

**SIDEWALKS ASSESSMENT PROJECT**  
TOWN OF MOUNTAIN VIEW, COLORADO

FEBRUARY 2017  
REVISED MAY 2017

**PREPARED BY:**



**RGA Job No.:**  
1104.0002



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## **INTRODUCTION**

RG and Associates, LLC (RGA) was retained to complete an assessment of existing sidewalk conditions for the Town of Mountain View. The purpose of this assessment was to identify, prioritize, and recommend sidewalk repairs and replacements.

This study began with field observations and data collection of the Town's approximate 26,500 lineal feet of existing sidewalks. Each sidewalk was walked and inspected by an RGA Inspector. Observations included both identification of deterioration and horizontal and vertical displacement. Almost all existing sidewalks are 5 feet wide and have tooled joints every 5 feet. Therefore, each 5 foot by 5 foot "stone" was evaluated.

The condition of trees were not evaluated, but field staff identified large trees in areas of vertical sidewalk displacement that may impact sidewalk replacements. Trees adjacent to sidewalk segments that are in need of replacement, will need further evaluation by an arborist or may require a specific replacement options in order to minimize damage to the trees. We identified a handful of stump removals near sidewalk replacements.

The Evaluation Summary Table identifies each sidewalk stone with cracking, vertical displacements and significant deterioration. The sidewalk segments were identified by street and by block per the Town Block Key Map.

## **FINDINGS AND RECOMMENDATIONS**

RGA identified each sidewalk as follows:

- **Minor Raised:** Where sidewalks were not damaged, but had between  $\frac{3}{4}$  inch and up to 2 inches of vertical displacement. Most displacements were caused by tree roots.
- **Major Raised:** Where sidewalks were raised vertically of more than 2 inches. Almost all instances of major displacements were caused by tree roots.
- **Minor Deterioration:** Where sidewalks contained fractures, but no horizontal or vertical displacement occurred.
- **Major Deterioration:** Where sidewalks were determined to be unserviceable due to breaks and displacement or in some cases they had been previously replaced with asphalt.

General tree sizes and locations were observed by RGA field staff in order to recommend a follow-up course of action. In about half the cases, trees appeared to be far enough that root damage could be minimized during replacements adjacent to raised walk areas. RGA has identified the trees in need of arborist evaluation. Trees stumps greater than 24 inches in circumference (about 8 inches diameter) recommended for removal have been included on the Evaluation Summary Table and on block maps.

RGA recommends repairs and replacements as follows:

- **Minor Raised:** For raised displacements up to 1 inch, grind the raised edge of sidewalk to match the adjacent sidewalk. For raised or lowered displacements up to 2 inches, pressure grout the lower edge of sidewalk to match the adjacent sidewalk. Both of the above measures



do not include removing the live tree roots that in most cases are causing the displacements. We propose any tree root cutting be performed in conformance to ANSI A300 (Part 8)-2013 Root Management and as recommended by a local arborist.

- Major Raised: Sidewalks shall be replaced following tree root assessment and cutting or relocation recommendations by an arborist. Consult a qualified arborist when cutting within a distance equal to five times the trunk diameter to the trunk<sup>1</sup>. Place at least 4 inches of uncompacted CDOT Class C Filter Material over treated geotextile fabric draped directly over the roots that have been cut or relocated to 8 inches below finished grade. CDOT Geotextile (Drainage) (Class 3) shall be treated with a systemic insecticide and fertilizer application as recommended by an arborist to reduce insect feeding and encourage healing. Pour a 4-inch concrete sidewalk directly over the Filter Material.
- Minor Deterioration: No immediate sidewalk modifications are recommended unless it is adjacent to a sidewalk segment proposed to be replaced.
- Major Deterioration: Remove the damaged sidewalk, excavate to a depth of 8 inches below finished grade, install 4 inches of compacted CDOT Class 6 Aggregate Base Course (ABC) and pour a 4-inch concrete sidewalk. Use CDOT Class C Filter Material and treated geotextile in place of CDOT Class 6 ABC if placed over live tree roots. Tree root cutting or relocation was not included in the replacement option, but should be included if tree roots are discovered during construction activities.

## **BUDGET**

RGA has prepared a Cost Summary Table, per street segment based on the above recommendations. We assumed 50% grinding and 50% pressure grouting at Minor Deterioration sidewalk repairs; tree root cutting or relocation required for 100% of Major Raised sidewalks replacements; and use of CDOT Class C Filter Material in place of CDOT Class 6 ABC at 25% of the Major Deterioration sidewalk replacements.

We calculated the sidewalk repairs and replacements to cost about \$300,000 plus an additional 25% for construction equipment and materials mobilization, construction management and documentation. The total sidewalk repairs and replacement was estimated to cost about \$375,000.

## **CONCLUSION**

Many of the Town's sidewalks are in need of total replacement. Attention should be given to the sidewalks near Town offices and school buildings first. Next, sidewalk repairs should be completed where no immediate utility or street repairs are proposed that could damage them. Finally, remaining town sidewalks should be completed concurrently with other street or curb ramp repair projects when possible to save on construction equipment mobilization costs.

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<sup>1</sup> Tree Care Industry Association, Inc. 2016.



