

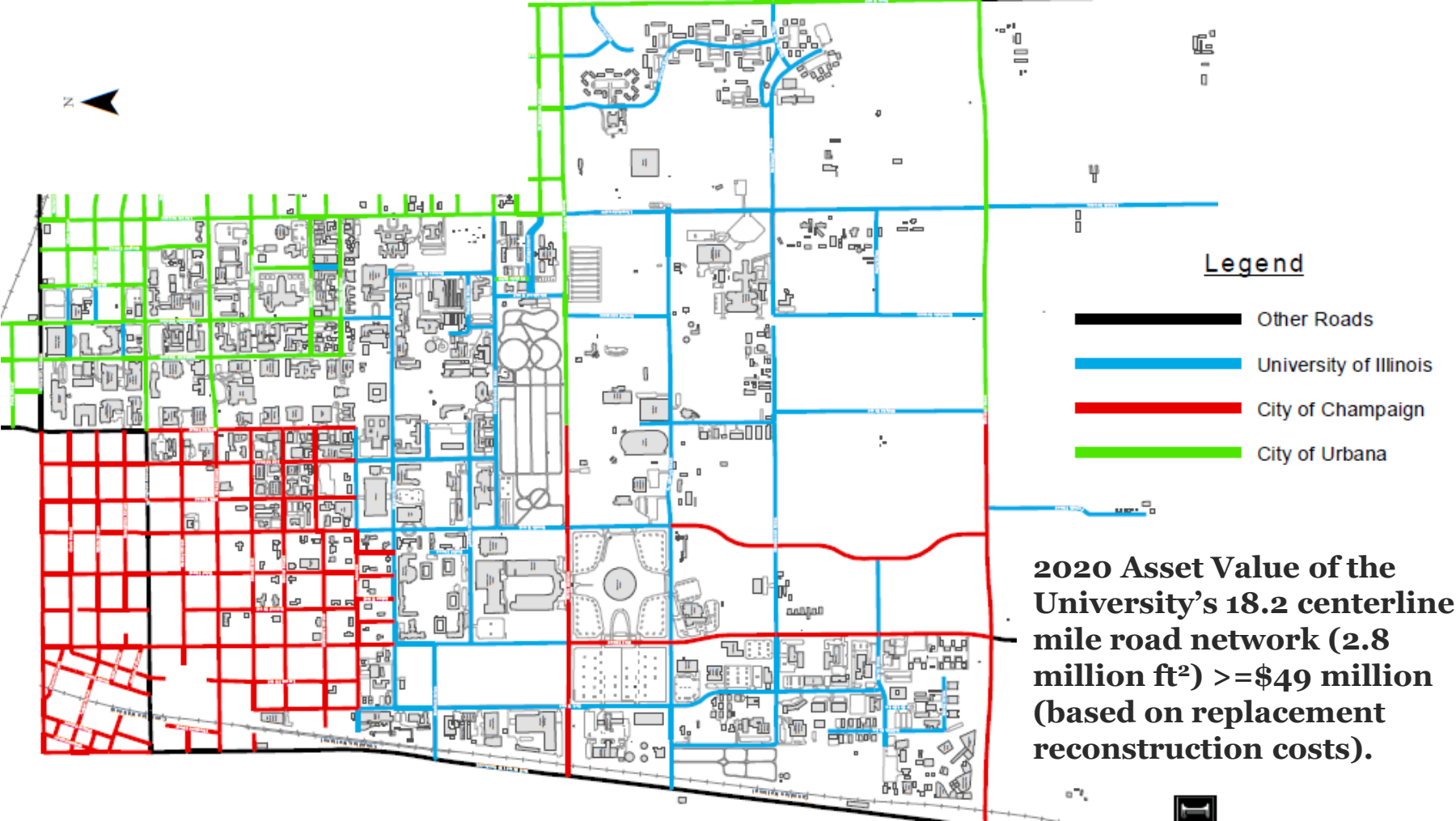
Transportation Asset Management – Maintenance & Repair

1

PAVEMENT ANALYSIS SUMMARY (EXCLUDES CAPITAL PROJECTS)

