



Sharp Avenue Permeable Pavement Project

Transportation Commission

June 18, 2025



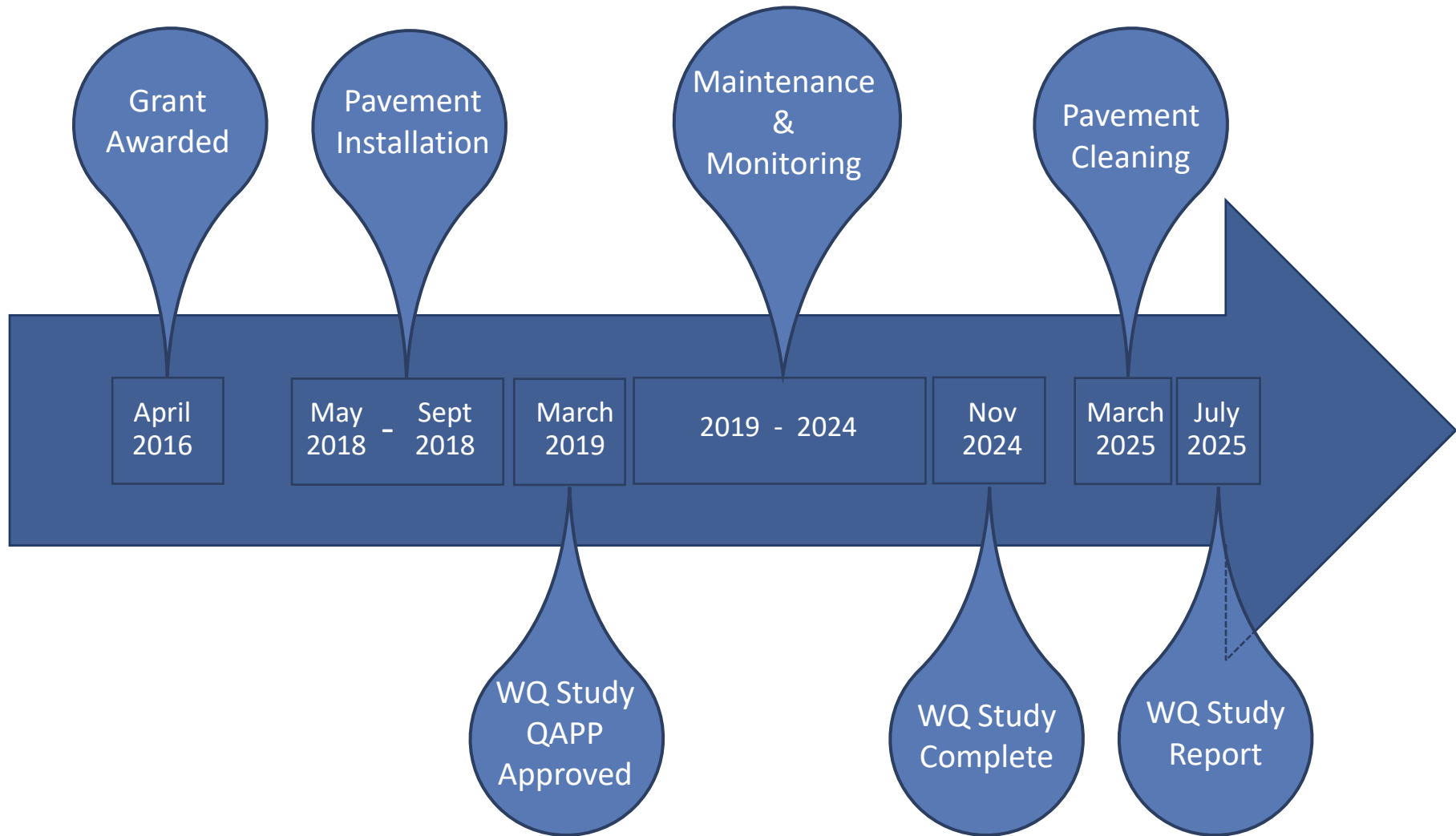
Overview

- Background information
- Pavement Condition Index
- Pavement maintenance
- Infiltration data
- Stormwater treatment
- Summary

