



AUDIT OF THE STREET MAINTENANCE PROGRAM

Department of Transportation



OBJECTIVES

This audit was conducted to determine whether effective controls are in place to ensure proper street maintenance of City streets in accordance with applicable policies, statutes, and other requirements.

BACKGROUND

The Department of Transportation is responsible for administering the street maintenance program and ensuring that more than 3,600 lane miles throughout the City are well-maintained. There are various types of pavement treatment that the department uses to preserve the life of its streets. These treatments include:

- Potholing — When isolated sections of pavement fail, these potholes can be temporarily repaired with a cold-mix asphalt. This treatment can help prevent further deterioration and delay more expensive repair of the pavement.
- Asphalt patching — When isolated sections of pavement fail, these sections of pavement can be repaired by milling down the pavement and then capping the top layer with a new hot-mix asphalt or completely removing the asphalt by saw cutting sections and repaving with a new hot-mix asphalt. This treatment helps the overall condition of the street.
- Mill and overlay — For severely distressed sections of pavement, mill and overlay is the process of removing the top layer of existing asphalt and adding a new layer of hot mix asphalt. This treatment extends the life cycle of the original pavement.
- Crack seal — A rubberized sealant used to fill pavement cracks. This treatment helps limit deterioration by preventing moisture and debris from entering the pavement.
- Seal coats — Slurry seal and fog seal are the most common types of surface treatment. These treatments help extend the life of the pavement, including slowing deterioration from oxidation and water penetration, by adding a protective layer over the paved surface.

The department uses in-house staff and third-party contractors to perform pavement treatments as well as pavement condition surveys. Pavement condition surveys are used to assess the condition of a street through visual surveys using a pavement condition index (PCI) method to quantify the street's condition. The PCI is a numerical indicator that rates the surface condition of the pavement, which ranges from 0 to 100 with 0 being the worse possible condition and 100 being the best possible condition. A pavement section's PCI rating will decrease based on pavement distresses identified during the visual surveys. Pavement distresses will vary in severity, ranging from low, moderate to high severity. Examples of common pavement distresses include potholes, alligator cracking, block cracking, longitudinal and transverse cracking, and weathering and raveling.

The data collected during the pavement condition surveys are entered into the department's pavement management software, which automatically calculates the pavement section's PCI rating.

The City uses the following PCI rating scale:

Good	71-100
Fair	51-70
Poor	0-50

The target for the department's street maintenance program is to maintain an average PCI rating at or above its minimum acceptable level of 70. The City's current PCI is 80.1. This number represents a weighted average of the condition of the City's major street classes – arterial, collector, and residential. See the Appendix for maps of the current pavement conditions.

The department uses the PCI rating to prioritize which streets will receive pavement treatment. In addition to the PCI rating, the department also takes into consideration the following factors:

- Budget — How much funding is available for street maintenance projects?
- Visual inspections — What are the current pavement conditions?
- Work history — What pavement treatments have been completed in previous years?
- Location — Where is the pavement section located?
- Logistics — Is there road work already being performed in the nearby area?
- Existing projects — Are there any existing City projects underway that would interfere with the pavement treatment, such as construction in progress or utility services?
- Aesthetics — What is the public perception of the current pavement conditions?
- As directed — Are there any special project requests that need to be prioritized?

SUMMARY OF OBSERVATIONS

1. The terms and conditions of third-party contracts were not always followed.
2. There are no written policies and procedures of the department's forecasting process.
3. The controls in place over the department's pavement condition data are not adequate.
4. The controls in place over third-party pavement condition data are not adequate.
5. The distribution of department resources is not always equitable.

CONCLUSION

In our opinion, the department has effective controls in place to ensure pavement treatments performed by in-house staff are properly performed and monitored. However, the department should improve its controls to ensure it complies with the contracts of its third-party contractors who perform pavement treatments and pavement condition surveys. In addition, the department should develop and implement controls to further improve its forecasting process and to ensure its pavement condition data is accurate and complete and its resources are equitably distributed. For additional details, please see the attached Issue and Action Plans.

ISSUE AND ACTION PLAN #1

The department did not always follow the contract terms and conditions for its third-party contractors

What We Found

The department contracts with third parties to perform pavement treatments as well as pavement condition surveys. However, the department does not have adequate internal controls in place to ensure its third-party contractors are complying with the terms and conditions of their contracts. Specifically, during the audit, the department did not require its third-party contractors to provide the following:

- Results of its independent material testing within 30 days of the contract award.
- Monthly emulsion and aggregate testing of material to verify material changes are not taking place.
- Certificates for its temperature gauges to demonstrate that calibration was completed within the last three months.
- Rubber crack sealant test results and crack sealant sample.
- Documentation that the public was notified prior to doing any road work that would affect access to their property.

In addition, the department does not retain documentation of its inspections to monitor the quality of the work performed by the third-party contractors. For example, punch lists are used to identify what needs to be corrected by the contractor. However, the punch lists are discarded once the contractor has corrected the issue. Further, the department does not have written policies and procedures in place to address contract monitoring for its third-party contractors.

What It Should Be

According to the scope of work for the following contracts:

- For its slurry seal contractors, all materials provided by the contractor will be tested by an independent laboratory and all tested results provided to a city representative within 30 days after contract award. In addition, the City will also require monthly emulsion and aggregate testing of the material as part of a quality control function at no additional cost of the City to verify material changes are not taking place.
- For its crack seal contractors, prior to the start of work, the contractor will provide certificates for all temperature gauges showing that calibration has been completed within the last three months. In addition to the temperature gauge calibration certificates, the contractor will provide rubber crack sealant test results and crack sealant sample at the beginning of the project and then upon request by the city representative.

- For all contractors, the city representative will inspect the quality and acceptability of all work performed under the contract. The City will notify the contractor if performance is unsatisfactory.
- For all contractors, the contractor will provide written notification to the property owners, tenants, post office, mass transit authorities, and any other parties which may be affected by work being performed under the contract. The contractors will provide copies of the written notification to the city representative.

Lastly, according to the City's Management Policy 100, Management Procedures, "operational procedures shall be written departmental procedures issued by the department head." In addition, according to MP 100, procedures are written instructions telling employees what actions are necessary to accomplish a particular action in compliance with previously approved policies, rules, and regulations.

Why Does It Matter

Without adequate internal controls in place, there is an increased risk that the work performed by third-party contractors is not being properly monitored to ensure their quality of work meets City standards as well as to ensure third-party contractors are complying with contract terms and conditions.

What We Recommend and Management's Action Plans

Recommendation #1-1: To help ensure compliance with the terms and conditions of third-party contracts, the department should develop and implement written policies and procedures to address the following:

- The process for monitoring third-party contractors to ensure it collects the required documentation, such as independent material test results, temperature gauge calibration certificates, and citizen notifications.
- Retaining documentation of its inspections to demonstrate that the quality of work performed by third-party contractors and repeated incidents of unsatisfactory performance are monitored.
- Periodically reviewing the terms and conditions to ensure the requirements are still valid and applicable.

