# ASSET MANAGEMENT

Professional Services Contract
Freese and Nichols, Inc

ERIC OSCARSON - JUNE 5, 2023

# ASSET MANAGEMENT

## DEFINITION

A strategy used to meet a required level of service, in the most cost-effective manner, by managing assets for present and future customers.

## WORKING MODEL

It employs predictive modeling, risk management, and optimized decision-making techniques to establish asset life cycle treatment options and related long-term funding predictions based upon a defined goal/level of service.

## HIERARCHY

Overall asset management typically includes a asset management policy, objectives, strategy, and planning.

# ASSET MANAGEMENT POLICY

An asset management policy is an essential component of having a solid and comprehensive asset management strategy. Providing a set of guiding principles, intentions, goals, and methods for asset management.

- Contains broad principles
- Identify roles and responsibilities, including policy implementation
- Outline how asset management is integrated within the organization
- Establish defined goals, service levels, and maintenance standards
- City wide Consequence of Failure Matrix

# ASSET EVALUATION

## CONSEQUENCE OF FAILURE

Consequences in safety, economy, and environment that is evaluated as the outcomes of a failure based on the assumptions that such a failure will occur.

## PROBABILITY OF FAILURE

Likelihood that an asset will fail at a given time and an important part of effective risk analyses.

# RISK MATRIX

The Consequence of Failure (CoF), calculated together with the Probability of Failure (PoF), helps establish the risk level for a particular asset and set maintenance/improvements based on the calculated risk.

| | | | LIKELIHOOD | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1 | 2 | 4 | 7 | 10 |
| | | | VL | L | M | H | VH |
| CONSEQUENCE | 10 | VH | 10 | 20 | 40 | 70 | 100 |
| | 7 | H | 7 | 14 | 28 | 49 | 70 |
| | 4 | M | 4 | 8 | 16 | 28 | 40 |
| | 2 | L | 2 | 4 | 8 | 14 | 20 |
| | 1 | VL | 1 | 2 | 4 | 7 | 10 |

Consequence of Failure × Likelihood or Probability of Failure = Risk of Failure

# CONSEQUENCE CRITICALITY MATRIX

A complex matrix with different consequence categories that contain threshold criteria for deciding how assets will be addressed.

| Consequence | Critical Success Factors | | | | | |
|---|---|---|---|---|---|---|
| | Safety | Quality of Services | Reputation | Environment | Cost | Legal/Contractual |
| Severe | Would cause loss of life. | Severe impact on the quality of services provided by the Council resulting in a significant increase in complaints from the community (increase of 50% or more). | External Reputation irrevocably destroyed or damaged. Severe impact on staff turnover (increase of >20% above average levels) | Would cause catastrophic environmental damage leading to fines against the Council and significant resources to rectify. | >2.5M | **Legal**. Numerous Major Litigations. **Contract**. Termination of Contract for default. |
| Major | Would cause serious casualties resulting in the long-term physical impairment of personnel. | Considerable impact on the quality of services provided by the Council resulting in a marked increase in complaints from the community (increase of 25-50%). | External Reputation severely damaged: considerable effort and expense required to recover. Major impact on staff turnover (increase of 10-20% above average levels) | Would cause extensive environmental damage requiring significant resources to rectify. | $1M-2.5M | **Legal**. Single Major litigation or numerous Moderate Litigations. **Contract**. Receive written notice from the contractor threatening termination if not rectified. |
| Moderate | Would cause several casualties that require hospitalisation with no long-term effects. | Some impact on the quality of services provided by the Council resulting in an increase in complaints from the community (10-25%). | External Reputation damaged: some effort and expense required to recover. Moderate impact on staff turnover (increase of 10-20% above average levels) | Would cause some environmental damage requiring the allocation of some resources to rectify. | $500k-1M | **Legal**. Single Moderate litigation or Numerous Minor Litigations. **Contract**. Receive verbal advice that, if breaches continue, a default notice may be issued. |
| Minor | Would cause several minor casualties that require medical attention off-site with no long-term effects. | Minor impact on the quality of services provided by the Council resulting in an increase in complaints from the community (<10%). | External Reputation minimally affected. Little effort or expense required to recover. Minor impact on staff turnover (increase of 5-10% above average levels) | Minor environmental damage. Rectification occurs from within existing budget. | $100k-500k | **Legal**. Single Minor litigation. **Contract**. Results in meeting between two parties in which contractor expresses concern. |
| Insignificant | Would cause minor injuries that are able to be treated at the site with no long-term effects. | No impact on the quality of services delivered by Council. | External Reputation not affected. No effort or expense required to recover. No impact on staff turnover | No environmental damage. | $0-100k | **Legal**. Threat of litigation requiring small compensation. **Contract**. No affect on contract performance. |

