Pavement Condition Index Presentation
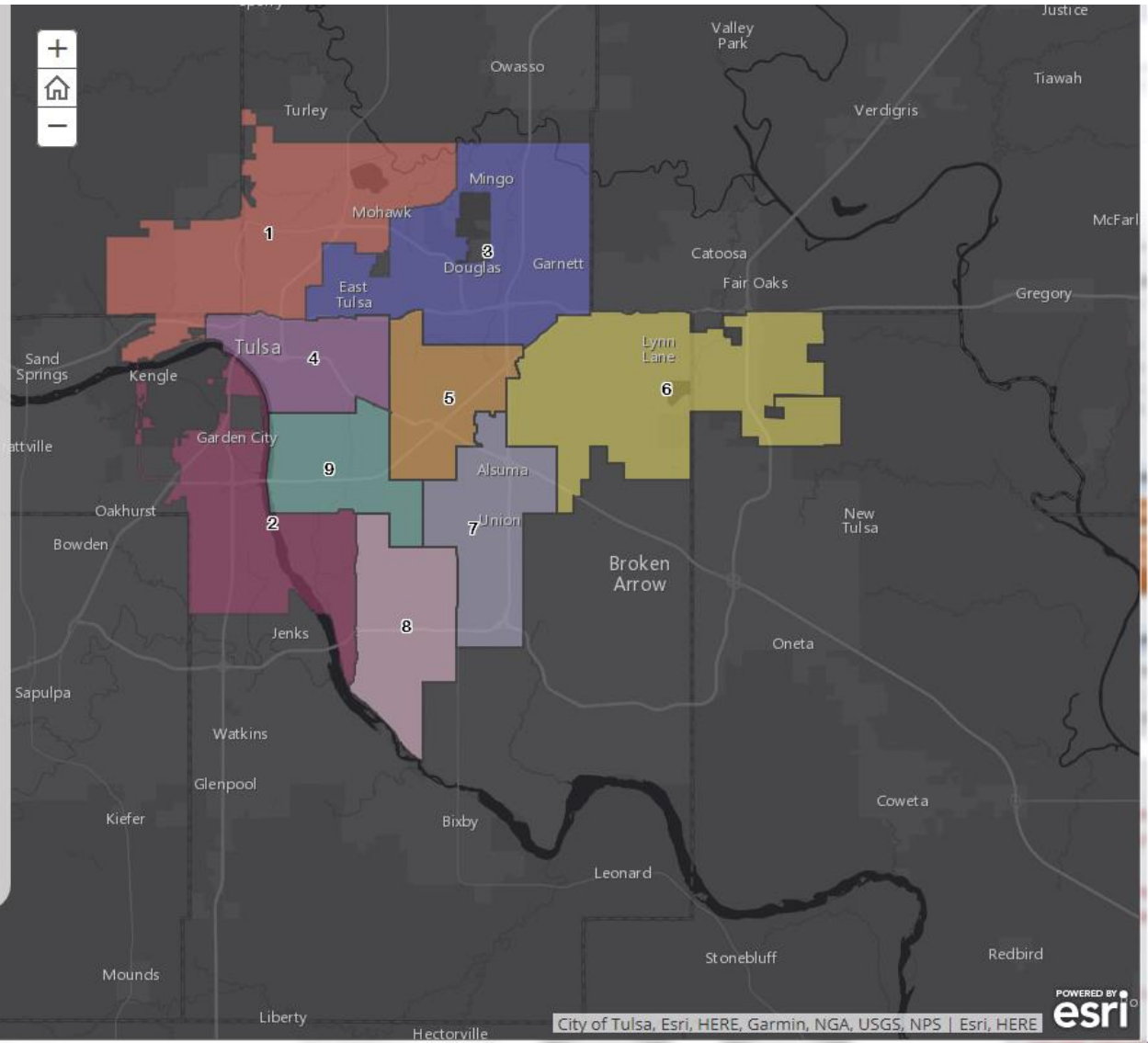
Pavement Condition Index (PCI)

The pavement condition index is a measurable scale given to rate the condition of the streets. The scale range is 0 to 100, where 100 is excellent. There are 19 criteria that determine the PCI value of each street segment including; appearance, drive ability, stress, and age. Tulsa uses the pavement condition index to determine and prioritize work needed for each street. Planned street work is allotted by council district need.

Goal:

Our goal is to improve upon the existing prioritization recommendations generated by the current PCI process by looking at other data in conjunction with the PCI data.

Council Districts

1
2
3
4
5
6
7
8
9

Slide/Map 1
Pavement Condition Index (PCI)

Pavement condition index rates the condition of the streets from 0 to 100, where 100 is best. 19 criteria are surveyed to determine the PCI value of each street segment including; age, drive ability, appearance, and stress. Pavement condition indexes are used prioritize any work needed for each street. Any street with a PCI below 40 is a candidate for complete reconstruction. Street work is allotted by council district need. Some districts contain much older streets than neighboring districts, and other districts contain many more miles of streets.

Goal:
Our goal is to improve upon the existing PCI prioritization recommendations by looking at other relevant data in conjunction with the PCI data.

