pond	\$\$		

Case Study 2: Neverending Detention Pond Restoration

Strategy	Project	Short term additional costs	Lifetime maintenance costs	Pond Condition
Current maintenance schedule	Bi-Annual pond clean-outs with no pond improvements or source control		Higher due to ongoing <i>restorative</i> maintenance costs	Maintaining current condition
Current maintenance schedule + Improve the ponds	Add compliant Trash Rack to Zeigler Pond	\$\$	Lower after pond is full restored due to ongoing <i>routine</i> maintenance costs	Improved operations, improved aesthetics, more compliant
	Add compliant Trash Rack to Lowe's Pond	\$\$		
Current maintenance schedule + Improve the ponds + Reduce incoming sediment	Source Control Audit	\$? *increases the chances of full pond restoration and lowered ongoing maintenance costs but increases sweeping program costs	Optimized operations and aesthetics, most compliant
	Modified Sweeping Schedule based on audit	\$\$-\$???		
	Modified Landscaping S.O.P. based on audit	\$\$-\$???		
	Modified snow removal S.O.P. based on audit	\$\$-\$???		



Condition Scoring Terms

Case Study 1

Case Study 2

Case Study 3

Case Study 4

Questions

Case Study 2: Neverending Detention Pond Restoration

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Condition Scoring Terms

Case Study 1

Case Study 2

Case Study 3

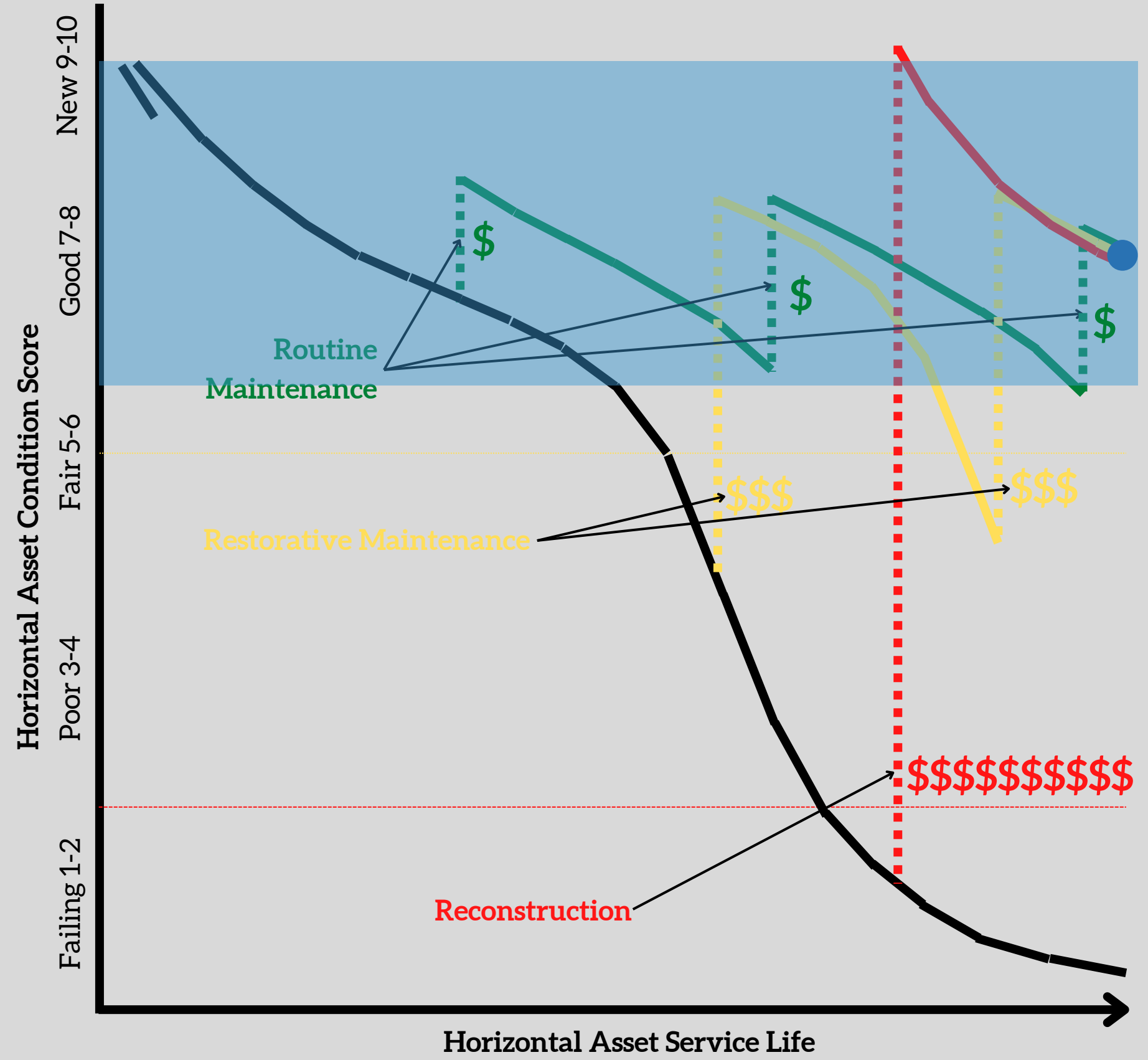
Case Study 4

Questions

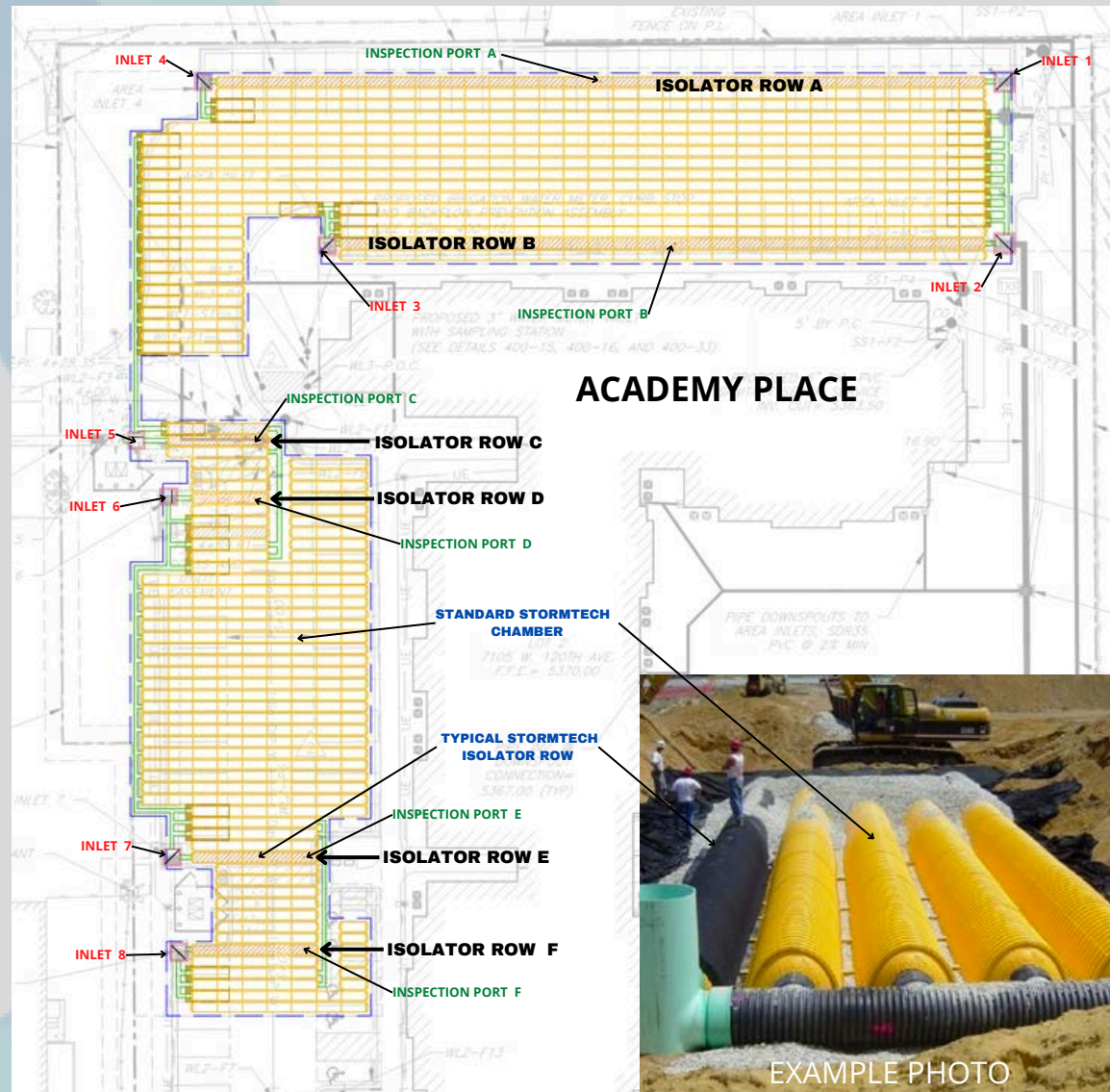
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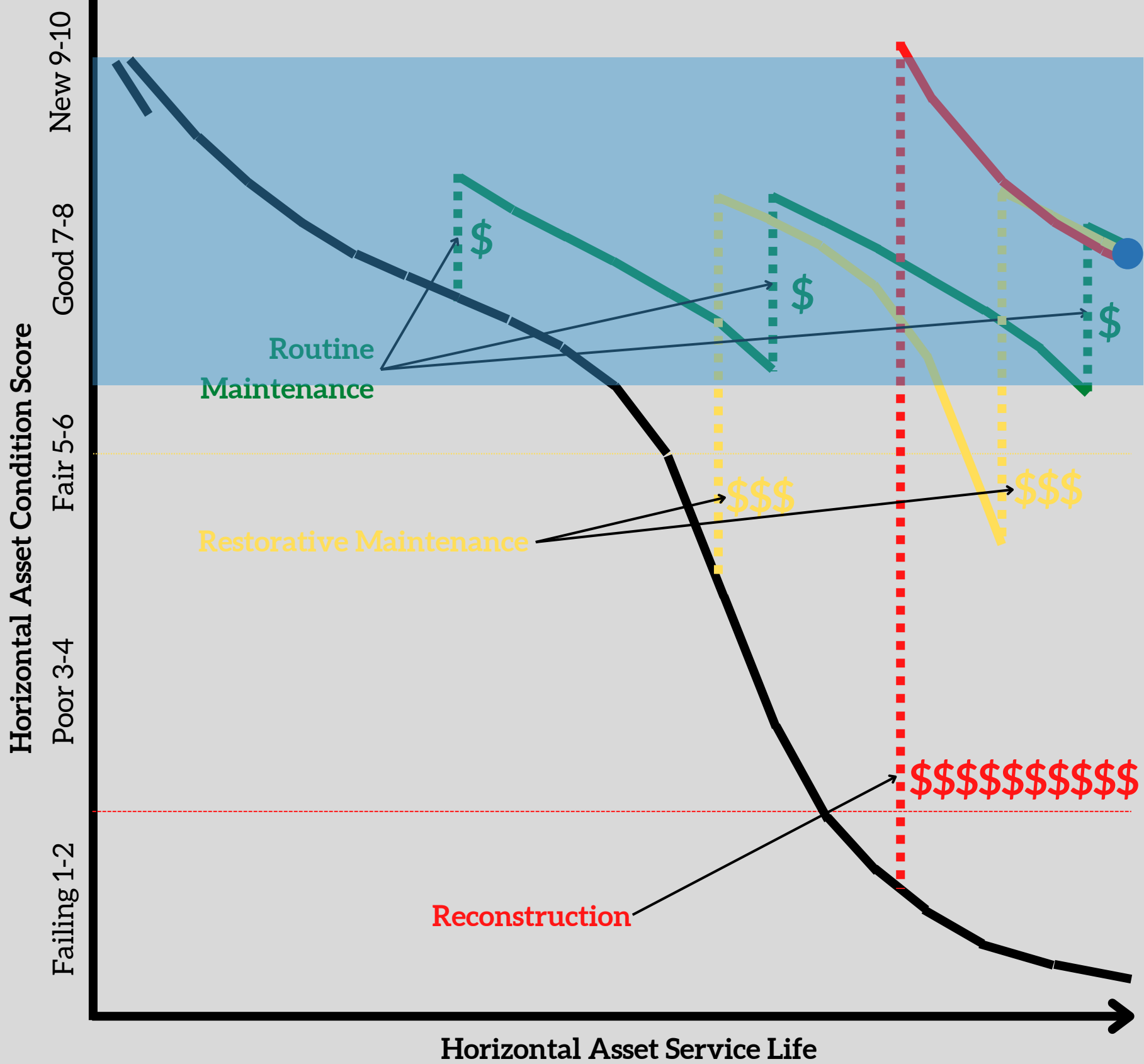
Case Study 2: Neverending Detention Pond Restoration




Case Study 3: Design (and hand-off!) with the End in Mind



Case Study 3: Design (and hand-off!) with the End in Mind





Case Study 3: Design (and hand-off!) with the End in Mind

Client A:	Nonstandard MS4 Permit Administration
Lesson:	Perform construction SWMP inspections with an eye toward long-term operation and maintenance of drainage systems

Case Study 3: Design (and hand-off!) with the End in Mind


Client A:	Nonstandard MS4 Permit Administration
Lesson:	Perform construction SWMP inspections with an eye toward long-term operation and maintenance of drainage systems



Case Study 3: Design (and hand-off!) with the End in Mind

Client A:	Nonstandard MS4 Permit Administration
Lesson:	Perform construction SWMP inspections with an eye toward long-term operation and maintenance of drainage systems