# ASSET RISK REGISTER

A complete register of all assets: documented risks, risk levels, and current/planned actions to mitigate the risks.

| | Risk Classification | Service Area | Failure or Adverse Event | Cause(s) | Consequences & Other Comments | LH | CONS | RISK | Existing Controls |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Financial | Water Utility | Change in legislation affects WW Treatment Plant compliance and requires significant capital spend | due to regulator mandate specifically around removal of Nitrogen and phosphorous and sludge management | | 4:H | 5:VH | 70 | New requirements will come through permit renewal. Existing permit in plac for next 3 years. |
| 2 | Service | Water Utility | Failure of Inverted siphon at 15400 SW Freeway | due to inability to maintain and inability to conduct condition assessment AND due to existing back up line has already failed | Would not be able to get wastewater to treatment plant and would lead to contamination of Oyster Creek which is water source for some downstream users. Major replacement costs. Would need to set up bypass pumping which is as major task. No documented response plan. One siphon line failed 6 years ago and both installed at same time. Was inspected by camera after failure. | 4:H | 5:VH | 70 | |
| 3 | Reputational | Traffic | Unable to power signs and signals and other assets during a major power outage | due to inadequate capacity of temporary power supplies and due to concerns over reliability due to inadequate planned maintenance on generators | Would cause problems on evacuation routes during hurricanes. Battery backups only last 8 hours. Only have 8 generators but 25 junctions on evacuation routes. | 3:M | 4:H | 28 | Currently have 8 generators owned by Traffic. |
| 4 | Service | Water Utility | Unnecessary or additional severity of failures to assets serving critical customers | due to lack of lack of well developed and documented emergency response plans | | 4:H | 3:M | 28 | Currently have water line asset management project (Arcadis).<br><br>Preventative maintenance plans. SOP's |
| 5 | Compliance | Water Utility | Spills from un-monitored lift stations | due to lack of SCADA monitoring on some pump stations | 70% of wastewater lift stations do not have SCADA coverage and could be spilling more than required | 4:H | 3:M | 28 | Lift stations manually checked by a person each day |

