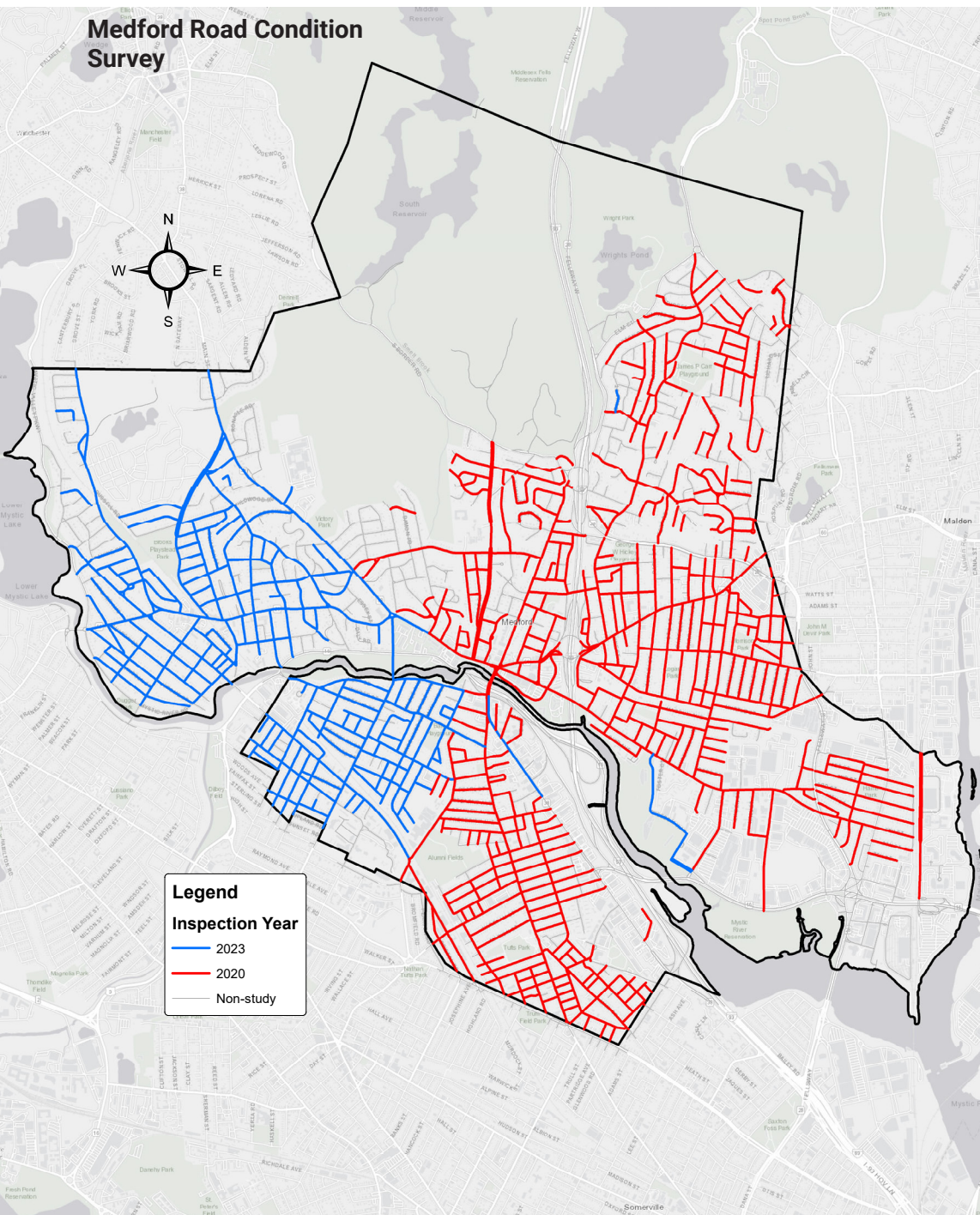
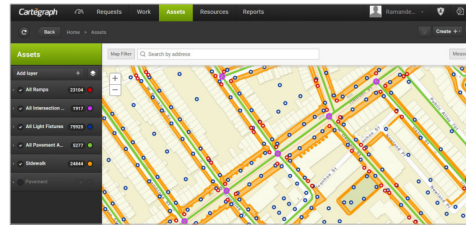