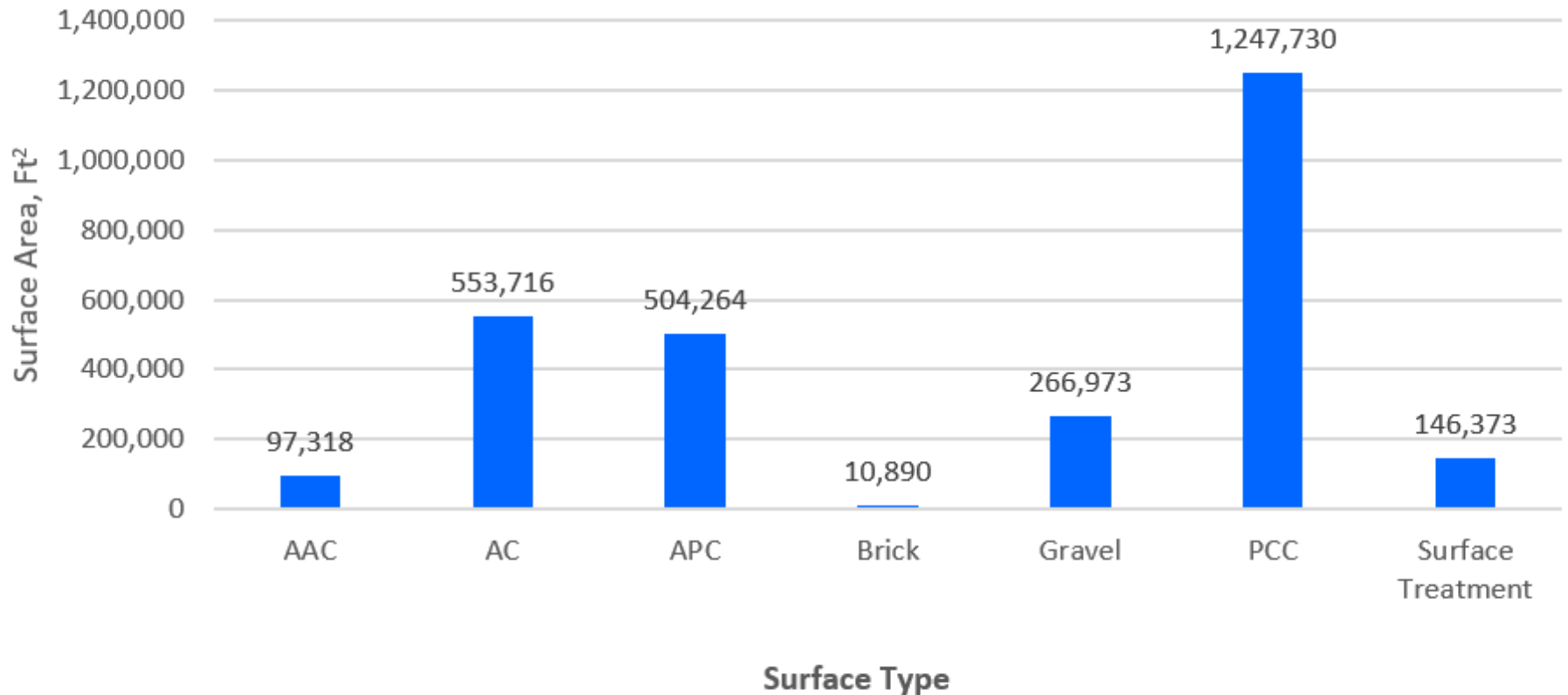
University Owned Streets

2



Pavement inventory by surface type

3

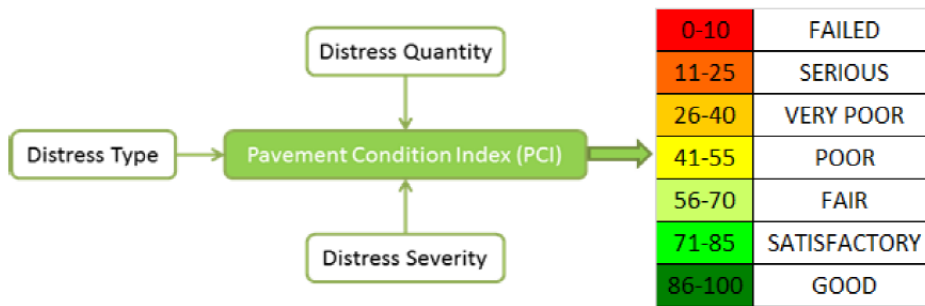


Where AAC = asphalt overlay of asphalt pavement, AC = asphalt concrete pavement, APC = asphalt overlay of PCC pavement, and PCC = concrete pavement

2016 Pavement Condition Index breakdown

4

Pavement condition index (PCI) – A numerical indicator between 0 and 100 that reflects the surface condition of a pavement. The average-weighted network PCI value of campus-owned streets was 65 as of March 2020 (excluding brick and gravel).