# CITY WIDE ASSETS

## WATER SYSTEM

- Water Mains
- Sewer Mains
- Storage Tanks

## TRAFFIC SYSTEM

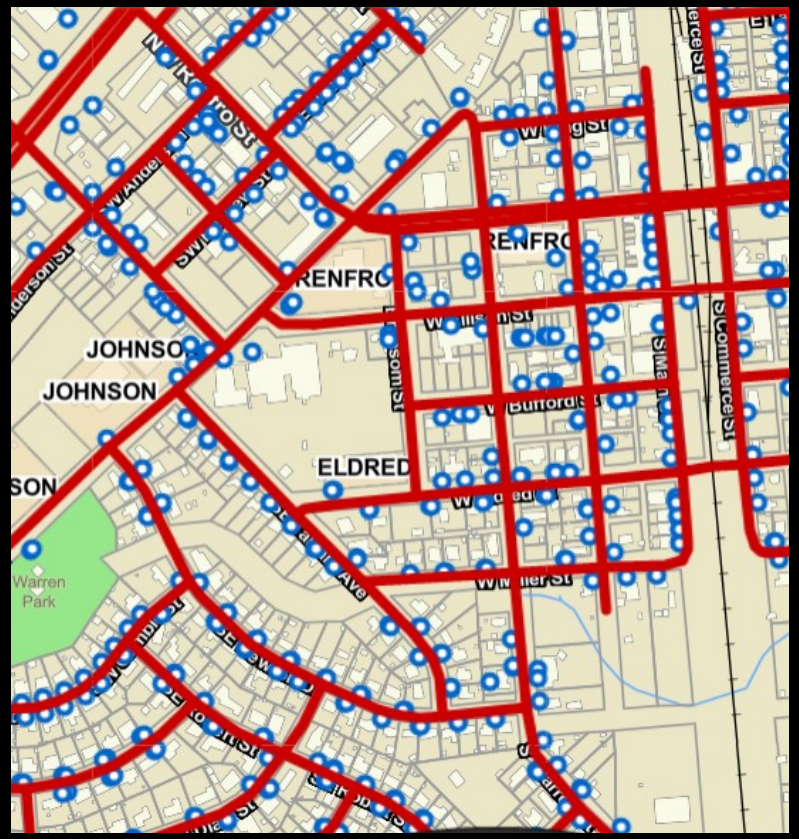
- Traffic & Crossing Signals
- Street & Traffic Signs
- Pavement Markings

## FACILITIES

- Roofs
- AC Units
- Power Generators

## FLEET

- Vehicles
- Fire Apparatus
- Equipment



# STARTING WITH PAVEMENT

Maintained Roadway: 216 Centerline Miles

- Asphalt: 51 %
- Concrete: 49 %

Replacement Value: $ 800,073,582

# CURRENT PAVEMENT PLAN

## PRIORITIZATION

The City currently prioritizes rehabilitation projects based on Pavement Condition scores and roadway classification.

## WORK ORDERS / CARTEGRAPH

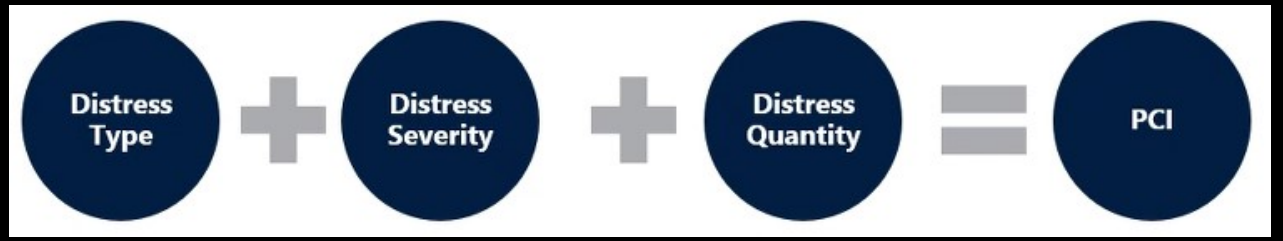
Minor repairs are made as concerns and complaints are submitted.