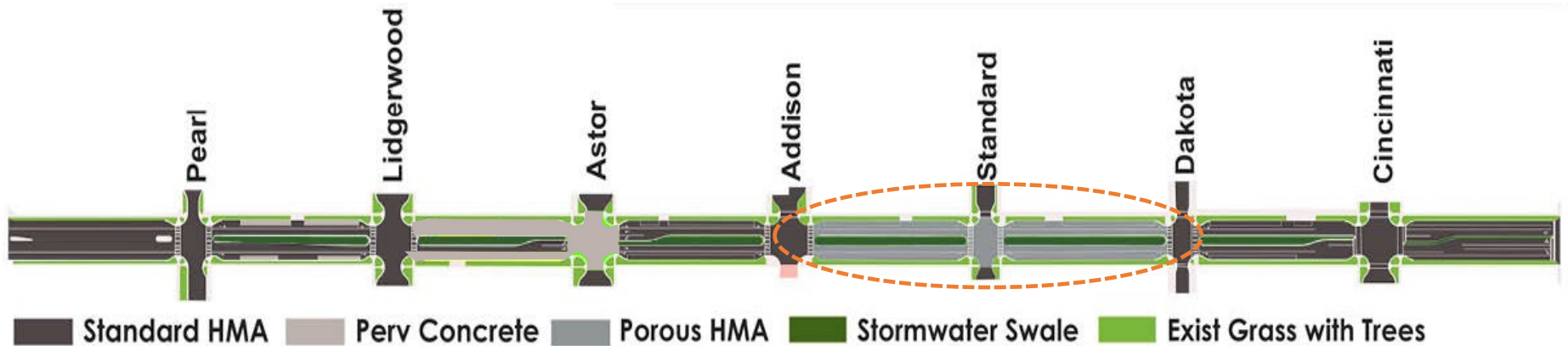
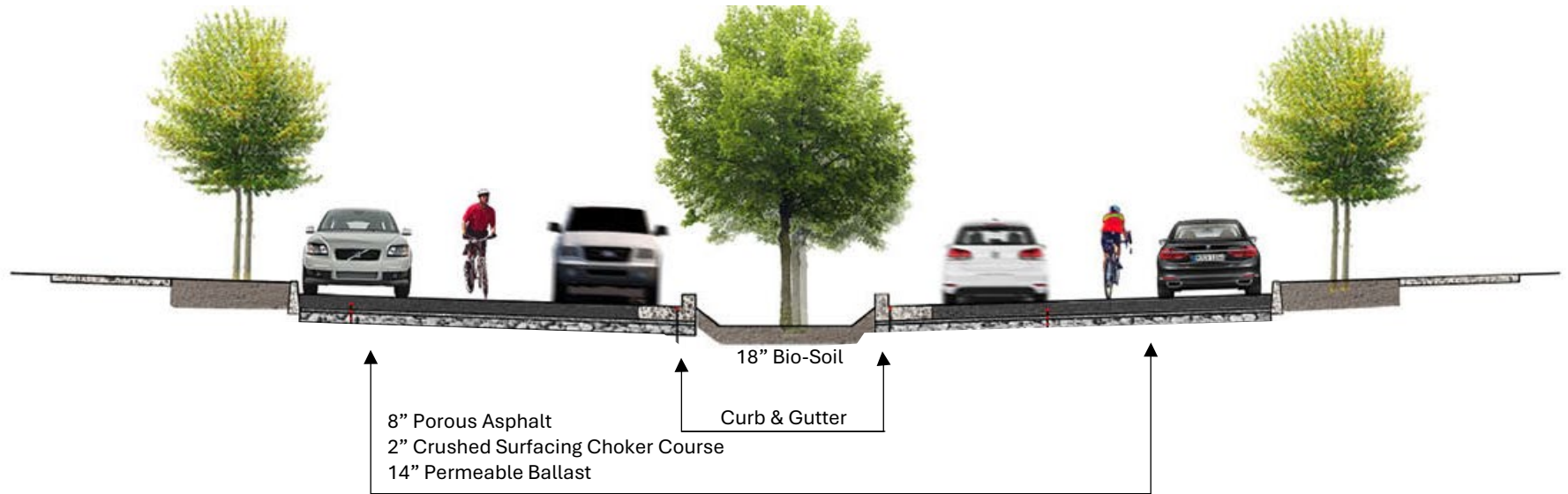
Background Information

- Project implemented to trial pavements
- Partially funded by Ecology to develop information
- Native soil properties and infiltration rates ideal
- Vehicle, bicycle, and parking lanes paved with porous asphalt and pervious concrete
- Median swales constructed as redundancy
- Project leveraged into an Effectiveness Study
- Gonzaga performs green area maintenance
- City maintains infrastructure

