

# **STREET MASTER PLAN**

2014 – 2018

FOR

**CENTERVILLE CITY**

BY

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## EXECUTIVE SUMMARY

After a careful study and analyzing of our street system and the updating of the City's Street Master Plan, I made the following findings and observations. There are five main factors why our streets are deteriorating with potholes and rough areas.

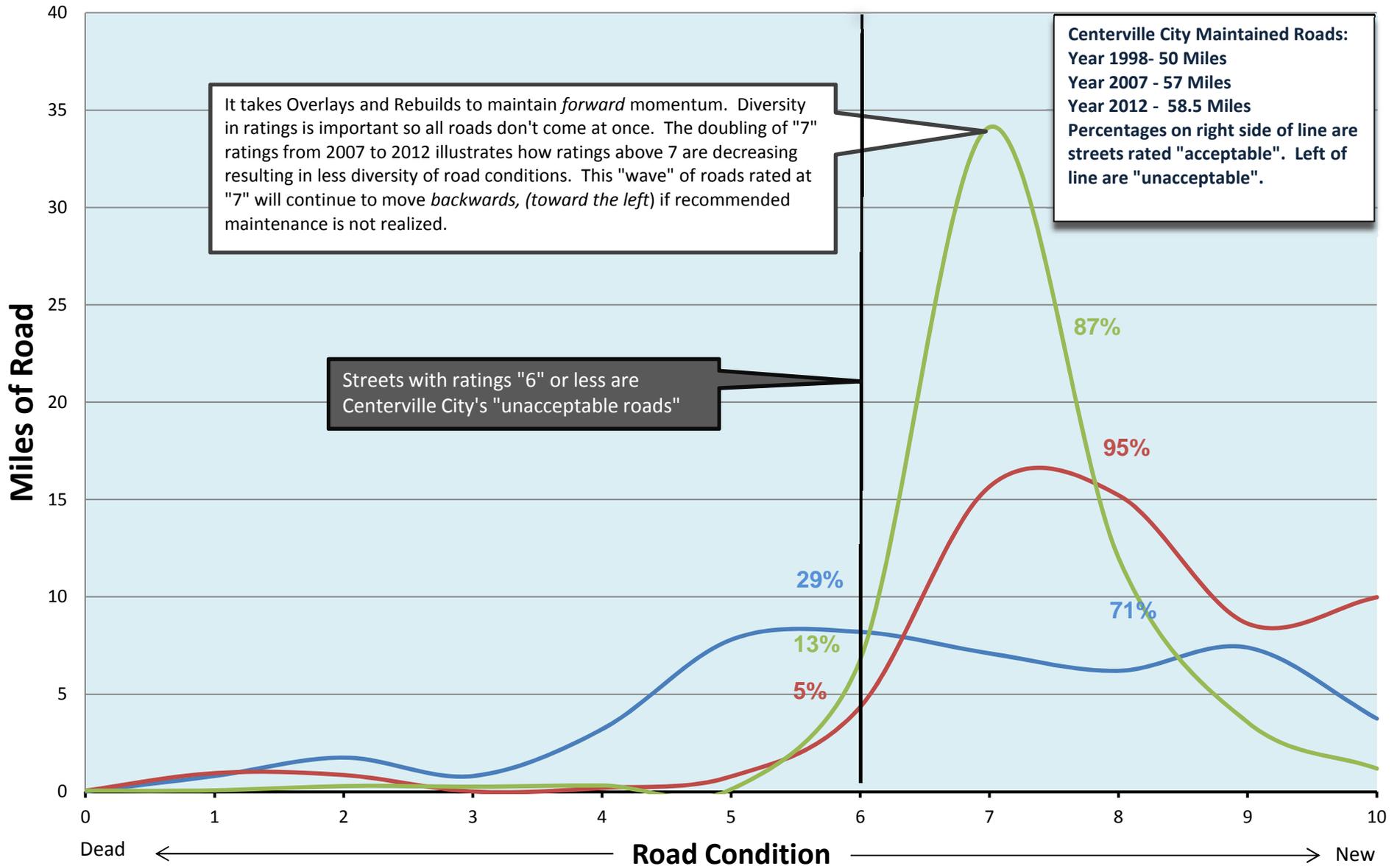
1. If we don't continue ongoing maintenance, the normal aging of our streets due to nature and our environment, such as sunlight, heat, cold, water and traffic, will over time create a very low quality street system.
2. Since we started using a street master plan in 1998, we have added over 7.22 miles of roads which is a 14% increase. Most of these added roads now need preventative maintenance, which takes more revenue.
3. During the period of the last master plan we were **unable** to complete the scheduled projects of 3.5 miles of rebuilt streets and 4.84 miles of overlays. This was due to lack of funding of about \$3,155,500.
4. Cuts in the streets made by utility companies shorten the life of the streets and make them rough to drive on. Last year we kept GIS records of where each street-cut took place and we had over 1,000 cuts made in our streets.
5. The cost to repair our streets continues to increase each year. Since the first master plan was written the costs have doubled. From the time the 2008-12 Master Plan was written, the cost of overlays has gone up 8% and the cost of rebuilds went up 25% to 30%. If we don't do street overlays as scheduled, then we have to rebuild them instead. To do rebuilds, it costs three times more than overlays. If we don't repair our roads in a timely manner, the cost for the repairs will continue to go up substantially.

One of the differences in this master plan is that half of the overlays are on streets that require a higher level of service because they are collector streets with heavy traffic. If they aren't maintained, the conditions will deteriorate and city residents will register complaints. There are 7.88 miles of major roads scheduled for overlay in this Master Plan.

We have many city utilities, waterlines, sub-drains, storm drains, plus other utility companies that need to replace aging lines. It is more cost effective and less damaging to the streets if all the city utilities coordinate their replacements. We would also encourage other utility companies to do this too. This could eliminate the risk of their lines blowing up and damaging our streets. It also reduces the need for another cut in our streets.

There is nothing that makes a city look more prosperous and well kept than streets that are smooth without potholes and yards that are well kept. Everyone, residents and visitors, who enters our City, travels on our streets and we would like the condition of the streets to reflect who we are.