# PAVEMENT ASSESSMENT

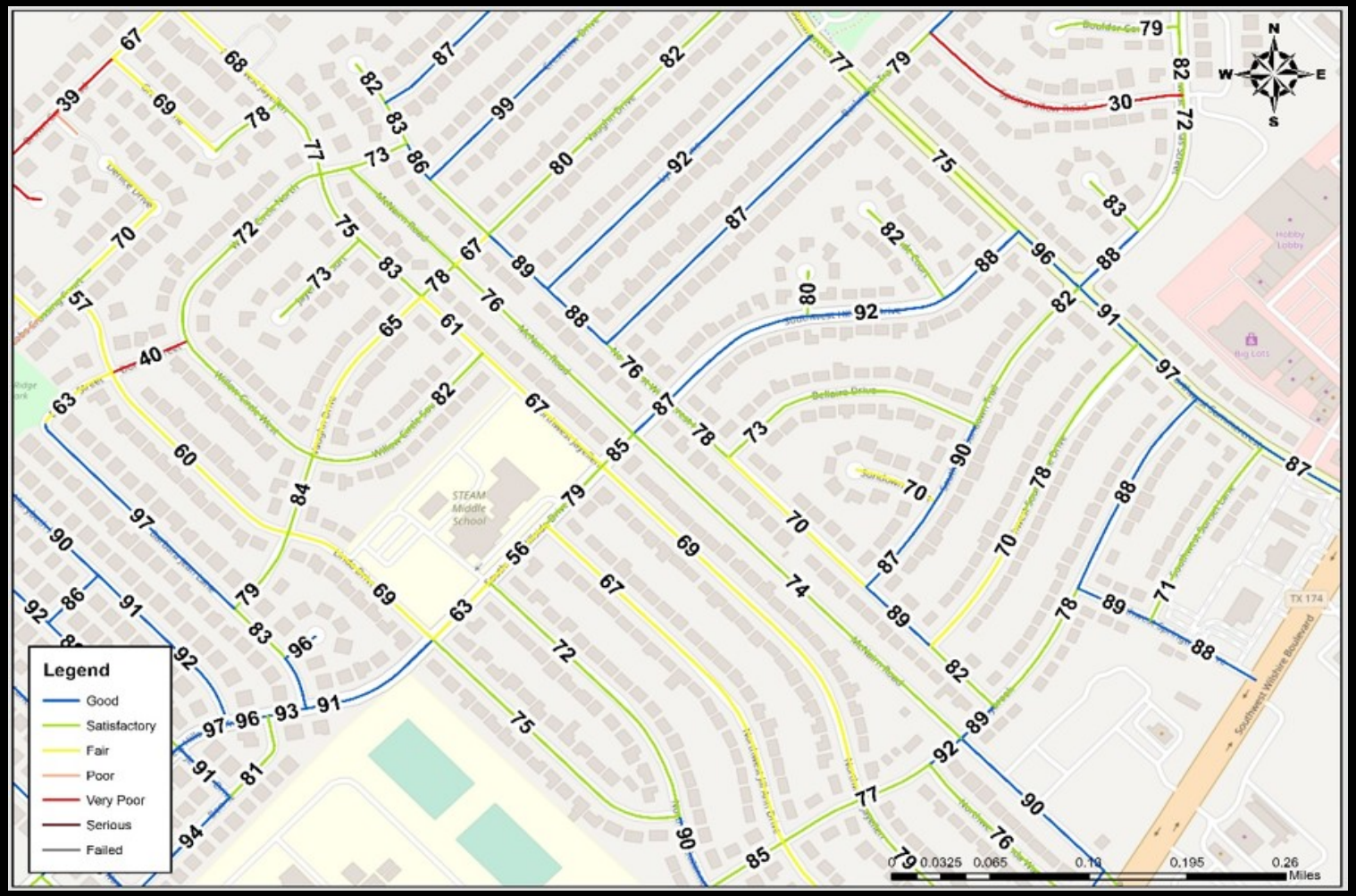
A full evaluation and in-depth analysis of current pavement condition.

- Review accuracy of our current GIS pavement information
- Collect current pavement condition data
- Providing a Pavement Condition Index (PCI) on each roadway
- Assign importance ratings for road segments, based on traffic volumes, road functional class, and community demand

# PAVEMENT PCI SCORES




| Pavement Condition Index (PCI) | Condition Description |
|---|---|
| 86 – 100 | GOOD |
| 71 – 85 | SATISFACTORY |
| 56 – 70 | FAIR |
| 41 – 55 | POOR |
| 26 – 40 | VERY POOR |
| 11 – 25 | SERIOUS |
| 0 – 10 | FAILED |