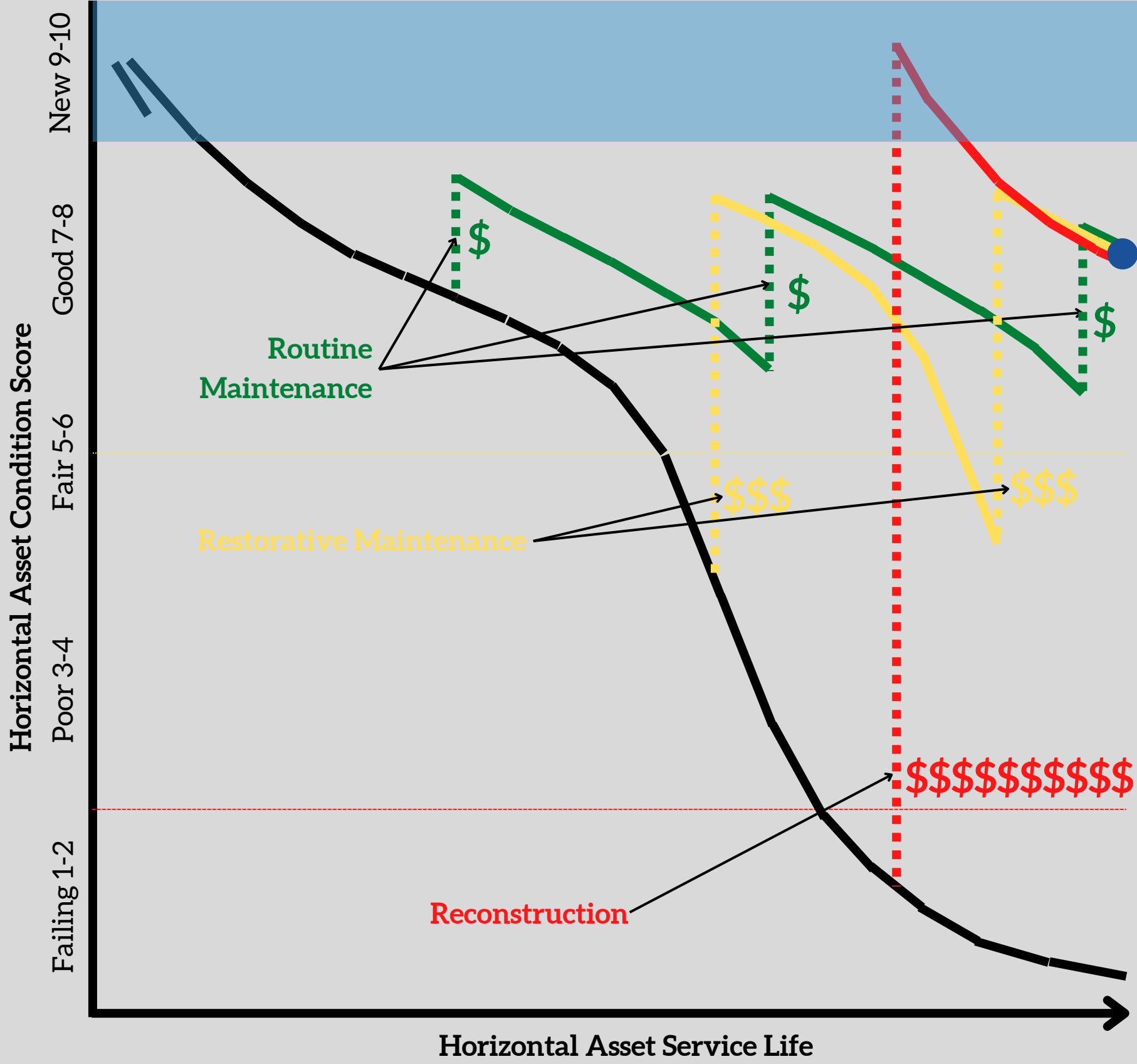




Case Study 3: Design (and hand-off!) with the End in Mind

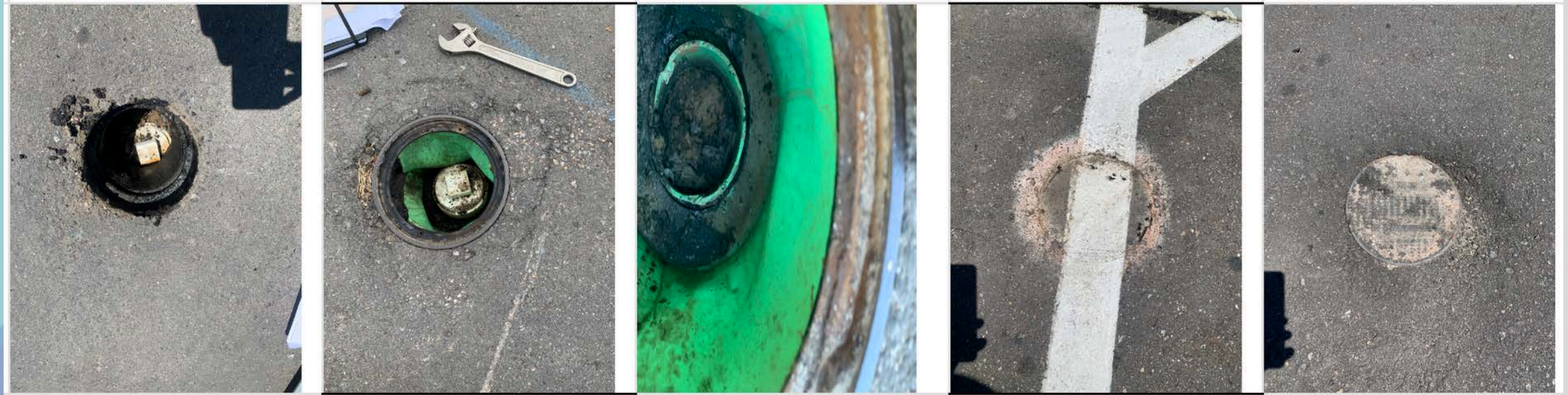
Client B:	Underground SCM with 6 Isolator Rows
Lesson:	Inspect assets while under warranty, inspect SCM access after projects like paving

Case Study 3: Design (and hand-off!) with the End in Mind



Case Study 3: Design (and hand-off!) with the End in Mind

Client B:	Underground SCM with 6 Isolator Rows
Lesson:	Inspect assets while under warranty, inspect SCM access after projects like paving



Case Study 3: Design (and hand-off!) with the End in Mind

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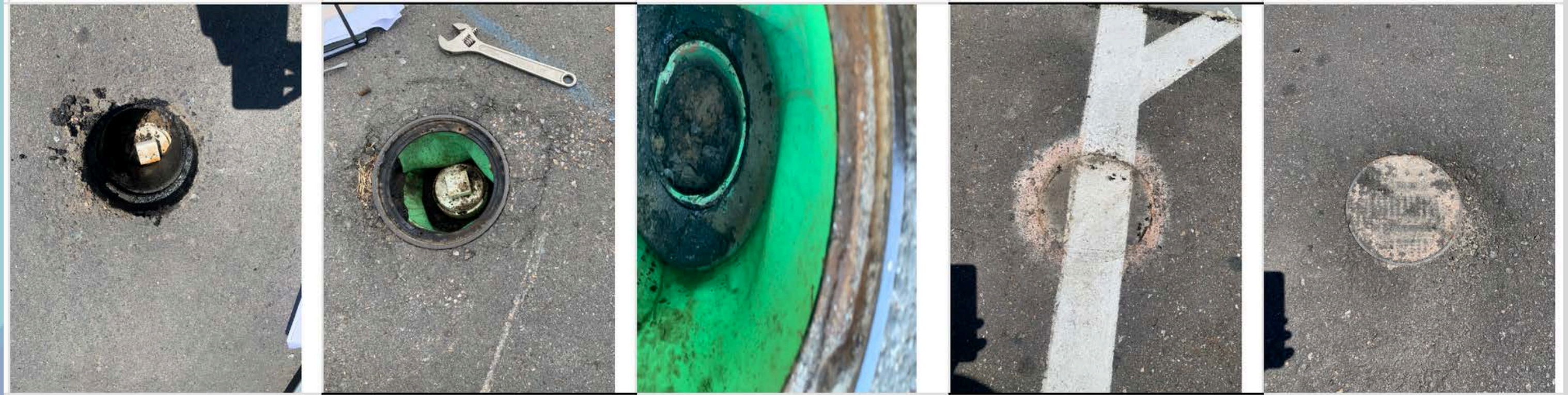
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Design (and hand-off!)
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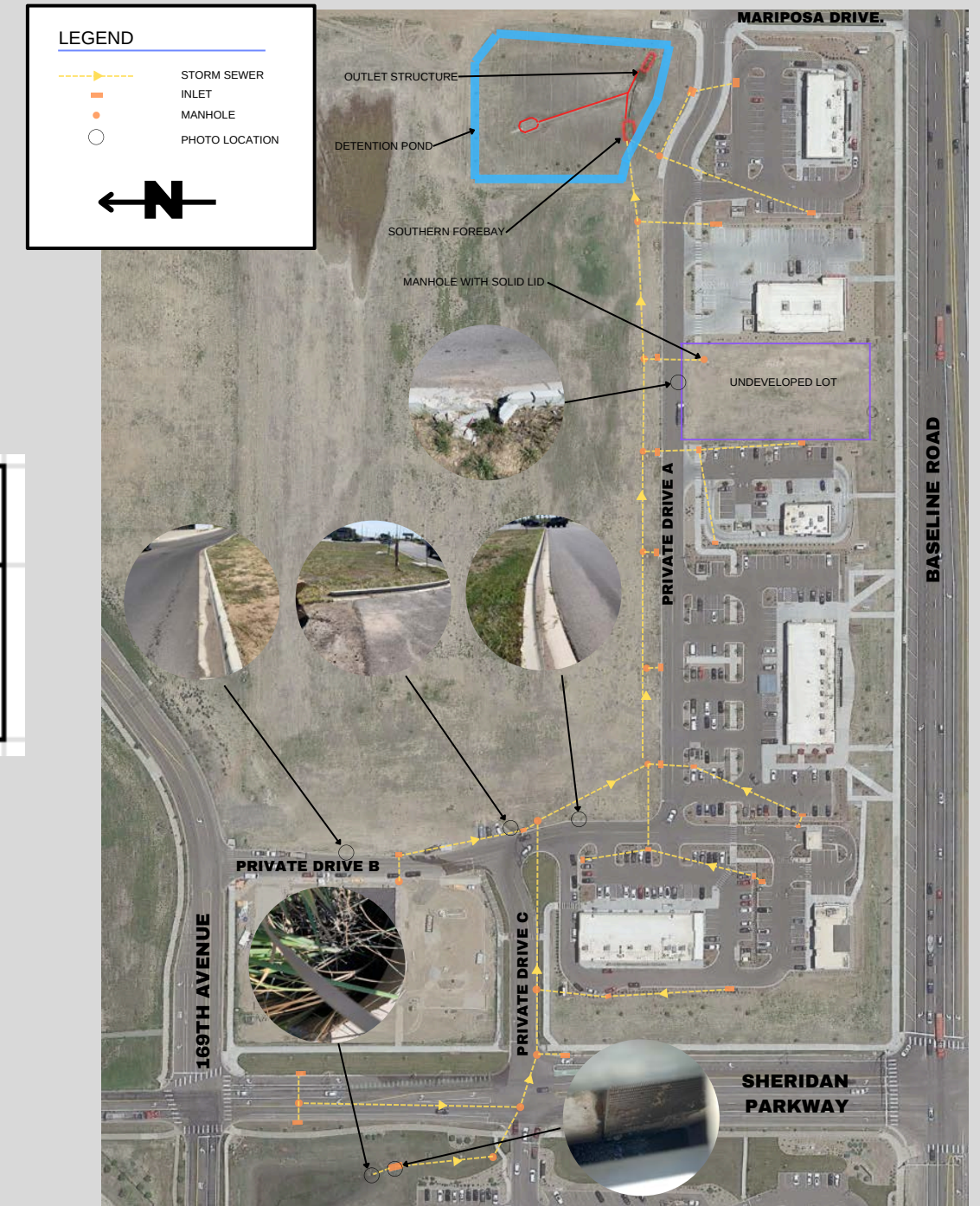
Case Study 3: Design (and hand-off!) with the End in Mind

Client B:	Underground SCM with 6 Isolator Rows
Lesson:	Inspect assets while under warranty, inspect SCM access after projects like paving



Case Study 3: Design (and hand-off!) with the End in Mind





Client C:	Developer on jurisdictional boundary
Lesson:	Audit the source of sediment and use contractors strategically




Case Study 3: Design (and hand-off!) with the End in Mind

Client C:	Developer on jurisdictional boundary
Lesson:	Audit the source of sediment and use contractors strategically