**Minor Raised: corner edge vertical displacement of about 1 ½ inches.**



**Major Raised: vertical displacement caused by trees - arborist recommendations needed.**





**Minor Deterioration: crack(s) with no vertical or horizontal displacement observed.**



**Major Deterioration: typical example of significant concrete damage.**

Cost Summary Table

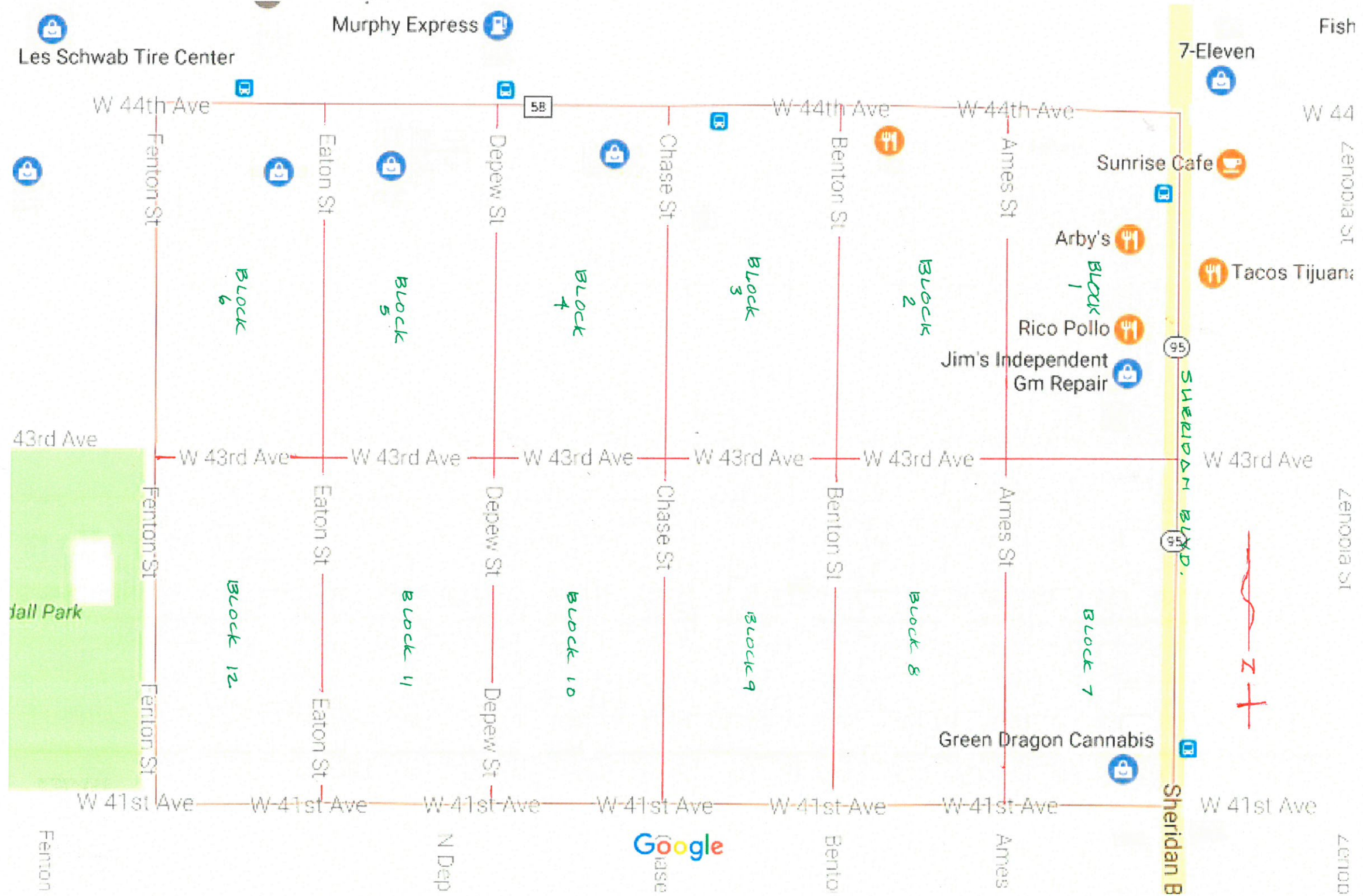
Street Name	Designated Town Block	Major Raised (> 2 inches)	Minor Raised (> 3/4" to < 2")	Major Deterioration	Minor Deterioration	Asphalt Removal	Tree Stump Removal	
Unit Repair Costs =		\$492	\$34	\$261	\$0	\$56	\$350	Total
Ames St	1	\$2,460	\$68	\$7,830	\$0	\$0	\$0	\$10,358
Sheridan Blvd	1	\$0	\$0	\$3,132	\$0	\$0	\$0	\$3,132
W 44th Ave	1	\$0	\$0	\$2,088	\$0	\$0	\$0	\$2,088
W 43rd Ave	1	\$1,968	\$0	\$4,437	\$0	\$0	\$0	\$6,405
Ames St	2	\$6,396	\$135	\$6,525	\$0	\$0	\$0	\$13,056
Benton St	2	\$492	\$203	\$7,569	\$0	\$0	\$0	\$8,264
W 44th Ave	2	\$8,856	\$0	\$4,698	\$0	\$333	\$0	\$13,887
W 43rd Ave	2	\$1,476	\$34	\$2,088	\$0	\$0	\$0	\$3,598
Benton St	3	\$1,476	\$135	\$9,135	\$0	\$0	\$0	\$10,746
Chase St	3	\$2,460	\$304	\$4,176	\$0	\$0	\$0	\$6,940
W 44th Ave	3	\$0	\$0	\$2,610	\$0	\$0	\$0	\$2,610
W 43rd Ave	3	\$0	\$101	\$2,871	\$0	\$0	\$0	\$2,972
Chase St	4	\$984	\$34	\$2,871	\$0	\$0	\$0	\$3,889
Depew St	4	\$984	\$101	\$3,132	\$0	\$0	\$0	\$4,217
W 44th Ave	4	\$0	\$0	\$0	\$0	\$0	\$0	\$0
W 43rd Ave	4	\$984	\$101	\$2,088	\$0	\$0	\$0	\$3,173
Depew St	5	\$492	\$68	\$5,742	\$0	\$0	\$0	\$6,302
Eaton St	5	\$0	\$135	\$7,569	\$0	\$0	\$0	\$7,704
W 44th Ave	5	\$0	\$0	\$1,827	\$0	\$0	\$0	\$1,827