FY 2024

Pavement Management Summary



Prepared for:
City of Medford
Department of
Public Works

Timothy J. McGivern, PE
Commissioner

Prepared by:
Stantec

45 Blue Sky Drive, 3rd Floor
Burlington, MA 01803

Existing Conditions

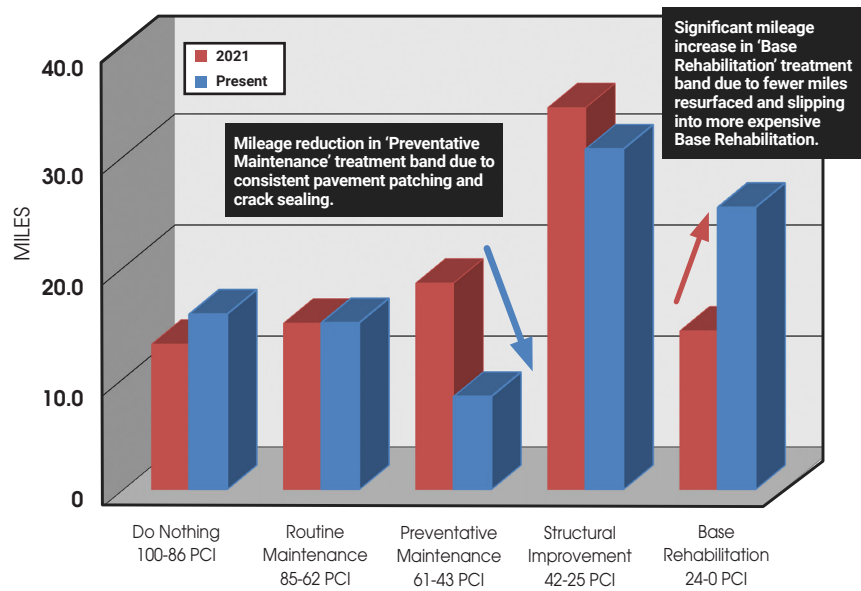
Medford's roadway network is comprised of 95.3 public miles.

Since implementing its Pavement Management System (PMS) in 2021, Stantec has been working with the City in providing new pavement condition surveys and updating its Pavement Management System. In December of 2023, Stantec completed a re-survey of approximately 34% of the City's public roadway network. Within this surveyed area Stantec determined today's average road network Pavement Condition Index (PCI), developed a roadway repair backlog, and modeled three (3) future funding scenarios based on today's estimated construction cost.

Stantec identified 569 public-accepted pavement segments and determined the City's average road network PCI in December 2023 was a 48.5, placing Medford's typical road conditions in the middle of the Preventative Maintenance treatment band (PCI range from 43 to 61), as seen to the right. Since 2022, the City reclaimed 0.2 miles, resurfaced 3.5 miles, pavement patched 2.2 miles, and crack sealed 10.5 miles of roadways.



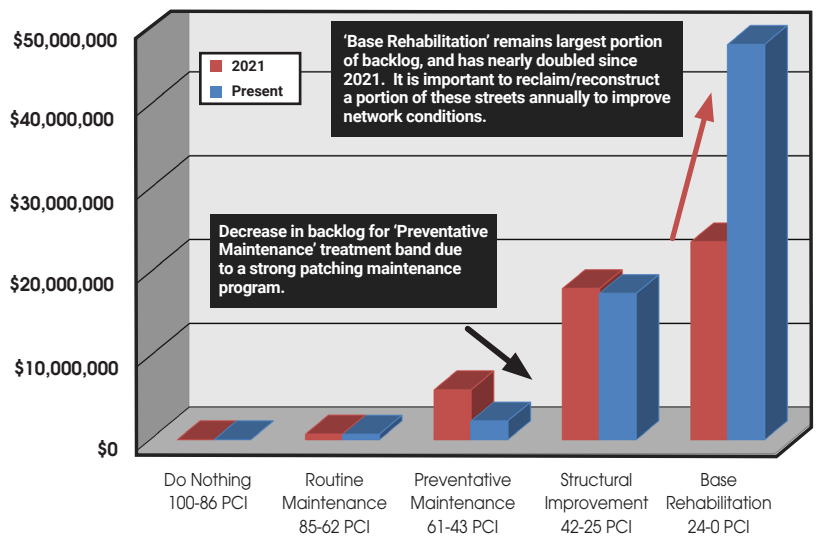
Current PCI Distribution in Miles By Treatment Band