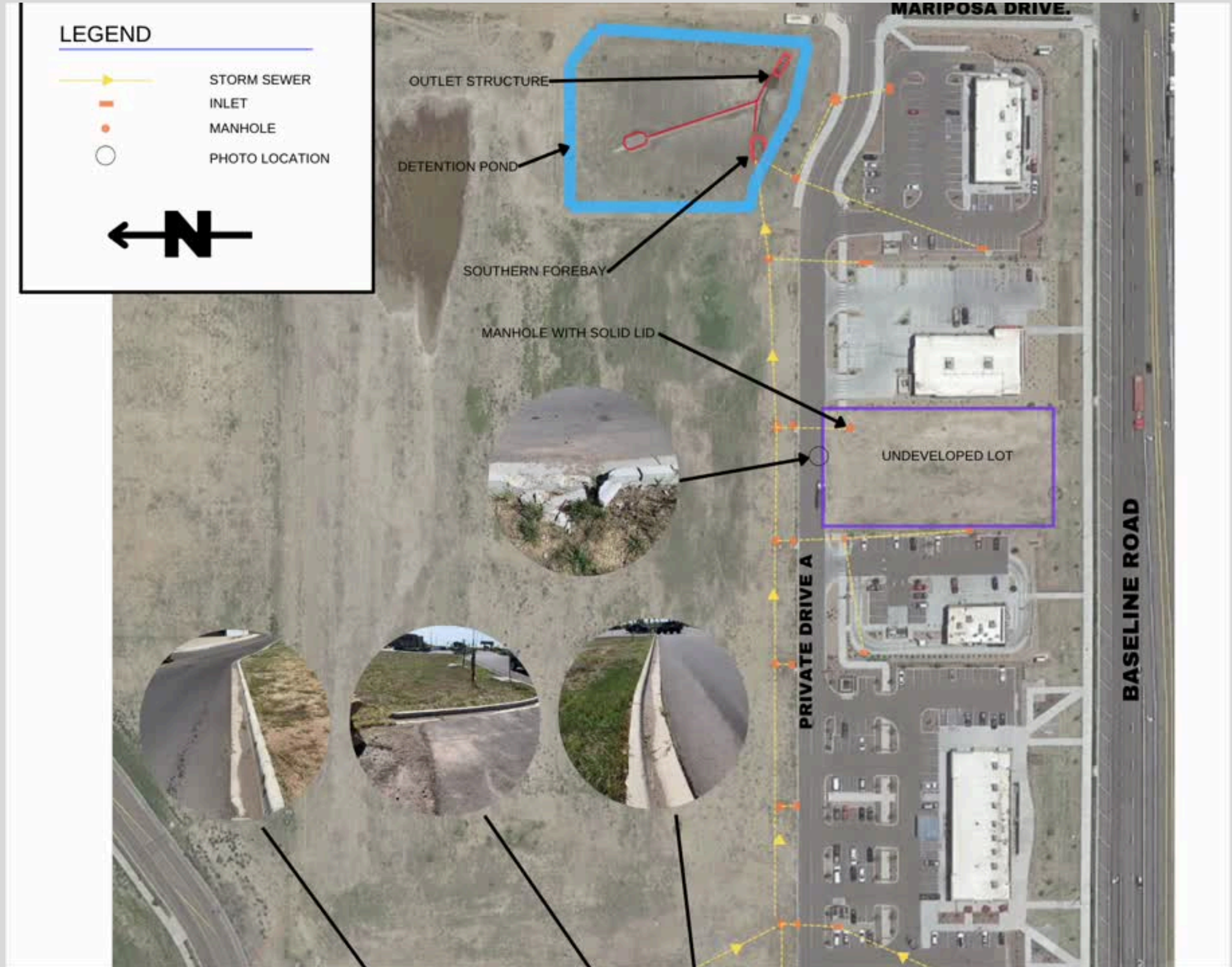
LEGEND

-  STORM SEWER
-  INLET
-  MANHOLE
-  PHOTO LOCATION

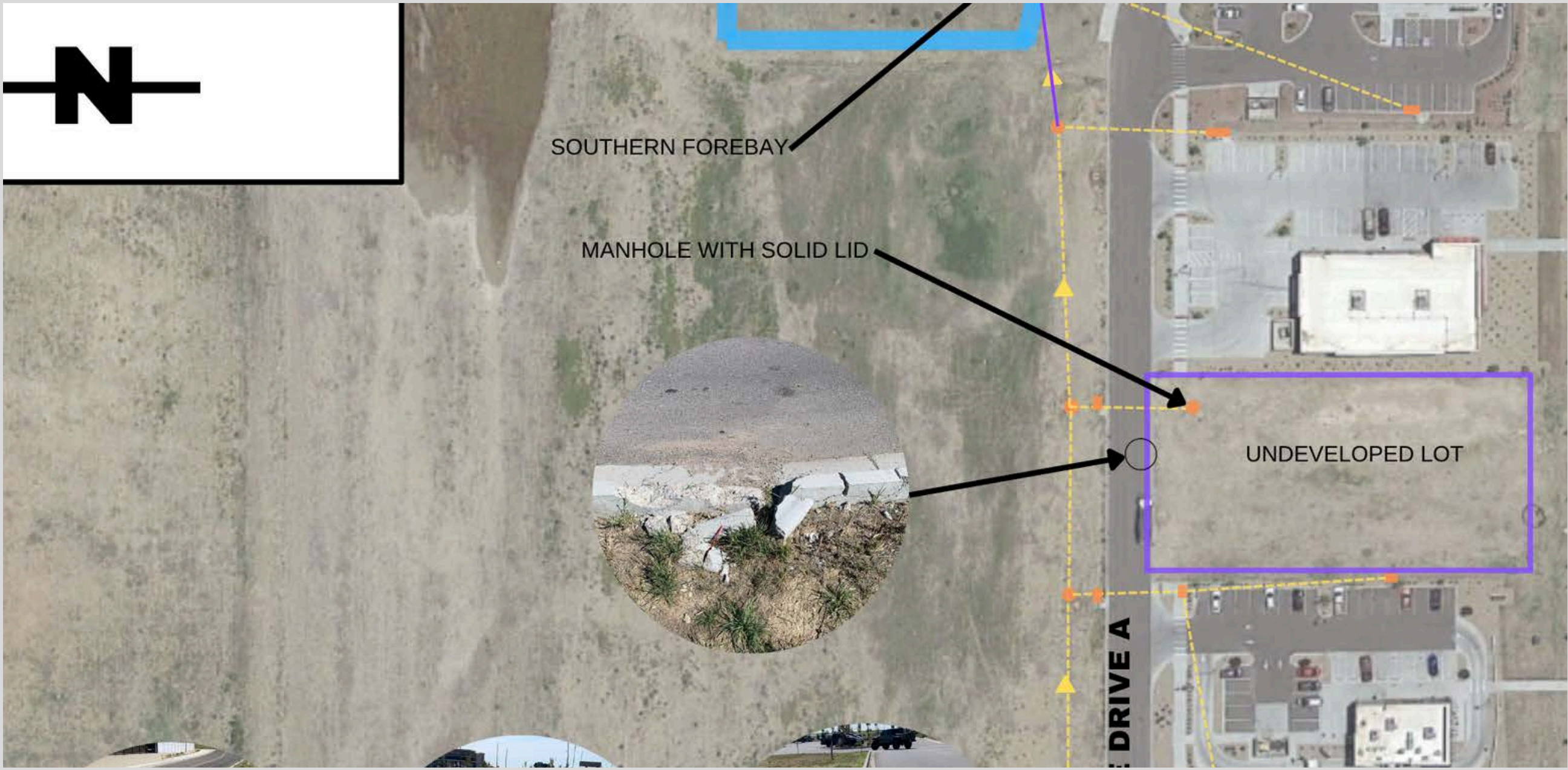




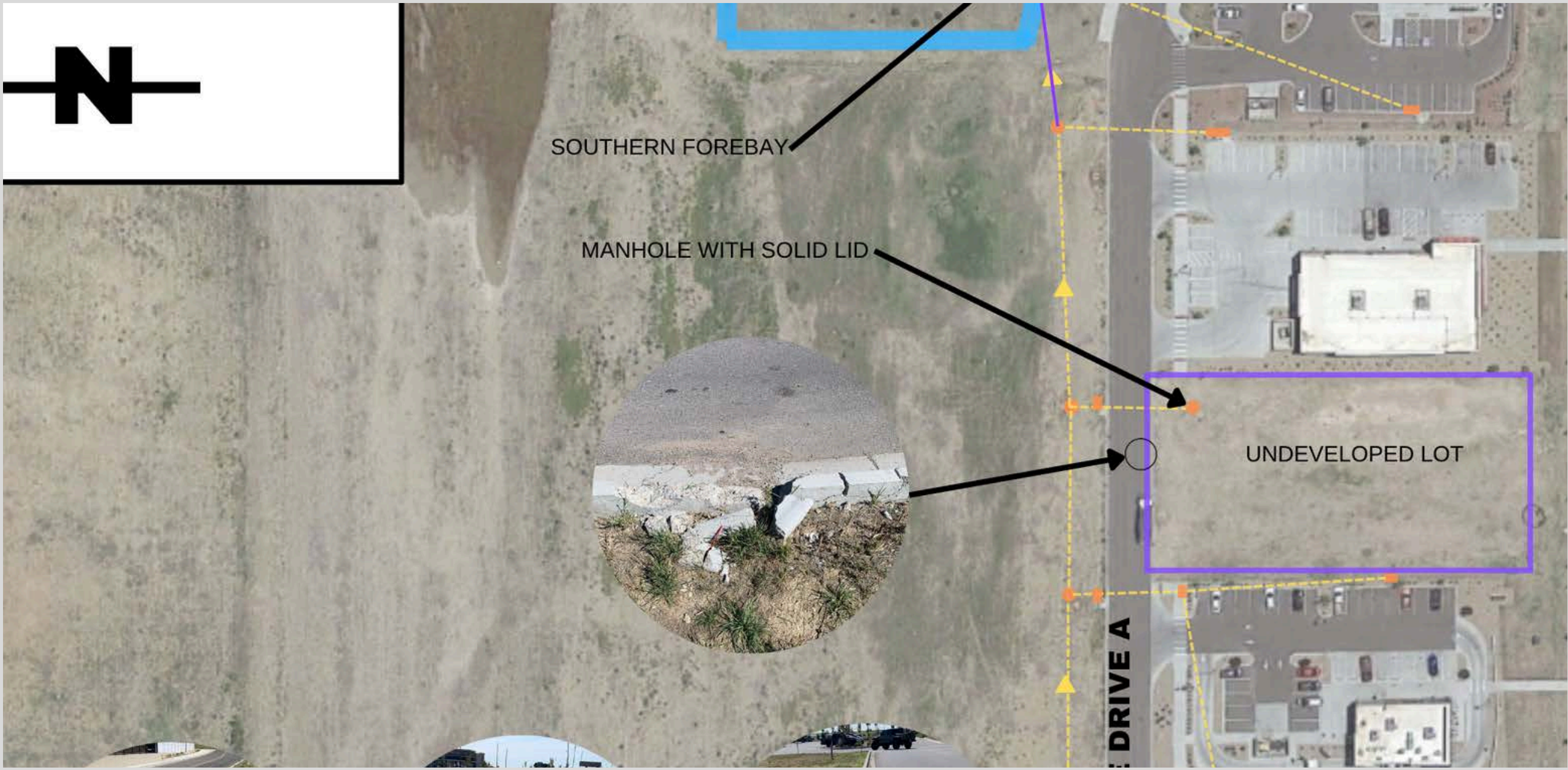
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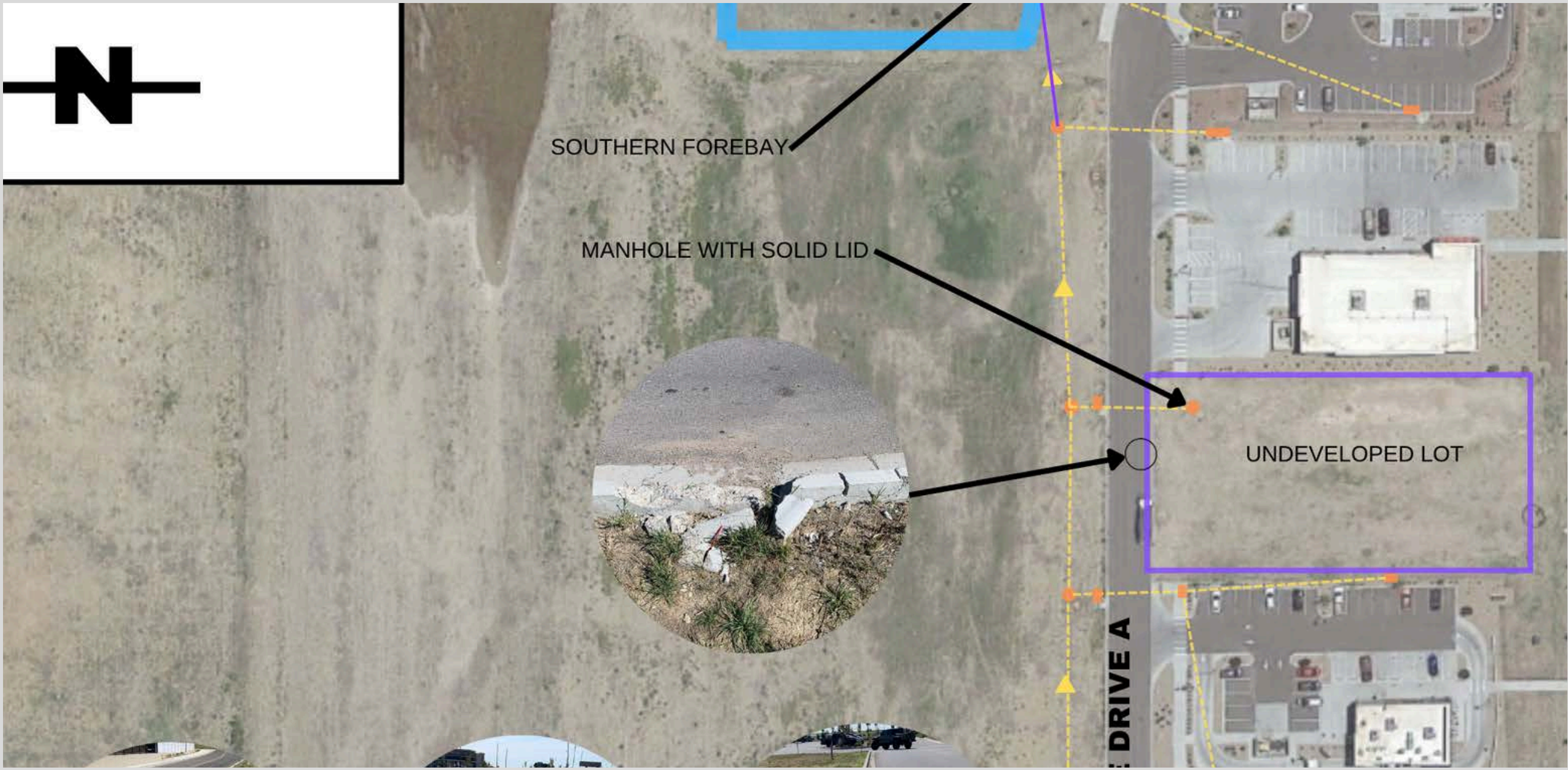
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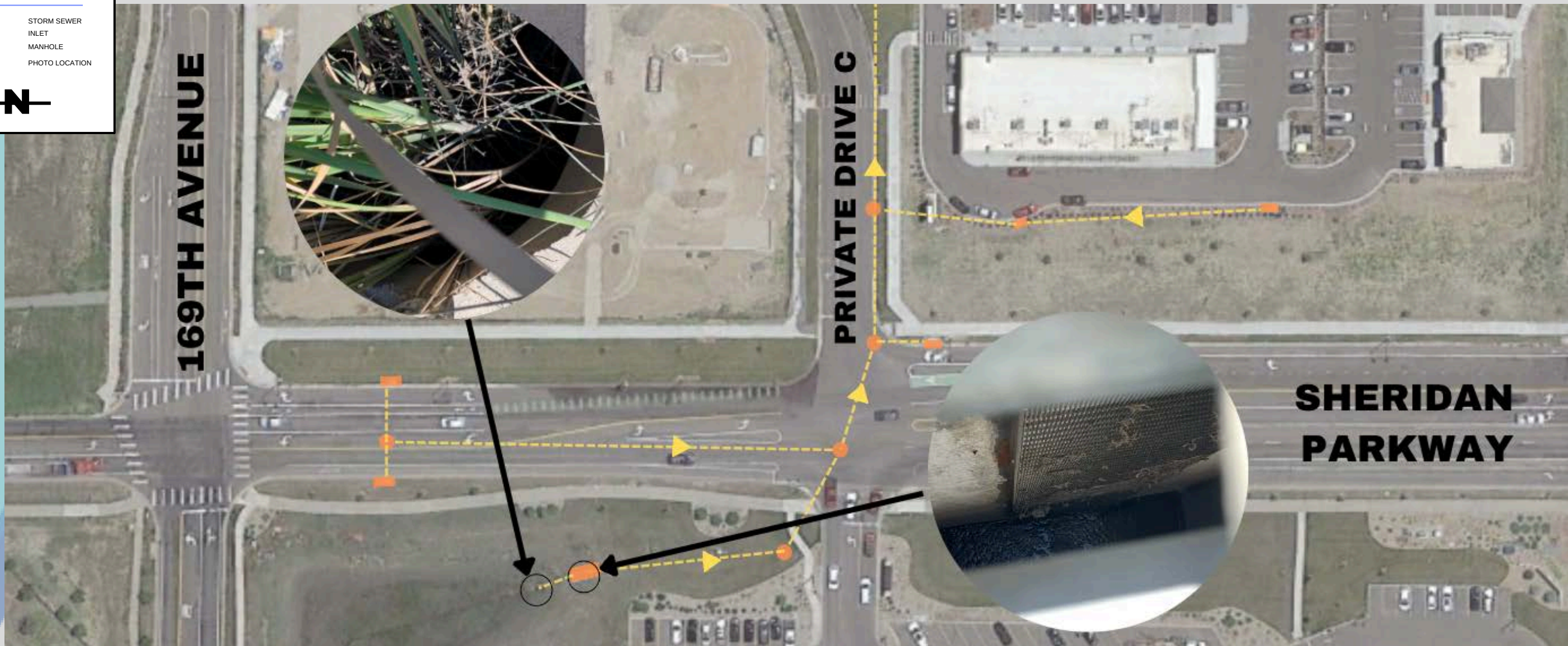