Action Plan #1-1: We will endeavor to verify that all items in the contract are necessary to complete the work functions. Care will be taken to only include the items needed and other areas of concern will be at the City's discretion. We will also ensure the documentation of these testing items and records received are stored in digital files for the duration of the contract. We are planning on issuing an addendum to the contract prior to renewal this fall 2023. This would include removal of any and all line items or specifications that do not directly apply to the work

functions being done. These documents will be retained for 3 years in accordance with the City's documentation retention policy.

A comprehensive review of all our current and upcoming contracts will also take place to ensure only items need to ensure quality are strictly enforced.

Individual or Position Responsible: Pavement Management Supervisor and/or Contract Specialist

Estimated Completion Date: 12/2023

Recommendation #1-2: The department should enforce or modify the terms and conditions of its third-party contracts.

Action Plan #1-2: Once a review is done of the needed items that are required for enforcement, the Contract Specialist responsible for the contract will first give the contractor a verbal warning of non-compliance. The second notification will be shut down of work until compliance is achieved. If we continue to experience non-compliance with the contract terms, we will have Purchasing issue a Letter of Cure to have a final opportunity for compliance. If this were to fail, we would need to have Purchasing issue a Default letter and services would no longer be permitted in the City of Mesa.

Individual or Position Responsible: Contract Specialist

Estimated Completion Date: Upon date of non-compliance

ISSUE AND ACTION PLAN #2

The department does not have written policies and procedures for its forecasting process

What We Found

The department is responsible for identifying and selecting which City streets will receive pavement treatment. However, there are no written policies and procedures for its annual forecasting process.

What It Should Be

According to the City's Management Policy 100, Management Procedures, "operational procedures shall be written departmental procedures issued by the department head." In addition, according to MP 100, procedures are written instructions telling employees what actions are necessary to accomplish a particular action in compliance with previously approved policies, rules, and regulations.

Why Does It Matter

Without written policies and procedures in place, there is an increased risk that criteria used to determine which City streets receive pavement treatment are inconsistent or not followed. In addition, developing and implementing written policies and procedures help ensure that the department's prioritization of City streets selected for pavement treatment are reasonable and appropriate.

What We Recommend and Management's Action Plans

Recommendation #2-1: The department should develop and implement written policies and procedures to address how City streets are prioritized for pavement treatments, such as:

- The forecasting process for identifying and selecting City streets that require treatment, including documenting the criteria used in the selection process.
- Retaining documentation of its selection process, including adjustments made to the forecast schedule.
- Review and approval of the City streets selected for pavement treatment, including any adjustments made to the forecast schedule.
- Periodically reviewing the forecasting process to ensure the criteria being used is still relevant and appropriate.

Action Plan #2-1: Forecasting has many different variables associated with the process. The following are an outline used for Forecasting treatments on the city roads, all or some may be utilized depending on the individual roadway situation.

1. Pavement Condition Index (PCI)
2. Visual Assessment/Survey
3. Work History
4. Available Treatments – Time of Year/Product availability
5. Logistics – Nearby similar work
6. Existing Projects – CIP, NCU, In-House (Asphalt, Utilities and other), Developers
7. Budget
8. Aesthetics
9. As Directed (Director, Council, City Manager)

An SOP will be added to our existing SOP's outlining these items as part of the decision making process in Forecasting treatments for Pavement Management.

Individual or Position Responsible: Pavement Management Supervisor and Pavement Management Technicians

Estimated Completion Date: On-going

ISSUE AND ACTION PLAN #3

The department does not have adequate controls in place to ensure its pavement condition data is accurate and complete

What We Found

The department is responsible for performing pavement condition surveys. During the surveys, visual inspections are performed to identify any pavement distresses. The data collected from the inspections are manually entered into the department's pavement management software, which automatically calculates the PCI rating for the pavement section. However, the department does not have adequate internal controls in place to ensure its pavement condition data is accurate and complete. Specifically, during the audit, the following issues were identified:

- Documentation was not always retained to support the data that was entered into the pavement management system.
- There was no documentation to demonstrate that the pavement condition data entered into the pavement management software was being reviewed.
- The department's pavement management software does not have the capabilities to log edits or changes made to pavement condition data.
- There are no written policies and procedures in place to address the process for in-house staff performing pavement condition surveys, including entering pavement condition data into the pavement management software.

In addition, pavement condition surveys are not performed on a timely or consistent basis. For example, there are pavement sections that have not been surveyed since 2015. Previously, the department's practice was to perform pavement condition surveys annually. However, as of 2018, pavement condition surveys are only performed when the street receives a pavement treatment, which could be several years later depending on the life cycle of the type of treatment applied.

What It Should Be

According to the City's Management Policy 100, Management Procedures, "operational procedures shall be written departmental procedures issued by the department head." In addition, according to MP 100, procedures are written instructions telling employees what actions are necessary to accomplish a particular action in compliance with previously approved policies, rules, and regulations.

In addition, according to the City's ITD Security Standard, all City systems must generate audit logs and be retained for at least one year, with a minimum of three months immediately available for analysis.

Why Does It Matter

Without written policies and procedures in place, there is an increased risk of staff performing pavement condition surveys inconsistently and improperly, which could result in unreliable pavement condition data. In addition, without a formal review process of the pavement condition data entered into the pavement management software, there is an increased risk that the data used to calculate a pavement section's PCI rating is not accurate or complete. Further, without software logging capabilities, there is an increased risk that inappropriate or unintended changes to pavement condition data may not be prevented or detected, which could affect the PCI rating for a pavement section.

What We Recommend and Management's Action Plans

Recommendation #3-1: To help ensure the accuracy and completeness of pavement condition data, the department should develop and implement written policies and procedures to address the following:

- The process for performing pavement condition surveys, including the frequency and criteria for when streets should be surveyed, to ensure surveys are performed properly and on a consistent basis.
- Retaining documentation to support the pavement condition data entered into the pavement management software.
- Periodically reviewing the pavement condition data entered into the pavement management software to ensure it accurately reflects the distresses identified during the pavement condition surveys, including retaining documentation of this review process.

Action Plan #3-1: Currently condition surveys are performed after treatments or other work is completed. This is entirely dependent upon the work schedule. This is due to the use of our current Pavement Management Software (PMS) PAVER. It calculates PCI based off of initial work. It does not calculate yearly degradation over time, to combat this we perform surveys as work is completed and other areas remain with their current PCI until their next work/survey is completed. The new PMS we are currently assessing does have this amongst other features to be better aligned with the items mentioned in this audit. These surveys are entered into the PMS daily as they are performed.

Quality control of surveys are currently performed randomly throughout the year and more focused during the forecast season (December-March) to ensure the proper treatment is selected. We will include these QC checks in a digital file in the Pavement Management folder on our SMSHARE drive for future reference. We currently have a SOP for performing distress surveys. We will add to the procedures for data entry daily as the surveys are performed.

Individual or Position Responsible: Pavement Management Supervisor or Pavement Management Technicians

Estimated Completion Date: 12/2023

Recommendation #3-2: To help prevent or detect inappropriate or unintended changes to pavement condition data in the pavement management software, the department should ensure user activity is logged and determine whether its software can be configured to generate logs that can be periodically monitored.