Current Backlog of Outstanding Repairs (\$67,547,767)

The backlog is defined as the cost of repairing all the roads within one year and bringing the average PCI to a near perfect 100. Backlog is a "snapshot" or relative measure of outstanding repair work. The backlog not only represents how far behind Medford's roadway network is in terms of its present physical condition, but its cost value also serves as a benchmark to measure the impact of various funding scenarios. The current backlog offers a basis for comparison to future and/or past year's backlog(s). Backlog dollars account for the pavement structure only; they do not include related repair cost for drainage, sidewalk, curbing, signals, or signs. Medford's backlog as of December 2023 is \$67,547,767. The figure to the right summarizes the backlog repair costs by PCI treatment bands since the original study in 2021.

Current Backlog Distribution By Treatment Dollars





Budget Analysis

Using the City's pavement/asset management software, Stantec modeled three, five-year future funding scenarios

The analysis software of the PMS is where financial determinations and projections are made. Consideration is given to the required budget, by repair type, based on previously supplied information from meetings with DPW and Stantec, for overall desired roadway network conditions. Various scenarios were analyzed to measure the effects of alternative funding levels and to determine the funding needed to avoid deteriorating pavement conditions. Today's backlog cost and future funding scenarios are based on Medford's current unit bid prices for roadway construction prices.

Using the City's pavement/asset management software, Stantec modeled three, five-year future funding scenarios:

1. \$0 per year
2. \$3,500,000 per year
3. \$6,000,000 per year

Each scenario, as depicted in the line charts below, results in a projected average network PCI and backlog. All scenarios incorporate a 4.0% annual inflation rate. Therefore, where the annual road appropriation appears to remain level, it actually represents a net budget decrease due to the impact of inflation.

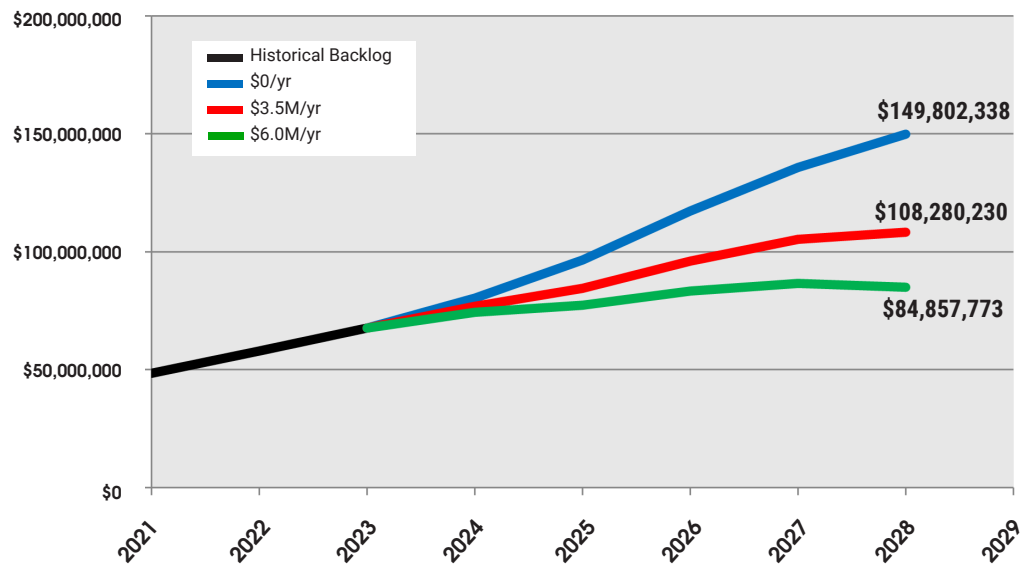
The five-year \$0 per year scenario represents a worst-case event, as seen by the blue line, that shows the backlog increasing significantly to \$149,802,338 while the network average PCI dramatically decreases to 33.2, in the year 2028. This scenario sees the network drop from "fair" to "poor" condition, while creating an unsustainable future backlog.