It is interesting to note that the overall PCI remained unchanged from 2016 to 2020, despite annual spending of about \$1.5 Million annually.

The critical PCI of 55 is used to distinguish between the need for minor and major M&R.

Types of Improvement Work

5

Maintenance & Repair (M&R) prolongs pavement life (preservation methods), is performed periodically, and includes:

- Crack sealing (PM)
- Spray Injection (PM)
- Patching/Pothole repair (stop-gap)
- Curb and gutter repair (stop-gap)
- Pavement marking (safety)
- Minor Overlays (PM)



Maintenance & Repair Needed

Major Rehabilitation [aka, Full Reconstruction] replaces pavement that has reached the end of its useful life; typically undertaken as a capital project and includes 8” – 10” concrete pavement, sub base, curb & gutter, storm sewer, sidewalk, street lights, and pavement markings



Reconstruction Needed

Preventive and Stopgap Maintenance Unit Costs

6

In general, the costs for rehabilitating pavements with a PCI below 40 represent the cost of reconstruction. For PCIs between 40 and 70, the costs generally represent the cost of patching or the cost of an asphalt overlay with varying amounts of pre-overlay repairs. Finally, costs for pavements with PCIs above 70 are for preventive maintenance and repairs. The table below shows the cost by PCI ranges of preventive and stopgap maintenance for asphalt and PCC roads.

| Maintenance Item | Cost | Work Unit |
|------------------------------|-------------|------------------|
| Crack Sealing - AC | \$1.09 | ft |
| Crack Sealing - PCC | \$1.09 | ft |
| Joint Seal (Localized) | \$1.09 | ft |
| Grinding (Localized) | \$0.56 | ft |
| Spread Sand | \$0.25 | ft ² |
| Patching - AC Full Depth | \$11.00 | ft ² |
| Patching - AC Partial Depth | \$7.00 | ft ² |
| Patching - AC Leveling | \$7.00 | ft ² |
| Patching - PCC Full Depth | \$21.00 | ft ² |
| Patching - PCC Partial Depth | \$40.00 | ft ² |
| Slab Replacement - PCC | \$18.00 | ft ² |

Cost by PCI range for preventive and stopgap maintenance

7

| PCI | PCC | | Asphalt | |
|-----|------------------------|------------------------|------------------------|------------------------|
| | Preventive | Stopgap | Preventive | Stopgap |
| 0 | \$2.00/ft ² | \$9.39/ft ² | \$8.00/ft ² | \$1.70/ft ² |
| 10 | \$2.00/ft ² | \$4.45/ft ² | \$8.00/ft ² | \$0.80/ft ² |
| 20 | \$2.00/ft ² | \$1.97/ft ² | \$4.25/ft ² | \$0.20/ft ² |
| 30 | \$2.00/ft ² | \$0.77/ft ² | \$2.50/ft ² | \$0.07/ft ² |
| 40 | \$2.00/ft ² | \$0.49/ft ² | \$1.25/ft ² | \$0.02/ft ² |
| 50 | \$2.00/ft ² | \$0.28/ft ² | \$0.50/ft ² | \$0.00/ft ² |
| 60 | \$2.00/ft ² | \$0.11/ft ² | \$0.06/ft ² | \$0.00/ft ² |
| 70 | \$0.85/ft ² | \$0.06/ft ² | \$0.02/ft ² | \$0.00/ft ² |
| 80 | \$0.50/ft ² | \$0.02/ft ² | \$0.02/ft ² | \$0.00/ft ² |
| 90 | \$0.05/ft ² | \$0.00/ft ² | \$0.01/ft ² | \$0.00/ft ² |
| 100 | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² |