Action Plan #3-2: [This currently is not possible in the PMS. We are currently reviewing other PMS for a change to better track this and other issues as addressed here in.](#)

Individual or Position Responsible: [Pavement Management Supervisor](#)

Estimated Completion Date: [3/2024](#)

ISSUE AND ACTION PLAN #4

The department does not have adequate internal controls in place to ensure its third-party contractor is providing accurate and reliable pavement condition data

What We Found

The department contracts with a third-party contractor to perform pavement condition surveys. However, the department did not have adequate internal controls in place to ensure the pavement condition data provided by the third-party contractor was accurate and complete. Specifically, the department was unable to provide documentation that the pavement condition data provided by the third-party contractor is reviewed for accuracy and reliability. In addition, the department did not perform procedures to verify that the pavement condition data was properly uploaded into the department's pavement management software. For example, during the audit, there were 22 pavement sections identified in the data provided by the third-party contractor that were reported twice, but with different PCI ratings.

In addition, the department does not request quality control documentation from its third-party contractor to ensure they are performing its quality control/quality assurance (QC/QA) procedures or to determine whether their third-party contractor's quality control/quality assurance procedures are sufficient to ensure the survey data they are providing is accurate and reliable.

What It Should Be

According to the contract's scope of work, the third-party contractor is solely responsible for developing a quality control/quality assurance procedure to ensure that the pavement condition survey is accurate and reproducible in an office setting as well as in the field. The QC/QA procedure will also verify that the data is accurately entered into the pavement management software.

Why Does It Matter

Without adequate internal controls in place, there is an increased risk that the pavement condition data provided by its third-party contractor could result in inaccurate and unreliable PCI ratings for a pavement section.

What We Recommend and Management's Action Plans

Recommendation #4-1: The department should perform monitoring and review procedures to ensure that the pavement condition data provided by its third-party contractor is accurate and reliable, including:

- Retaining documentation of its procedures performed to demonstrate the pavement condition data was reviewed.

- Verifying the pavement condition data was properly uploaded into the department's pavement management software to identify any errors or duplicate entries.
- Requesting documentation of its quality control process and procedures performed.

Action Plan #4-1: After reviewing the contract for these services, we will request and store QC review by the third party contractor in our digital file. We will also review the data to ensure that it is current and accurate for the roadway section.

Individual or Position Responsible: Pavement Management Supervisor

Estimated Completion Date: Annually

ISSUE AND ACTION PLAN #5

Department resources are not always distributed equitably throughout the City

What We Found

Based on an analysis of the pavement condition index (PCI) scores, the zip code with the City's lowest median household income also has the lowest average PCI score. In addition, this zip code was one of the two zip codes for the City whose PCI score was rated as Fair using the department's PCI rating scale.

Zip Code	Average of PCI	Median Household Income	PCI Rating Scale
85210	64.2	\$ 46,258	Fair
85201	77.8	\$ 46,348	Good
85206	78.9	\$ 51,572	Good
85202	71.2	\$ 54,047	Good
85208	88.3	\$ 54,982	Good
85204	74.8	\$ 55,906	Good
85205	81.7	\$ 57,850	Good
85203	66.9	\$ 60,412	Fair
85209	85.0	\$ 64,663	Good
85215	85.3	\$ 73,873	Good
85207	87.5	\$ 77,750	Good
85213	79.4	\$ 77,942	Good
85212	86.3	\$ 104,235	Good

Source: Analysis of pavement condition data from the City's Geographic Information System (GIS) inventory of streets and median household income by zip code from the U.S. Census Bureau website, as of August 2022.

What It Should Be

Department resources should be distributed equitably to ensure the needs of all community members are being met, including those from underserved communities, with a goal of reducing inequities among the communities most affected.

Why Does It Matter

Without the use of equity measures to help guide the department's forecasting process, there is an increased risk that some communities may not have equitable access to well-maintained streets.

In addition, by using equity measures as part of its forecasting process, the department may be able to better identify those underserved communities most affected by inequities.

What We Recommend and Management's Action Plans

Recommendation #5-1: To ensure resources are distributed equitably throughout the City, the department should review its annual forecasting process, including the criteria used to prioritize which streets receive pavement treatment. In addition, the department should also review its budgeting process to ensure funding is allocated equitably for projects throughout the City.

Action Plan #5-1: When we are selecting treatments to be performed on City roads where we are and who lives there is not part of the equation. The need of the road and the 9 items in the Forecasting Process outlined above are what is used to make those decisions. The analysis provided did not consider the cancelation of 15 asphalt overlay projects that were scheduled for the next 3-5 years in the areas with a lower PCI and lower income. This was due to conflict with the current fiber optic projects from Gilbert road to the western most limits of Mesa. This was a directive from the City Engineer to avoid complications and unnecessary waste of City resources dealing with the complexity of each competing project. Once the Fiber Optic projects are complete, the overlays will be rescheduled.

In the meantime, these areas are continuing to receive maintenance as they can to maintain roadways until the overlays are scheduled to begin.

The Transportation Department will analyze, on an annual basis, our current Pavement Condition Index maps (PCI) against a map showing income distribution throughout Mesa.

Individual or Position Responsible: Pavement Management Supervisor

Estimated Completion Date: Annually

SCOPE

The scope of the audit was the period from July 1, 2021 through June 30, 2022. However, some procedures performed, such as performing field observations and analyzing PCI data, consisted of testing the department's current field operations and PCI data.

METHODOLOGY

To accomplish our objective, we performed the following:

- Interviewed Transportation personnel and observed processes to gain an understanding of street maintenance operations.
- Reviewed the department's standard operating procedures and contracts with its third-party contractors.
- Performed field observations of in-house staff performing pavement treatments and pavement condition surveys.
- Selected a sample of pavement treatments to determine if the projects selected were prioritized reasonably and appropriately.
- Analyzed PCI data to determine if department resources were used equitably throughout the City.