Arterial PCI Value

PCI can be grouped as follows:

Anything less than 40 is Reconstruction
40 to 70 is Major Repair
Anything above 70 is Routine and Preventative Maintenance

There is a significant cost difference between Routine & Preventative Maintenance, Major Repair, and Reconstruction; with Reconstruction being the most expensive.
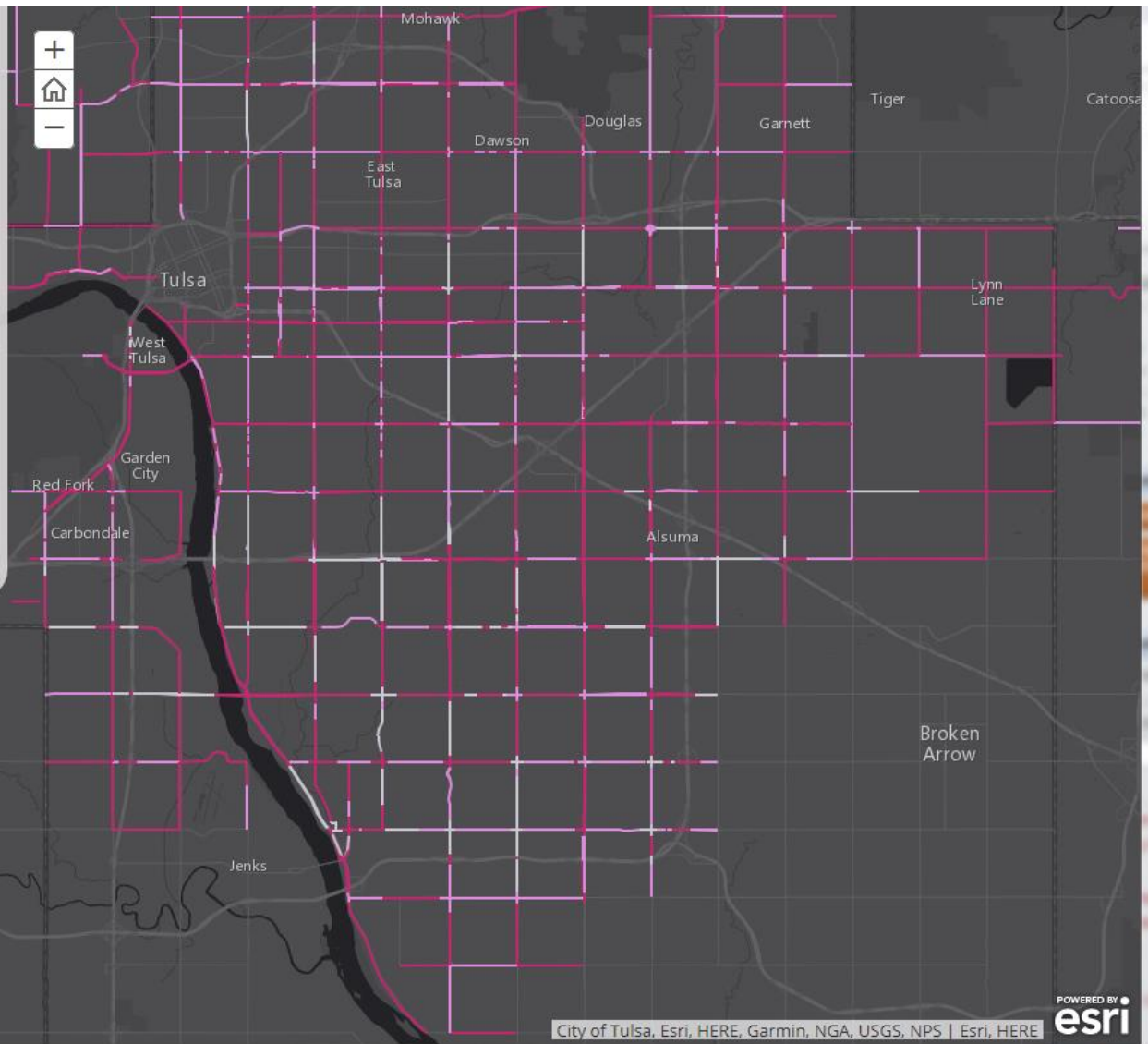
Arterial PCI Value
PCI Value

——— > 70 to 100

——— > 40 to 70

——— Less than 40

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Slide/Map 2
Arterial PCI Value

For PCI value grouping, anything 40 or less is a candidate for Reconstruction, anything greater than 40 and less than 70 is a candidate for Major Repair, and anything above 70 can be considered for Routine and Preventative Maintenance

Costs increase between Routine & Preventative Maintenance, Major Repair, and Reconstruction; with Reconstruction being the most expensive.

Budget constraints prevent wholesale efforts to perform Reconstruction upon all streets where PCI ratings fall below 40; The City must be selective with how funds are applied to maintain the overall PCI average.

Arterial by Year

For this exercise, we assumed starting in 2022 through 2025 there will be 20 million dollars a year for arterial street improvements. Based on our assumption, this is our consultant's recommendation of potential arterial streets that could be rehabilitated each year.