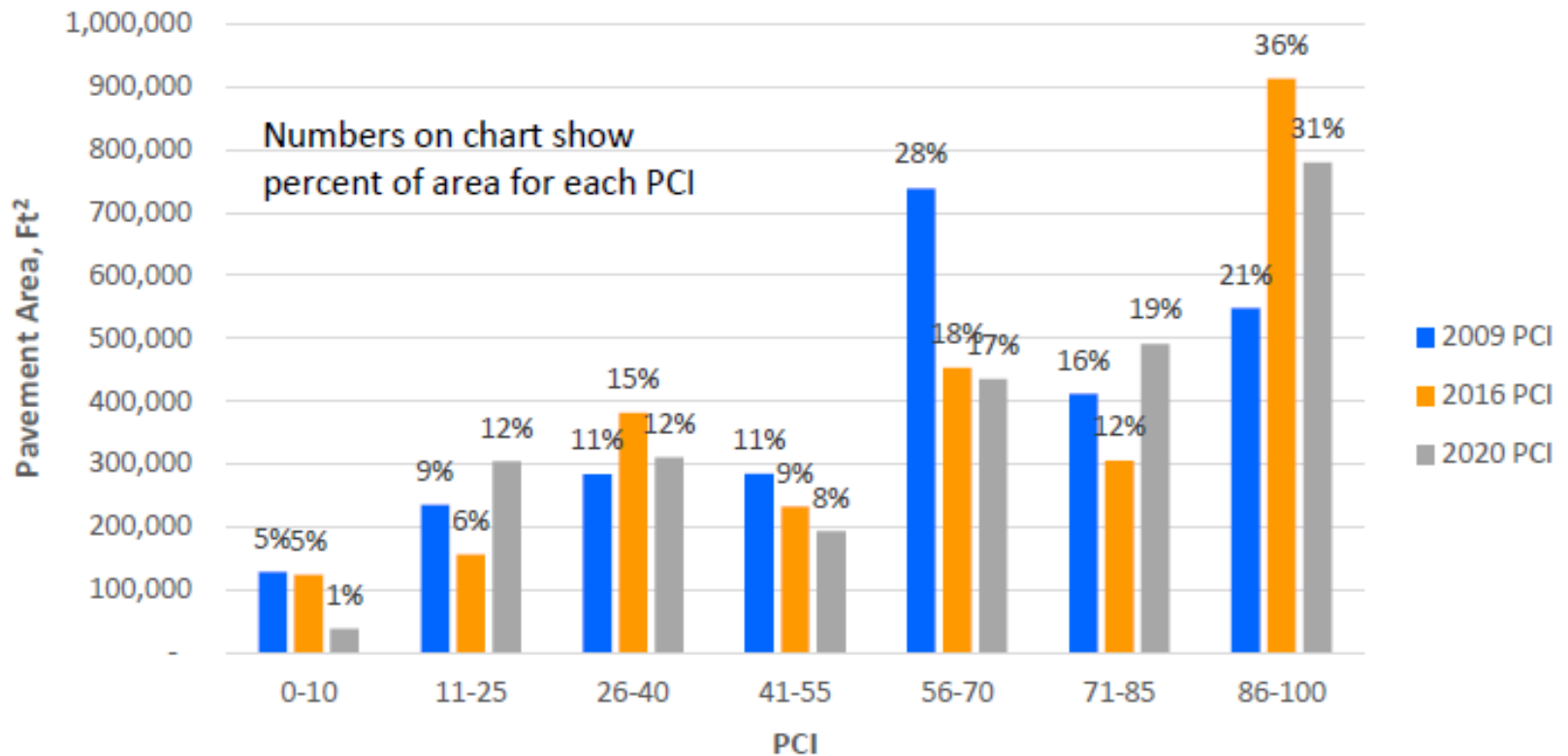
Cost by PCI range for rehabilitation activities

8

| PCI | Arterial/Collector ¹ | | Local ¹ | |
|-----|---------------------------------|------------------------|-------------------------|------------------------|
| | PCC | Asphalt | PCC | Asphalt |
| 0 | \$24.00/ft ² | \$9.00/ft ² | \$16.80/ft ² | \$6.30/ft ² |
| 10 | \$24.00/ft ² | \$9.00/ft ² | \$16.80/ft ² | \$6.30/ft ² |
| 20 | \$24.00/ft ² | \$9.00/ft ² | \$16.80/ft ² | \$6.30/ft ² |
| 30 | \$24.00/ft ² | \$9.00/ft ² | \$16.80/ft ² | \$6.30/ft ² |
| 40 | \$24.00/ft ² | \$9.00/ft ² | \$16.80/ft ² | \$6.30/ft ² |
| 50 | \$3.60/ft ² | \$3.75/ft ² | \$3.60/ft ² | \$2.35/ft ² |
| 60 | \$3.60/ft ² | \$3.75/ft ² | \$3.60/ft ² | \$2.35/ft ² |
| 70 | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² |
| 80 | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² |
| 90 | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² |
| 100 | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² | \$0.00/ft ² |