AUDIT STANDARDS

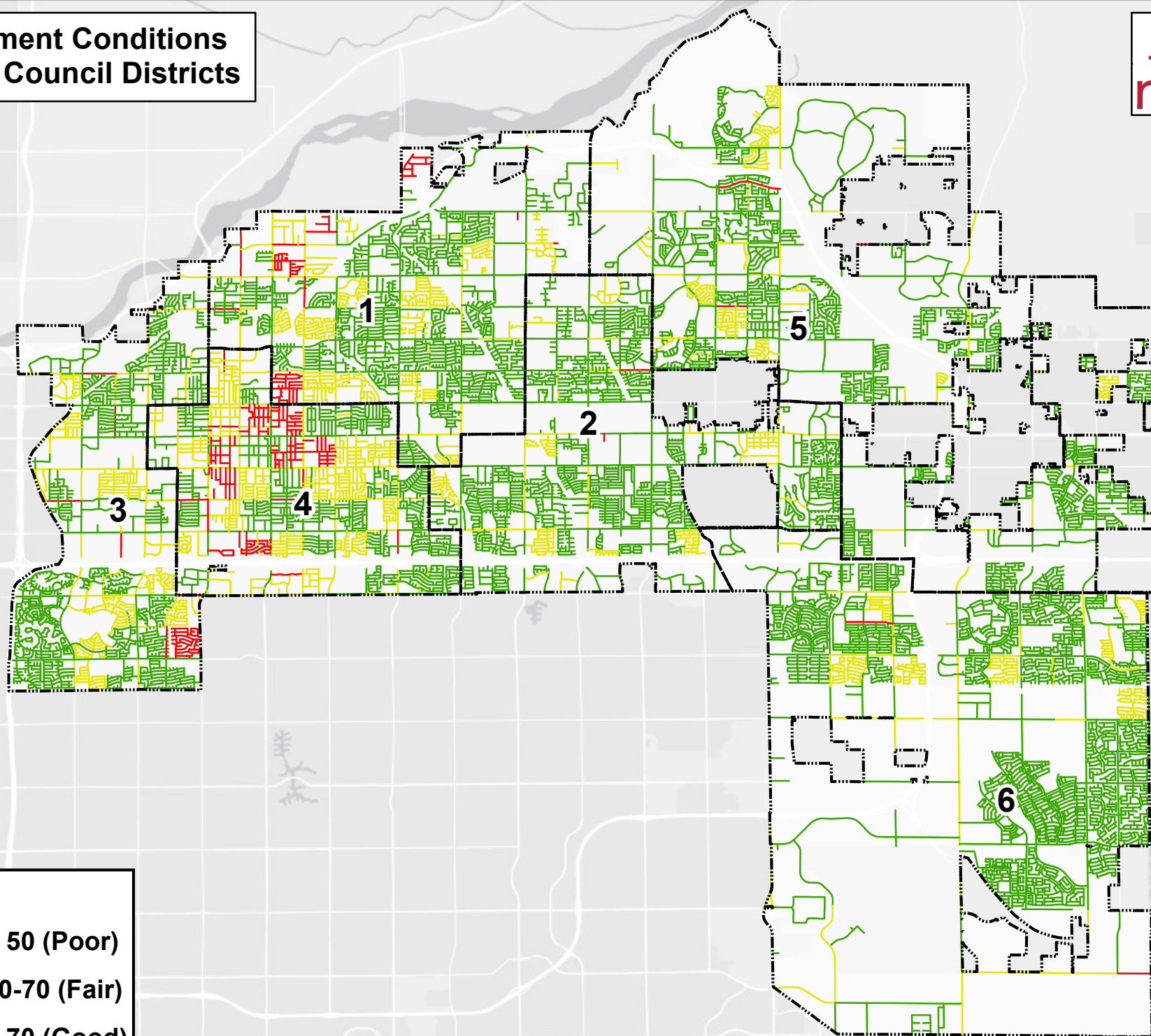
We conducted this audit in accordance with Generally Accepted Government Auditing Standards, which require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

APPENDIX

The following maps present the current pavement conditions citywide and by council district, as of October 2022:

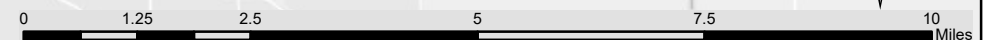
- Pavement Conditions and City Council Districts (Citywide)
- Pavement Conditions per Council District — Council District 1
- Pavement Conditions per Council District — Council District 2
- Pavement Conditions per Council District — Council District 3
- Pavement Conditions per Council District — Council District 4
- Pavement Conditions per Council District — Council District 5
- Pavement Conditions per Council District — Council District 6

Pavement Conditions & City Council Districts



PCI

- < 50 (Poor)
- 50-70 (Fair)
- > 70 (Good)

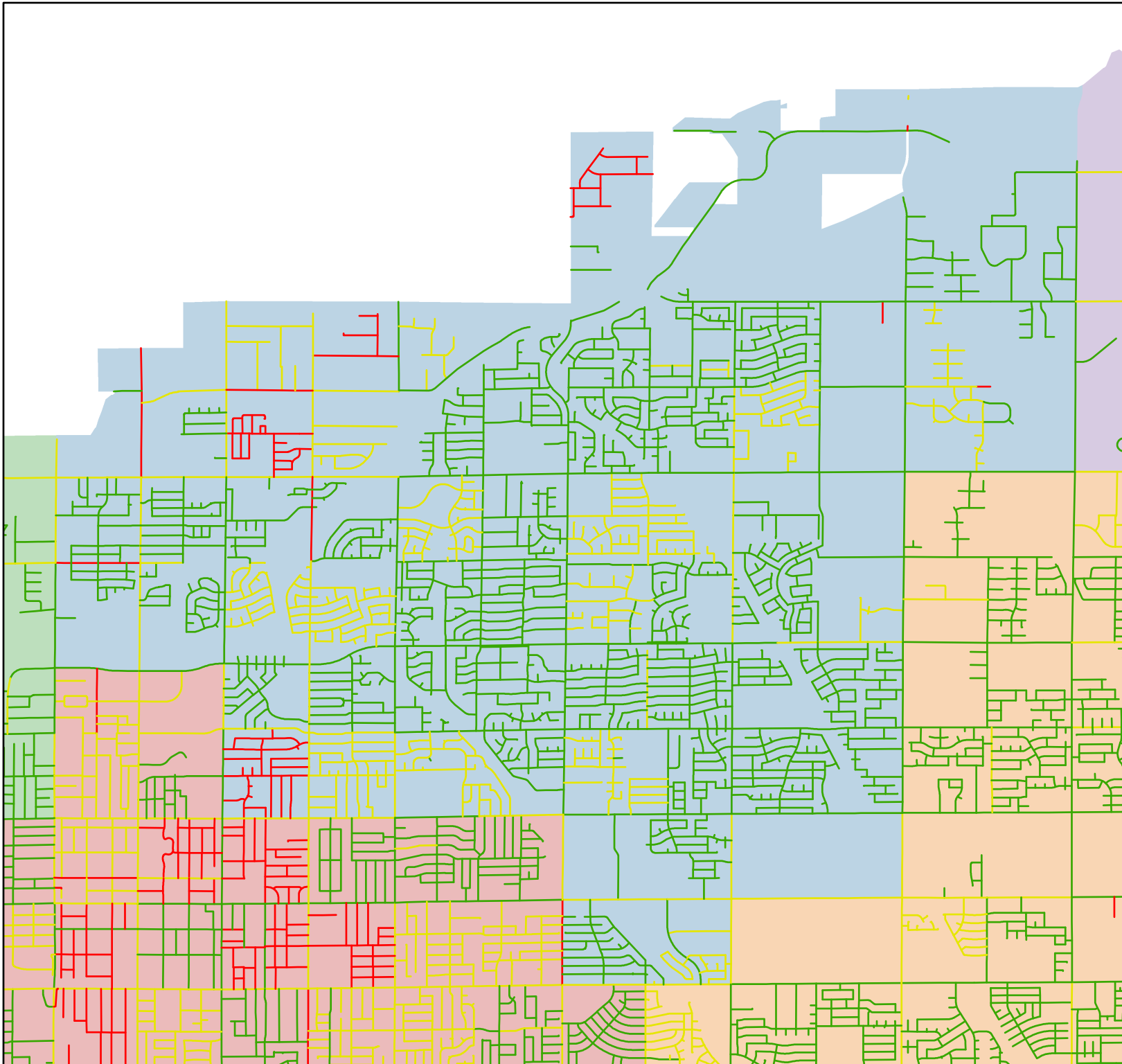
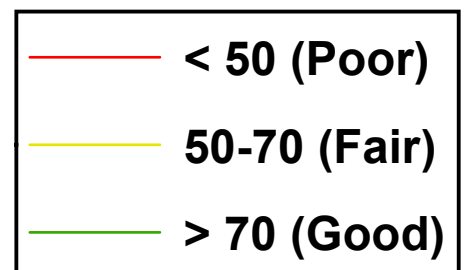
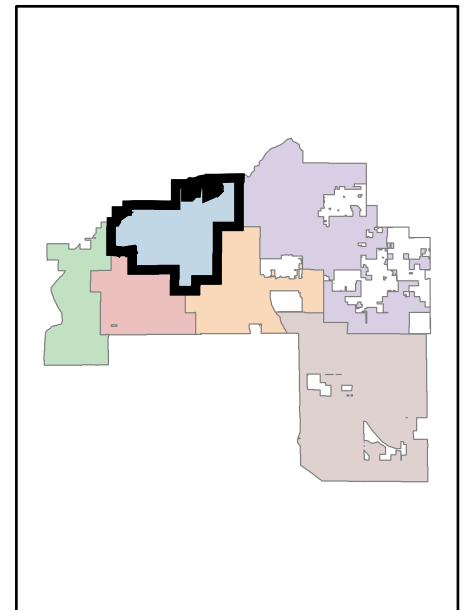