Arterial by Year

— 2017
— 2018
— 2019
— 2020
— 2022
— 2023
— 2024
— 2025

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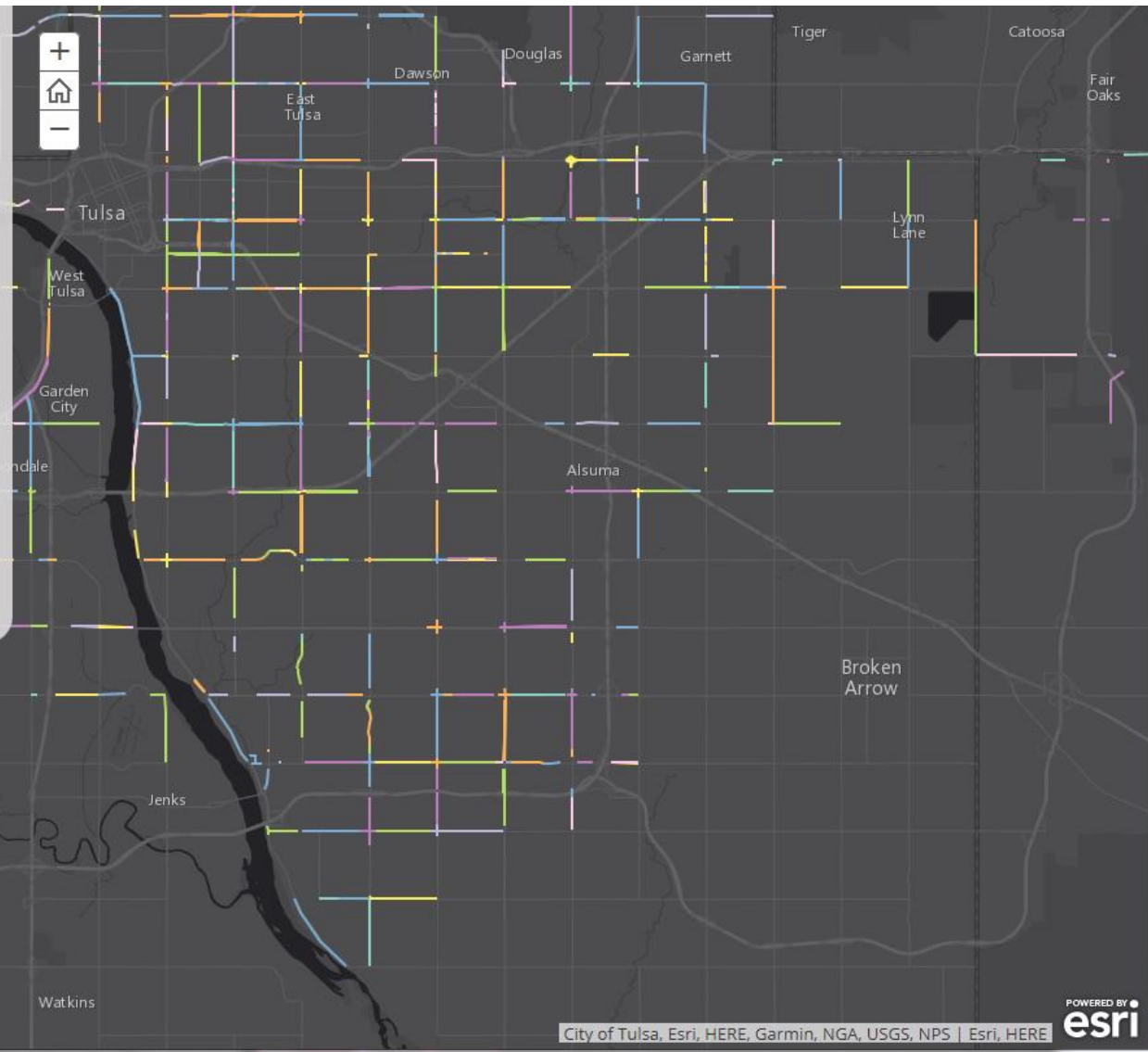
Slide/Map 3

Arterial by Year

For this exercise, we assumed there will be 20 million dollars a year for arterial street improvements starting in 2022 and continuing through 2025. Based upon that value, our consultants used software called ICON (made by the vendor GoodPointe) to generate the recommendations of potential arterial streets that could be rehabilitated each year.

Water Mains

The water main distribution lines were separated by age and grouped as follows:
Older than 75 years, Older than 65 years to 75 years, Older than 55 years to 65 years and Newer than 55 years. This helped isolate areas of Tulsa with aging water lines.
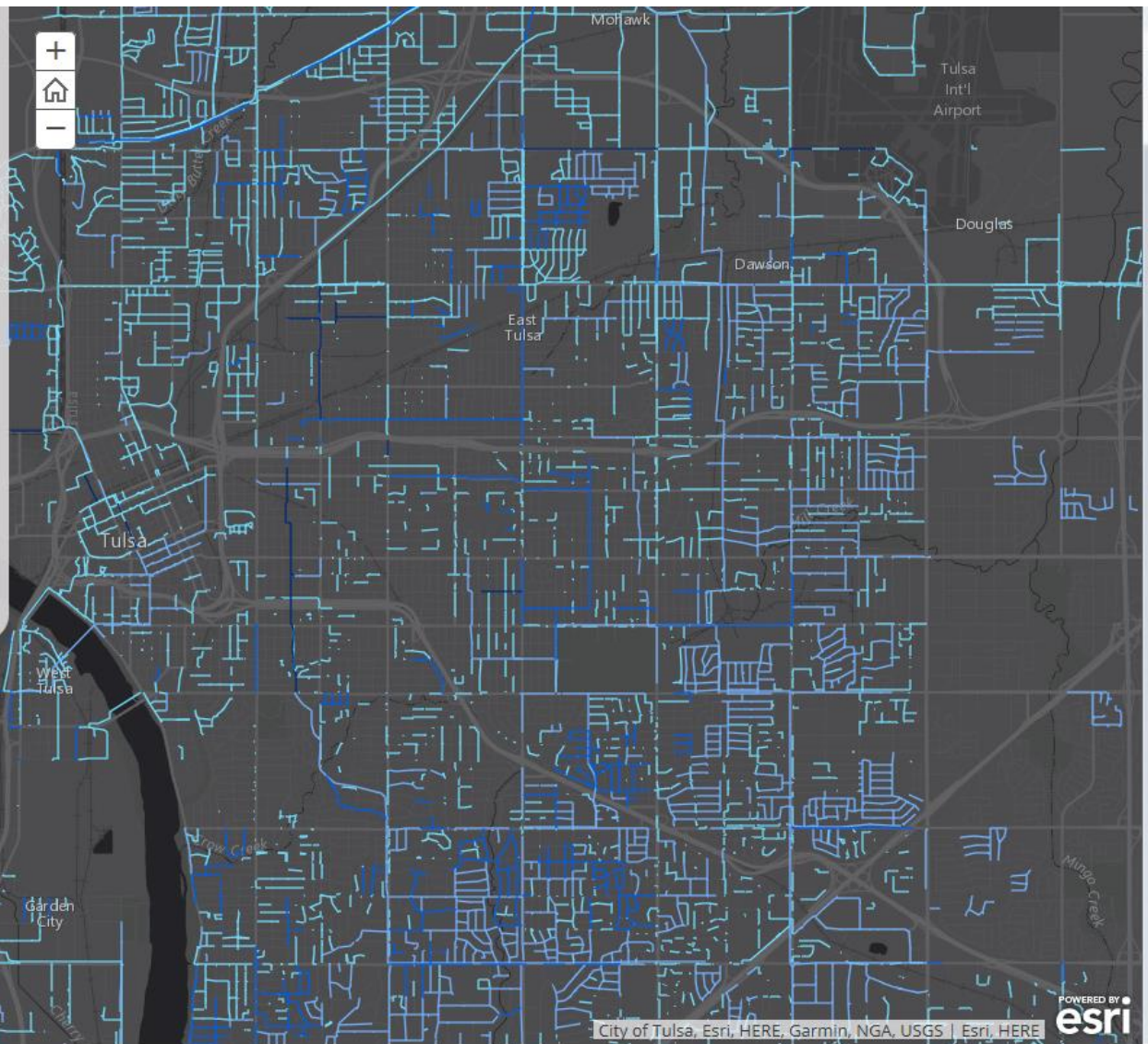
Mains Older than 75 Years
——