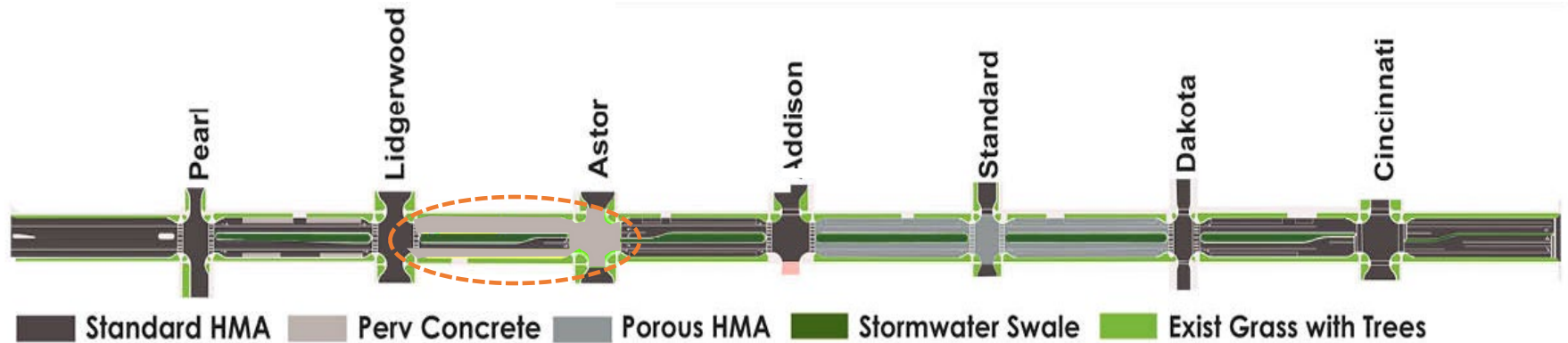
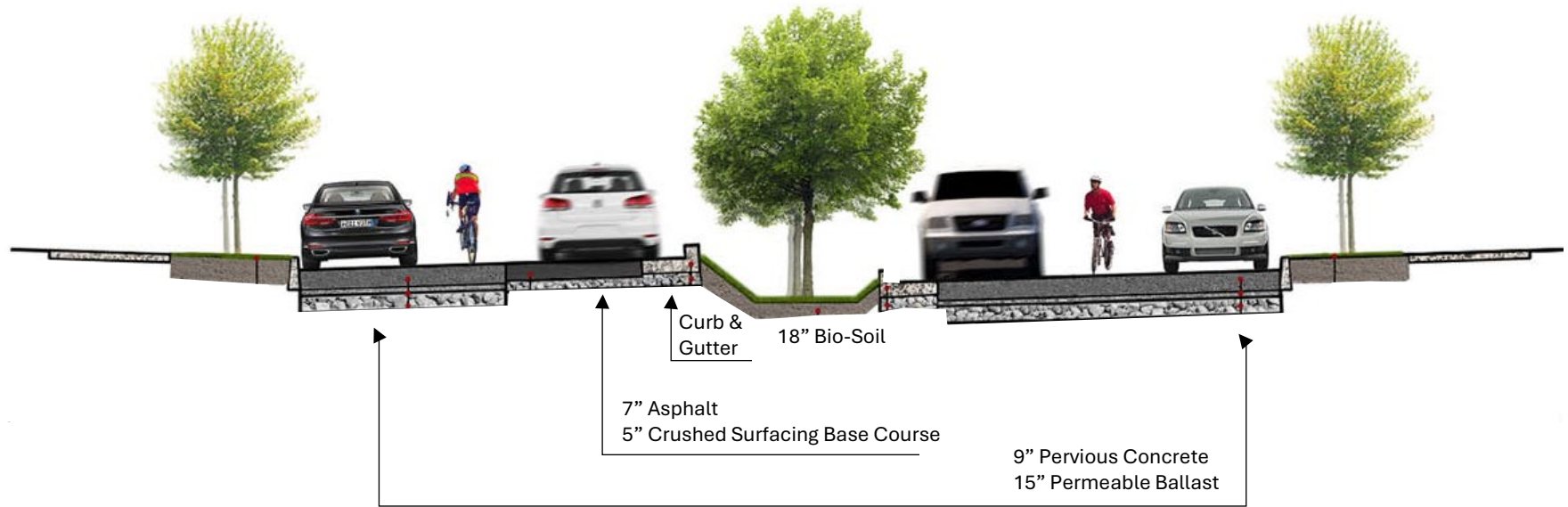
Project Timeline