## Street Condition Ratings for years: 1998, 2007, 2012

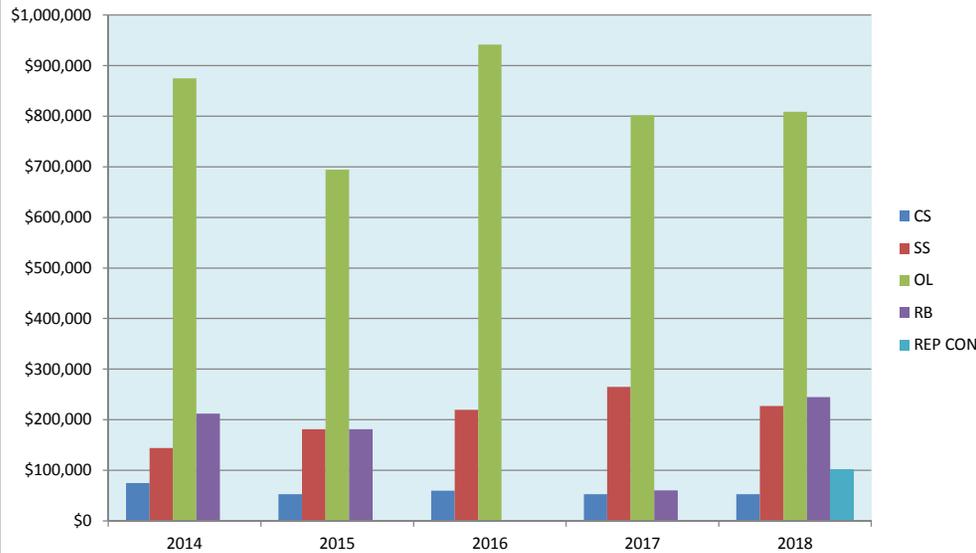


## 2014-2018 Street Maintenance Master Plan

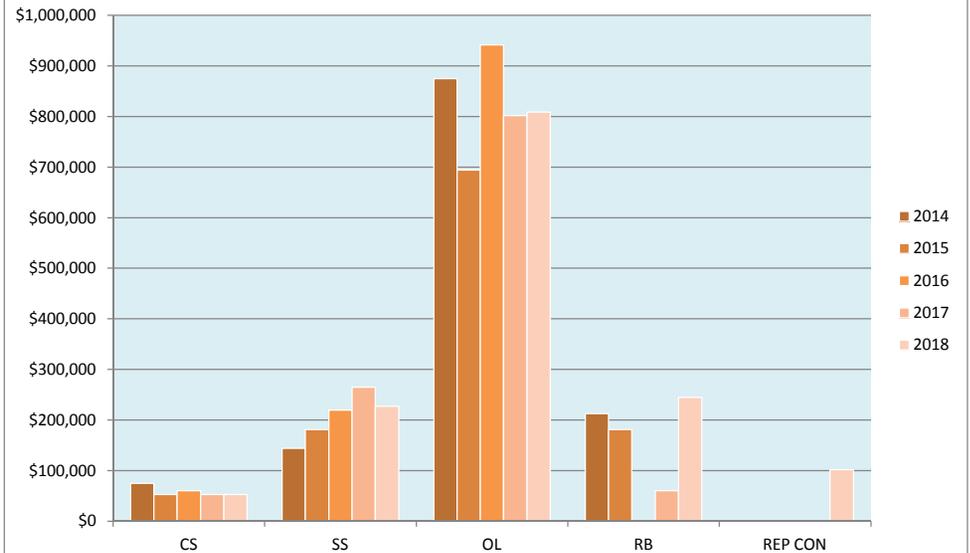
### ESI reported estimates 1/14/13 (Includes trails and parking lots)

	2014	2015	2016	2017	2018	5 YEAR TOTAL	YEARLY AVERAGE
CS	\$75,000	\$52,500	\$60,000	\$52,500	\$52,500	\$292,500	\$58,500
SS	\$143,816	\$181,125	\$219,692	\$264,684	\$227,011	\$1,036,328	\$207,266
OL	\$874,926	\$694,485	\$941,613	\$801,813	\$809,068	\$4,121,905	\$824,381
RB	\$212,296	\$181,293	\$0	\$60,384	\$244,965	\$698,938	\$139,788
REP CON					\$101,787	\$101,787	\$101,787
<b>Mobilization &amp; Traffic Control</b>	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000	\$250,000	\$50,000
<b>Contingency (10% of Construction Total)</b>	\$135,603	\$115,940	\$127,130	\$122,938	\$148,533	\$650,144	\$130,029
<b>Engineering (7% of Construction Total)</b>	\$94,923	\$81,158	\$88,991	\$86,057	\$103,973	\$455,102	\$91,020
<b>Inflation (3% of Treatment Construction Total (3% per year after 2014))</b>	\$40,681	\$69,564	\$114,417	\$147,526	\$222,800	\$594,988	\$118,998
<b>TOTALS</b>	<b>\$1,627,244</b>	<b>\$1,426,065</b>	<b>\$1,601,843</b>	<b>\$1,585,902</b>	<b>\$1,960,637</b>	<b>\$8,201,691</b>	<b>\$1,640,338</b>

### Cost Per Year



### Yearly Treatment Comparison by Cost



**CS** - Crack Seal existing cracks with asphalt emulsion.  
**SS** - Slurry Seal is asphalt emulsion and gravel to create a new 3/8" wearing surface.  
**OL** - Overlay is 2" asphalt layer on top of existing surface.  
**RB** - Rebuild involves removing existing asphalt and replacing with 12"-24" base and sub-base  
**REP CON** - Replace Concrete

#### Treatment Costs 2013 Bids From ESI

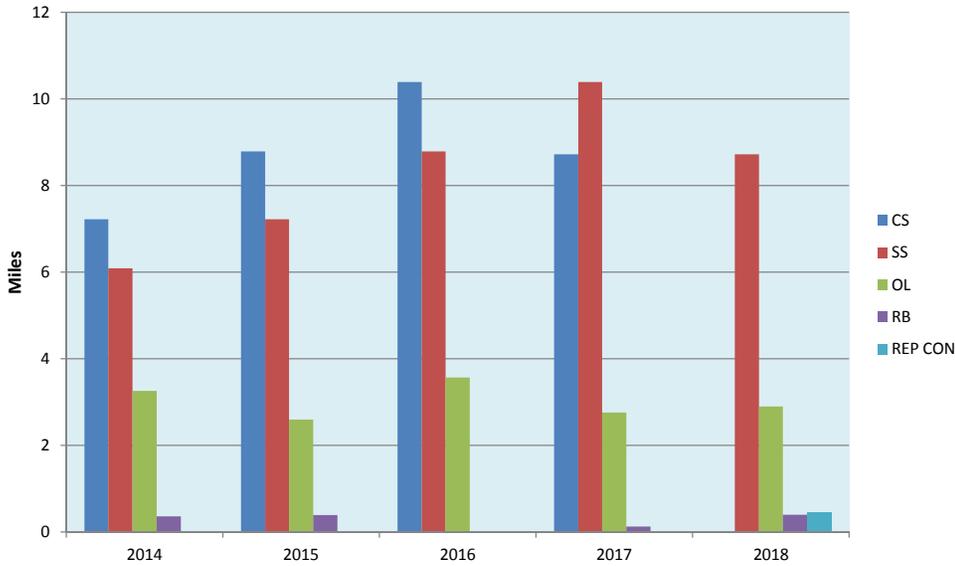
Treatment	Cost Per Mile
Crack Seal	\$10,000.00 (\$1,600 per ton)
Slurry Seal	\$22,968.00
Overlay & Mill	\$229,680.00
Rebuild	\$612,480.00 12" deep
	\$765,600.00 24" deep
Replace Concrete	\$689,040.00 (\$4.50 per sq ft)