Mains Older than 65 Years
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Mains Older than 55 Years
——

Mains Newer than 55 Years
——

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Slide/Map 4

Water Mains

Distribution lines were grouped by age to show water mains older than 75 years, 65 years to 75 years, 55 years to 65 years, and newer than 55 years, revealing areas with aging water lines.

Since the risk of line failure can increase with the age of the water main, and because waterlines are placed in the right of way, street areas with low PCI values merit additional consideration if they are adjacent to aging water mains.

Water Line Breaks in the City of Tulsa

Historic water line work orders were geocoded, then filtered by problem codes indicating line breaks by diameter. This data helped easily identify water networks experiencing excessive line break history, and can be contrasted to the Water Main Age data.

Water Line Breaks

High

Low
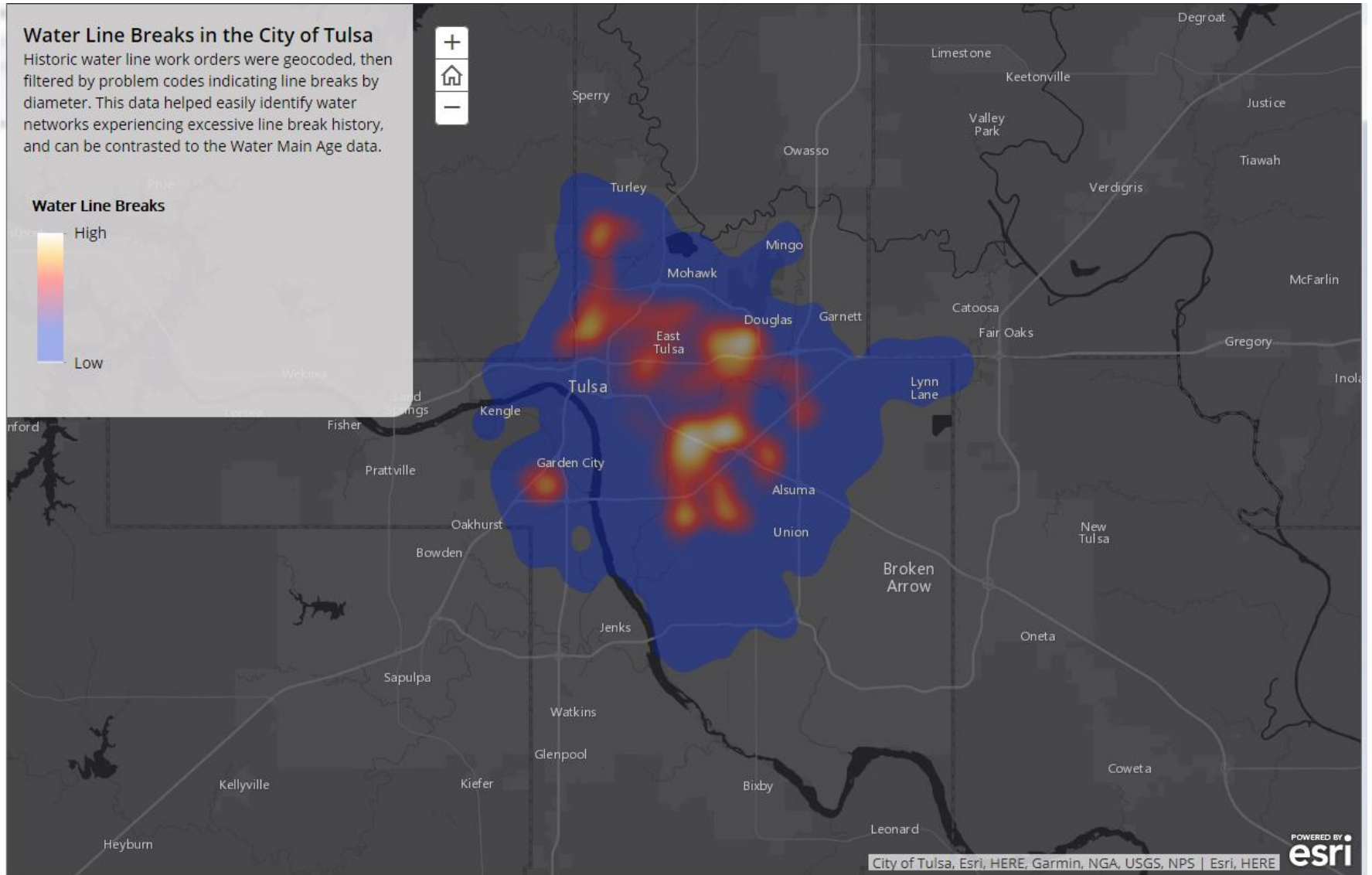
Slide/Map 5

Water Line Breaks in the City of Tulsa
Historic water line breaks were geocoded from CassWorks, Water & Sewer's work order system, then associated by diameter to water mains of the same size. This aided in rapid location of areas historically experiencing excessive line breaks, and contrasted well with the Water Main Age data.