W 43rd Ave	5	\$0	\$101	\$2,088	\$0	\$0	\$0	\$2,189
Eaton St	6	\$3,444	\$135	\$6,786	\$0	\$0	\$350	\$10,715
Fenton St	6	\$0	\$169	\$5,742	\$0	\$0	\$0	\$5,911
W 44th Ave	6	\$0	\$135	\$2,088	\$0	\$1,389	\$0	\$3,612
W 43rd Ave	6	\$2,460	\$34	\$1,827	\$0	\$0	\$0	\$4,321
Sheridan Blvd	7	\$0	\$0	\$2,610	\$0	\$0	\$0	\$2,610
Ames St	7	\$2,952	\$135	\$2,610	\$0	\$0	\$0	\$5,697
W 43rd Ave	7	\$984	\$169	\$2,349	\$0	\$0	\$0	\$3,502
W 41st Ave	7	\$492	\$0	\$2,871	\$0	\$0	\$0	\$3,363
Ames St	8	\$6,888	\$0	\$9,657	\$0	\$0	\$350	\$16,895
Benton St	8	\$3,444	\$0	\$3,654	\$0	\$0	\$0	\$7,098
W 43rd Ave	8	\$0	\$0	\$1,566	\$0	\$0	\$0	\$1,566
W 41st Ave	8	\$2,952	\$203	\$5,481	\$0	\$0	\$0	\$8,636
Benton St	9	\$6,888	\$68	\$5,742	\$0	\$0	\$350	\$13,048
Chase St	9	\$4,920	\$68	\$4,176	\$0	\$0	\$0	\$9,164
W 43rd Ave	9	\$0	\$34	\$1,305	\$0	\$0	\$0	\$1,339
W 41st Ave	9	\$0	\$0	\$4,437	\$0	\$0	\$0	\$4,437
Chase St	10	\$8,856	\$237	\$3,393	\$0	\$0	\$0	\$12,486
Depew St	10	\$3,936	\$203	\$6,003	\$0	\$0	\$0	\$10,142
W 43rd Ave	10	\$0	\$0	\$2,349	\$0	\$0	\$0	\$2,349
W 41st Ave	10	\$0	\$0	\$2,349	\$0	\$0	\$0	\$2,349
Depew St	11	\$5,412	\$68	\$7,569	\$0	\$0	\$0	\$13,049
Eaton St	11	\$984	\$34	\$6,264	\$0	\$0	\$0	\$7,282
W 43rd Ave	11	\$0	\$0	\$3,132	\$0	\$0	\$0	\$3,132
W 41st Ave	11	\$0	\$68	\$2,610	\$0	\$0	\$0	\$2,678
Eaton St	12	\$0	\$203	\$7,569	\$0	\$0	\$0	\$7,772
Fenton St	12	\$0	\$34	\$9,918	\$0	\$0	\$0	\$9,952
W 43rd Ave	12	\$0	\$101	\$3,132	\$0	\$0	\$0	\$3,233
W 41st Ave	12	\$984	\$0	\$5,481	\$0	\$0	\$0	\$6,465
Summary of Costs:		\$84,624	\$3,616	\$205,146	\$0	\$1,722	\$1,050	\$296,158