## 2014-2018 Street Maintenance Master Plan

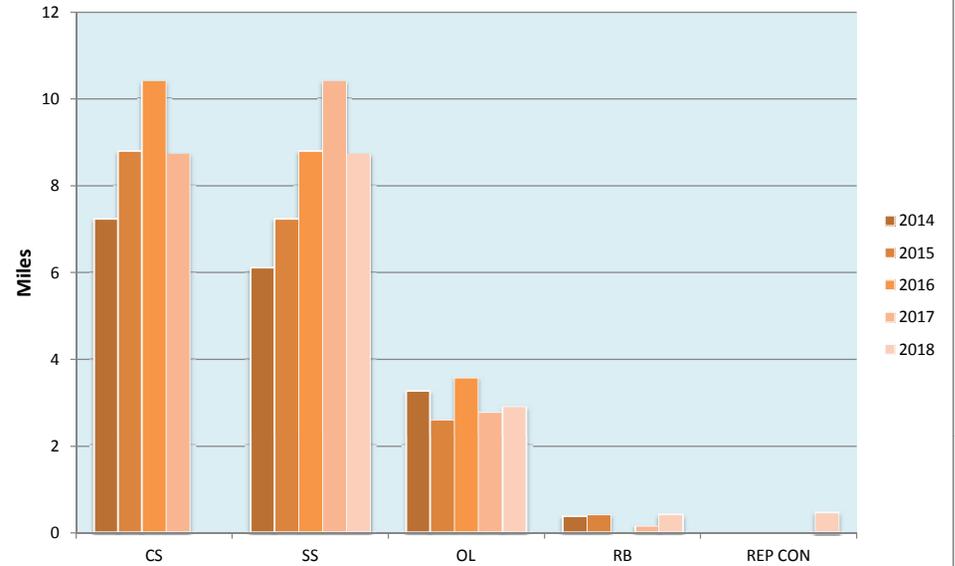
### Mileage of Roads Scheduled for Repair 2014-2018

	2014	2015	2016	2017	2018	5 YEAR TOTAL	YEARLY AVERAGE
<b>CS</b>	7.22	8.79	10.39	8.72	0	<b>35.12</b>	<i>7.02</i>
<b>SS</b>	6.09	7.22	8.79	10.39	8.72	<b>41.21</b>	<i>8.24</i>
<b>OL</b>	3.26	2.6	3.57	2.76	2.9	<b>15.09</b>	<i>3.02</i>
<b>RB</b>	0.36	0.39	0	0.13	0.4	<b>1.28</b>	<i>0.26</i>
<b>REP CON</b>	0	0	0	0	0.44	<b>0.44</b>	<i>0.09</i>
<b>TOTALS</b>	16.93	19	22.75	22	12.46	<b>93.14</b>	

#### Road Treatment Per Year



#### Yearly Treatment Comparison by Mileage



**CS** - Crack Seal existing cracks with asphalt emulsion.  
**SS** - Slurry Seal is asphalt emulsion and gravel to create a new 3/8" wearing surface.  
**OL** - Overlay is 2" asphalt layer on top of existing surface.  
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**REP CON** - Replace Concrete

# New Roads Since 1998

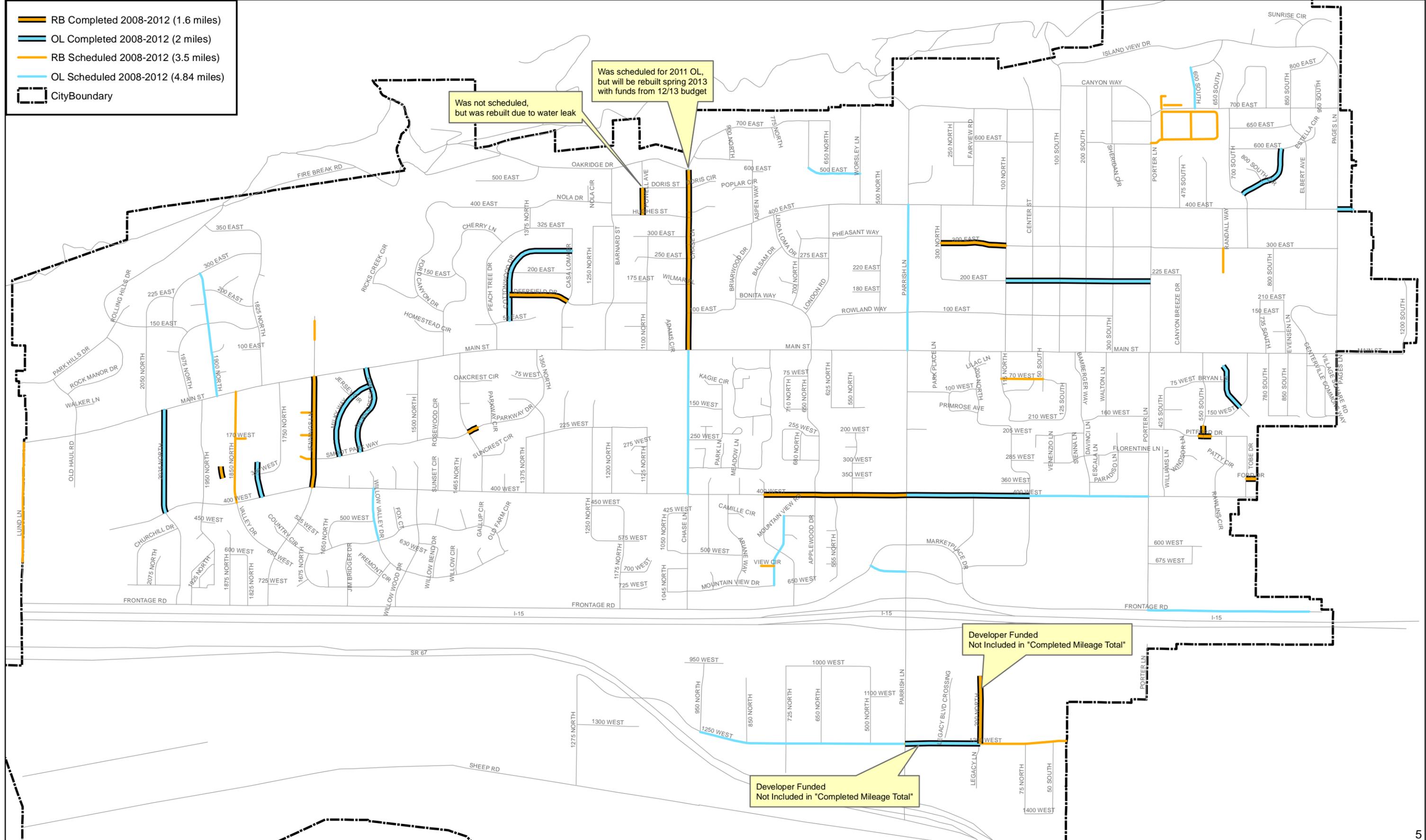
## 7.22 Total Miles Added (14% increase)