W 41st St S and S 25th W Ave

The water mains in this area are newer than 55 years, and yet this general location experienced a higher number of water line breaks when compared to other parts of Tulsa.
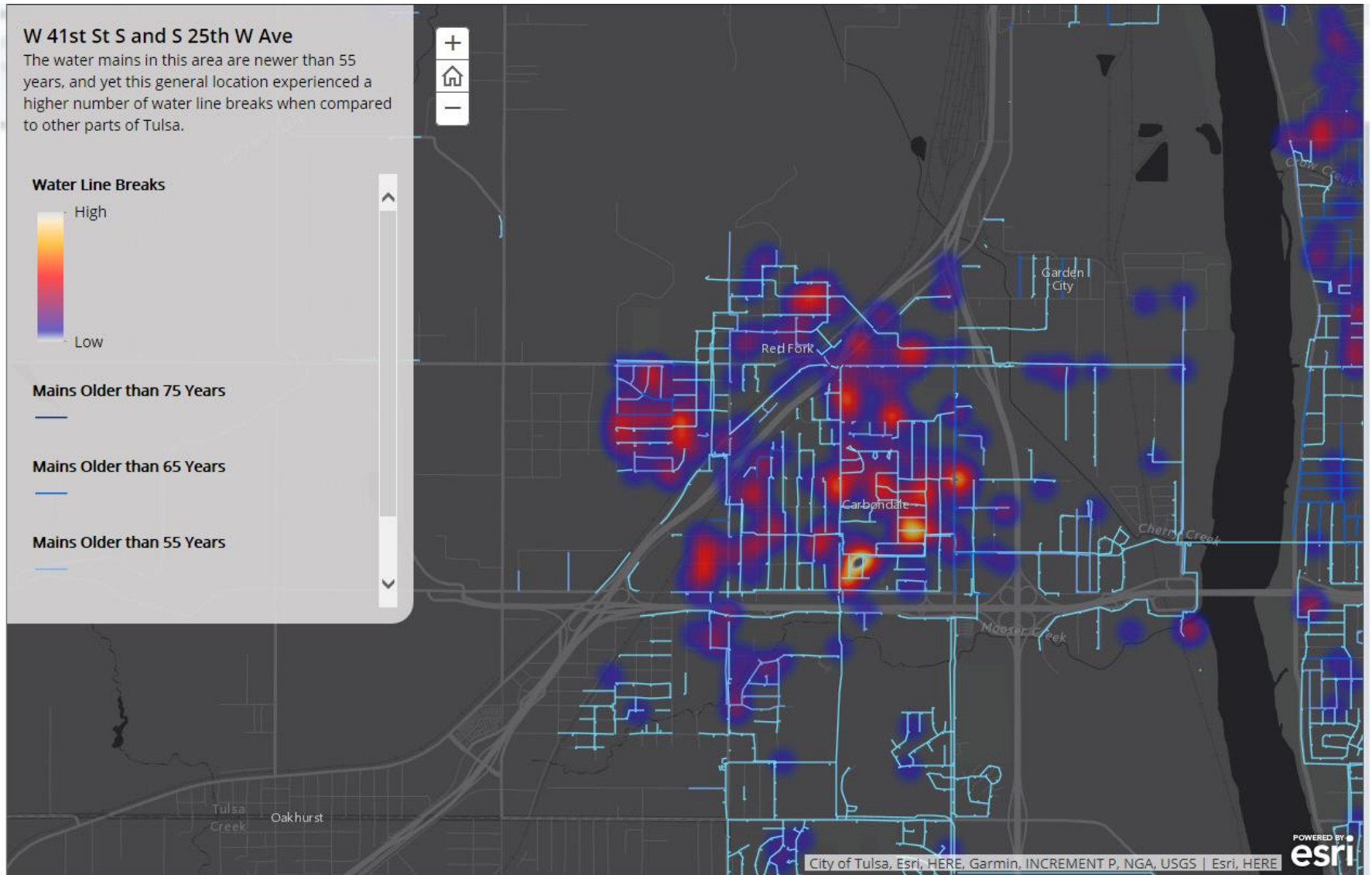
Water Line Breaks

High

Low

Mains Older than 75 Years

Mains Older than 65 Years

Mains Older than 55 Years

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Slide/Map 6

W 41st St S and S 25th W Ave

Here we see water mains newer than 55 years experiencing an elevated number of water line breaks compared with other areas. Data such as this helps us to quickly identify locations where system behavior (in this case, the integrity of the City's water mains) is not common cause variation. While this information doesn't solely provide immediate answers to the cause of this variance, it does allow for rapid focus on an area needing deeper analysis.
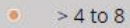
Current Year Traffic Collisions