Porous Asphalt Cross Section



Pervious Concrete Cross Section



Pavement Condition Index*

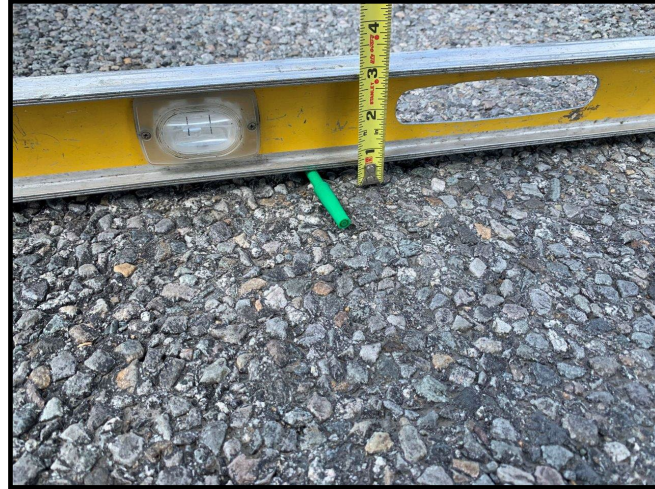
| Pavement | Comments | Apr-19 | Oct-20 | Oct-21 | Nov-22 | Oct-23 | Oct-24 |
|--|---|--------|--------|--------|--------|--------|--------|
| Pervious Concrete (EB Parking) | Edge Cracking | 100 | 100 | 100 | 100 | 100 | 98 |
| Pervious Concrete (WB Lane & Parking) | 2 Linear Cracks | 98 | 98 | 96 | 90 | 84 | 84 |
| Pervious Concrete (Intersection) | 6 Light Linear Cracks 3 Light Patches 10 Medium Scaling | 100 | 100 | 100 | 95 | 89 | 89 |
| Porous Asphalt (WB Lane) | Light Rutting | 100 | 82 | 82 | 79 | 79 | 79 |
| Porous Asphalt (EB Lane) | Light Rutting | 100 | 82 | 82 | 79 | 79 | 81 |
| Asphalt (Lanes & Intersections) | -- | 100 | 100 | 100 | 100 | 100 | 100 |

* PCI is the numerical index (0-100) used to indicate the general condition of a pavement section.