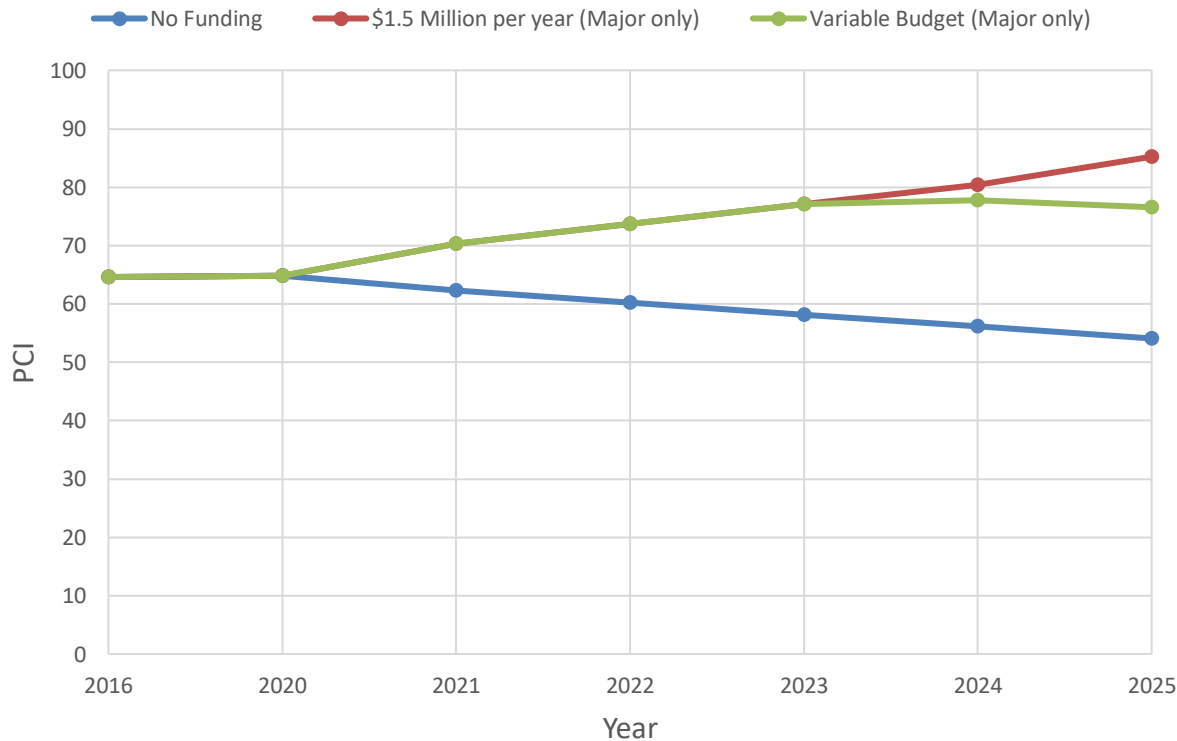
Pavement area by condition from 2009 to 2020

9



Funding Impact on PCI

10



*If no funding is provided for Transportation Asset Management Maintenance, the pavement network is expected to deteriorate from an average PCI of 63.8 to a PCI of **48** by 2026.*

Bus Traffic Impact



This report also emphasizes the need for special considerations in the vicinity of bus stop locations. A number of localized failures were observed, some in newly reconstructed pavements, that appear directly associated with bus operations. Special attention needs to be given to these areas so that expensive repair work is not prematurely destroyed.

| Branch ID | Section ID | Surface | LCD ¹ | Area (Ft ²) | Bus Rt (Yes/No) | Inspected PCI | | Drop in PCI/year since 2016 | Predicted PCI (assuming no major M&R) | | | | |
|-----------|------------|---------|------------------|-------------------------|-----------------|---------------|------|-----------------------------|---------------------------------------|------|------|------|------|
| | | | | | | 2016 | 2020 | | 2021 | 2022 | 2023 | 2024 | 2025 |
| GHUFFDR | UW03 | AAC | 2014 | 13,420 | Y | 100 | 68 | -8.0 | 65 | 62 | 59 | 56 | 53 |

Summary

12

In summary, at an annual funding level of about \$1.5 Million the University has maintained the network condition at an area-weighted average of about 65 since 2016. If that funding level were to continue the PMS predicts that the network would dramatically improve over the next 5 years using a variety of repair techniques across a wider range of condition levels. A significant reduction in funding shows a significant drop in condition over time. Experience has shown that the lower the condition, the higher the required budget to maintain condition. The University has invested a lot of money in recent years to improve conditions, and should preserve those improvements with funding dedicated to roadway maintenance and preservation rather than allowing the roads to deteriorate at an accelerated pace and require future reconstruction.