An equilibrium funding scenario was analyzed. This five-year \$3,500,000 per year scenario, as seen by the red line, shows the backlog increasing to \$108,280,230 while the network average PCI slightly increases to

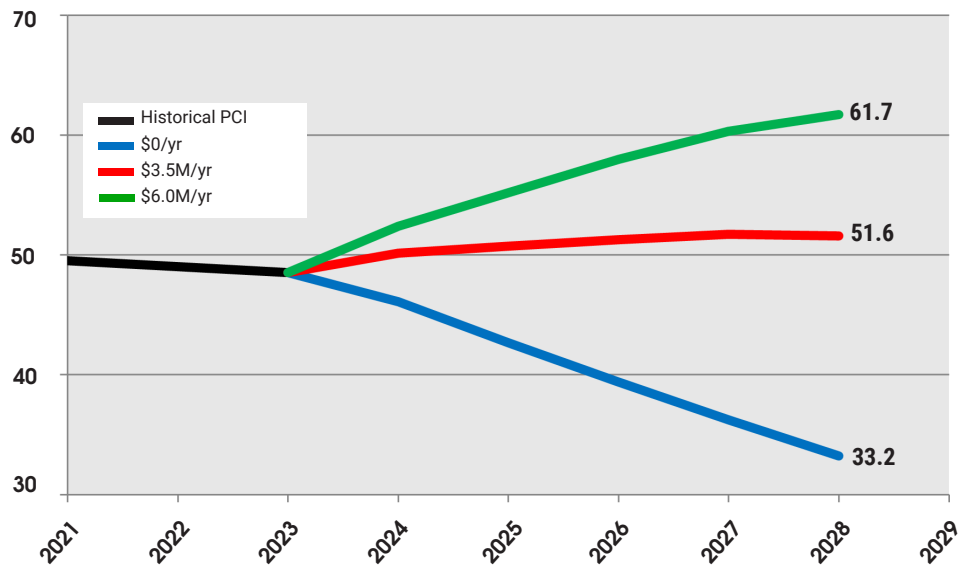
51.6, in the year 2028. This scenario maintains the network at "fair" condition, while slightly increasing the future backlog.

Finally, a five-year \$6,000,000 per year scenario was evaluated as the minimum funding required to stay the course of improving city-wide conditions and reducing the backlog to a more sustainable level for the future. As shown by the green line, the backlog increases to \$84,857,773 and the network average PCI increases to 61.7. This budget nearly brings the network to a "good" condition.