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Lesson:	Audit the source of sediment and use contractors strategically

LEGEND

- ▶ STORM SEWER INLET
- MANHOLE
- MANHOLE
- PHOTO LOCATION

N ←

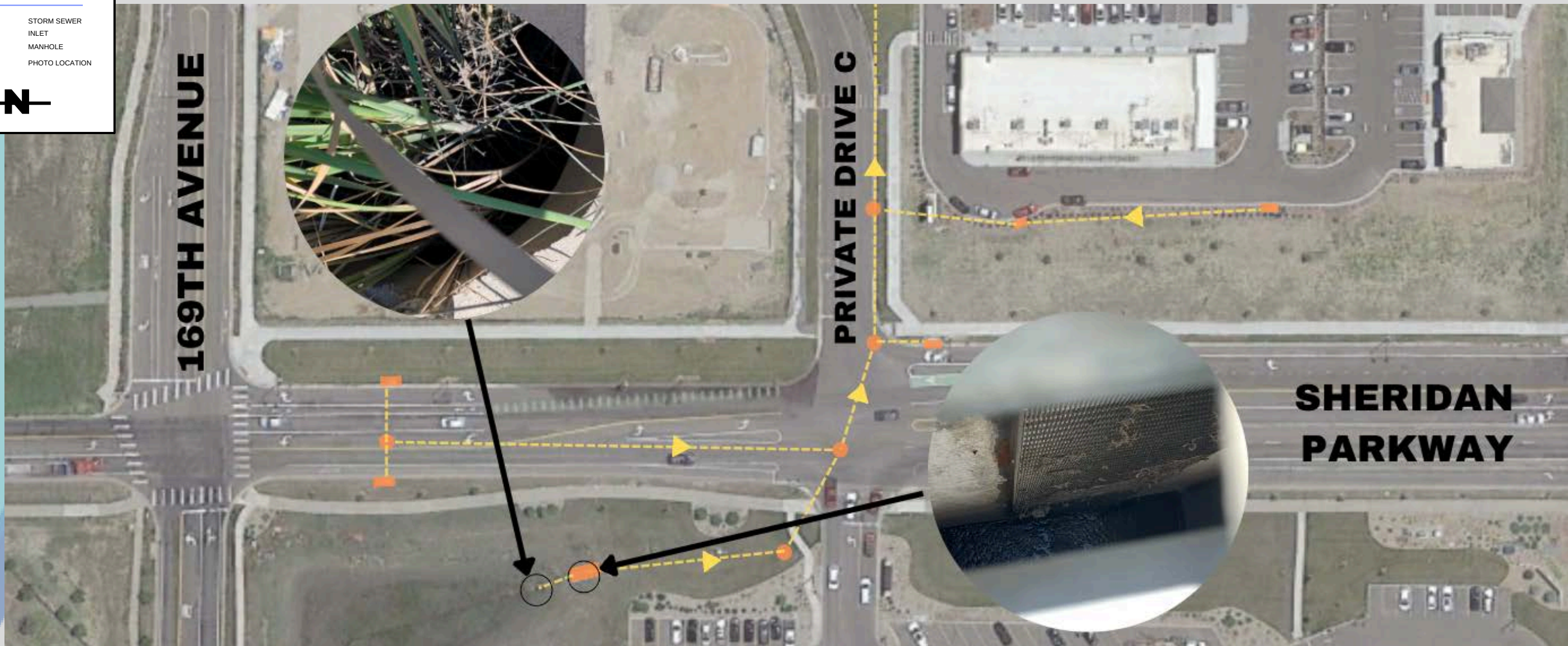


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LEGEND

- - - STORM SEWER
- - - INLET
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N ←

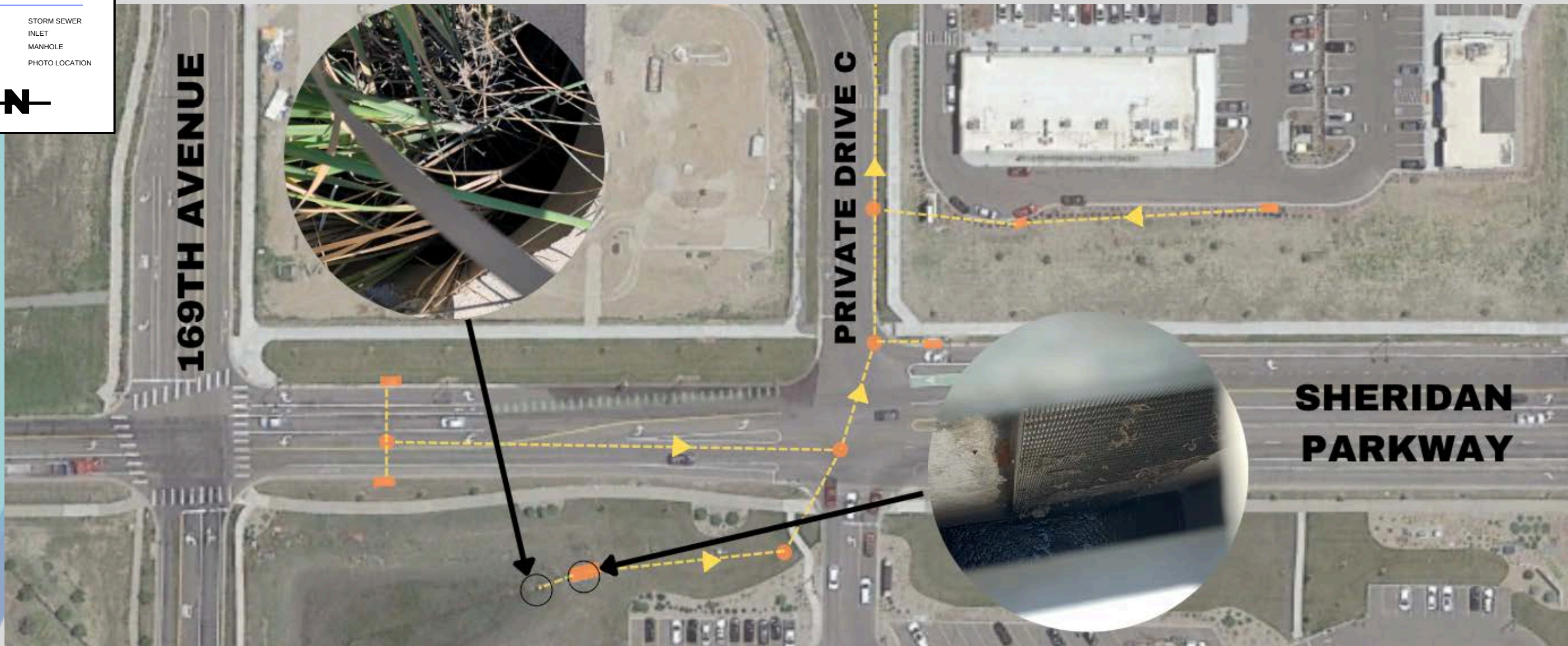


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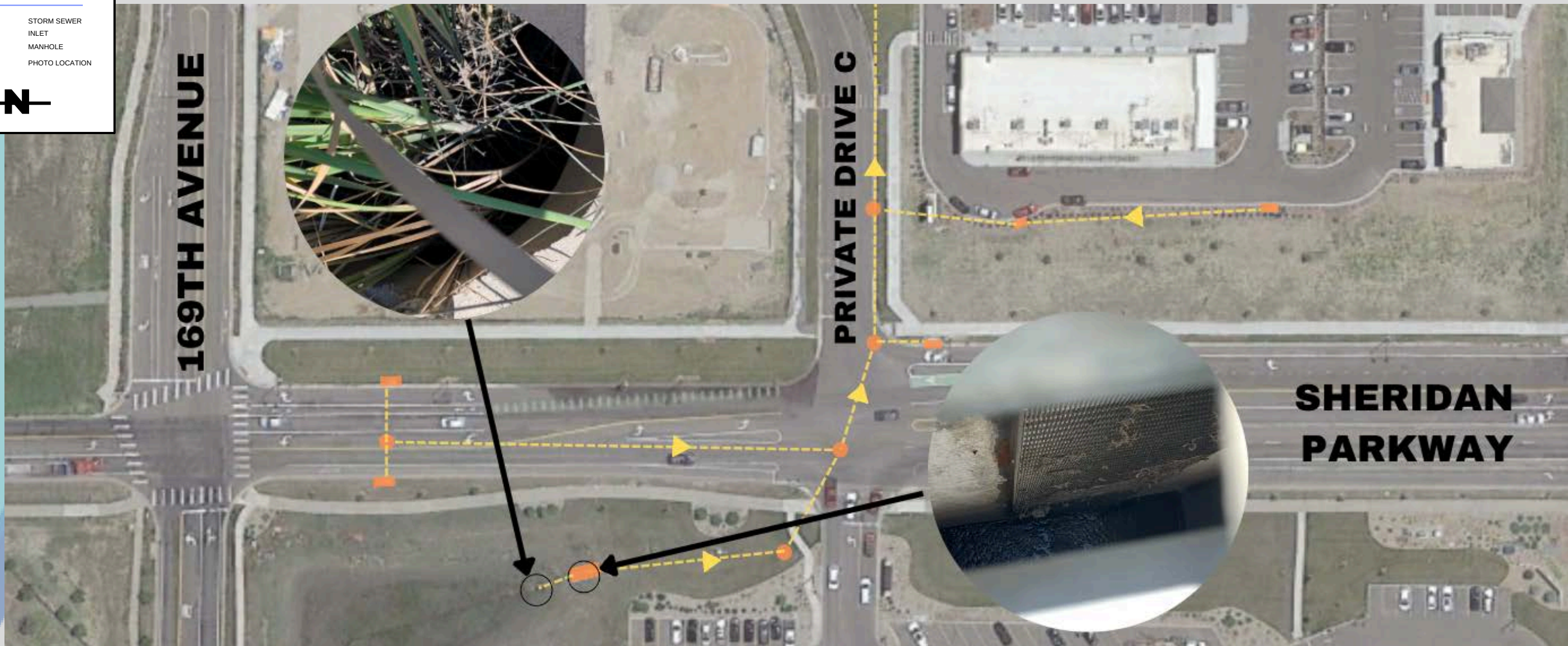