Construction Items	Unit	Unit Cost	*Each Cost
Cutting/Relocation of Roots	hour	\$120	\$240
Grinding of Sidewalk	sq yd	\$16	\$44
Pressure Grouting of Sidewalk	cu yd	\$500	\$23
Removal of Sidewalk	sq yd	\$20	\$56
Unclassified Excavation (Haul)	cu yd	\$35	\$11
Reconditioning (Subgrade)	sq yd	\$12	\$33
Aggregate Base Course (Class 6)	cu yd	\$60	\$19
Filter Material (Class C) [+Fabric]	cu yd	\$85	\$26
Concrete Sidewalk (4 Inch)	sq yd	\$50	\$139

\*Each is equal to recommended work for construction item per each 5 foot by 5 foot stone



Town Block Key Map

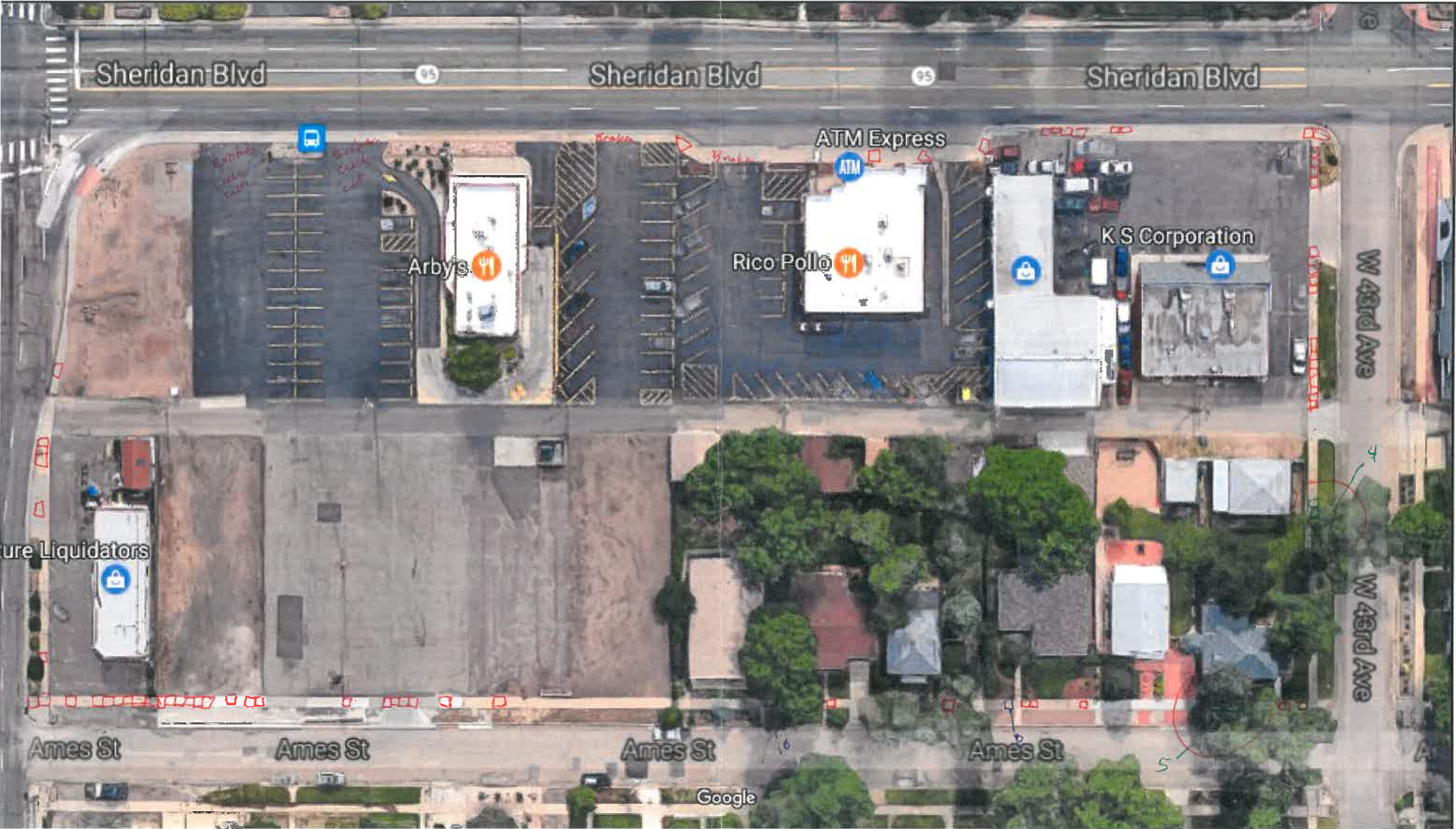




Evaluation Summary Table

Street Name	Designated Town Block	Major Raised (> 2 inches)	Minor Raised (> 3/4" to < 2")	Major Deterioration	Minor Deterioration	Asphalt Removal	Tree Stump Removal	Notes/Comments
Ames St	1	5	2	30	0	0	0	tree evaluation needed by arborist
Sheridan Blvd	1	0	0	12	0	0	0	all curb cuts in poor condition
W 44th Ave	1	0	0	8	0	0	0	
W 43rd Ave	1	4	0	17	0	0	0	tree evaluation needed by arborist
Ames St	2	13	4	25	0	0	0	tree evaluation needed by arborist
Benton St	2	1	6	29	2	0	0	
W 44th Ave	2	18	0	18	0	6	0	curb cuts in poor condition
W 43rd Ave	2	3	1	8	0	0	0	
Benton St	3	3	4	35	0	0	0	
Chase St	3	5	9	16	3	0	0	
W 44th Ave	3	0	0	10	0	0	0	
W 43rd Ave	3	0	3	11	0	0	0	
Chase St	4	2	1	11	0	0	0	
Depew St	4	2	3	12	0	0	0	
W 44th Ave	4	0	0	0	0	0	0	curb cuts in poor condition
W 43rd Ave	4	2	3	8	0	0	0	
Depew St	5	1	2	22	0	0	0	
Eaton St	5	0	4	29	0	0	0	curb cut in poor condition
W 44th Ave	5	0	0	7	0	0	0	
W 43rd Ave	5	0	3	8	0	0	0	
Eaton St	6	7	4	26	6	0	1	tree evaluation needed by arborist
Fenton St	6	0	5	22	0	0	0	
W 44th Ave	6	0	4	8	0	25	0	all curb cuts in poor condition
W 43rd Ave	6	5	1	7	0	0	0	tree evaluation needed by arborist
Sheridan Blvd	7	0	0	10	1	0	0	
Ames St	7	6	4	10	1	0	0	
W 43rd Ave	7	2	5	9	0	0	0	
W 41st Ave	7	1	0	11	0	0	0	
Ames St	8	14	0	37	5	0	1	tree evaluation needed by arborist
Benton St	8	7	0	14	0	0	0	tree evaluation needed by arborist
W 43rd Ave	8	0	0	6	1	0	0	
W 41st Ave	8	6	6	21	3	0	0	
Benton St	9	14	2	22	0	0	1	tree evaluation needed by arborist
Chase St	9	10	2	16	0	0	0	tree evaluation needed by arborist
W 43rd Ave	9	0	1	5	0	0	0	
W 41st Ave	9	0	0	17	0	0	0	
Chase St	10	18	7	13	0	0	0	tree evaluation needed by arborist
Depew St	10	8	6	23	0	0	0	tree evaluation needed by arborist
W 43rd Ave	10	0	0	9	0	0	0	
W 41st Ave	10	0	0	9	0	0	0	
Depew St	11	11	2	29	0	0	0	tree evaluation needed by arborist
Eaton St	11	2	1	24	2	0	0	tree evaluation needed by arborist
W 43rd Ave	11	0	0	12	0	0	0	
W 41st Ave	11	0	2	10	0	0	0	
Eaton St	12	0	6	29	0	0	0	
Fenton St	12	0	1	38	0	0	0	
W 43rd Ave	12	0	3	12	0	0	0	
W 41st Ave	12	2	0	21	0	0	0	tree evaluation needed by arborist
Summary of Damage:		172	107	786	24	31	3	