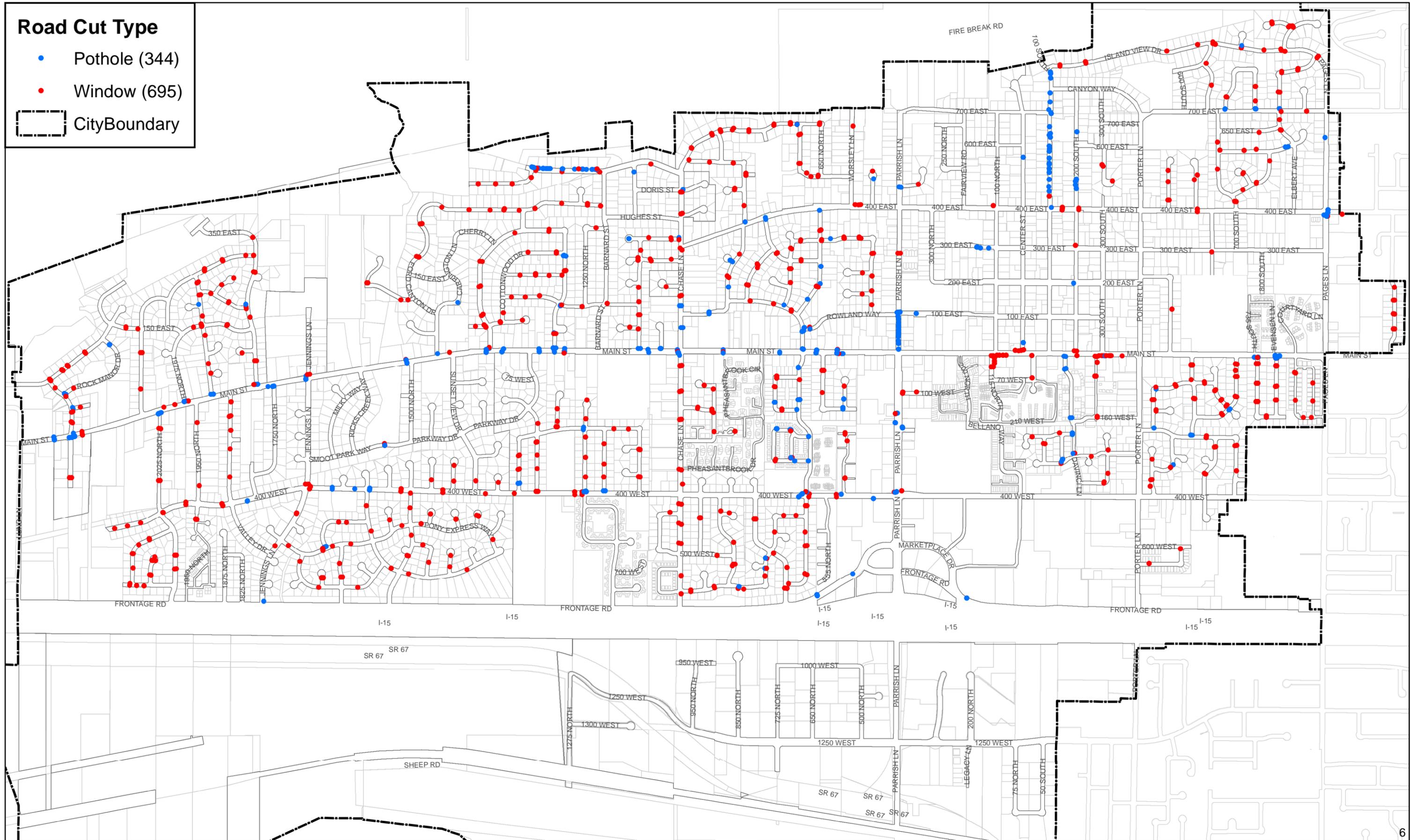
# RB & OL Scheduled for 2008-2012

VS

# RB & OL Completed 2008-2012



# Potholes/Window Cuts Occurred August 2011 to October 2012

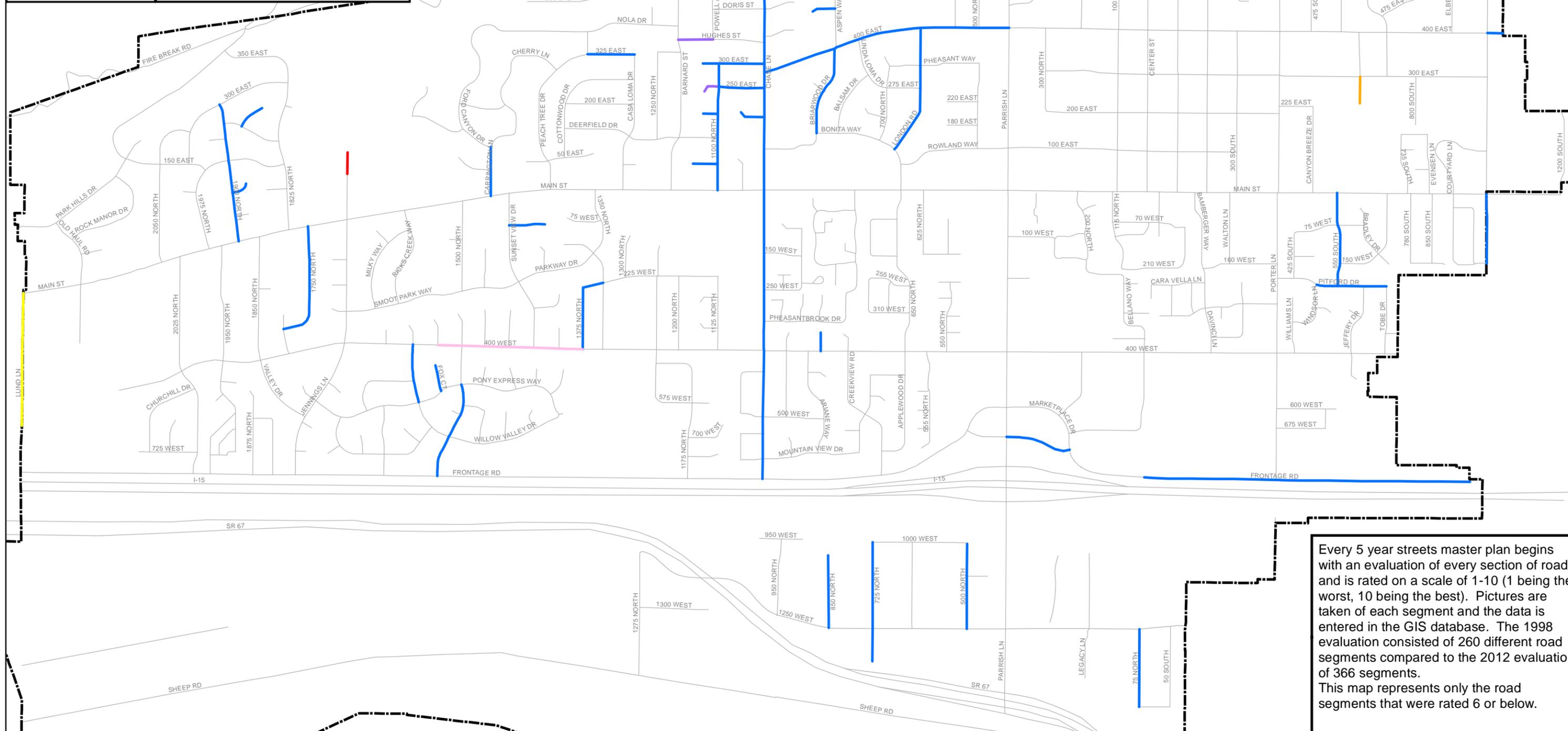
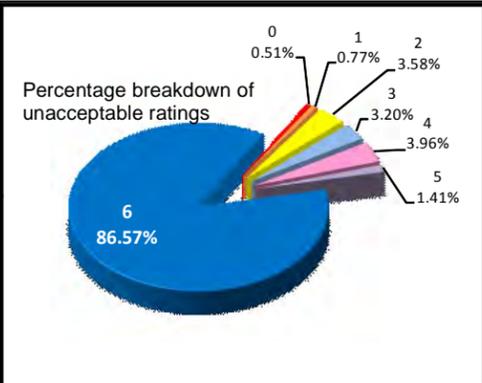