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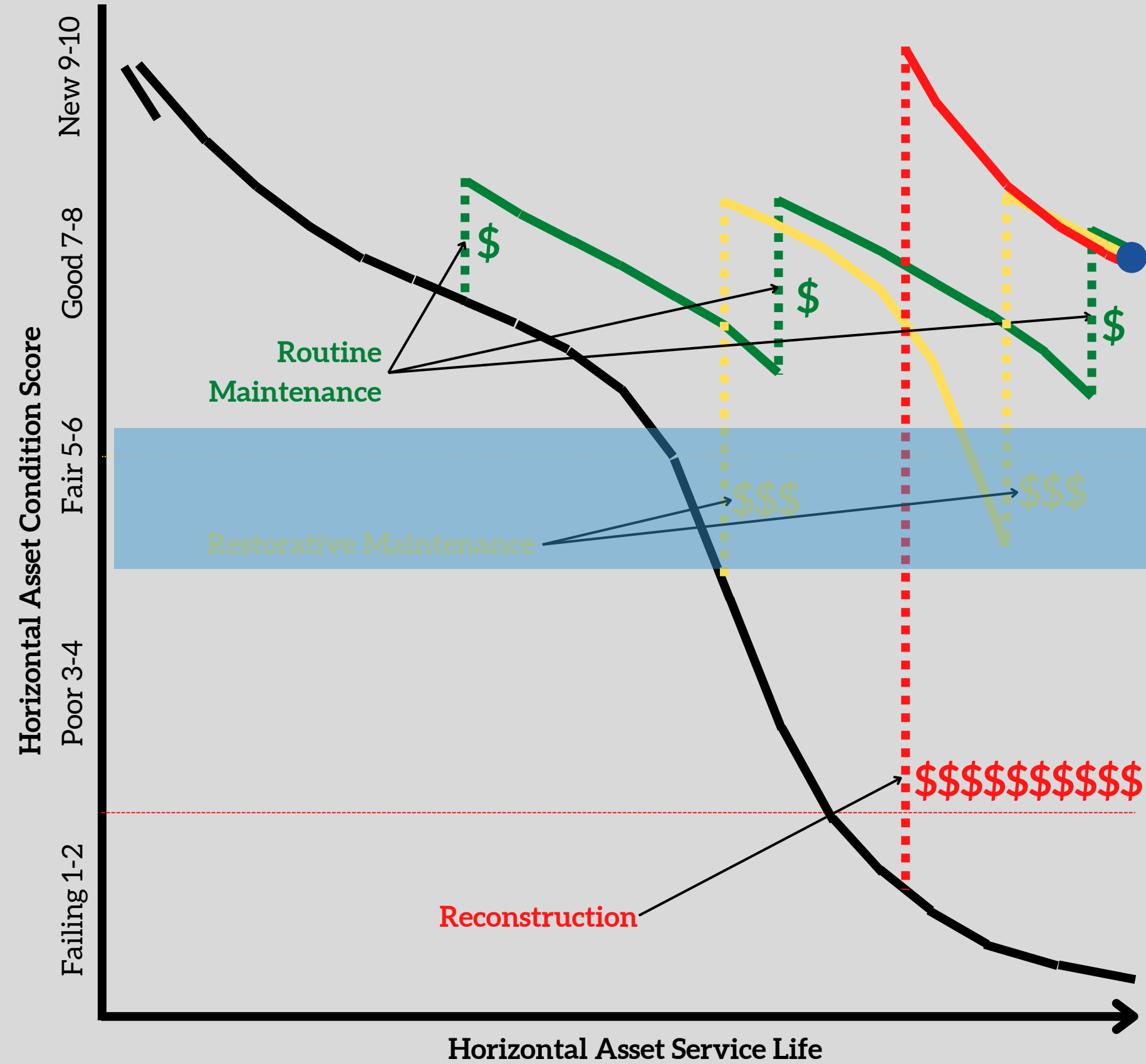
LEGEND

- ▶ STORM SEWER INLET
- MANHOLE
- MANHOLE
- PHOTO LOCATION

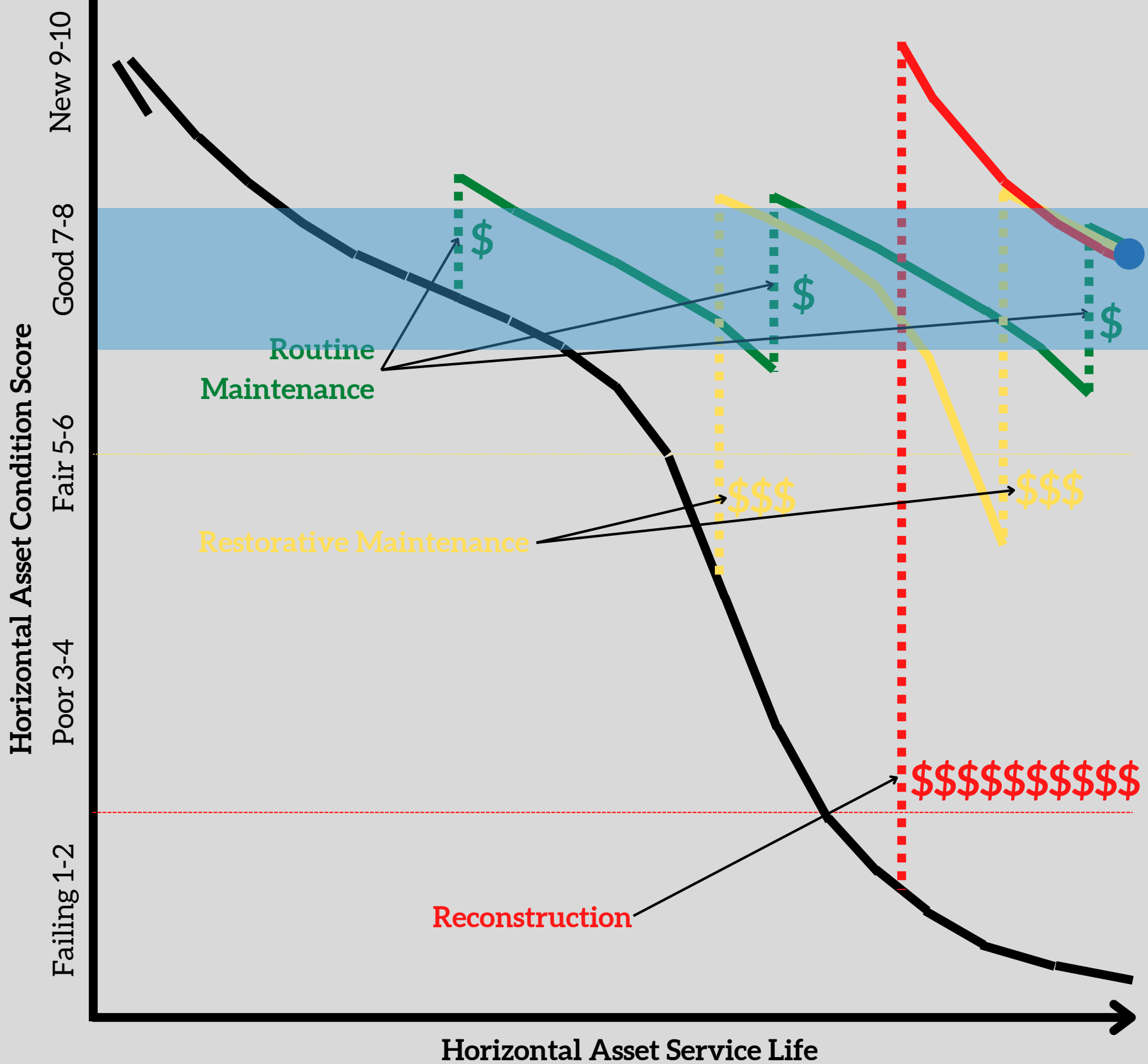
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Case Study 3: Design (and hand-off!) with the End in Mind

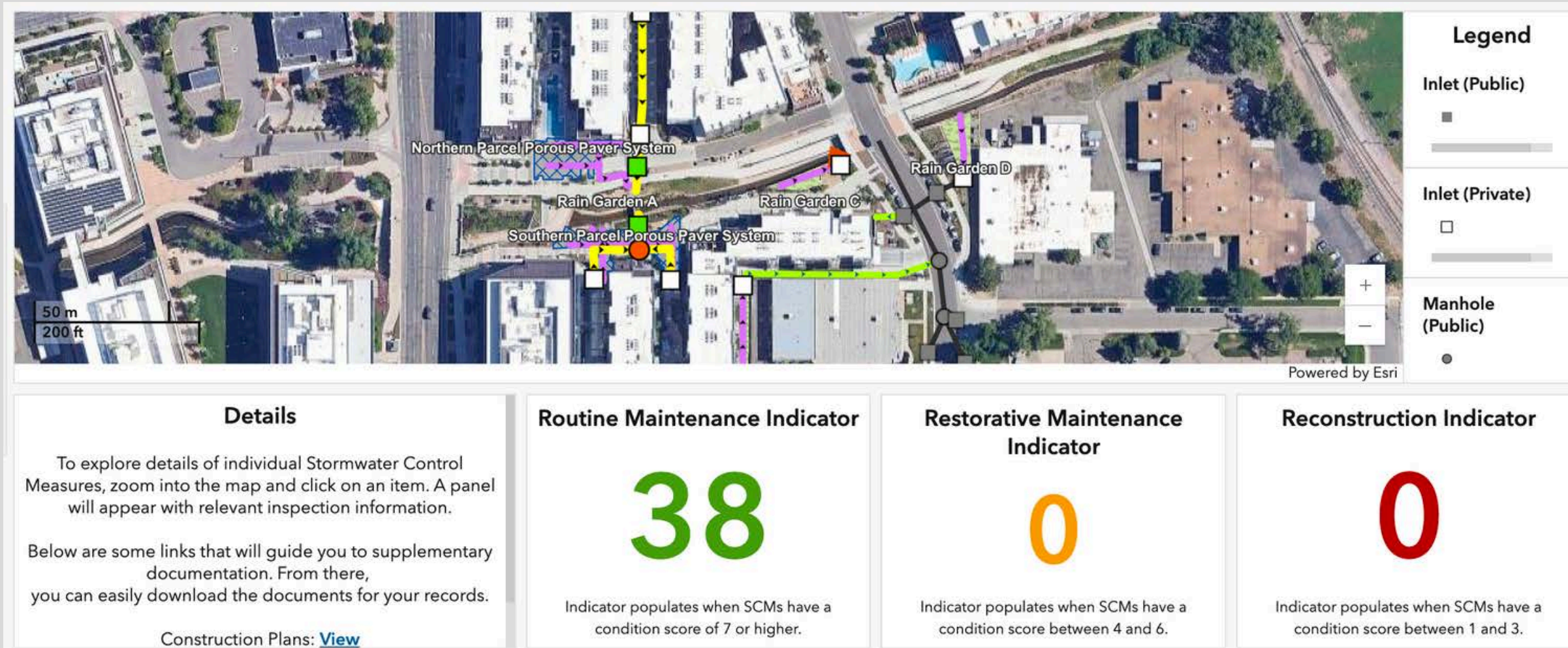


Case Study 3: Design (and hand-off!) with the End in Mind



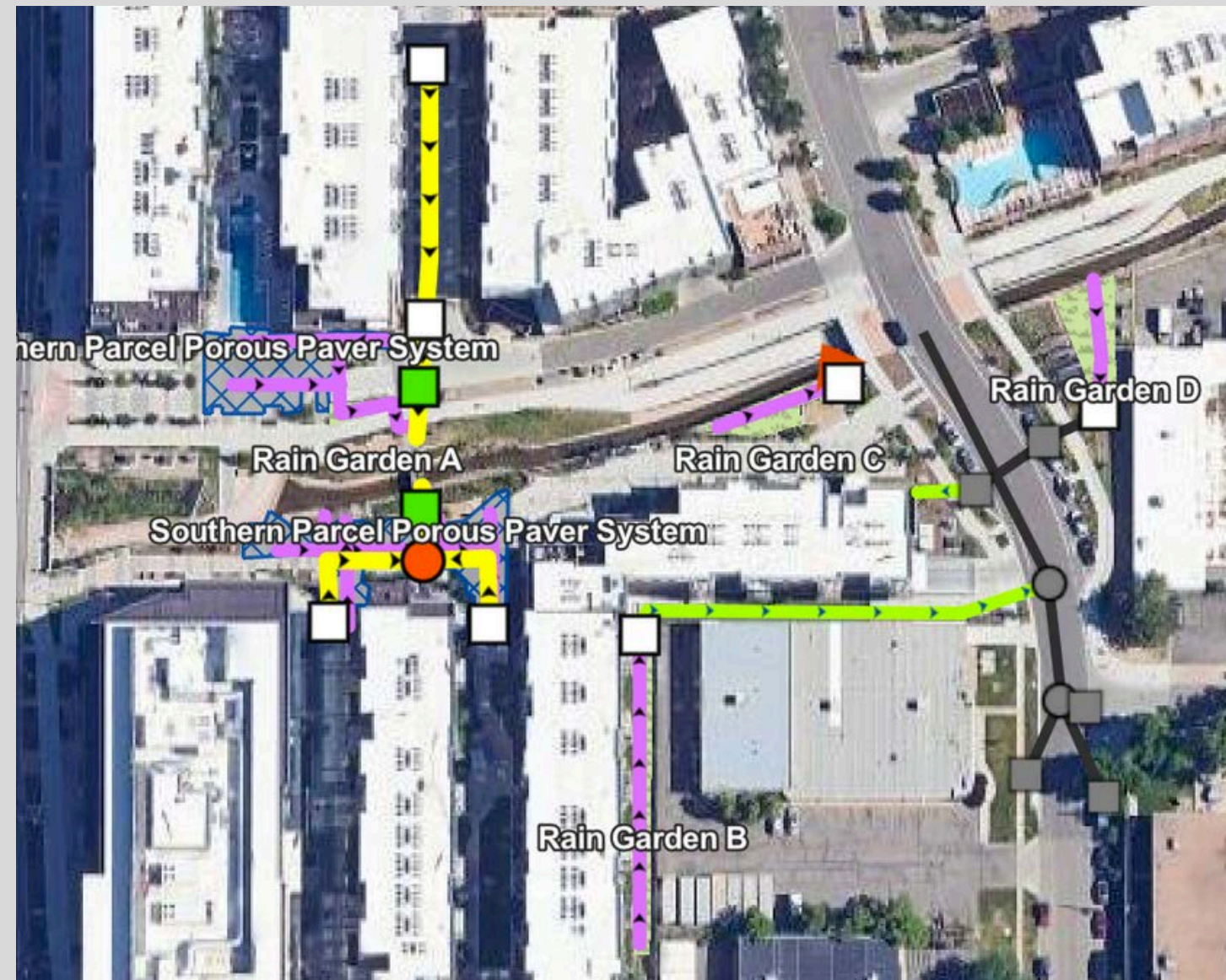
Case Study 4 : Organized Assets Multifamily

Client Profile: Assets mapped, inspection and maintenance information stored within shape file, assets are maintained regular to stay in compliance



Case Study 4 : Organized Assets Multifamily

Client Profile:	Assets mapped, inspection and maintenance information stored within shape file, assets are maintained regular to stay in compliance
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Case Study 4 : Organized Assets Multifamily

Reve Boulder Apartments Dashboard

Inspection Date: May 29, 2024

AbName	UD
Condition Score	8
Inspection Form	View

Legend

- Inlet (Public)
- Inlet (Private)
- Manhole (Public)
- Manhole

Details

To explore details of individual Stormwater Control Measures, zoom into the map and click on an item. A panel will appear with relevant inspection information.