We wanted to look at traffic collisions and compare it to the Pavement Condition Index. Some of the areas in Tulsa that have a low PCI value also have a high number of traffic collisions. East 81st Street South and South Memorial Drive is one such area.
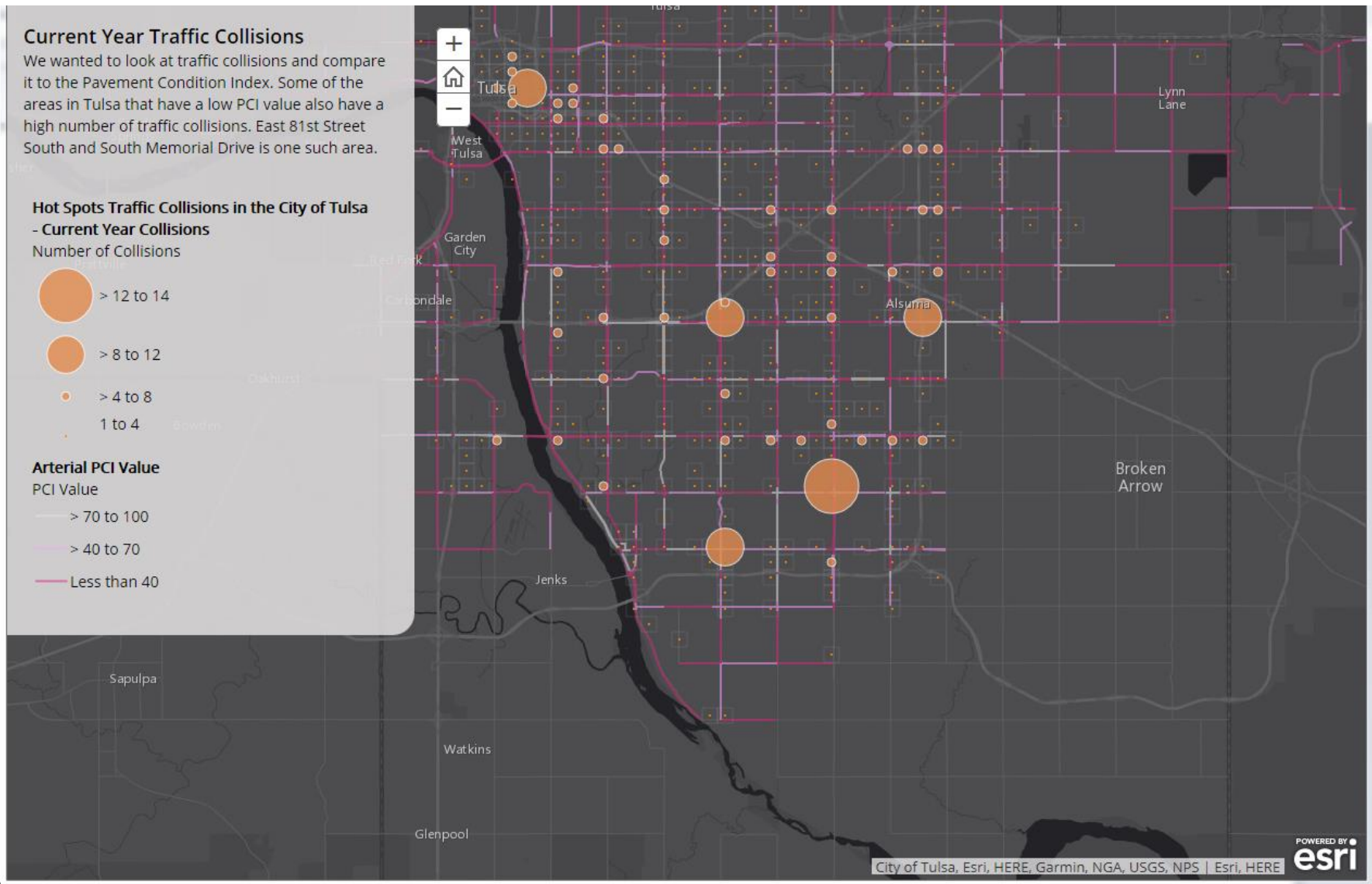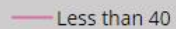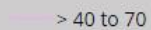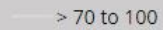
Hot Spots Traffic Collisions in the City of Tulsa - Current Year Collisions
Number of Collisions

> 12 to 14

> 8 to 12

> 4 to 8

1 to 4

Arterial PCI Value
PCI Value

> 70 to 100

> 40 to 70

Less than 40

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Slide/Map 7

Current Year Traffic Collisions

Traffic collisions were compared to the Pavement Condition Index values to look for areas that have a low PCI value and a higher number of traffic collisions. If the Pavement Condition Index values reveal candidates for Reconstruction or Major Rehabilitation occurring in high-collision areas, then those areas can be given additional consideration for prioritization and traffic safety measures. East 81st Street South and South Memorial Drive is one such area.

Sidewalk Gaps and PCI Data

Sidewalk gaps are sidewalks that are not present or incomplete. Data is used to identify and prioritize sidewalk construction projects throughout the Tulsa Region.
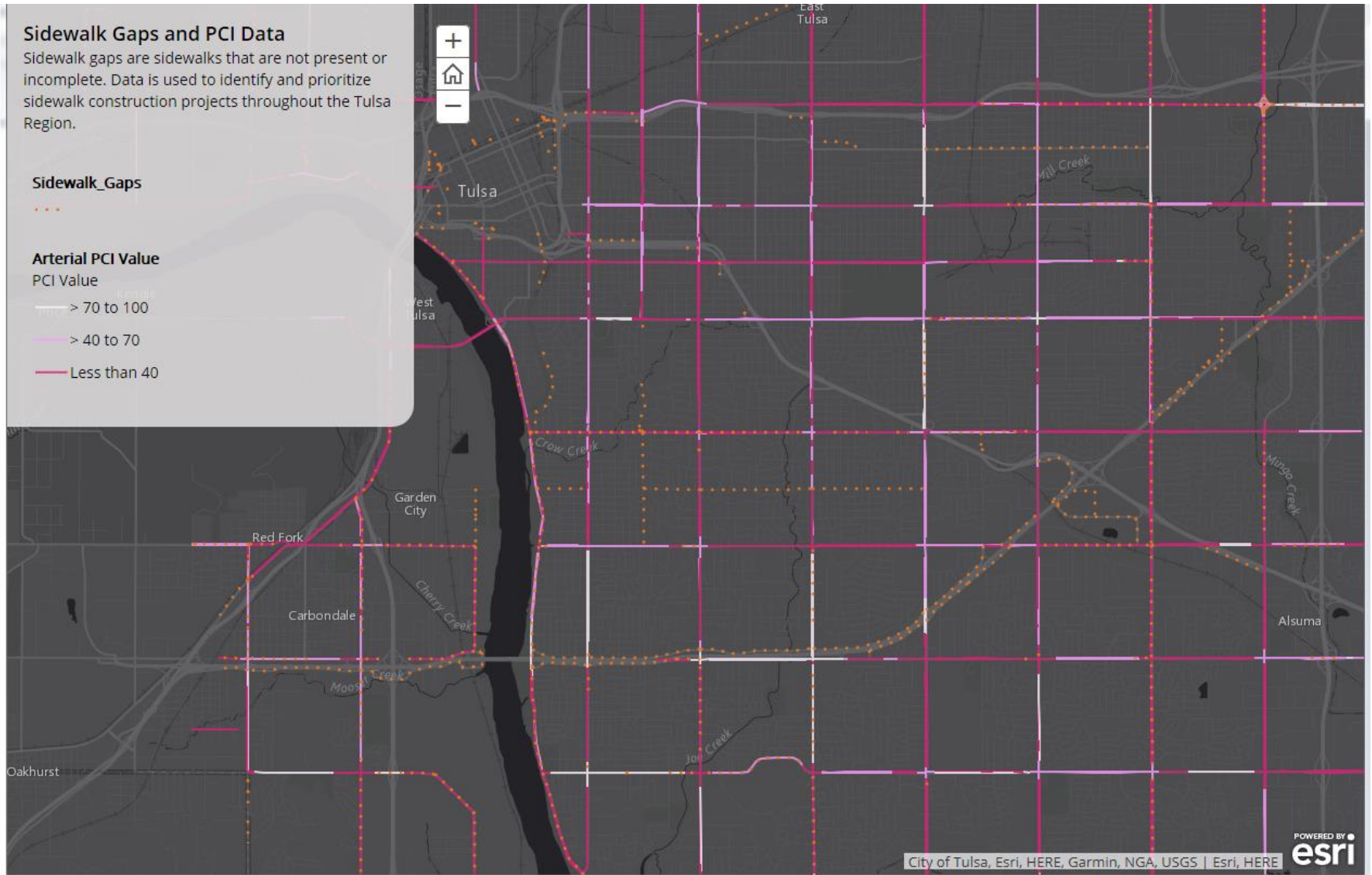
Sidewalk_Gaps