# Roads Rated "6" or Less as of June 2012

## 13% of all City Maintained Roads

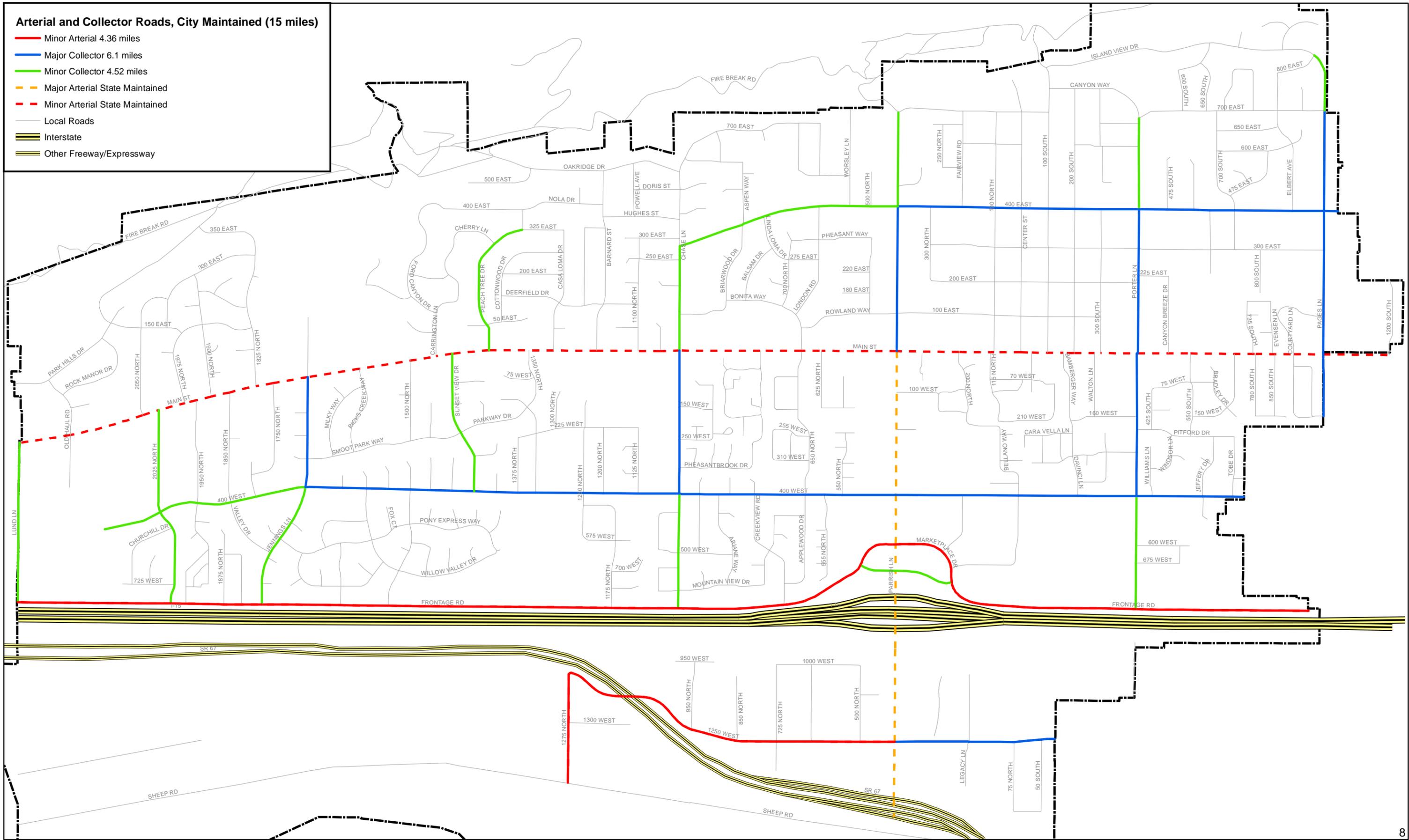


**Ratings "1 - 6"**  
**City Standard: "6" and below is "unacceptable"**  
 Road <= 6 (7.83 miles 13.4% of roads)  
 As observed summer 2012



Every 5 year streets master plan begins with an evaluation of every section of road and is rated on a scale of 1-10 (1 being the worst, 10 being the best). Pictures are taken of each segment and the data is entered in the GIS database. The 1998 evaluation consisted of 260 different road segments compared to the 2012 evaluation of 366 segments. This map represents only the road segments that were rated 6 or below.