PAVEMENT CONDITIONS

per Council District



COUNCIL DISTRICT 1

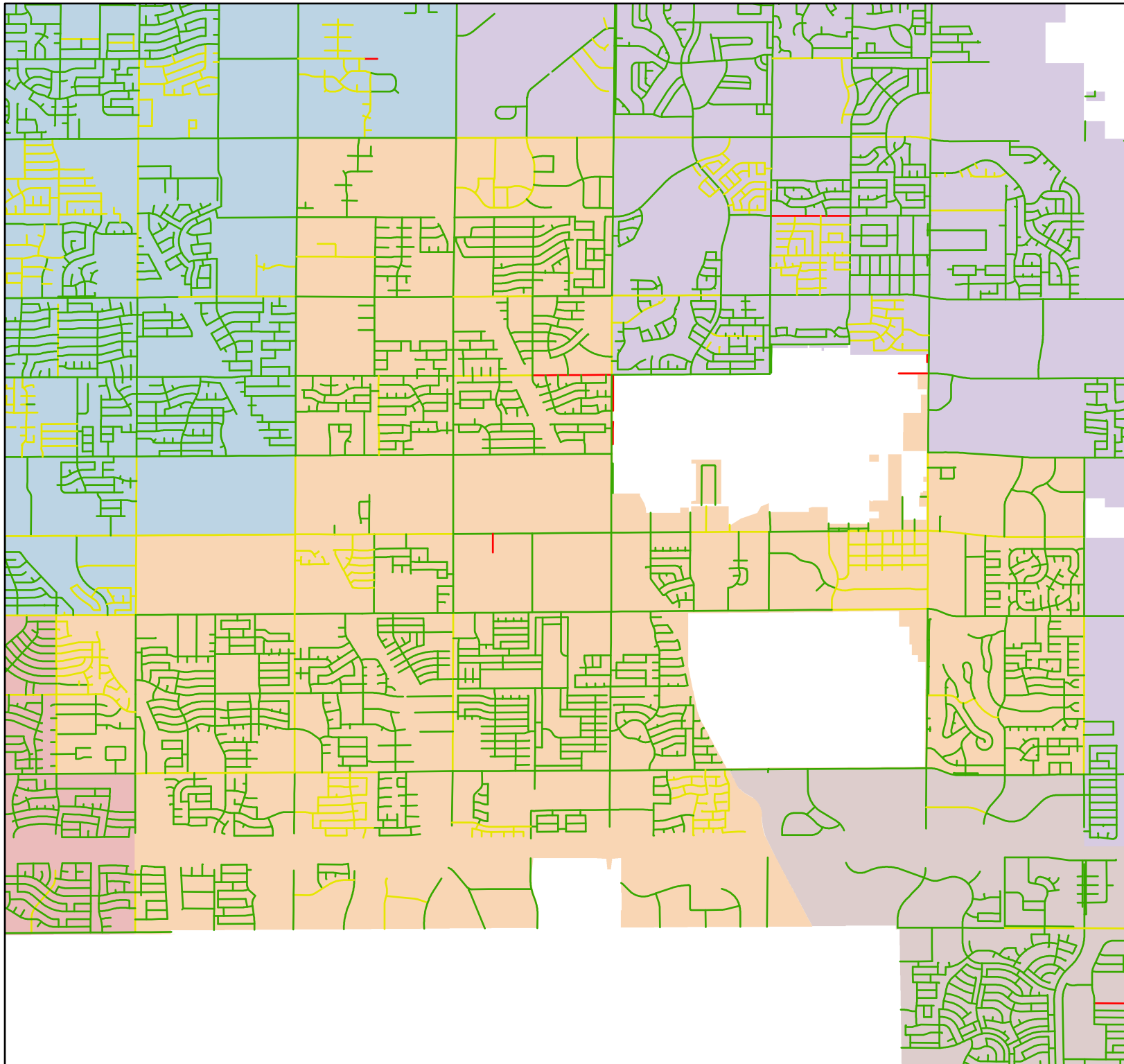
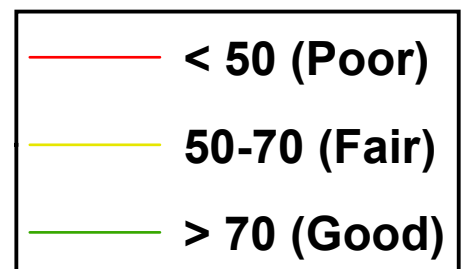
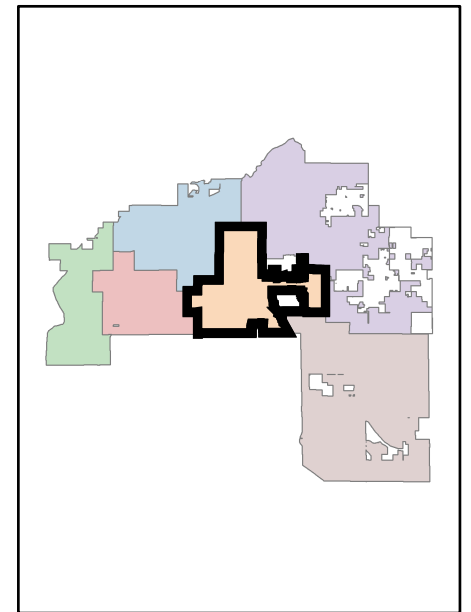