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Arterial PCI Value
PCI Value

— > 70 to 100

— > 40 to 70

— Less than 40

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Slide/Map 8

Sidewalk Gaps and PCI Data

Sidewalk gap data shows locations where sidewalks are not complete. As with previous data sets, areas where Sidewalk Gaps overlap with low PCI values can be given additional consideration for construction prioritization.
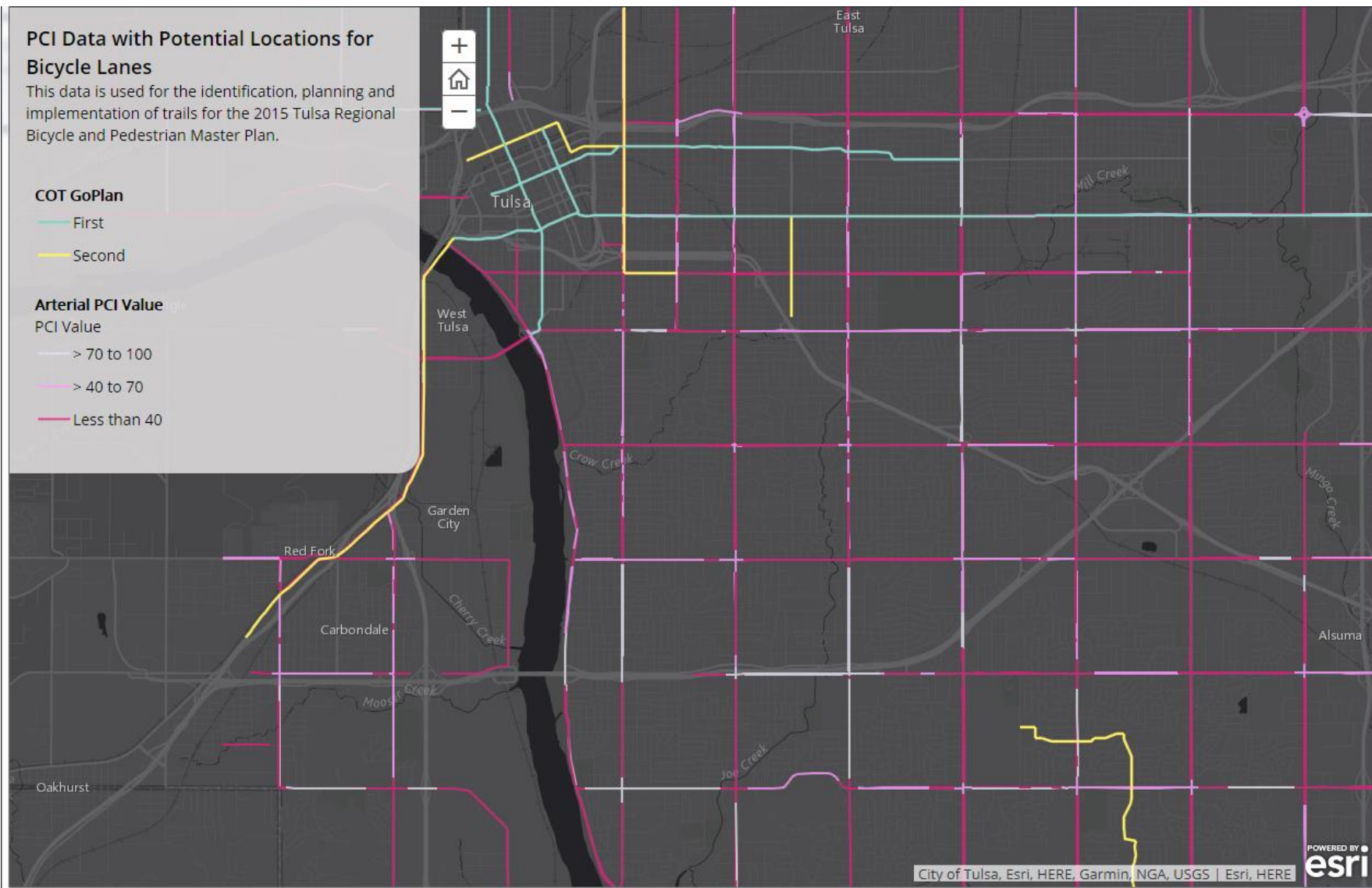
PCI Data with Potential Locations for Bicycle Lanes

This data is used for the identification, planning and implementation of trails for the 2015 Tulsa Regional Bicycle and Pedestrian Master Plan.