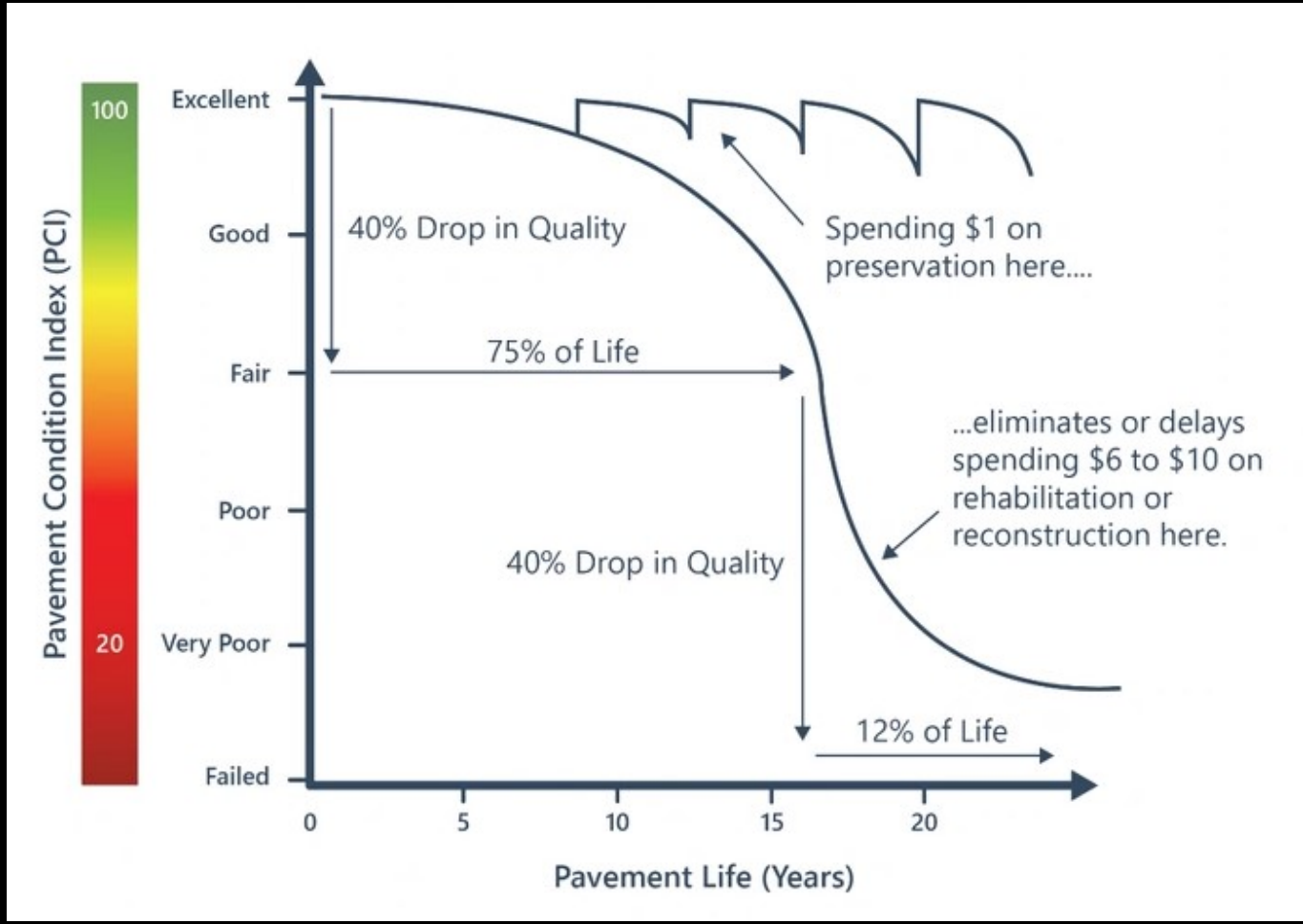
# PAVEMENT MANAGEMENT PLAN

A comprehensive pavement management program will allow City staff to make informed recommendations and decisions that optimize the timing of maintenance activities, reduce overall lifecycle cost of the roadway network, and extend the life of the City's roadway infrastructure.