PCI Survey Observations



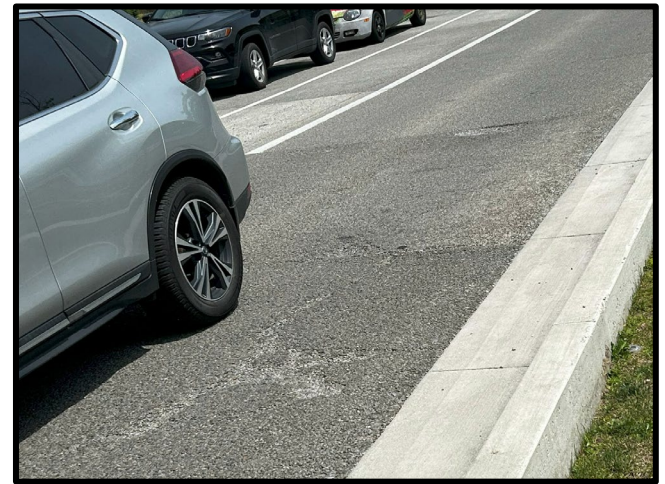
Linear Cracks



Light Rutting

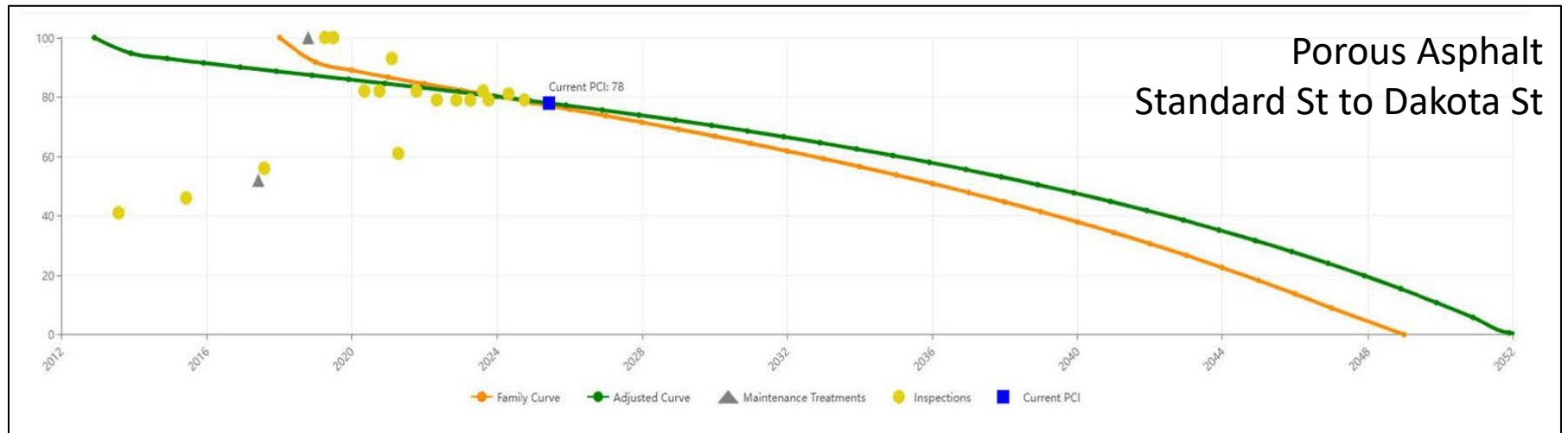
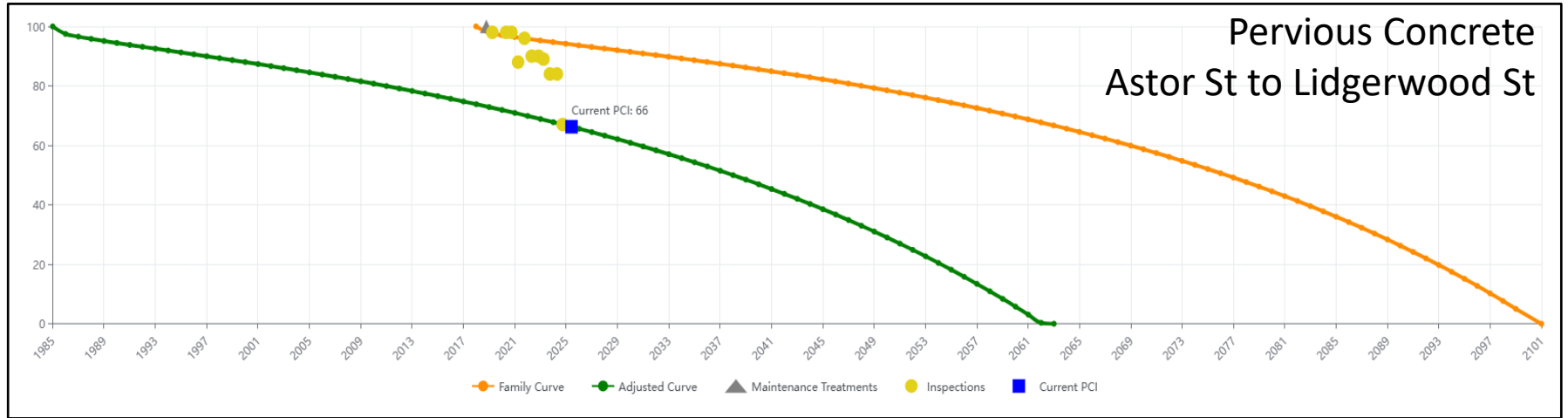