<https://1drv.ms/b/s!AiAaWTRa5R4agpNTVizJcyVlc0OnIA?e=q...>

Routine Maintenance

38

Indicator populates when SCMs have a condition score of 7 or higher.

Restorative Maintenance

0

Indicator populates when SCMs have a condition score between 4 and 6.

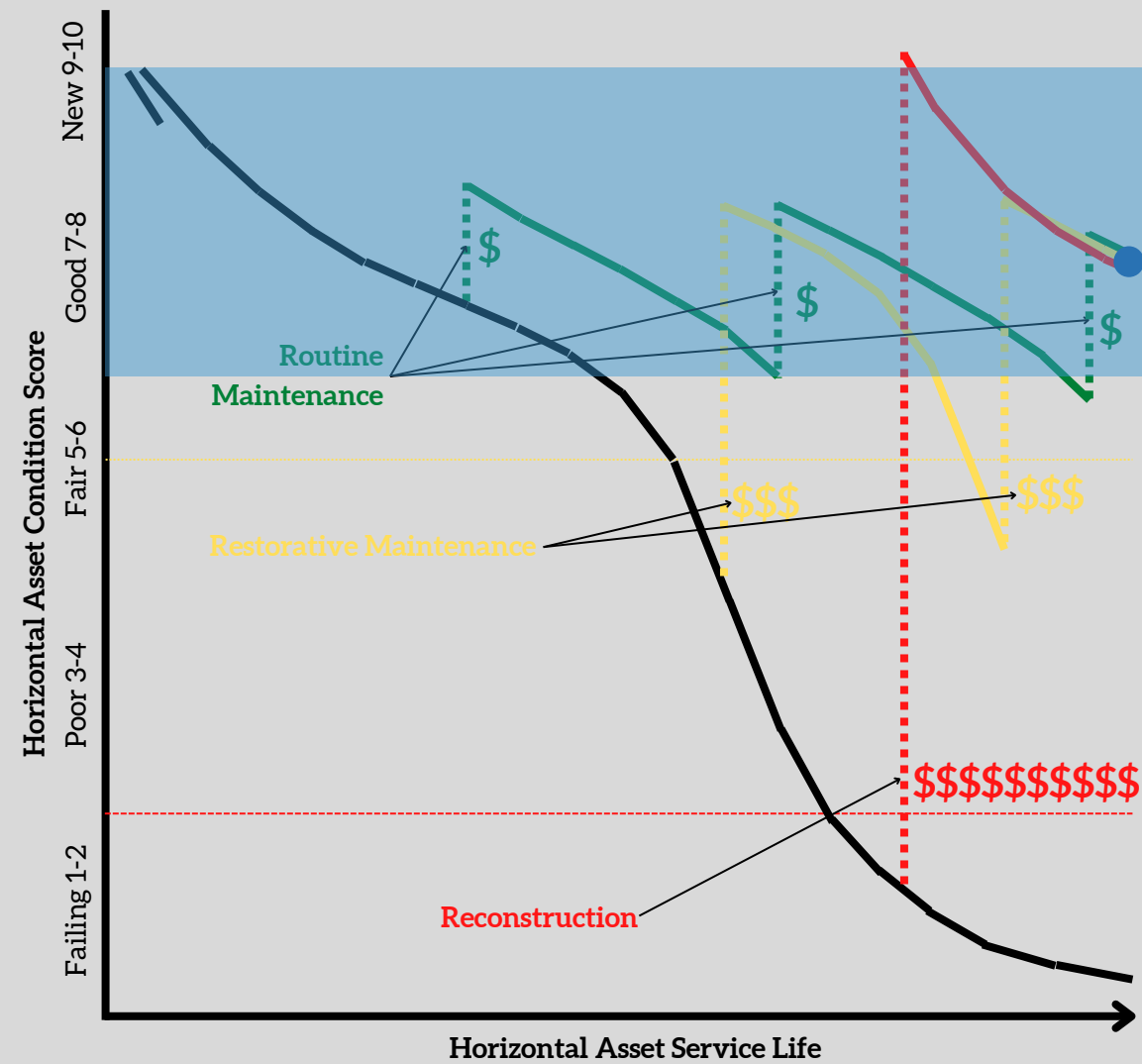
Reconstruction Indicator

0

Indicator populates when SCMs have a condition score between 1 and 3.

Case Study 4 : Organized Assets Multifamily

Client Profile:	Assets mapped, inspection and maintenance information stored within shape file, assets are maintained regular to stay in compliance
------------------------	---



Case Study 4 : Organized Assets Multifamily

Client Profile: Assets mapped, inspection and maintenance information stored within shape file, assets are maintained regular to stay in compliance



Details

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Construction Plans: [View](#)

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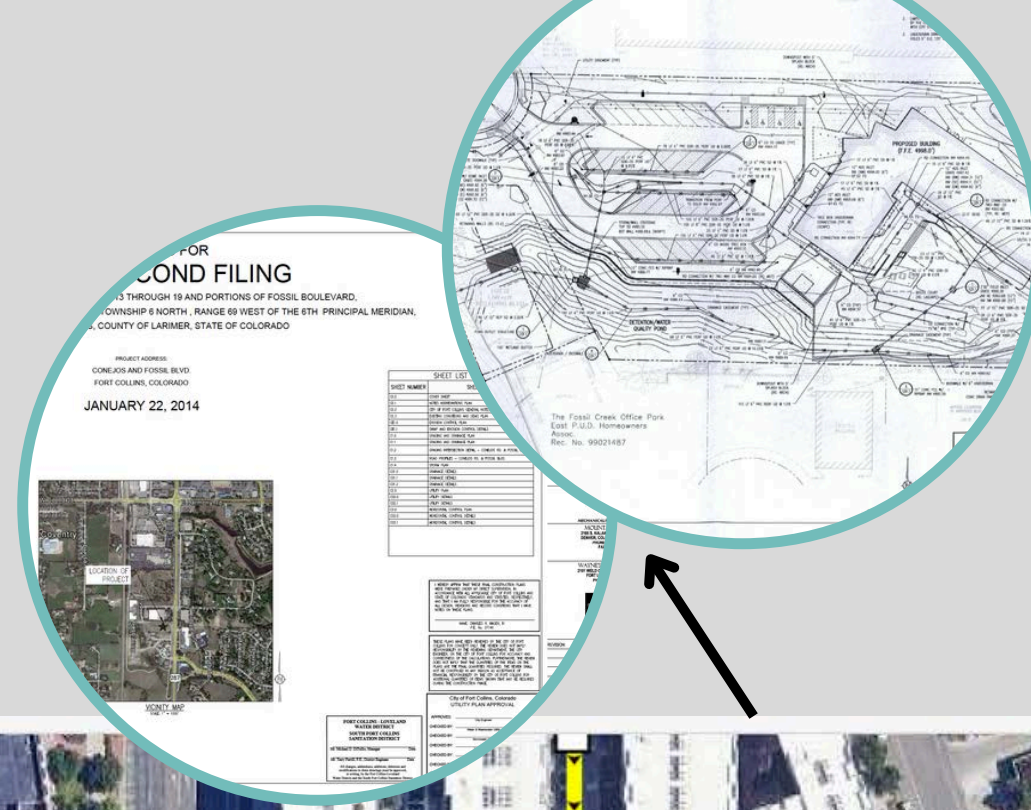
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Reconstruction Indicator

0

Indicator populates when SCMs have a condition score between 1 and 3.

Case Study 4 : Organized Assets Multifamily



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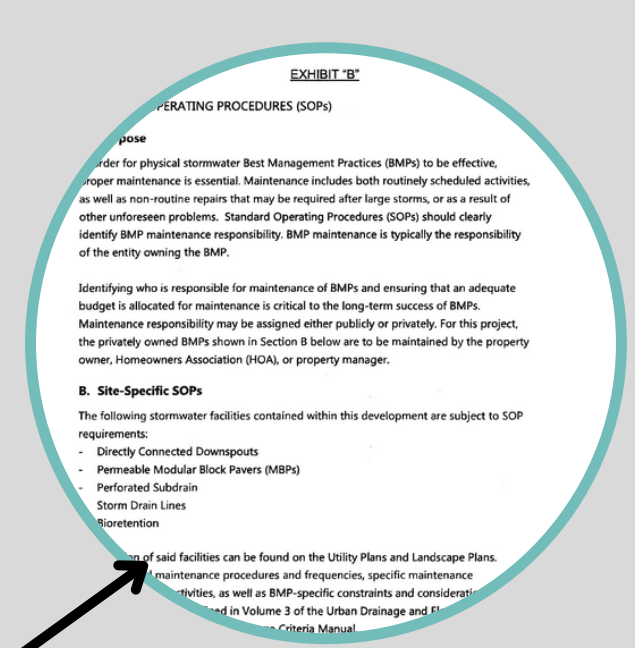
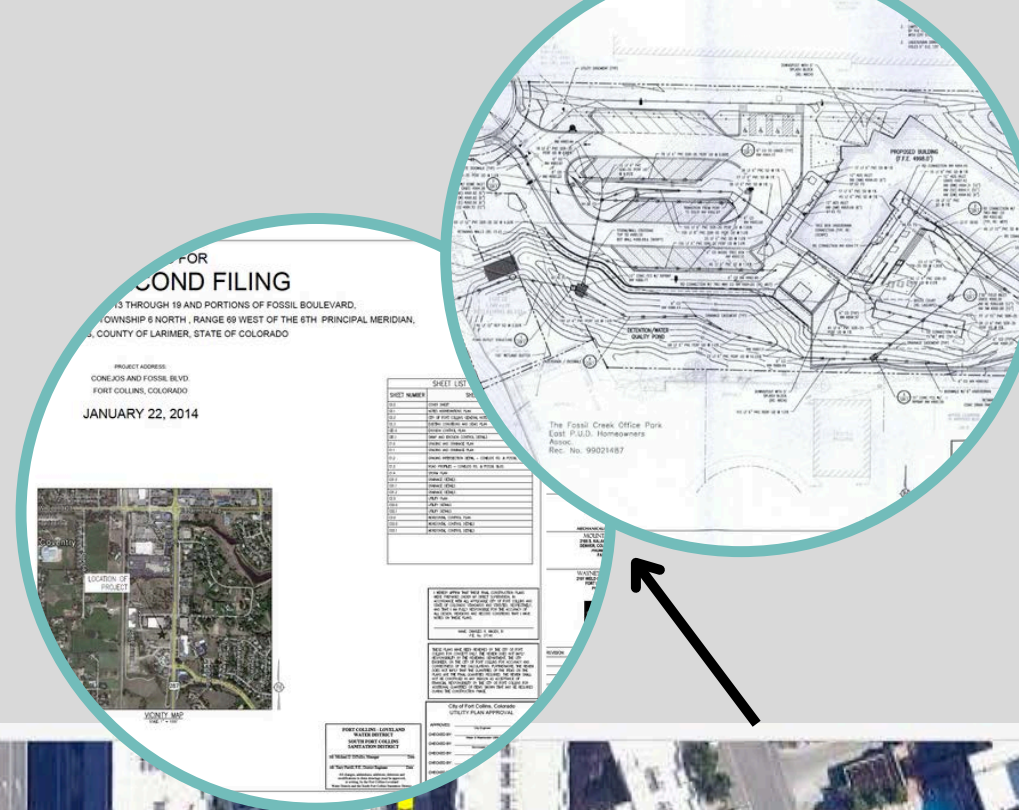
Indicator populates when SCMs have a condition score between 4 and 6.

Reconstruction Indicator

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Indicator populates when SCMs have a condition score between 1 and 3.

Case Study 4 : Organized Assets Multifamily



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Case Study 4 : Organized Assets Multifamily

FOR SECOND FILING
13 THROUGH 19 AND PORTIONS OF FOSSIL BOULEVARD,
TOWNSHIP 6 NORTH, RANGE 69 WEST OF THE 6TH PRINCIPAL MERIDIAN,
COUNTY OF LARIMER, STATE OF COLORADO

PROJECT ADDRESS:
CONEXOS AND FOSSIL BLVD
FORT COLLINS, COLORADO
JANUARY 22, 2014

Legend
Inlet (Public)
Inlet (Private)
Manhole (Public)