Future Backlog Projection



Future PCI Projection





Concluding Remarks

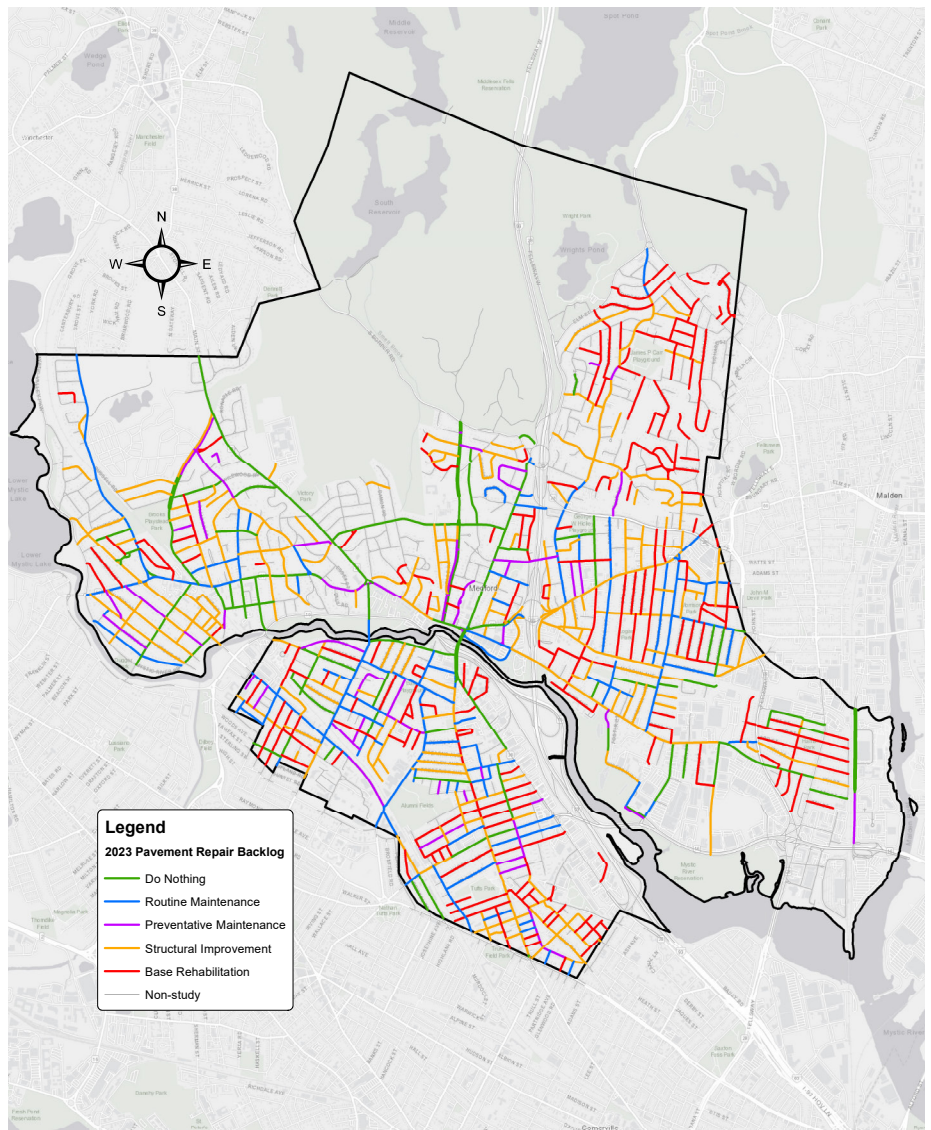
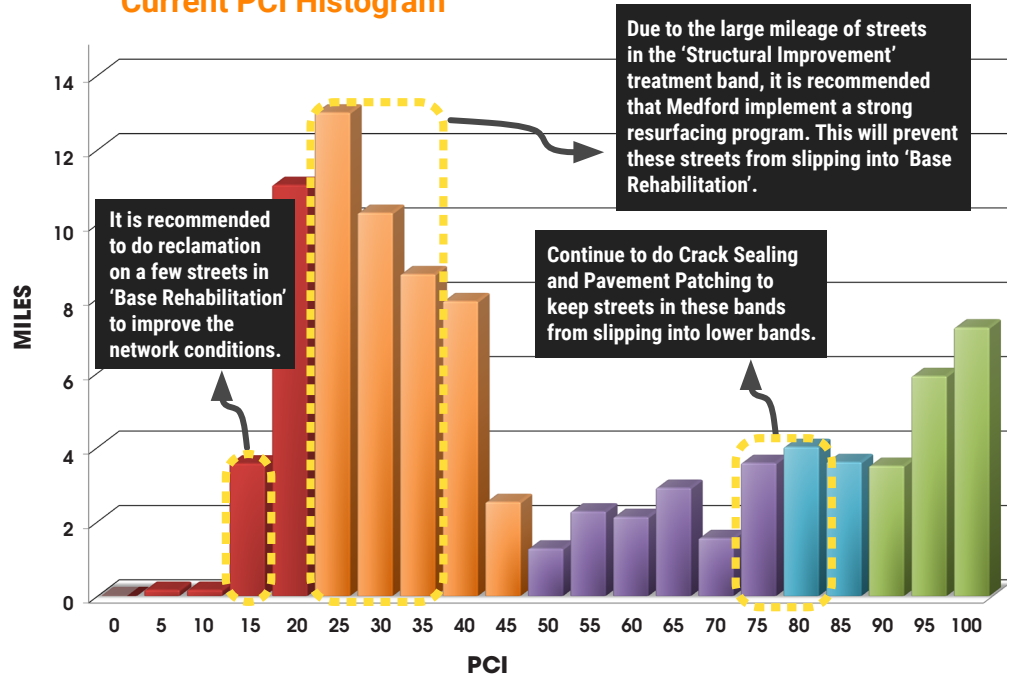
Medford's roadway conditions have slightly deteriorated over the past couple of years, indicating more work is to be done and utility coordination is underway. While the City has done the necessary routine crack sealing and pavement patching to maintain its streets with "fair" PCI, the mileage of streets requiring capital improvements has increased substantially.