Unraveling

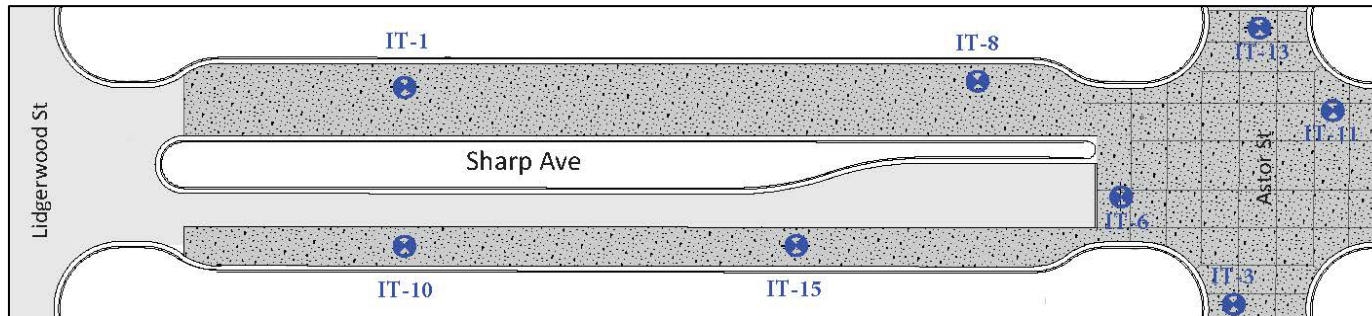
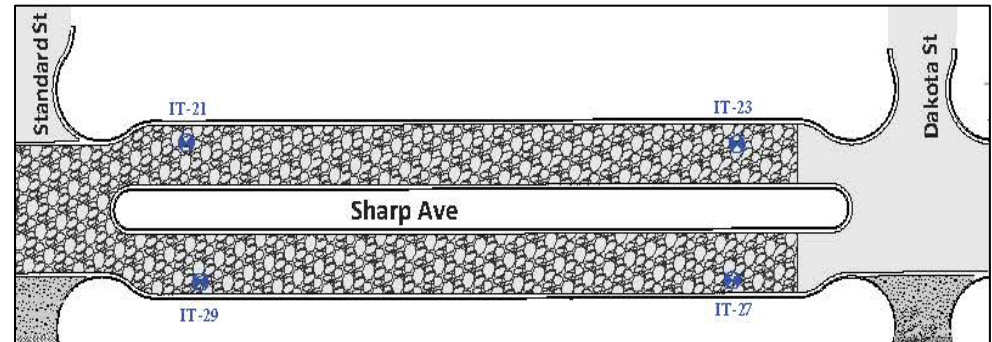
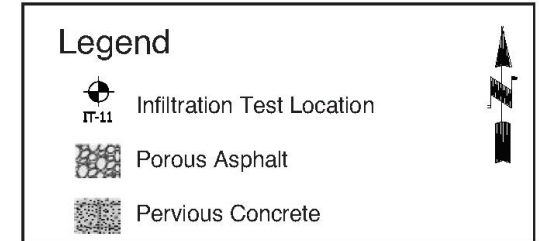
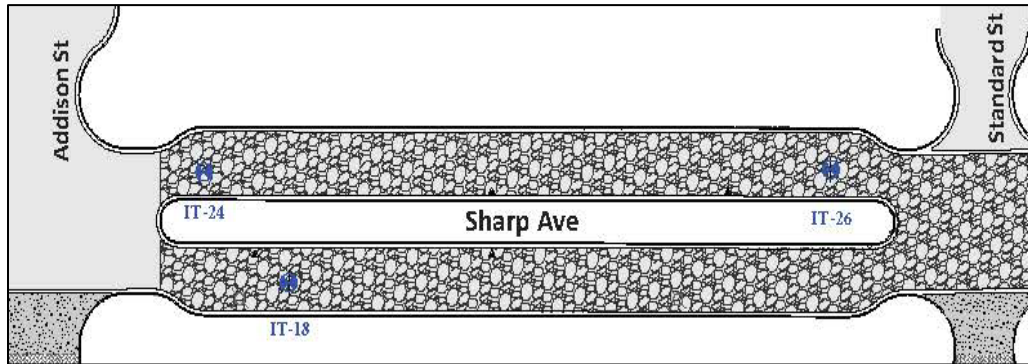