Details
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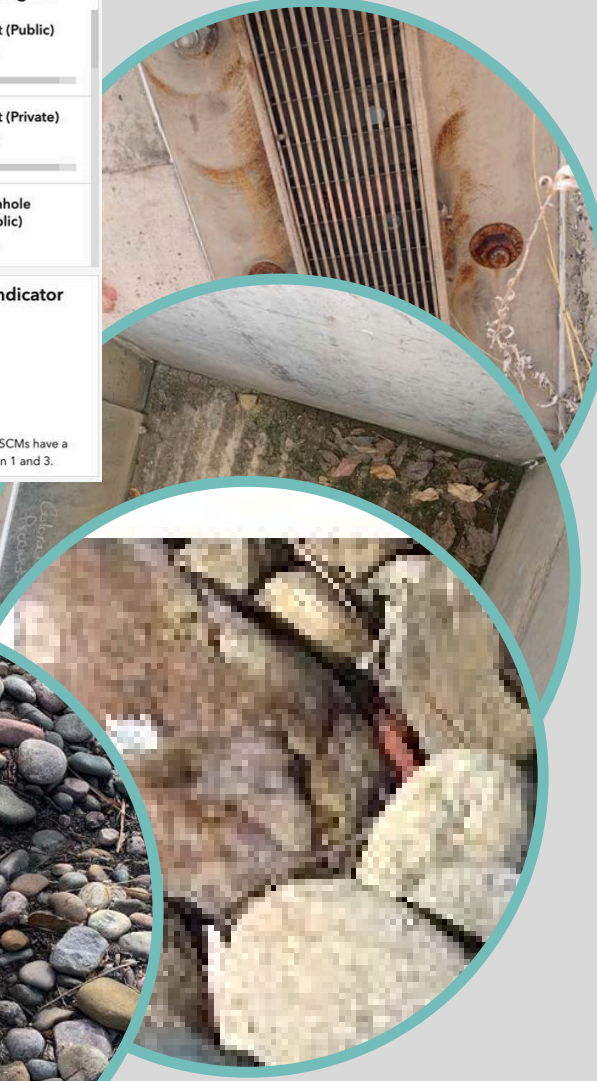
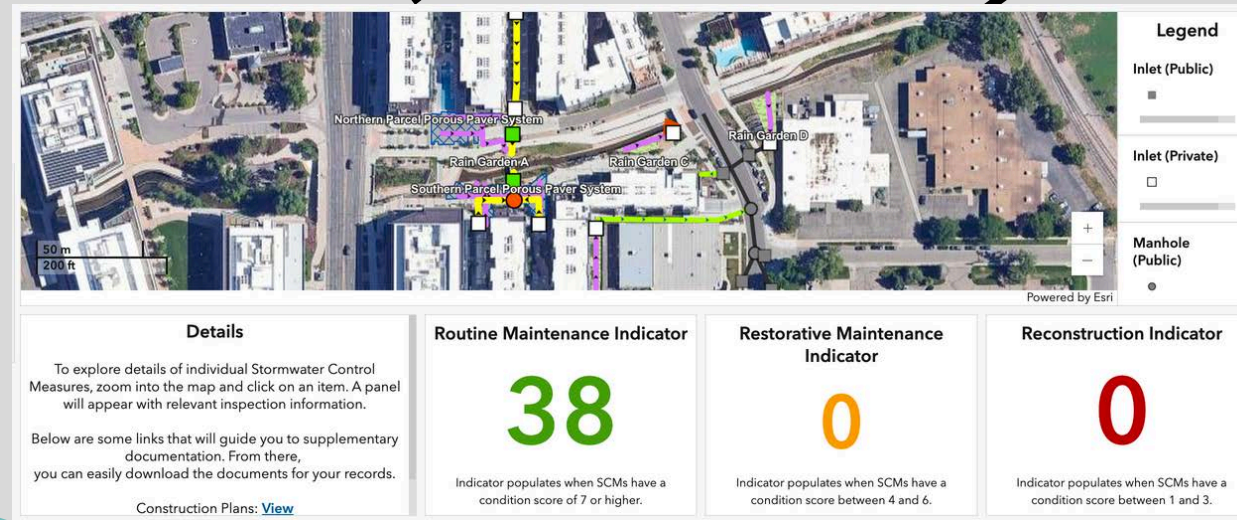
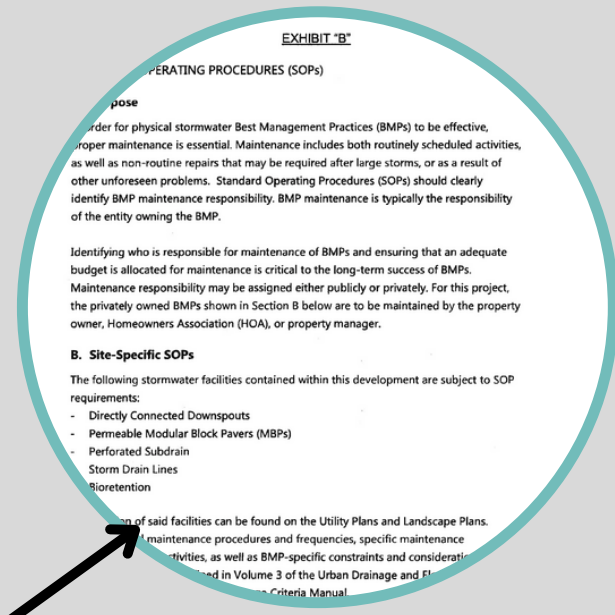
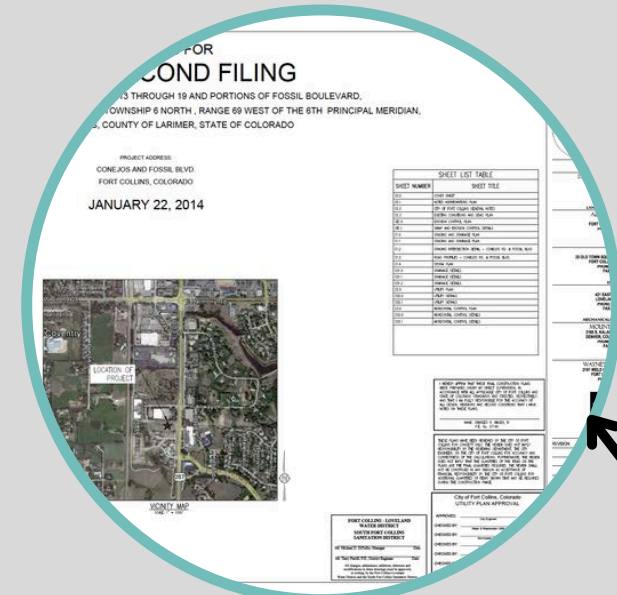
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Indicator populates when SCMs have a condition score between 1 and 3.

EXHIBIT "B"
OPERATING PROCEDURES (SOPs)
...
order for physical stormwater Best Management Practices (BMPs) to be effective, proper maintenance is essential. Maintenance includes both routinely scheduled activities, as well as non-routine repairs that may be required after large storms, or as a result of other unforeseen problems. Standard Operating Procedures (SOPs) should clearly identify BMP maintenance responsibility. BMP maintenance is typically the responsibility of the entity owning the BMP.
Identifying who is responsible for maintenance of BMPs and ensuring that an adequate budget is allocated for maintenance is critical to the long-term success of BMPs. Maintenance responsibility may be assigned either publicly or privately. For this project, the privately owned BMPs shown in Section B below are to be maintained by the property owner, Homeowners Association (HOA), or property manager.
B. Site-Specific SOPs
The following stormwater facilities contained within this development are subject to SOP requirements:
- Directly Connected Downspouts
- Permeable Modular Block Pavers (MBPs)
- Perforated Subdrain
- Storm Drain Lines
- Bioretention
... of said facilities can be found on the Utility Plans and Landscape Plans. ... maintenance procedures and frequencies, specific maintenance ... activities, as well as BMP-specific constraints and considerations ... in Volume 3 of the Urban Drainage and Flood Control Engineering Criteria Manual.

Case Study 4 : Organized Assets Multifamily



Case Study 4 : Organized Assets Multifamily

Client Profile:	Assets mapped, inspection and maintenance information stored within shape file, assets are maintained regular to stay in compliance
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SUSTAINABLE RUNOFF SOLUTIONS
Permeable Pavement Inspection Form

Property Name: Redtail Ponds PSH
Property Address: 5080 Fossil Blvd, Fort Collins, CO 80525

MID: PPI, PPI2, & PPI3

SCM Description: Three permeable concrete interlocking paver areas within parking stalls
SCM Location: Front (west) drive area
Weather Conditions: Clear, slight breeze 52 degrees | Rain in Last 48 hrs? None

Inspection Item	Comments/Observations	Condition Score
Pavement Surface	Fair condition, some signs of fluid leakage from vehicles. Some sign of block settlement adjacent to concrete ribbon on PPI.	7
Pavement Joints	Sediment and organics build up seen in paver joints. Joint filler material not seen consistently within joints.	5
Underdrain	No signs of sediment within underdrain as seen from cleanout port.	8

Permeability Test (minimum 3/10,000 sf)

Test Location	Test Results (flow spread)	Pass/Fail
1 western side of PPI1	8-foot flow spread	Pass
2 western side of PPI2	10-foot flow spread	Pass
3 east side of PPI3	10-foot flow spread	Pass
4 east side of PPI3	10-foot flow spread	Pass
5 east side of PPI3	10-foot flow spread	Pass
6 east side of PPI3	10-foot flow spread	Pass
7 east side of PPI3	10-foot flow spread	Pass
8 east side of PPI3	10-foot flow spread	Pass
9 east side of PPI3	10-foot flow spread	Pass
10 east side of PPI3	10-foot flow spread	Pass
11 east side of PPI3	10-foot flow spread	Pass
12 east side of PPI3	10-foot flow spread	Pass
13 east side of PPI3	10-foot flow spread	Pass
14 east side of PPI3	10-foot flow spread	Pass
15 east side of PPI3	10-foot flow spread	Pass
16 east side of PPI3	10-foot flow spread	Pass
17 east side of PPI3	10-foot flow spread	Pass
18 east side of PPI3	10-foot flow spread	Pass
19 east side of PPI3	10-foot flow spread	Pass
20 east side of PPI3	10-foot flow spread	Pass




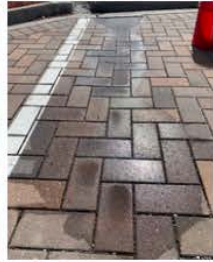
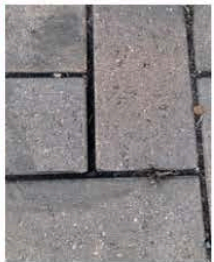

Note the following conditions:

Condition	Observed	Notes
standing water not draining	at observed	erosion or settlement observed on surface
missing or low joint aggregate	at observed	access ports or manholes not accessible
structural deficiencies or issues	at observed	weed growth within pavers




Additional photos showing pavement details and inspection points.

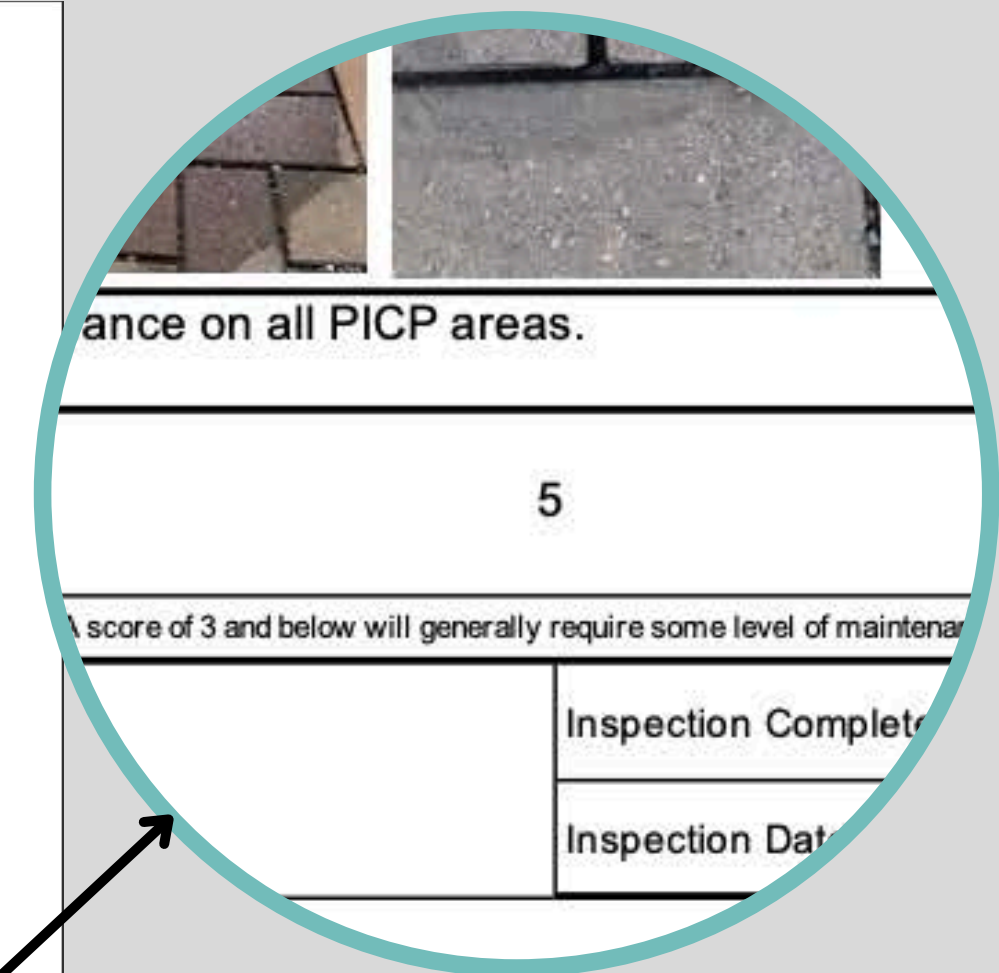
Case Study 4 : Organized Assets Multifamily



 SUSTAINABLE RUNOFF SOLUTIONS				
Permeable Pavement Inspection Form				
Property Name:	Redtail Ponds PSH			
Property Address:	5080 Fossil Blvd, Fort Collins, CO 80525			
SCM ID	PP1, PP2, & PP3			
SCM Description:	Three permeable concrete interlocking paver areas within parking stalls			
SCM Location:	Front (west) drive area			
Weather Conditions:	Clear, slight breeze 52 degrees Rain in Last 48 Hrs? None			
Inspection Item	Comments/Observations	Condition Score		
Pavement Surface	Fair condition, some signs of fluid leakage from vehicles. Some sign of block settlement adjacent to concrete ribbon on PP3.	7		
Pavement Joints	Sediment and organics build up seen in paver joints. Joint filter material not seen consistently within joints	5		
Underdrain	No signs of sediment within underdrain as seen from cleanout port	8		
Permeability Test (minimum 3/10,000 sf)	Test Location	Test Results (flow spread)	Pass/Fail	
1	western stall of PP1	8-foot flow spread	Pass	
2	western stall of PP2	>10-foot flow spread	Fail	
3	3rd stall from the west on PP3	> 10-foot flow spread	Fail	
Note the following conditions:				
sediment accumulation	standing water not draining	erosion or settlement observed on surface		
missing or low joint aggregate	oil observed	access ports or manholes not accessible		
structural deficiencies or issues	weed growth within pavers			
Inspection Photos/Sketch:				
	Maintenance Recommendations: Conduct restorative maintenance on all PICP areas.			
	Overall Condition Score	5		
	Overall condition score is a 1 to 10 scale where 10 is a newly functional asset and 1 is fully failing. A score of 3 and below will generally require some level of maintenance			
		Inspection Completed By:	JMT	
		Inspection Date:	4/13/22	