PAVEMENT CONDITIONS

per Council District



COUNCIL DISTRICT 2

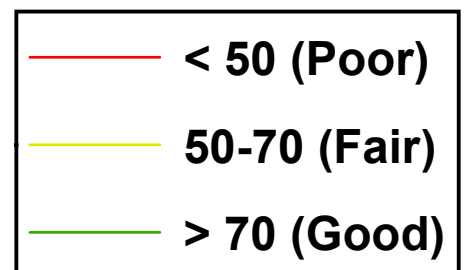
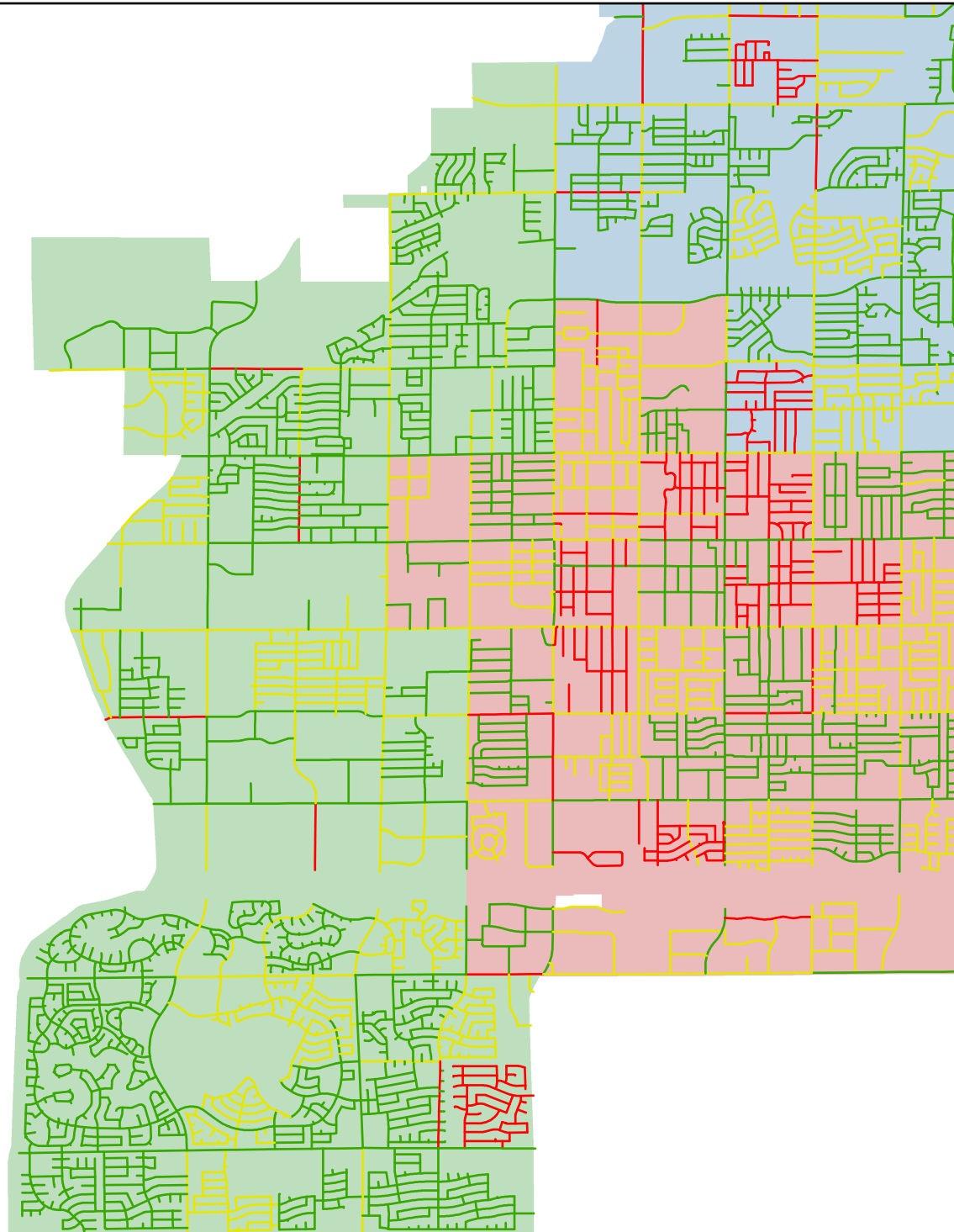
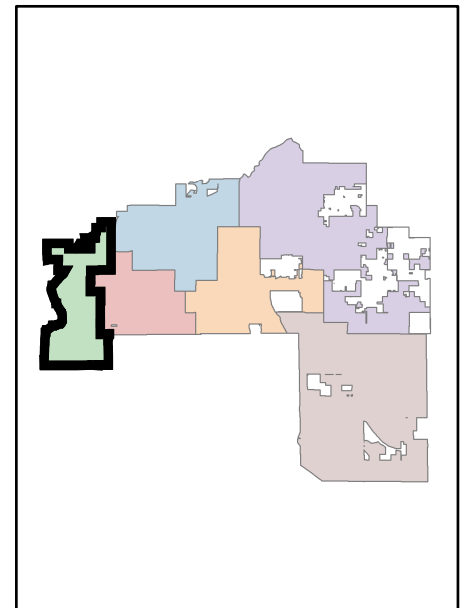