# Centerville Roads Hierarchy



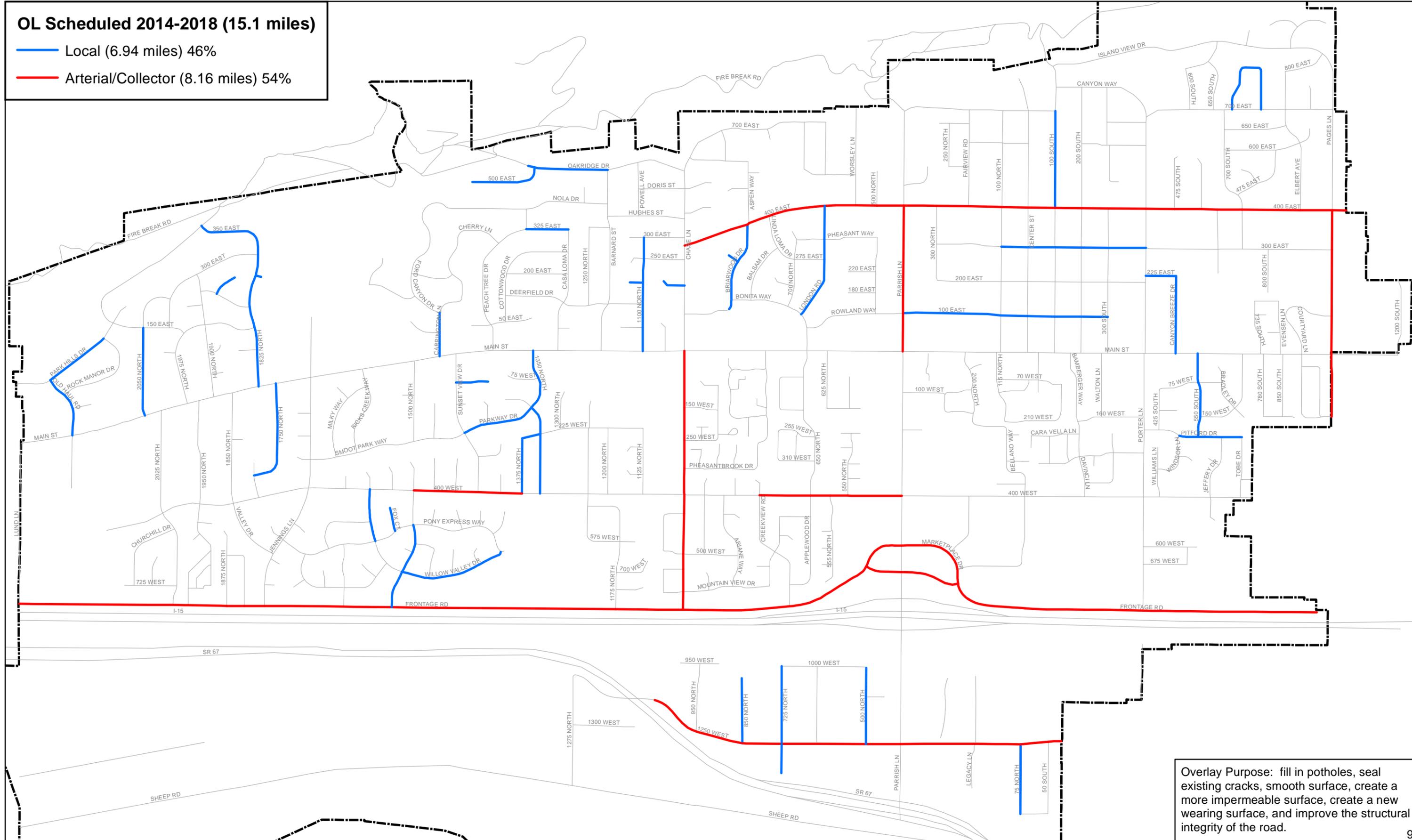
# OL Scheduled 2014-2018

## 54% are Arterial/Collectors



**OL Scheduled 2014-2018 (15.1 miles)**

- Local (6.94 miles) 46%
- Arterial/Collector (8.16 miles) 54%



**Overlay Purpose:** fill in potholes, seal existing cracks, smooth surface, create a more impermeable surface, create a new wearing surface, and improve the structural integrity of the road.

# OL Scheduled for 2014-2018

## 15.1 Total Miles



Path: C:\GIS\workspace\Projects\Streets\Street Master Plan\2014-2018\OL\_Scheduled\_2014-2018.mxd  
2,000 1,000 0 2,000 Feet



**OL Scheduled 2014-2018**  
**15.1 Miles**

- Not Scheduled
- 2014 (3.87 miles)
- 2015 (2.13 miles)
- 2016 (3.57 miles)
- 2017 (2.79 miles)
- 2018 (2.72 miles)
- CityBoundary

Overlay Purpose: fill in potholes, seal existing cracks, smooth surface, create a more impermeable surface, create a new wearing surface, and improve the structural integrity of the road.

# RB Scheduled for 2014-2018

## 1.29 Total Miles



2,000 1,000 0 2,000 Feet

**RB Scheduled 2013-2017 (none in 2016)**

**1.29 Miles**

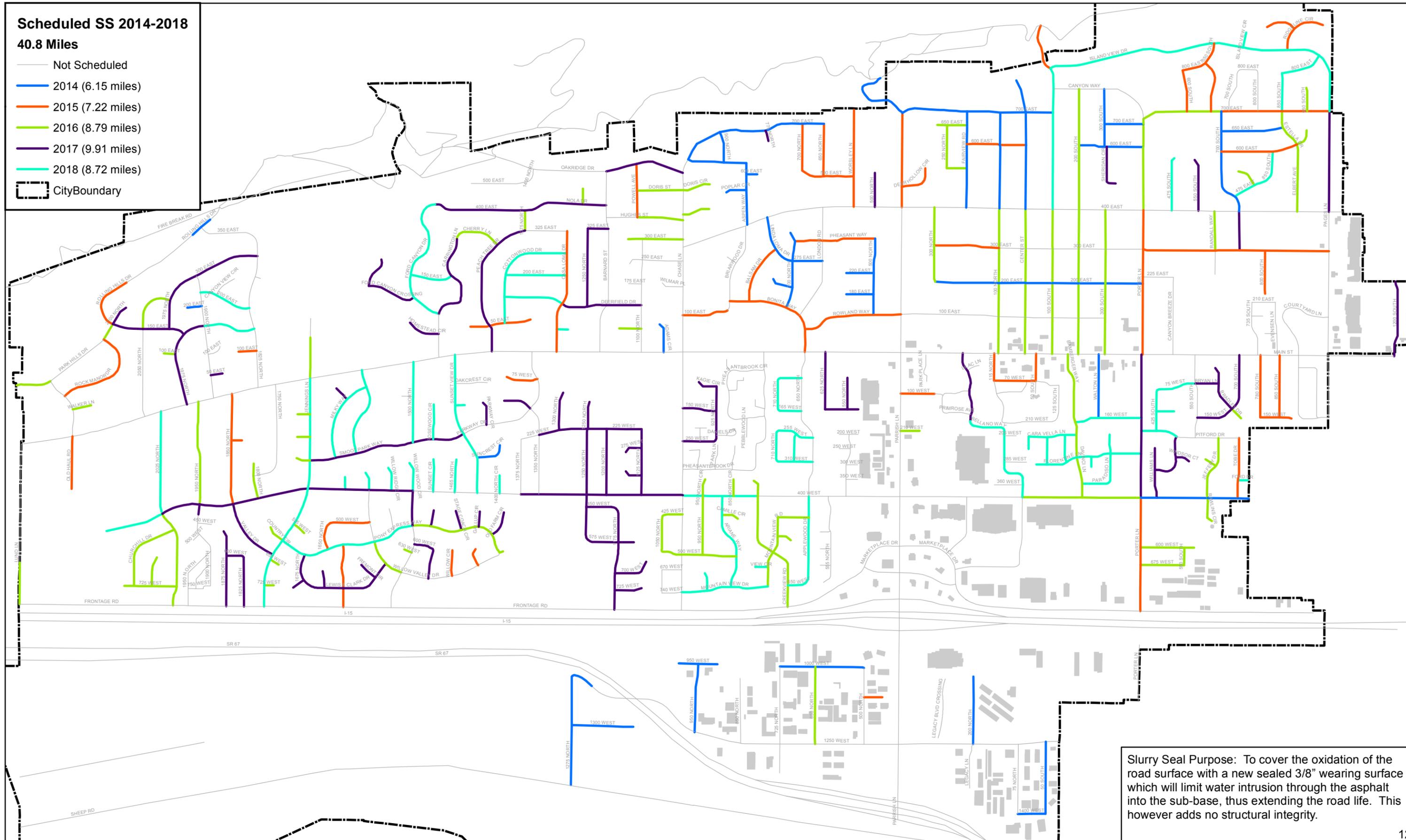
- Not Scheduled
- 2014 (.36 miles)
- 2015 (.39 miles)
- 2017 (.13 miles)
- 2018 (.4 miles)
- CityBoundary



**Rebuild Purpose:** To re-establish structural integrity due to improperly built road, or water intrusion that has resulted in sub-base failure. The asphalt is stripped off and the base is removed and we remove the sub-base down 12"-24" depending on the structural integrity of that cross-section. Then we rebuild the sub-base section, put in 8" of road base, and then repave with 3"-4" of asphalt.