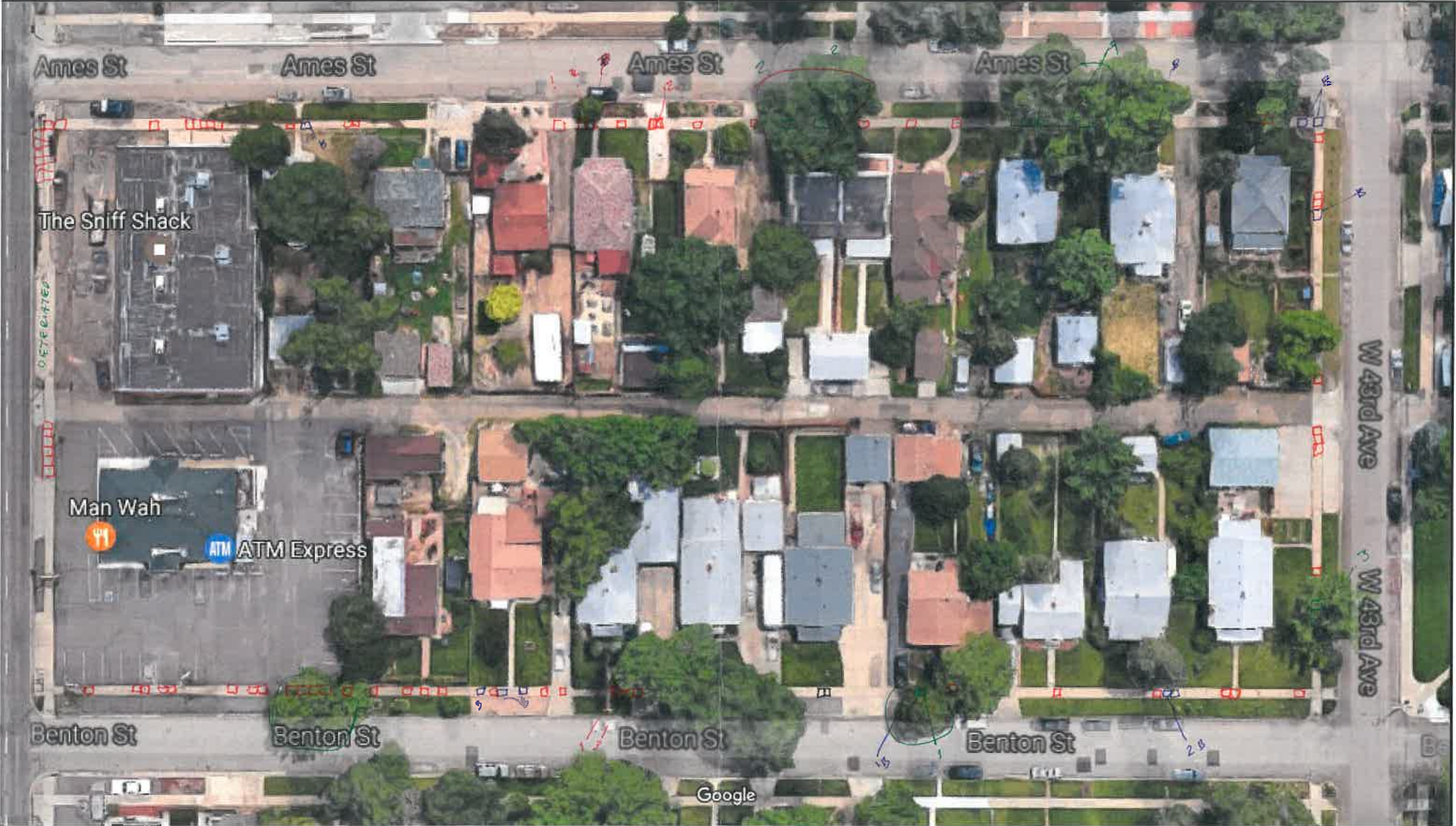




SEE CURB CUTS - ALL IN BAD SHAPE  
ON SHERIDAN

MAJOR	RAISED	-9
MINOR	RAISED	-2
MAJOR	DETERIORATION	-67
MINOR	DETERIORATION	-0





DETERIORATING CURB WT ON 44TH ST.