PAVEMENT CONDITIONS

per Council District



COUNCIL DISTRICT 3

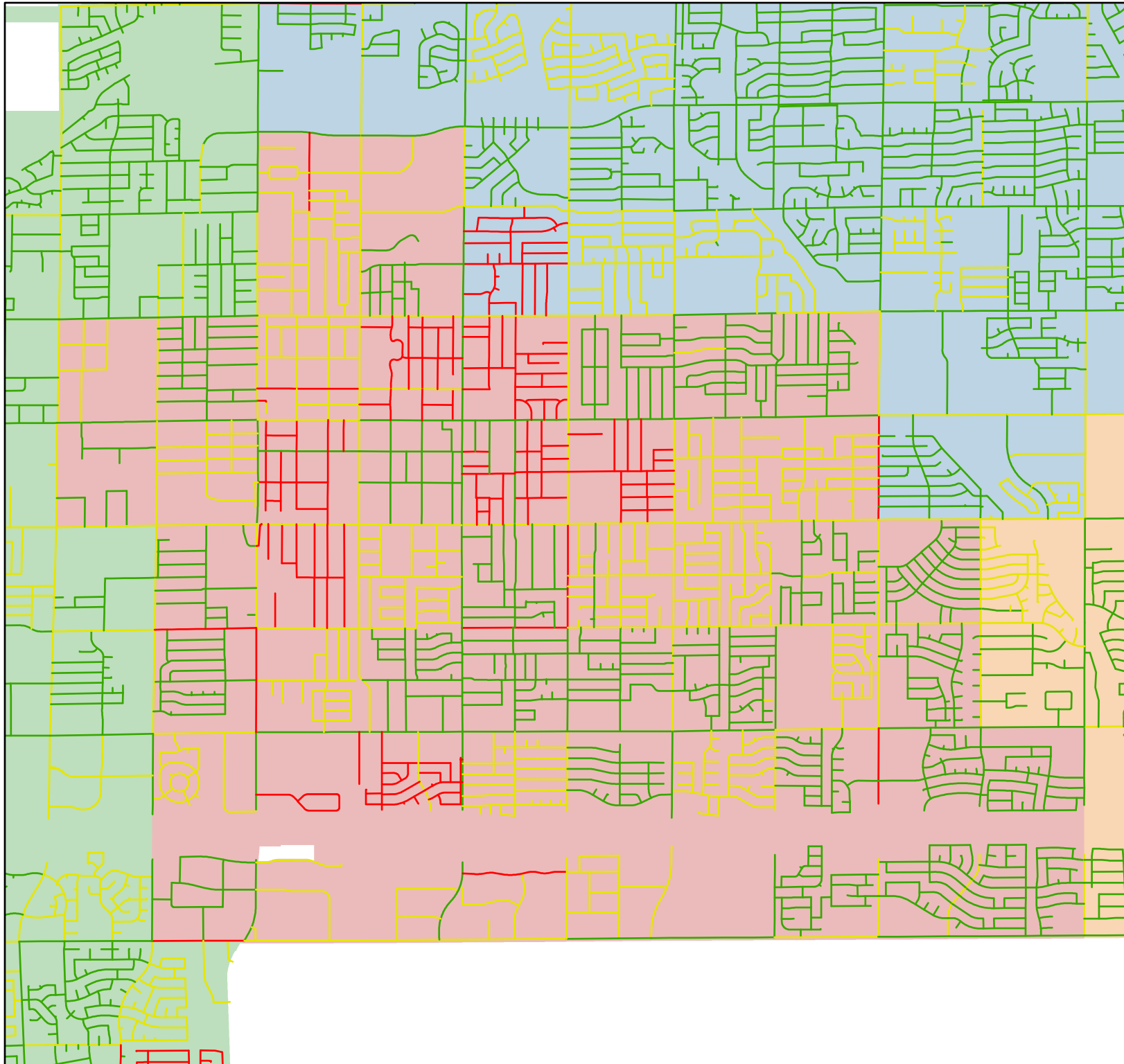
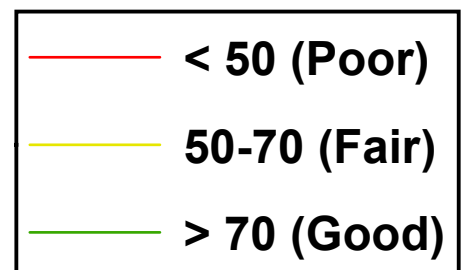
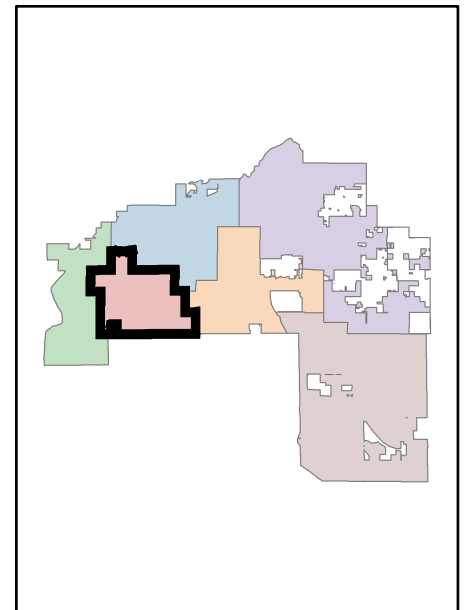


PAVEMENT CONDITIONS

per Council District



COUNCIL DISTRICT 4

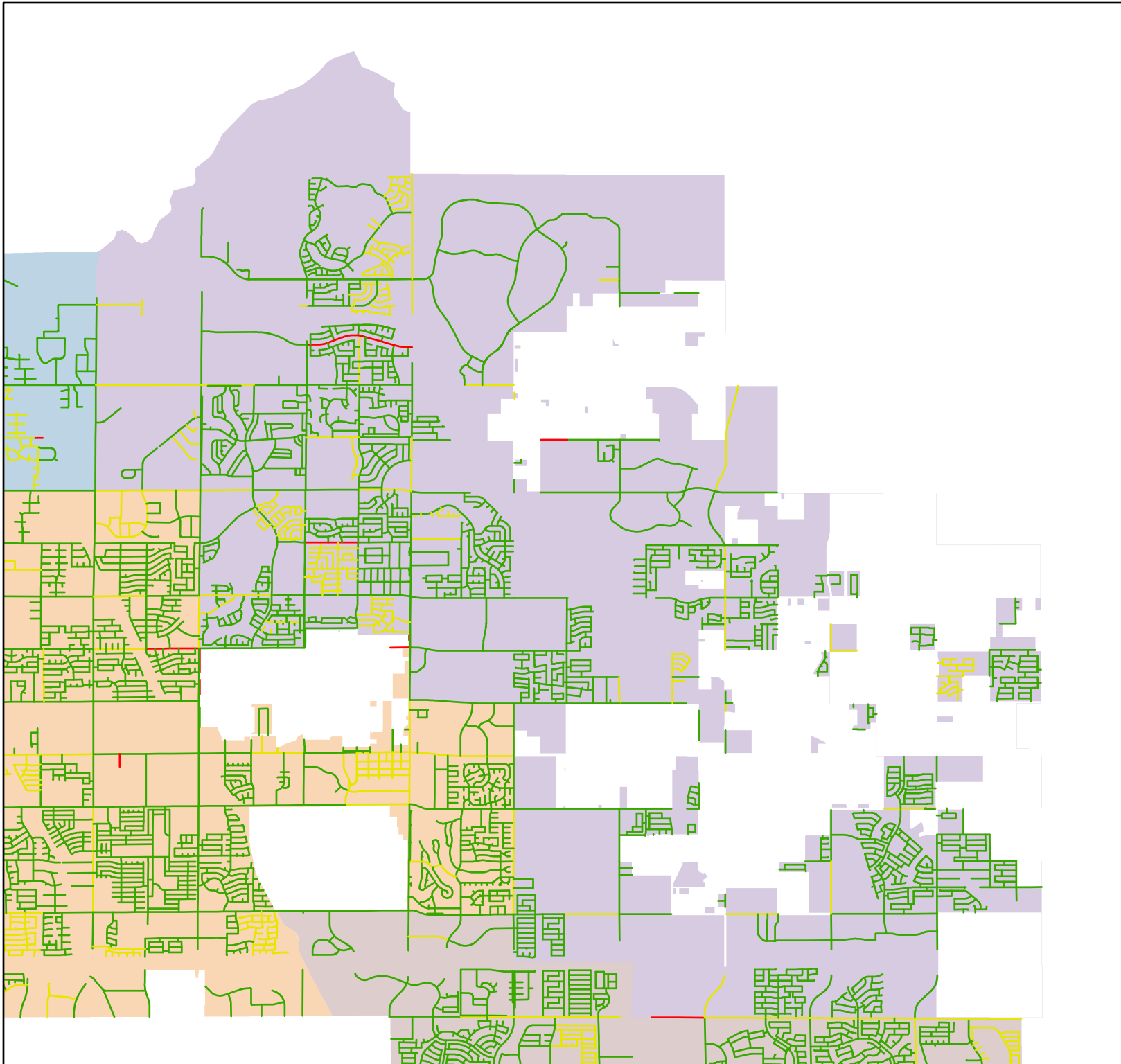
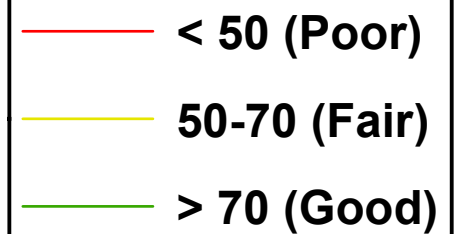
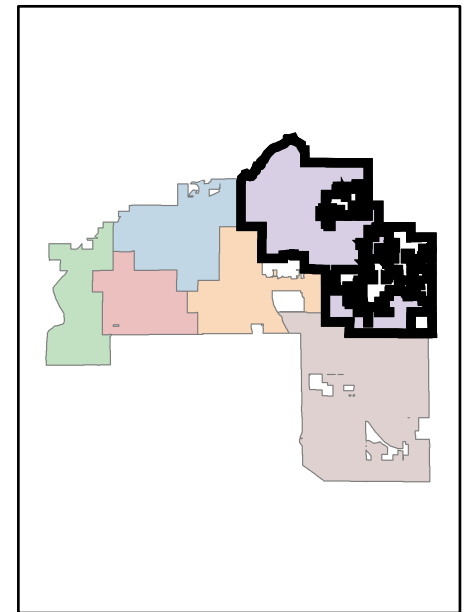