# SS Scheduled between 2014-2018

## 40.8 Total Miles



**Scheduled SS 2014-2018**  
**40.8 Miles**

- Not Scheduled
- 2014 (6.15 miles)
- 2015 (7.22 miles)
- 2016 (8.79 miles)
- 2017 (9.91 miles)
- 2018 (8.72 miles)
- City Boundary

Slurry Seal Purpose: To cover the oxidation of the road surface with a new sealed 3/8" wearing surface which will limit water intrusion through the asphalt into the sub-base, thus extending the road life. This however adds no structural integrity.

# CS 2014-2018

## These are scheduled 1 year before SS scheduled for 2015-2018 (35 Total Miles)



**Legend**

**Scheduled CS 2014-2018 (none in 2018)**

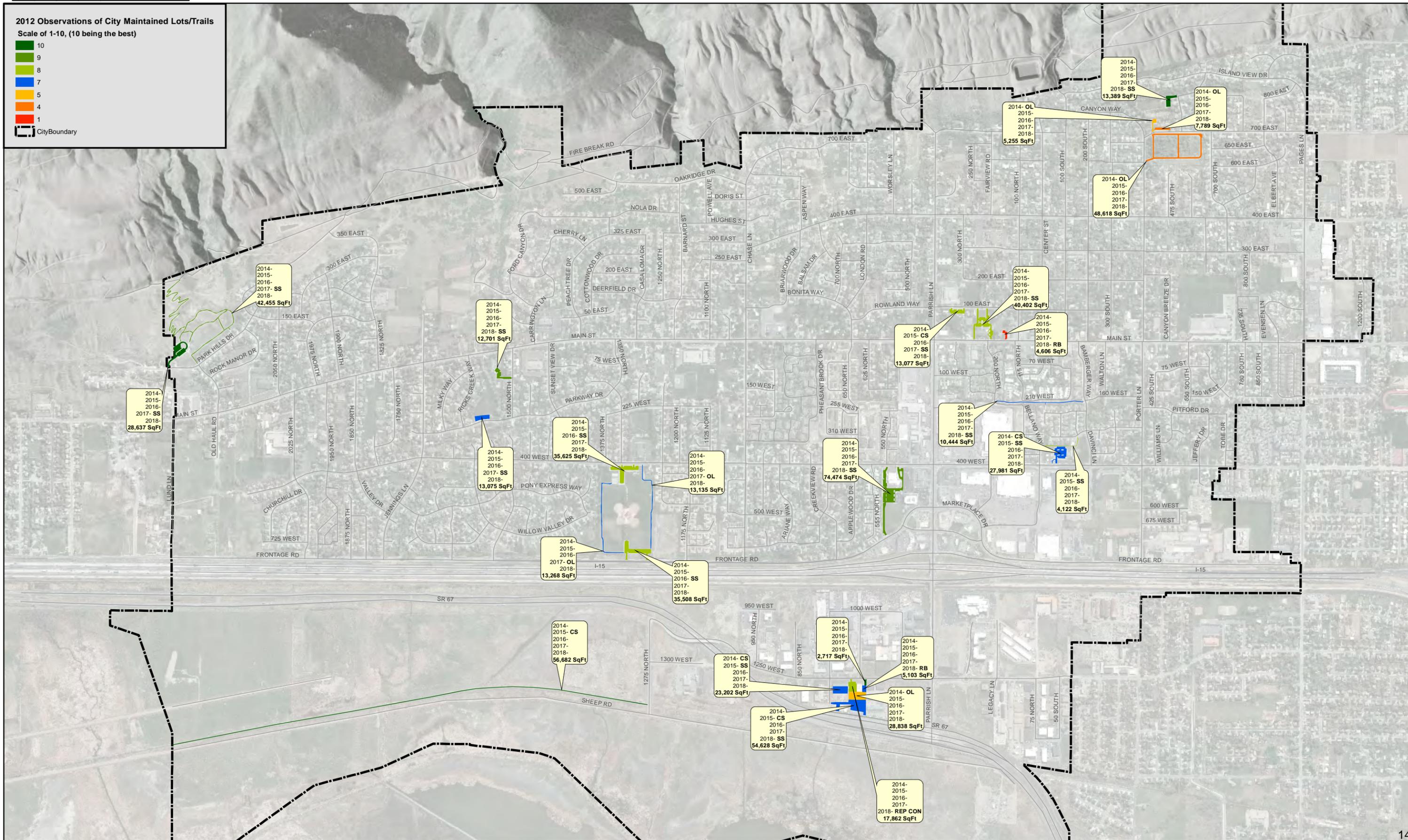
**35 Miles**

- None Scheduled
- 2014 (7.37 miles)
- 2015 (8.78 miles)
- 2016 (10.38 miles)
- 2017 (8.72 miles)



**Crack Seal Purpose:** Seals in joints so water can't permeate through the asphalt into the sub-base that can result in premature road base failure. This needs to be done often due to the expansion and contraction of asphalt which is constantly creating new cracks and reopening old cracks.