Over the past two years the average PCI has decreased by 1 point and the backlog has increased by 40%. The PCI histogram indicates the City's breakdown of mileage by PCI is trending in the wrong direction, and by dollars, the City has more than two-thirds of its current roadway backlog within the 'Base Rehabilitation' band suggesting the City needs to aggressively program repairs on these roadways.

It is recommended that Medford implement an annual pavement management program by spending \$6.0 million at a minimum over the next 3 years to increase funding on capital improvement projects as seen in the 'Structural Improvement' and 'Base Rehabilitation' treatment bands.

As seen on current PCI histogram, Medford should strive to resurface and base rehab between 6-8 miles per year over the next 3 years as shown on the suggested 3 year pavement plan.

Current PCI Histogram



Sidewalk Conditions

A total of 337 out of 2,662 block-to-block sidewalk segments were re-inspected (25.4 sidewalk miles) and 12 new accepted sidewalk segments were added to the City's sidewalk asset management in FY2024.

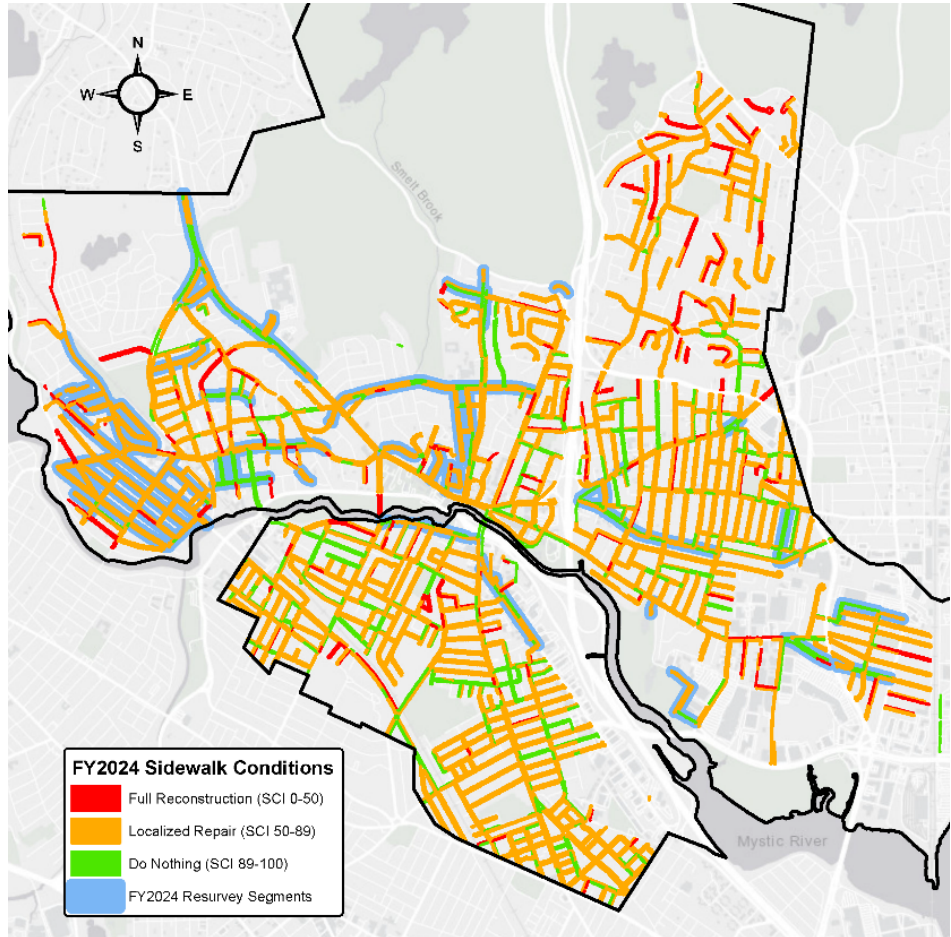
For each sidewalk segment Stantec quantified the sidewalk conditions into sidewalk condition bands. A sidewalk condition index or SCI was established to categorize sidewalk conditions into a repair strategy scheme. This index is based on a 0 to 100 scale which is calculated using count of Hard Obstructions, Tree Root Damage, Curb conditions, and Visual Sidewalk Condition. Below is the formula used to calculate an SCI value:

$$SCI = 100 - (Hard\ Obstruction\ Score + Tree\ Root\ Score + Distress\ Score + Curb\ Condition\ Score + Visual\ SCI\ Score) / (Highest\ Total\ Score)$$

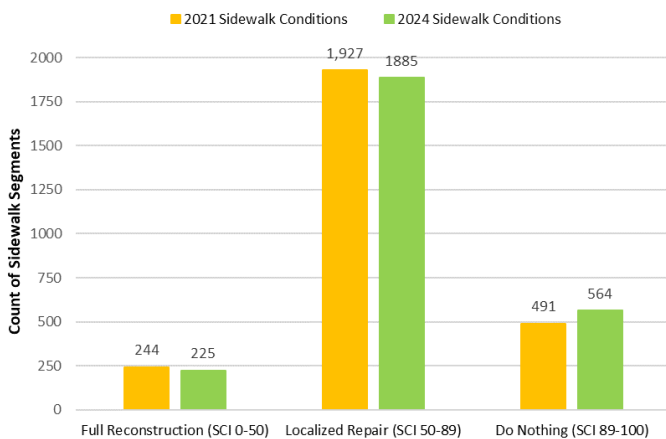
The current network average SCI for sidewalks in Medford is 76.8 points. This is an increase of 0.2 points from 2021's average SCI of 76.6 points.

Stantec categorized individual segments into three treatment repair bands, shown on the map to the right:

- 0 - 50 = Full Replacement/ Reconstruction
- 50-89 = Localized Repair/ Panel Replacement
- 89-100 = Do Nothing



Below is a chart comparing current sidewalk conditions with sidewalk conditions from 2021.



As illustrated in the sidewalk conditions chart above, network conditions have remained in equilibrium. This indicates that the City has done good work maintaining its sidewalks and keeping up with repairs.

Sidewalk Backlog

Backlog is defined as the cost of repairing all sidewalks, localized repair and full reconstruction, within one year bringing the sidewalk network to a near perfect condition. The backlog not only represents how far behind Medford is in terms of its condition, but it also provides a comparison of future and/or past year's backlog(s) to determine if the City is improving sidewalk conditions or falling behind.

The City's current sidewalk backlog is \$29,862,921. This is a decrease from the backlog in 2021, which was \$30,817,570.

The table below shows the current and past unit costs used to determine backlog. Based on the unit costs for Portland Cement and Brick sidewalks increasing, backlog has remained in equilibrium.

| Sidewalk Material | FY2021 Unit Cost | FY2024 Unit Cost |
|---------------------------------|------------------|------------------|
| Portland Cement | \$15 per SF | \$18 per SF |
| Bituminous | \$15 per SF | \$15 per SF |
| Brick | \$30 per SF | \$33 per SF |
| Portland Cement w/ Brick Accent | \$25 per SF | \$25 per SF |