Spalling

PCI Projection Curves



Infiltration Test Locations

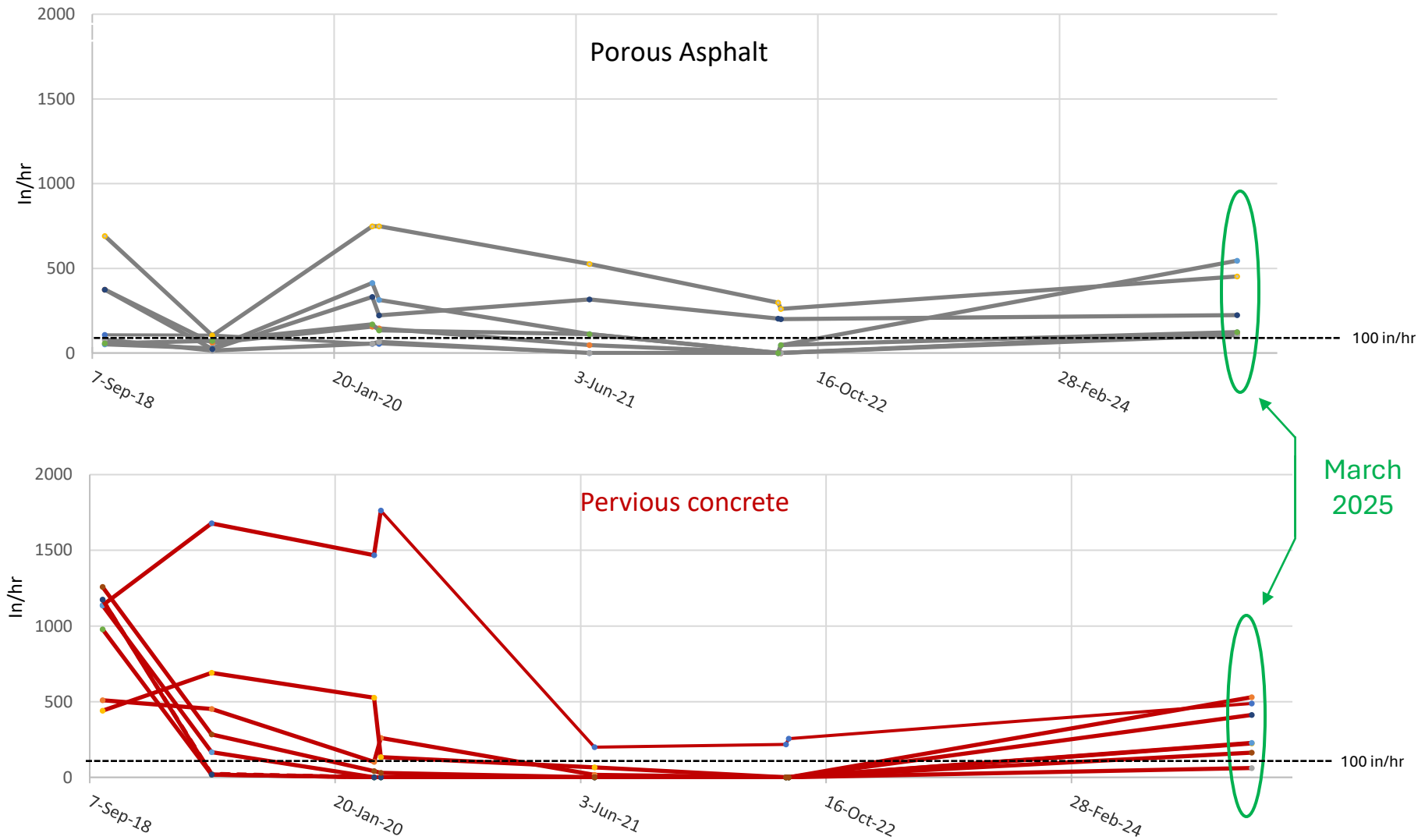


Recent Maintenance

- Specialized equipment
 - High Pressure Water Jets
 - High Vacuum
 - Similar equipment used by Navy for spill mitigation
- Maintenance contract
 - 5 day estimate for ~49,000 sq ft
 - 100 in/hr infiltration criteria
 - Wastewater Department support
- Results
 - Cleaning rate $\approx 1000 \text{ ft}^2/\text{hr}$
 - Cleaning cost $\approx \$0.60 / \text{ft}^2$