- Inventory pavement conditions, identifying good, fair and poor pavements
- Schedule maintenance of good roads to keep them in good condition and stay ahead of the degradation curve.
- Schedule repairs of poor and fair pavements as remaining available funding allows

# PAVEMENT LIFE

The main purpose for a complete/updated evaluation and assessment is to better understand the value in **preventive maintenance** versus **reactive maintenance** at a much higher cost.



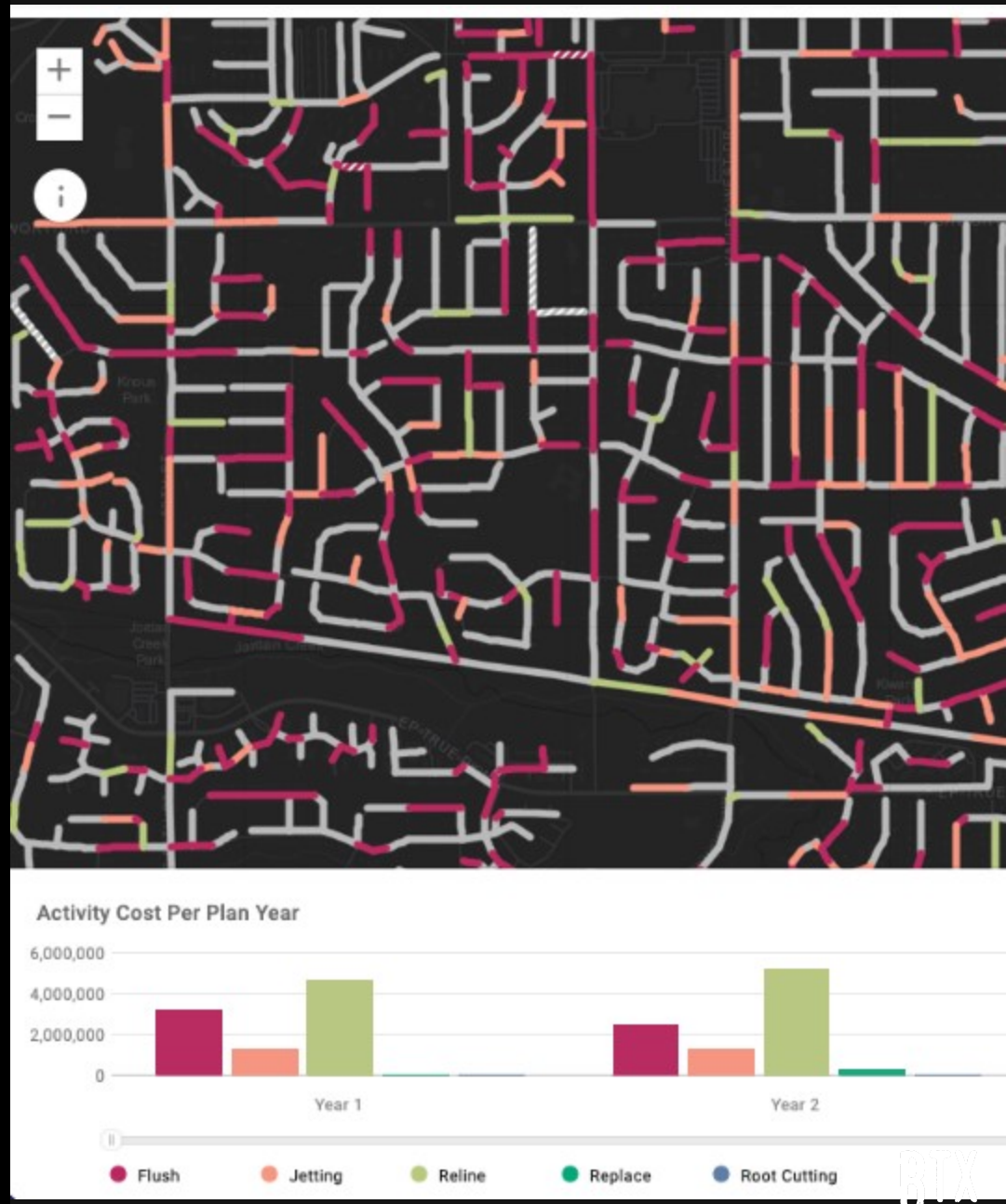
## Table 1: Conservative Steady State Roadway Maintenance Activities & Estimated Annual Cost