MAJOR	RAISED	- 17
MINOR	RAISED	- 10
MAJOR	DETERIORATED	- 80
MINOR	DETERIORATION	- 2

DLK2





MAJOR	RAISED	- 8
MINOR	RAISED	- 16
MAJOR	DETERIORATED	- 72
MINOR	DETERIORATED	- 3

BLUE 3





CURB CUTS ON 44th IN BAD SHAPE

MAJOR	RAISED	- 6
MINOR	RAISED	- 7
MAJOR	DETERIORATION	- 30
MINOR	DETERIORATION	- 5

BLK 4



TREES  
BLACK - stump  
RED - HARD - NEEDS A PLAN / NOT 100% TREES  
GREEN - EASY / SAME TREE



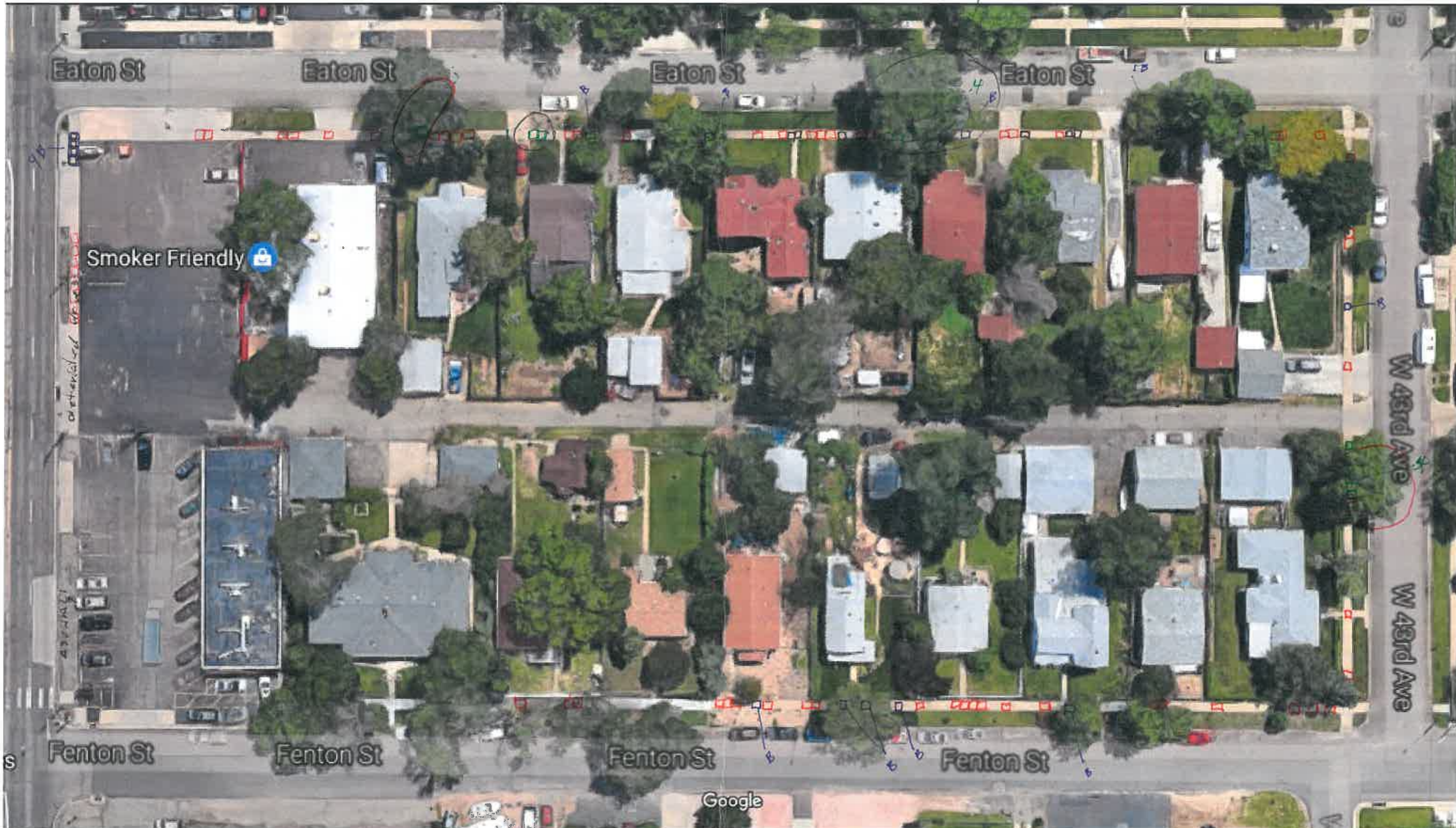
SEE CURB CUT ON EATON - IN BAD SHAPE

MAJOR	RAISED	- 1
MINOR	RAISED	- 9
MAJOR	DETERIORATION	- 66
MINOR	DETERIORATION	- 0

BCK S



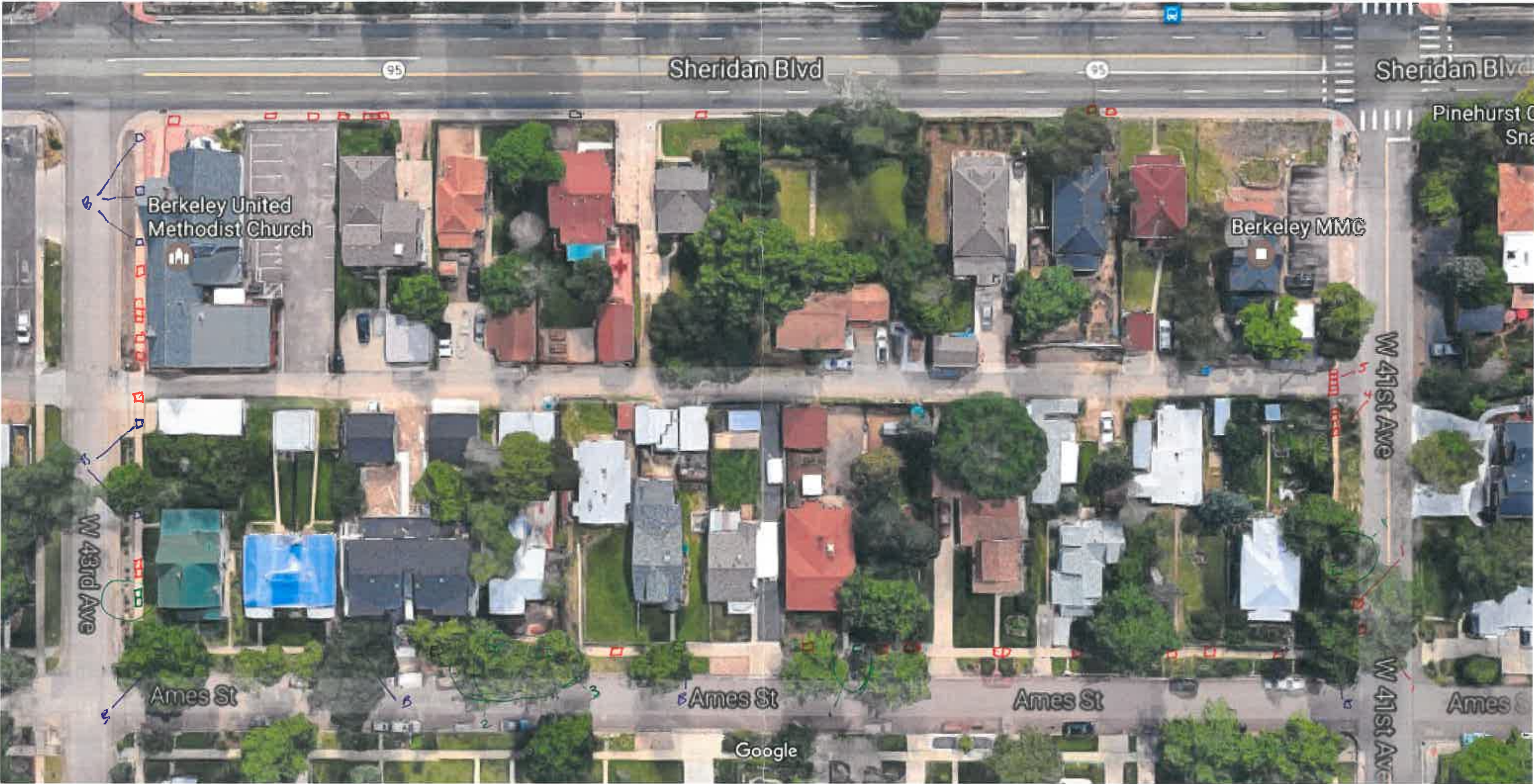
Being taken out?