Infiltration Rates



Pollutant Removal Efficiencies

| | DRO | ORO | Total P | TSS | As | Cd | Ca | Cr | Cu | Pb | Mg | Zn |
|-------------------|-------|-------|---------|-------|--------|-------|-------|--------|-------|-------|-------|------|
| Pervious Concrete | 0.07 | -0.12 | 0.84 | 0.52 | -11.88 | 0.66 | 0.64 | -8.38 | -0.74 | 0.27 | 0.62 | 0.94 |
| | -1.50 | -1.27 | 0.50 | -0.96 | -13.59 | 0.65 | 0.70 | -8.45 | -1.49 | -1.55 | 0.56 | 0.31 |
| | -- | -- | -- | -- | -6.30 | 0.99 | 0.10 | -0.54 | 0.28 | 0.79 | 0.90 | 0.97 |
| | -1.09 | 0.18 | 0.68 | 0.78 | -1.87 | 0.85 | -3.77 | -2.13 | -3.20 | 0.87 | 1.00 | 0.98 |
| | 0.23 | 0.58 | 0.71 | 0.80 | -1.04 | 0.57 | 0.71 | 0.08 | 0.44 | 0.74 | 0.80 | 0.78 |
| | 0.07 | 0.68 | 0.57 | 0.87 | -2.96 | 0.79 | -0.07 | -0.69 | 0.41 | 0.74 | 0.64 | 0.95 |
| | -0.02 | 0.37 | 0.47 | 0.48 | -2.60 | 0.40 | 0.16 | -0.84 | -0.05 | 0.42 | 0.42 | 0.83 |
| | -0.09 | 0.56 | 0.68 | 0.72 | -3.46 | 0.14 | 0.63 | -1.20 | -0.19 | 0.57 | 0.52 | 0.89 |
| | 0.27 | 0.70 | 0.91 | 0.98 | -3.23 | 0.82 | 0.34 | -2.97 | 0.37 | 0.97 | 0.02 | 0.98 |
| | 0.21 | 0.37 | 0.82 | 0.71 | -4.70 | 0.75 | 0.60 | -1.01 | 0.15 | 0.53 | 0.55 | 0.94 |
| | 0.67 | 0.09 | 0.88 | 0.97 | -4.82 | 0.06 | -1.13 | -3.22 | 0.25 | 0.96 | -0.05 | 0.97 |
| | 0.57 | 0.02 | 0.22 | 0.86 | -5.57 | 0.75 | 0.50 | -9.56 | -1.31 | 0.84 | -0.17 | 0.92 |
| | -- | -- | -0.62 | 0.89 | -13.32 | -4.29 | 0.19 | -10.36 | -0.99 | 0.85 | -0.81 | 0.88 |
| | -0.11 | 0.84 | 0.93 | 0.81 | -0.90 | 0.71 | -2.26 | 0.10 | 0.61 | 0.90 | 0.44 | 0.96 |
| | -0.04 | -0.03 | 0.45 | 0.90 | -6.23 | -0.75 | 0.10 | -4.53 | -0.34 | 0.65 | -0.68 | 0.81 |
| Porous Asphalt | 0.17 | 0.58 | 0.86 | 0.10 | -6.14 | 0.66 | -0.83 | -7.15 | 0.01 | 0.95 | -2.42 | 0.99 |
| | -0.25 | 0.53 | 0.74 | 0.71 | -6.71 | 0.91 | -0.53 | -9.26 | -0.14 | 0.71 | -2.15 | 0.96 |
| | -- | -- | -- | -- | -3.00 | 0.99 | -1.52 | 0.13 | 0.72 | 0.72 | -0.06 | 0.94 |
| | 0.08 | 0.05 | 0.48 | 0.82 | -3.76 | 0.66 | -2.11 | -5.54 | 0.23 | 0.71 | 0.21 | 0.98 |
| | 0.62 | -0.05 | 0.81 | 0.47 | -5.53 | 0.81 | -0.37 | -4.87 | -0.36 | 0.41 | -0.56 | 0.97 |
| | 0.15 | 0.71 | 0.28 | 0.97 | -4.54 | 0.70 | -3.63 | -0.62 | 0.14 | 0.89 | -1.89 | 0.94 |
| | -0.48 | -0.17 | -0.29 | 0.38 | -4.18 | -2.60 | -0.88 | -0.43 | -0.31 | 0.39 | -1.27 | 0.70 |
| | -0.31 | -0.04 | 0.59 | 0.24 | -3.10 | -0.14 | 0.28 | -0.68 | -0.52 | 0.30 | -0.42 | 0.74 |
| | -0.61 | -0.30 | 0.61 | 0.57 | -8.13 | -0.05 | -0.10 | -0.23 | -0.98 | 0.17 | -0.83 | 0.78 |
| | 0.67 | 0.09 | 0.64 | 0.86 | -7.25 | 0.32 | -2.56 | -0.86 | 0.12 | 0.85 | -3.47 | 0.93 |
| | 0.52 | -0.05 | -2.30 | -1.44 | -5.45 | 0.65 | 0.16 | -1.77 | -1.75 | 0.55 | -1.96 | 0.83 |
| | -0.13 | -0.16 | 0.48 | 0.42 | -8.74 | -1.88 | -0.01 | -1.48 | -0.97 | -0.33 | -1.59 | 0.59 |

Sharp Avenue Project Summary

- Permeable pavements manage stormwater effectively
 - Inherently plug with sediment
 - Requires active maintenance with specialized equipment
- Treats stormwater for some pollutants
 - Lead
 - Zinc
 - TSS
 - Phosphorous
- Permeable pavement viability
 - Varies by pavement type and application
 - Durability challenged on arterials
 - Moderate durability in low traffic areas
 - Parking lanes, parking lots, and bike lanes (or similar)