PAVEMENT CONDITIONS

per Council District



COUNCIL DISTRICT 5

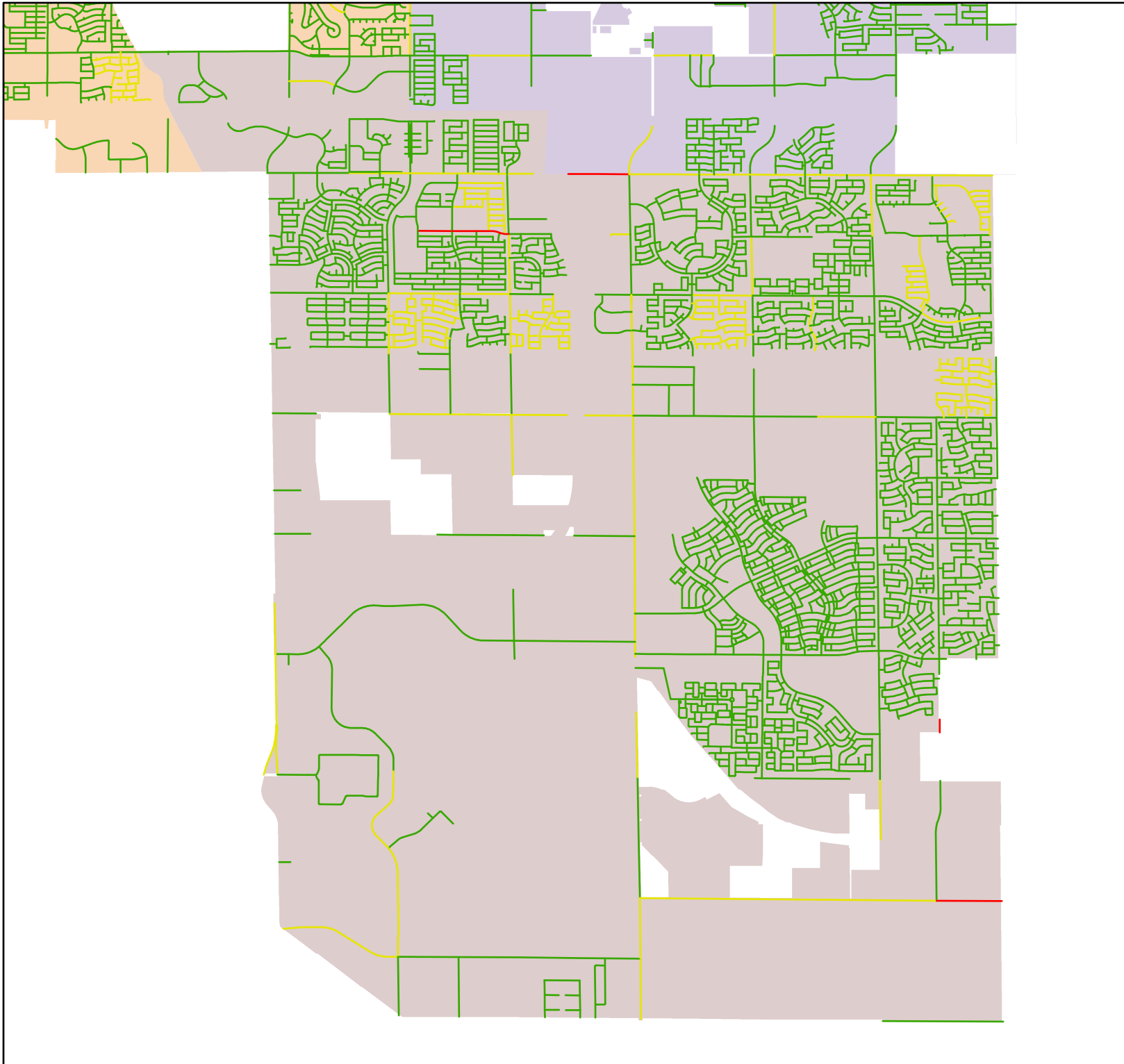
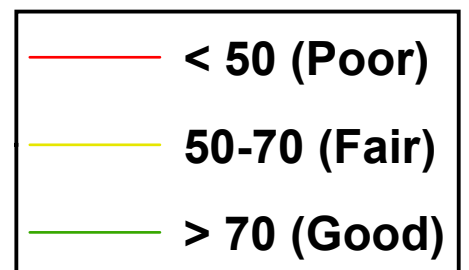
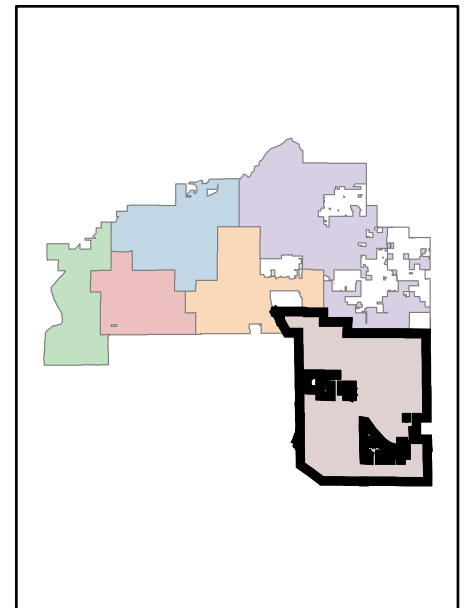


PAVEMENT CONDITIONS

per Council District



COUNCIL DISTRICT 6





The City Auditor's office provides audit, consulting, and investigative services to identify and minimize risk, maximize efficiencies, improve internal controls, and strengthen accountability to Mesa's citizens. We serve as an independent resource to City Management and the City Council, to provide them with timely, accurate, and objective information, assurances, and recommendations pertaining to City of Mesa programs and activities.

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