SEE CURB CUTS ON 44th - all in bad shape

MAJOR	RAISED	- 12
MINOR	RAISED	- 14
MAJOR	DETERIORATION	- 63
MINOR	DETERIORATION	- 6





Imagery ©2016 Google, Map data ©2016 Google 50 ft

EACH □ = to 1 stone (x 5' STONE)

MAJOR	RAISED	- 9
MINOR	RAISED	- 9
MAJOR	DETERIORATION	- 40
MINOR	DETERIORATION	- 2

BLK 7



Google Maps

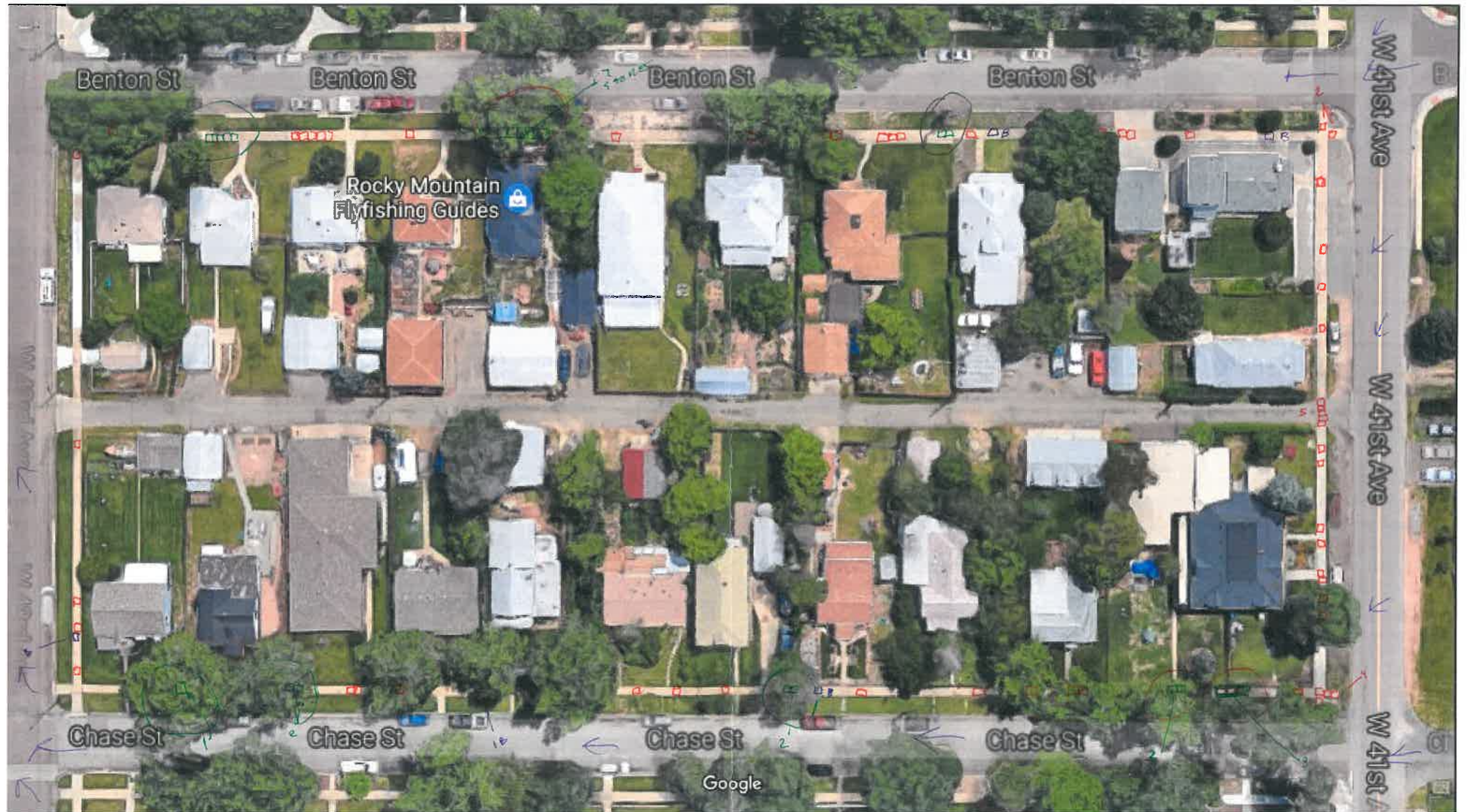


MAJOR	RAISED	-27
MINOR	RAISED	-6
MAJOR	DETERIORATION	-25