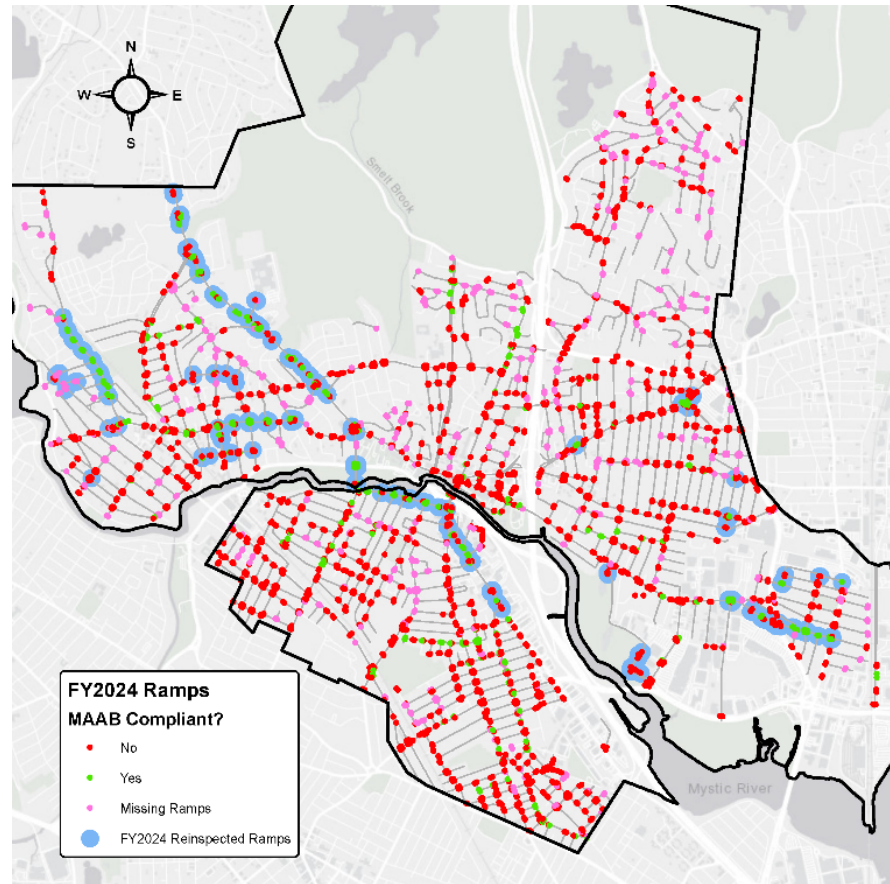
Ramp Conditions

A total of 199 out of 2,811 ramps were re-inspected and 67 new ramps were inventoried in the City of Medford in FY2024. Along with general ramp attributes, Stantec collected specific attributes to determine the likely compliance of each ramp.

Of the 2,878 total ramp locations, 582 are “missing” ramps which hinder accessibility greatly. These include situations where driveways act as ramps, sidewalks end abruptly with no ramp, or crosswalks lead directly into a curb. Below is a picture of a missing ramp on Steve Miller Drive.



Missing Ramp at the end of Steve Miller Drive near the High School



A total of 295 ramps were determined to be MAAB/ADA compliant, while 2,001 ramps were deemed non-compliant (excluding missing ramps). The map above on the right shows the locations of the compliant ramps, non-compliant ramps, and missing ramps surveyed.

Based on the ramps that were re-inspected and/or added this year, it was determined that approximately 87% of ramps (excluding missing ramps) were likely not MAAB compliant. This is a significant improvement from 2021, in which 96% of ramps were deemed to be likely not MAAB compliant.

The table below shows current ramp accessibility conditions compared to those in FY2021.

| Ramp Accesibility | FY2021 Ramp Count | FY2024 Ramp Count |
|---|-------------------|-------------------|
| Existing Ramp w/ landing and no obstruction | 1,247 | 1,362 |
| Existing Ramp w/ no landing present | 919 | 909 |
| Ramp is missing | 622 | 582 |
| Existing Ramp w/ obstruction within proximity to path of travel | 23 | 25 |
| TOTAL | 2,811 | 2,878 |

■ Conclusion

The overall sidewalk network in the City of Medford is in good to fair condition. As outlined in the Sidewalk Conditions and Sidewalk Backlog sections, the overall sidewalk network conditions have remained in equilibrium, indicating the City has performed necessary maintenance or reconstruction keeping up with its sidewalk repairs.

Stantec recommends that the City continue to implement a baseline of \$2.5M to maintain current network conditions. Asset management is an important process that requires the long-term support and commitment from City practitioners and decision-makers to maintain the asset management database. This database system serves as a valuable tool to the City in their proactive approach to managing sidewalk and ramp assets.