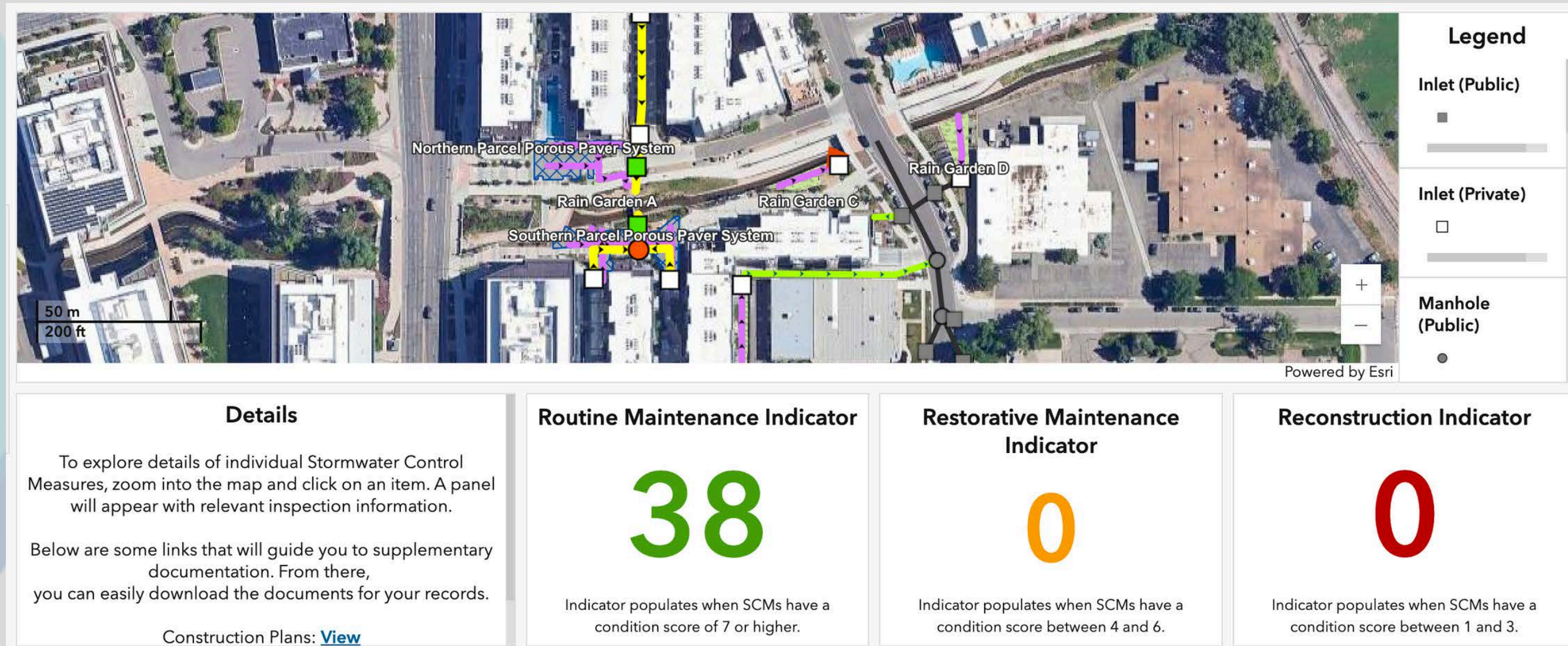
Case Study 4 : Organized Assets Multifamily

 SUSTAINABLE RUNOFF SOLUTIONS Permeable Pavement Inspection Form				
Property Name:		Redtail Ponds PSH		
Property Address:		5080 Fossil Blvd, Fort Collins, CO 80525		
SCM ID	PP1, PP2, & PP3			
SCM Description:	Three permeable concrete interlocking paver areas within parking stalls			
SCM Location:	Front (west) drive area			
Weather Conditions:	Clear, slight breeze 52 degrees	Rain in Last 48 Hrs?	None	
Inspection Item	Comments/Observations	Condition Score		
Pavement Surface	Fair condition, some signs of fluid leakage from vehicles. Some sign of block settlement adjacent to concrete ribbon on PP3.	7		
Pavement Joints	Sediment and organics build up seen in paver joints. Joint filter material not seen consistently within joints	5		
Underdrain	No signs of sediment within underdrain as seen from cleanout port	8		
Permeability Test (minimum 3/10,000 sf)	Test Location	Test Results (flow spread)	Pass/Fail	
1	western stall of PP1	8-foot flow spread	Pass	
2	western stall of PP2	>10-foot flow spread	Fail	
3	3rd stall from the west on PP3	> 10-foot flow spread	Fail	
Note the following conditions:				
sediment accumulation	standing water not draining	erosion or settlement observed on surface		
missing or low joint aggregate	oil observed	access ports or manholes not accessible		
structural deficiencies or issues	weed growth within pavers			
Inspection Photos/Sketch:				
	Maintenance Recommendations: Conduct restorative maintenance on all PICP areas.			
	Overall Condition Score	5		
	Overall condition score is a 1 to 10 scale where 10 is a newly functional asset and 1 is fully failing. A score of 3 and below will generally require some level of maintenance			
		Inspection Completed By:	JMT	
		Inspection Date:	4/13/22	

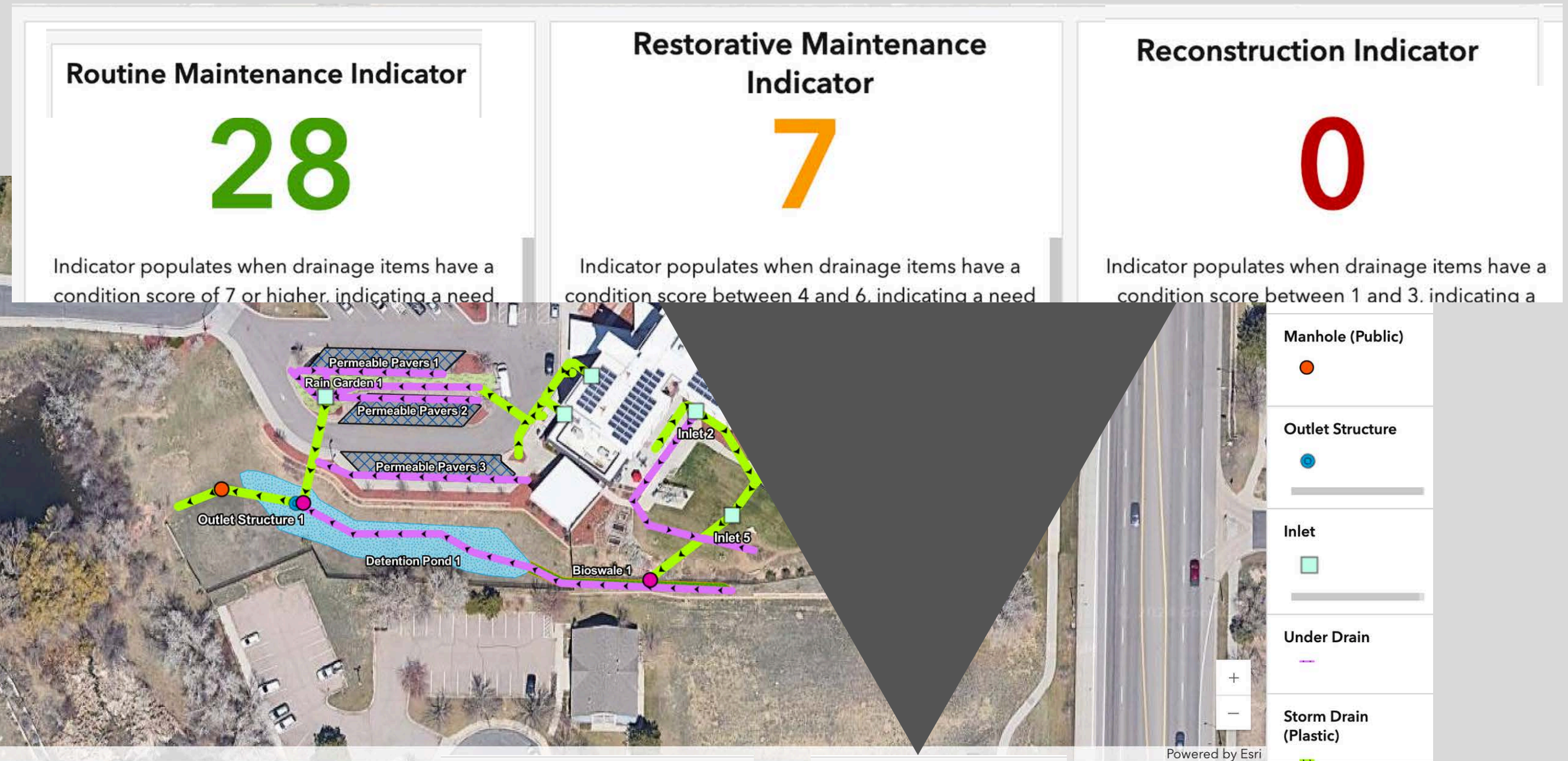


Case Study 4 : Organized Assets Multifamily

Client Profile: Assets mapped, inspection and maintenance information stored within shape file, assets are maintained regular to stay in compliance



Case Study 4 : Organized Assets Multifamily



Routine Maintenance Indicator

28

Indicator populates when drainage items have a condition score of 7 or higher, indicating a need

Restorative Maintenance Indicator

7

Indicator populates when drainage items have a condition score between 4 and 6, indicating a need

Reconstruction Indicator

0

Indicator populates when drainage items have a condition score between 1 and 3, indicating a

Details

To explore details of individual drainage items, zoom into the map and click on an item.
A details panel will populate with relevant inspection information.

Below are some links that will guide you to supplementary documentation. From there, you can easily download the documents for your records.

Routine Maintenance Indicator

28

Indicator populates when drainage items have a condition score of 7 or higher, indicating a need for routine maintenance.

Restorative Maintenance Indicator

7

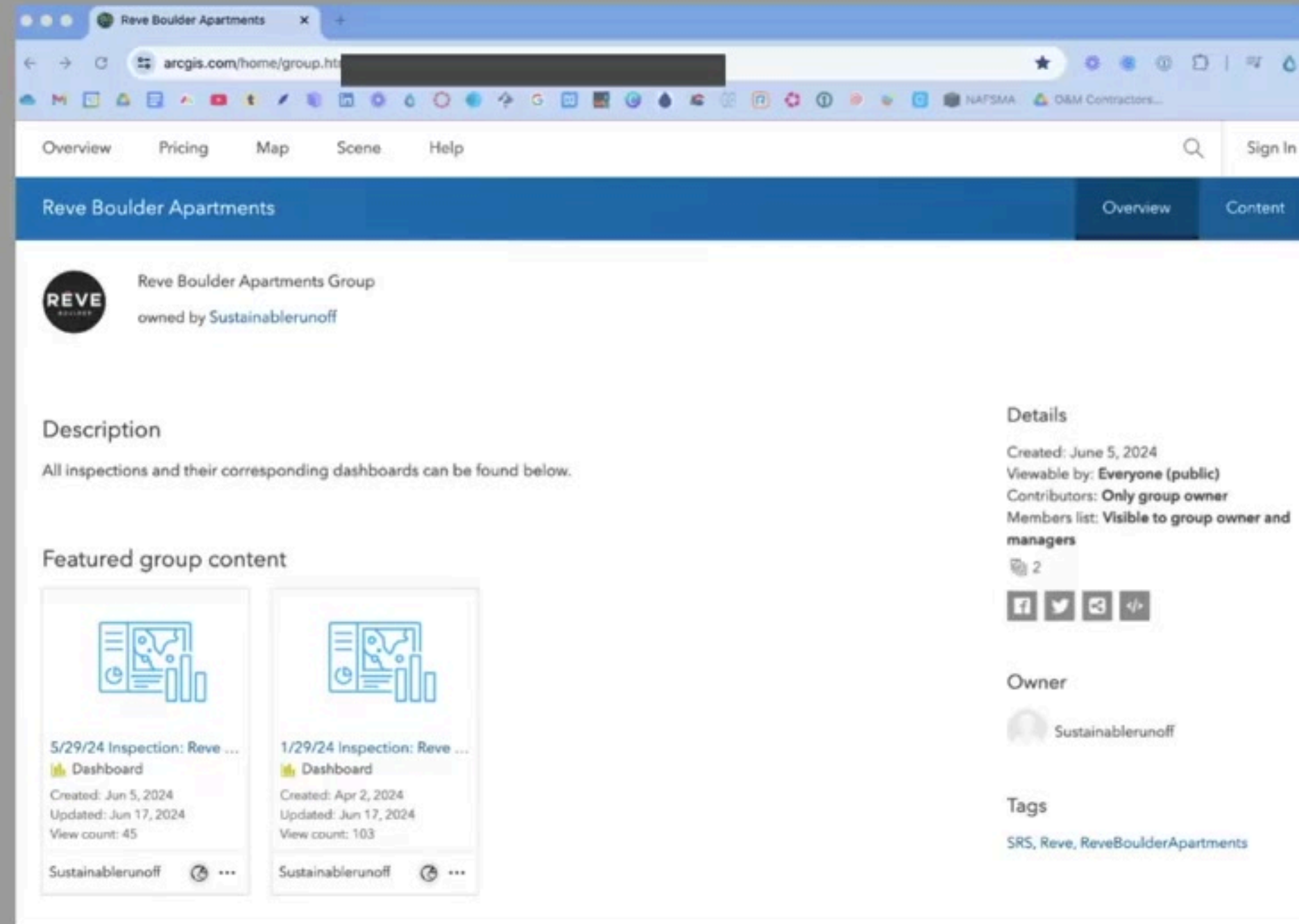
Indicator populates when drainage items have a condition score between 4 and 6, indicating a need for restorative maintenance.

Reconstruction Indicator

0

Indicator populates when drainage items have a condition score between 1 and 3, indicating a need for reconstruction.

Case Study 4 : Organized Assets Multifamily





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Condition Scoring Terms

Case Study 1

Case Study 2

Case Study 3

Case Study 4

Questions