# Lots/Trails Scheduled between 2014-2018





Alligatoring



Frost\_Heaving



Larger\_Area\_Starts\_To\_Fail



Oil\_Loss



Oil\_Loss2



Oil\_Loss\_And\_Rotting



Overlay\_Will\_Not\_Work\_Anymore



Pothole\_On\_Pothole



Road\_Held\_Together\_With\_Rubberbands



Road\_only\_20\_years\_old



Shifting\_Aspphalt



Skin\_Patch



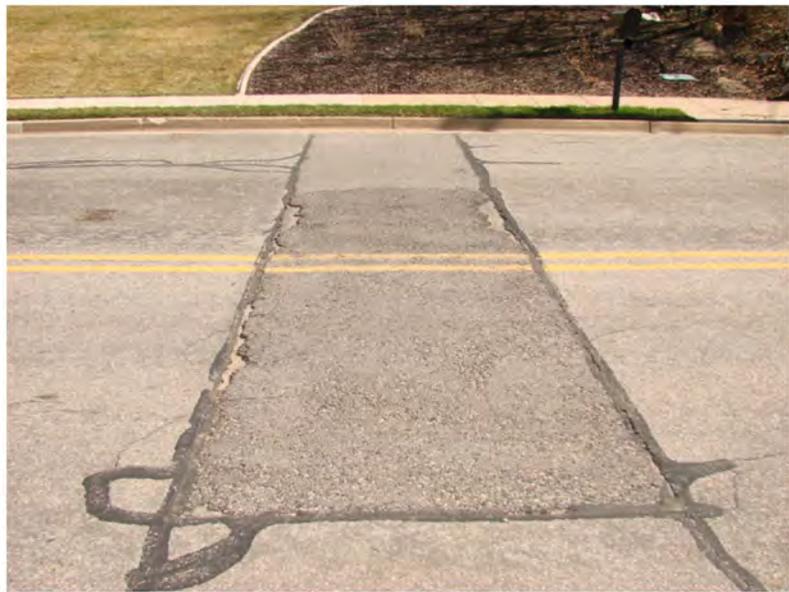
Sub\_Base\_Failing



Utility\_Cuts



Utility\_Cuts3



Utility\_Cuts\_2

## DEFINITIONS

### REBUILD

Street is completely rebuilt with new roadbase 4" to 24" deep and asphalt. Streets that have gone far beyond their usable life need to be rebuilt.

### OVERLAY

An overlay is an additional 1½" to 2" of asphalt. Each street should receive an overlay every 15 to 20 years to keep the road from breaking up.

### SLURRY SEAL

Slurry seal is a thin coat of asphalt and small chips that are squeegeed onto the road surface. It helps keep the roads sealed so water will run off into the curb rather than into the road base. It allows rejuvenation of the road surface and prevents oxidation. All streets should be slurry sealed every five years to extend their life of service.

### CRACK SEALING

Cracks are sealed in the road. This extends the life of a road by keeping water out of the sub-base. Roads should be sealed a year or more before overlaid or slurry sealed.

### NEW DEVELOPMENT

New roads that may need the city's help to encourage their development in the next five years.

### DEVELOPER

A new road that has been completed by a developer. No work will be required by the city for the next five years.

### C & B FUNDING

Gas tax from the State that is earmarked for roads.

## DEFINITION OF ROAD CONDITIONS

### RATING SCHEDULE #1 (Worst) – #10 (Best)

- #1 Road is dead with no life left. There is no reason to hurry and repair it because it can't get any worse and it has low traffic volume.
- #2 No life is left in this road, but it needs to be worked on before #1 projects because of high traffic and coordination with other utility work.
- #3 The road is mostly dead with very little life. However, it needs to be worked on before #1 because of high volume traffic and complaints.
- #4 Road has deteriorated but an overlay can save it. It should have high priority in order to preserve the life and avoid replacement.
- #5 A lot of pot holes, and more alligating and cracking are seen on this road.
- #6 This road will have few pot holes. Longitudinal and horizontal cracking are very apparent and some in-between cracks are appearing.
- #7 This road is beginning to show longitudinal and horizontal cracking.
- #8 More cracks are apparent on this road with a life of 80% to 85% remaining.
- #9 The road has 85% to 90% of life remaining. It is in good condition; however, it may have a few small cracks. Surface is starting to change color because of sun light.
- #10 The road has 90% to 100% of life remaining. It is in very good condition.

## PRIOR OBSERVATIONS

1998

NOTE: This page is a reprint of a page in the 1998 report.

1. Roads that are 15 to 20 years old are worn out. Longitude and horizontal cracking has been created from many years of expansion and contraction going from winter to summer. After roads become cracked then water gets into the bases and softens them substantially. Roads then become susceptible to more cracks and alligating is formed. Roads that have received regular maintenance such as slurry or chip seals look much better.
2. Many roads 15 to 20 years old are oxidized because sunlight has eaten away much of the fine sand and has created a lot of loose gravel. Roads that have received very little maintenance were graphically more worn out.
3. Roads receiving more and heavier traffic loads that have not been overlaid within the last ten to fifteen years are failing.
4. Factors that lead to a longer road life are:
  - a. Proper design
  - b. Proper compaction when the road is built
  - c. Surface maintenance
  - d. Overlay
  - e. Installing fabric between layers of overlay
  - f. Keep utility cuts to a minimum
  - g. Major roads require more repair and maintenance sooner than minor roads
  - h. A good inspection program throughout pavement life.
5. There is life curve for pavement. There is a point when it becomes cost prohibitive to try and save a road. The only alternative is to replace it at a much higher cost. The road generally doesn't get much worse, but it always looks terrible.
6. Factors that limit the life of pavements.
  - a. Age
  - b. Heat and frost
  - c. Lack of maintenance
  - d. Poor compaction
  - e. Water getting into bases
  - f. Sunlight
  - g. Utility companies
  - h. Traffic volume and weight of vehicles
  - i. Location of pavement geographically. A flat road does not last as long as those with a grade.
  - j. Poor drainage
  - k. Pavement design

## PRIOR BACKGROUND REPORTS 1998

In September 1998, the Public Works Department completed the City's first Streets Master Plan. The Master Plan incorporated a street rating system where the worst streets were rated "1" and the best were rated "10". Based upon that ratings system, a ten-year replacement and maintenance plan was developed to include slurry seal, crack seal, overlay, and rebuild priorities. After the maintenance plan was implemented, the City Council adopted a Capital Improvement Plan (CIP) to develop additional master plans for the water, subdrain, and storm drain systems. The Council then acquired bonds to fund the CIP. All of the master plans, developed by the City staff, were then merged so that all of the underground utilities could be completed prior to street re-pavement. The coordination created a cost-savings strategy not utilized prior to the CIP.

Before the Streets Master Plan was adopted, citizens and the Council tried to set annual priorities for street maintenance. The input, although well appreciated, created more conflict than productivity. After the Council agreed upon the plan, the City staff utilized the plan to determine which streets needed which type of maintenance for each year. The staff continues to use the report and other facts in order to make sound judgments. The results have been a remarkable increase of the quality of life for our citizens by improving the drivability, looks, and safety of our city street system. We have been able to keep our streets maintained at a higher level while lowering our yearly costs because of the strategic and timely manner in which our streets are being maintained.

One way we maximized our dollars was to let dead streets die and to upgrade streets that were serviceable. One by one, we have been rebuilding dead streets and currently only a few remain. An integral part of the management of the street infrastructure is the coordination of underground utility installation and replacement. In most cases, the cost to patch and repair a road, after utilities have been installed, is as much as a complete road rebuild.

We use other master plans to help us determine when to work on streets based upon the underlying utilities. If the street has utilities requiring maintenance, we will repair the utilities prior to working on the street. Letters are sent to utility companies to let them know which streets we are repairing and to inform them that no excavation fee will be charged, nor will they have to patch the street, if they repair their utility while the street is under construction. We have had great participation and success with this request.

There were many other standards implemented by the Council that have helped the staff improve the quality of our streets. The following ordinance changes are examples:

1. Developers have to slurry seal streets within the warranty period.
2. The subdivision standards for streets have been increased by requiring a more durable road.
3. Utility companies must bore to install their utility in the streets, unless approved by the Public Works Director.