| Min. PCI Score | Max. PCI Score | Pavement Type | Centerline Miles | Total Assessed Area (sq.ft) | Average Segment Area (sq.ft) | Recommended Activity | % to be addressed per Year | Activity Cost ($/sq.ft) | Annual Estimated Cost |
|---|---|---|---|---|---|---|---|---|---|
| 91 | 100 | Asphalt | 17.4 | 919,205 | 5,107 | Crack Sealing | 50% | $ 0.23 | $ 105,709 |
| | | Concrete | 32.9 | 1,928,923 | 2,963 | No Action | | $ - | $ - |
| 81 | 90 | Asphalt | 40.3 | 2,091,870 | 4,567 | Rejuvenator Application & Crack Sealing | 33% | $ 1.39 | $ 959,541 |
| | | Concrete | 18.9 | 960,374 | 3,011 | Joint Sealing | 33% | $ 0.52 | $ 164,800 |
| 71 | 80 | Asphalt | 27.6 | 1,436,275 | 4,804 | Microsurface | 20% | $ 0.39 | $ 112,029 |
| | | Concrete | 12.7 | 678,954 | 3,058 | Small Full Depth Repair (5% Avg. Segment Area) | 20% | $ 28.60 | $ 194,181 |
| 61 | 70 | Asphalt | 22.1 | 1,147,557 | 5,625 | Mill and 2" Overlay | 25% | $ 2.98 | $ 854,930 |
| | | Concrete | 3.2 | 136,096 | 3,024 | Medium Full Depth Repair (10% Avg. Segment Area) | 25% | $ 28.60 | $ 97,309 |
| 41 | 60 | Asphalt | 20.1 | 1,039,185 | 6,375 | Mill and 6" Overlay | 25% | $ 8.93 | $ 2,319,981 |
| | | Concrete | 1.5 | 65,369 | 3,268 | Large Full Depth Repair (20% Avg. Segment Area) | 25% | $ 28.60 | $ 93,478 |
| 0 | 40 | Asphalt | 6.4 | 332,062 | 6,386 | Reconstruction | 20% | $ 19.59 | $ 1,301,020 |
| | | Concrete | 0.0 | 0 | 0 | | | $ 28.60 | |
| | | | | | | | | Estimated Asphalt Maintenance Cost: | $ 4,352,190 |
| | | | | | | | | Estimated Concrete Maintenance Cost: | $ 549,767 |
| | | | | | | | | **Total Estimated Maintenance Cost:** | **$ 4,901,957** |
| | | | | | | | | Estimated Reconstruction Cost: | $ 1,301,020 |
| | | | | | | | | **Total Estimated Maintenance & Reconstruction Cost:** | **$ 6,202,977** |

# CARTEGRAPH SCENARIO BUILDER

CREATE DATA-DRIVEN BUDGETING PLANS FOR ASSET NETWORKS TO IDENTIFY, FORECAST, AND PIORITIZE IMPROVEMENT PROJECTS.

RUN MULTIPLE SCENARIOS BASED ON BUDGET LIMITATIONS OR TARGET PCI SCORES - TO PLAN, PREDICT COSTS, AND PRIORITIZE MAINTENANCE.