COT GoPlan
— First
— Second

Arterial PCI Value
PCI Value
— > 70 to 100
— > 40 to 70
— Less than 40

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Slide/Map 9

PCI Data with Potential Locations for Bicycle Lanes
This data from the 2015 Tulsa Regional Bicycle and Pedestrian Master Plan is used for the identification, planning and implementation of trails. GoPlan Bicycle paths are yet another data set where gains in community improvement can be considered as a factor alongside PCI values.
It should be emphasized that the City has performed similar PCI analysis efforts in the past, but some data sets like Bicycle Lanes and Sidewalk Gaps were not yet available, while other data sets like Water Main Ages and Break History were not yet in a format that facilitated easy analysis.

Going Forward
The next step for the Pavement Condition Index project is to examine additional data sets for potential overlap and introduce scripting/automation where possible to already identified processes.

Sidewalk_Gaps
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COT GoPlan Prioritized
– – First
– – Second

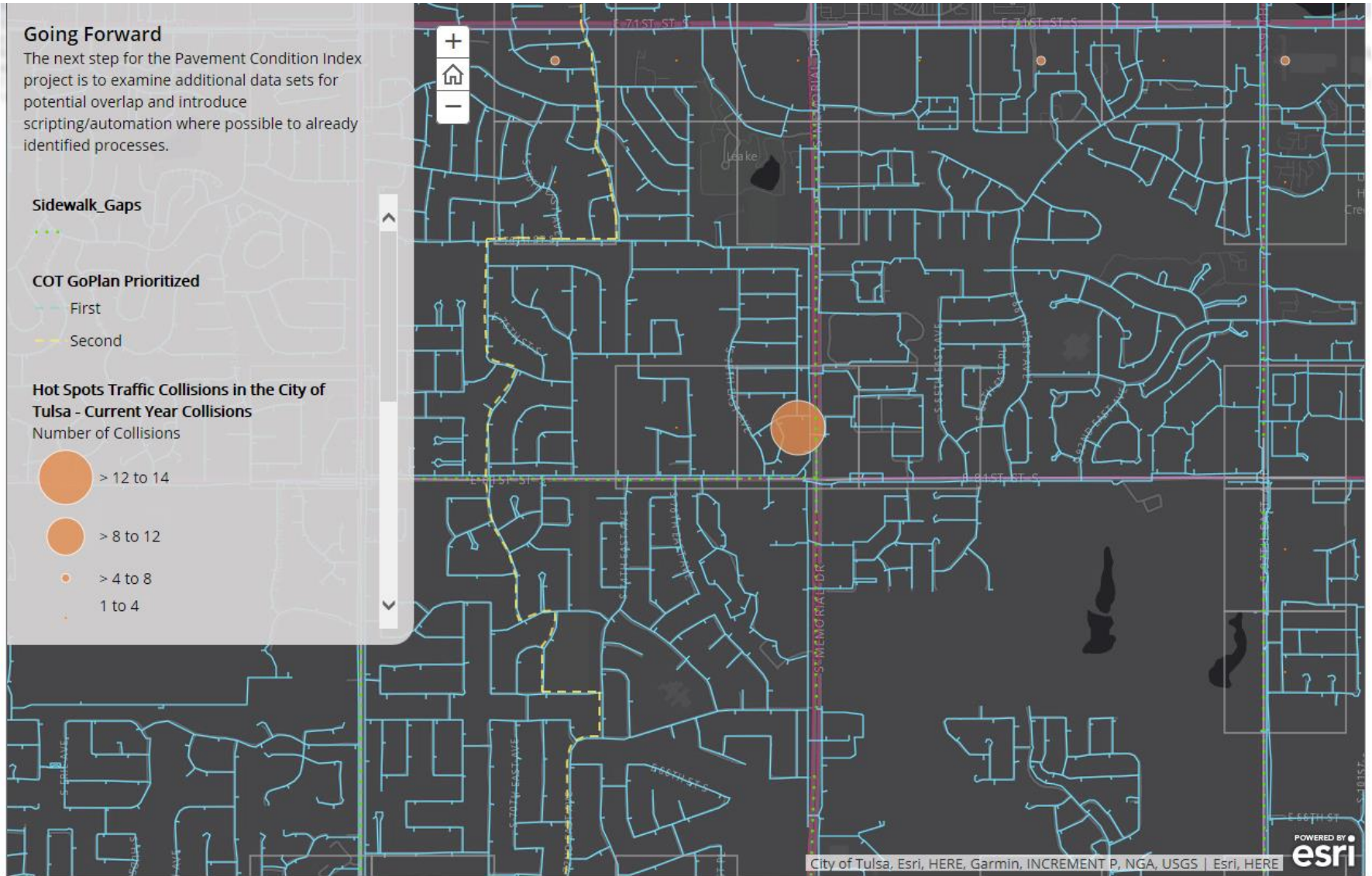**Hot Spots Traffic Collisions in the City of Tulsa - Current Year Collisions**
Number of Collisions

- \> 12 to 14
- \> 8 to 12
- \> 4 to 8
- 1 to 4

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Slide/Map 10
Going Forward
Going forward we plan to examine additional data sets for potential overlap and introduce scripting/automation where possible to already identified processes. These steps are already underway.

Thanks to: Chaya Balsiger, Matt Liechti, Chris Cox, Brent Stout, Chad Stall, Anand Kilambi, the folks at INCOG, and everyone at the City of Tulsa that is helping us to make this possible.

http://arcg.is/2rPG1cN