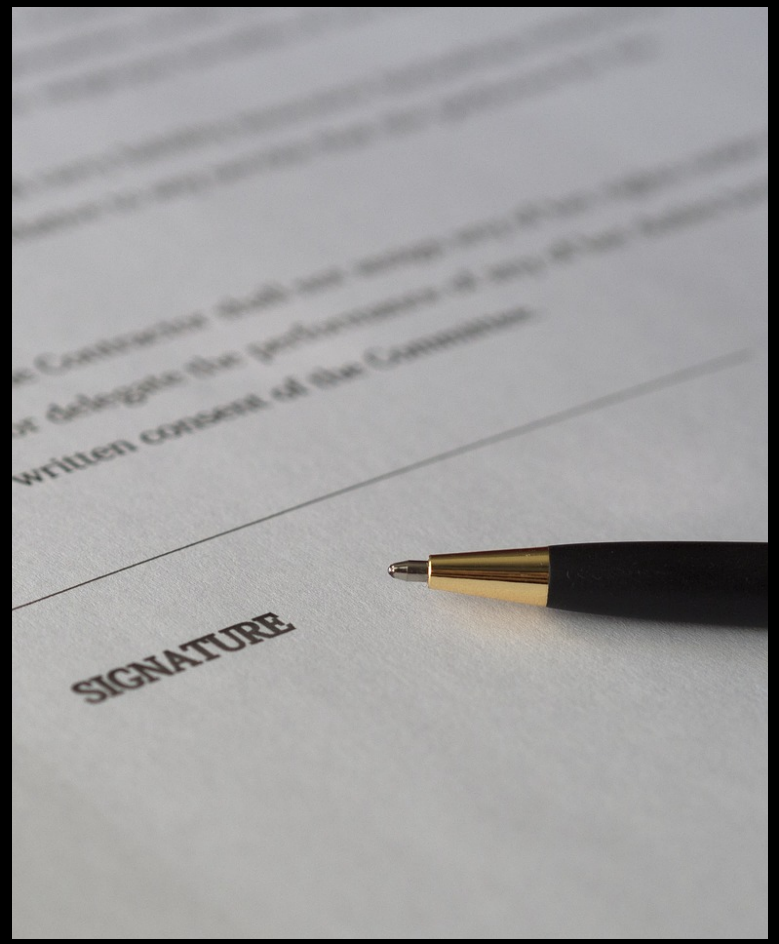
# NEW CONTRACT

## INCLUDED IN CONTRACT

- Asset Management Policy
- Citywide Corporate Consequence/Criticality Matrix
- Complete Risk Register
- Pavement Management Program implemented into Cartegraph

## FREESE AND NICHOLS, INC.

- Engaged on previous pavement management projects
- Experience with staff on other asset management projects



# STEPS TO SUCCESS


City-wide policy

Included in this contract

Input from all stake holders

Included in this contract

Fugro Land USA contracted to complete this year

Financial Modeling

Included in this contract

Treatment Methods

Optimization Modeling

Included in this contract

# FUTURE STEPS

| ASSET MANAGEMENT POLICY/COF MATRIX | COUNCIL REVIEW OF DRAFT POLICY/COF MATRIX | FINALIZE POLICY/COF MATRIX AND BEGIN RISK REGISTRY | COUNCIL ADOPTION | PAVEMENT MANAGEMENT PRESENTATION |
|---|---|---|---|---|
| Draft | | | | |
| Department Input<br>July - December 2023 | Gather Input from Council on Policy and COF Matrix<br>January 2024 | Staff will finalize policy and COF Matrix and create risk registry<br>February - March 2024 | Adoption of Policy and COF Matrix<br>April 2024 | Present Pavement Management Program Based on New Policy and COF Matrix<br>May 2024 |

# OPTIONS

RECOMMENDED

APPROVE A SERVICE CONTRACT WITH FREESE AND NICHOLS, INC TO CREATE A PAVEMENT MANAGEMENT PLAN, A RISK MATRIX, AND AN ASSET MANAGEMENT POLICY IN THE AMOUNT OF $148,814.

DENY A SERVICE CONTRACT WITH FREESE AND NICHOLS, INC TO CREATE A PAVEMENT MANAGEMENT PLAN, A RISK MATRIX, AND AN ASSET MANAGEMENT POLICY IN THE AMOUNT OF $148,814.