MINOR	DETERIORATION	-9

Imagery ©2016 Google, Map data ©2016 Google 50 ft

BLK 8



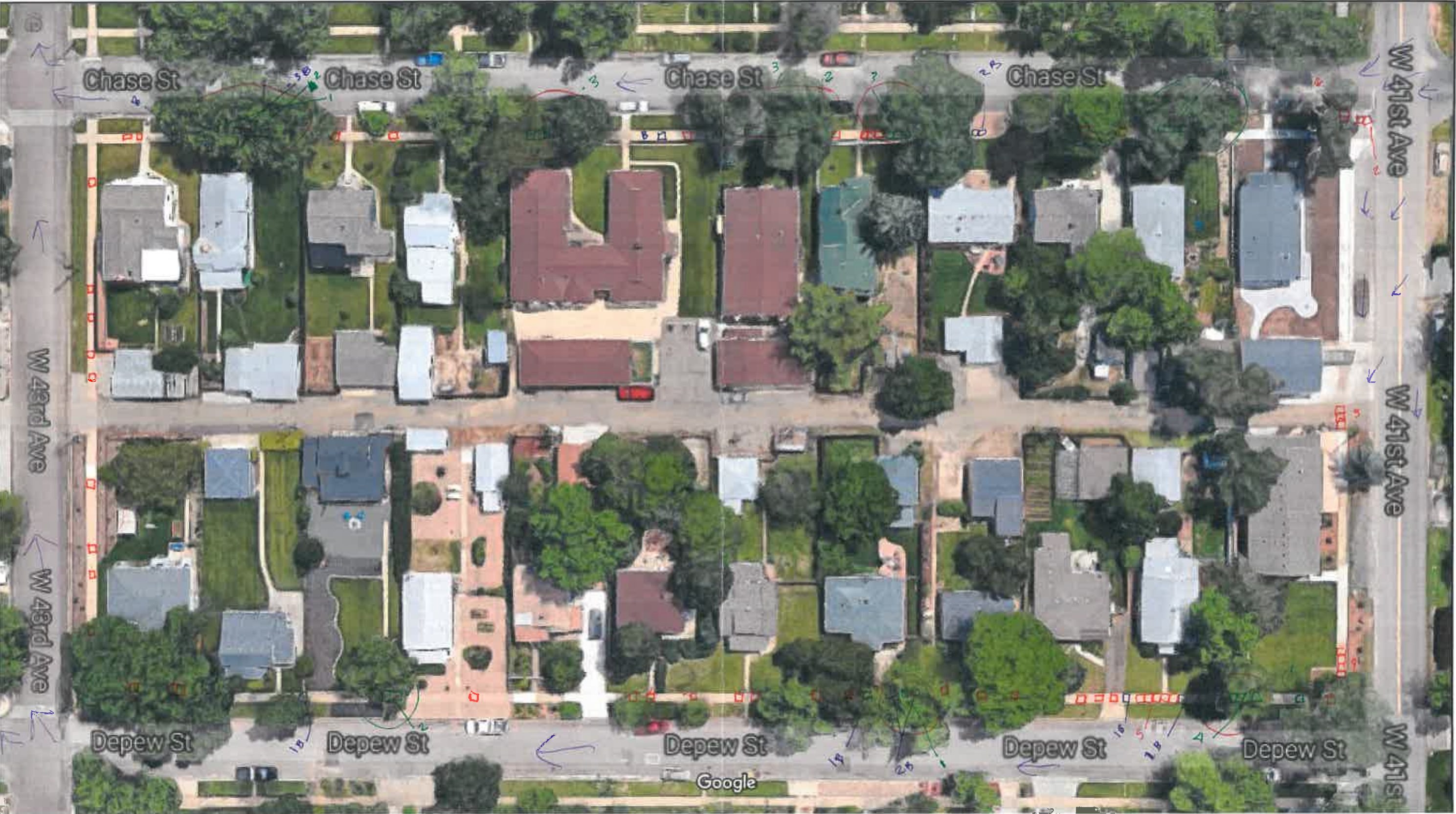


MAJOR	RAISED	-25
MINOR	RAISED	-5
MAJOR	DETERIORATION	-60
MINOR	DETERIORATION	-10

Imagery ©2016 Google, Map data ©2016 Google 50 ft

BLK 9

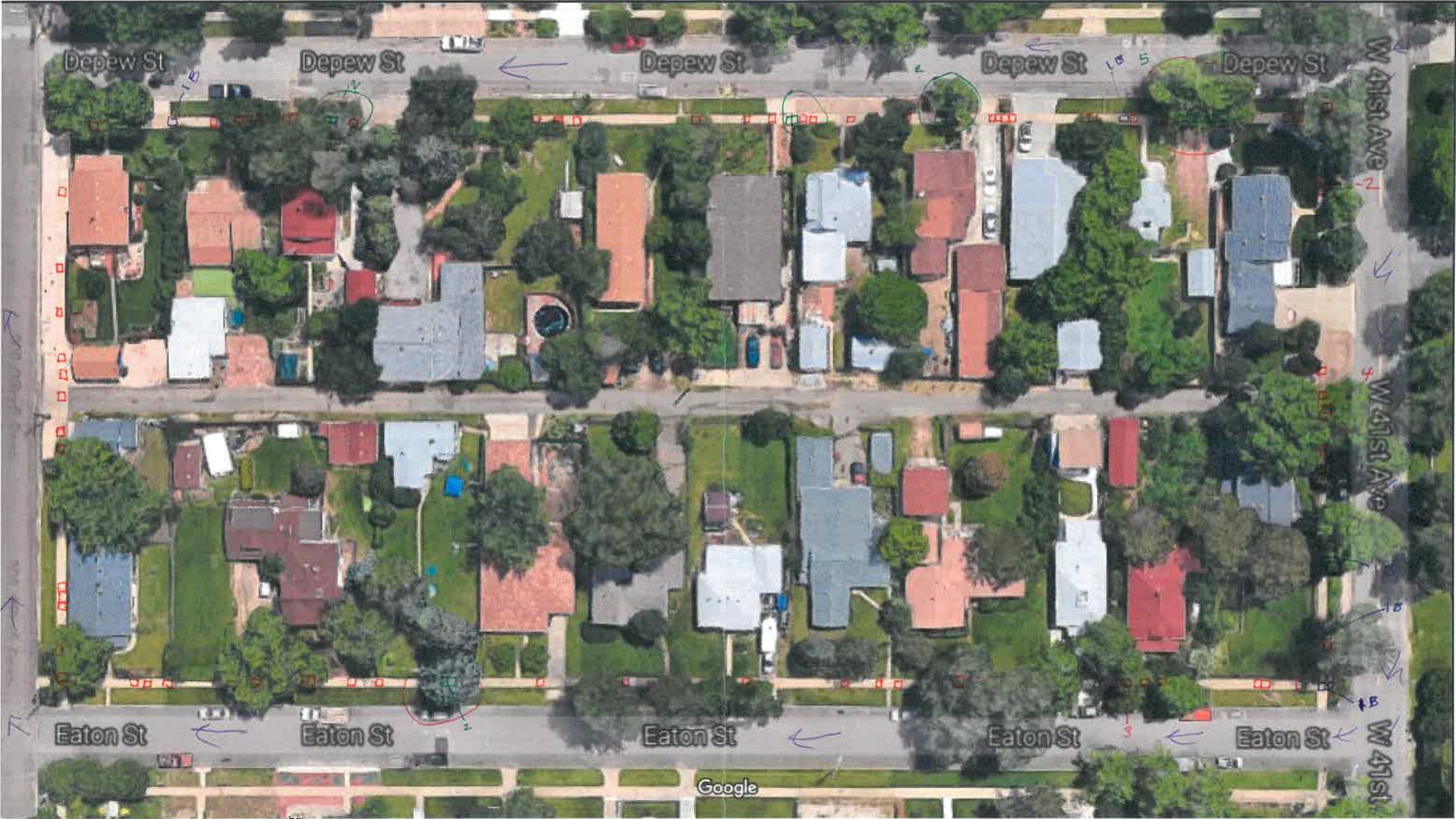




MAJOR	RAISED	- 26
MINOR	RAISED	- 13
MAJOR	DETERIORATION	- 54
MINOR	DETERIORATION	- 0

BLK 10  
1

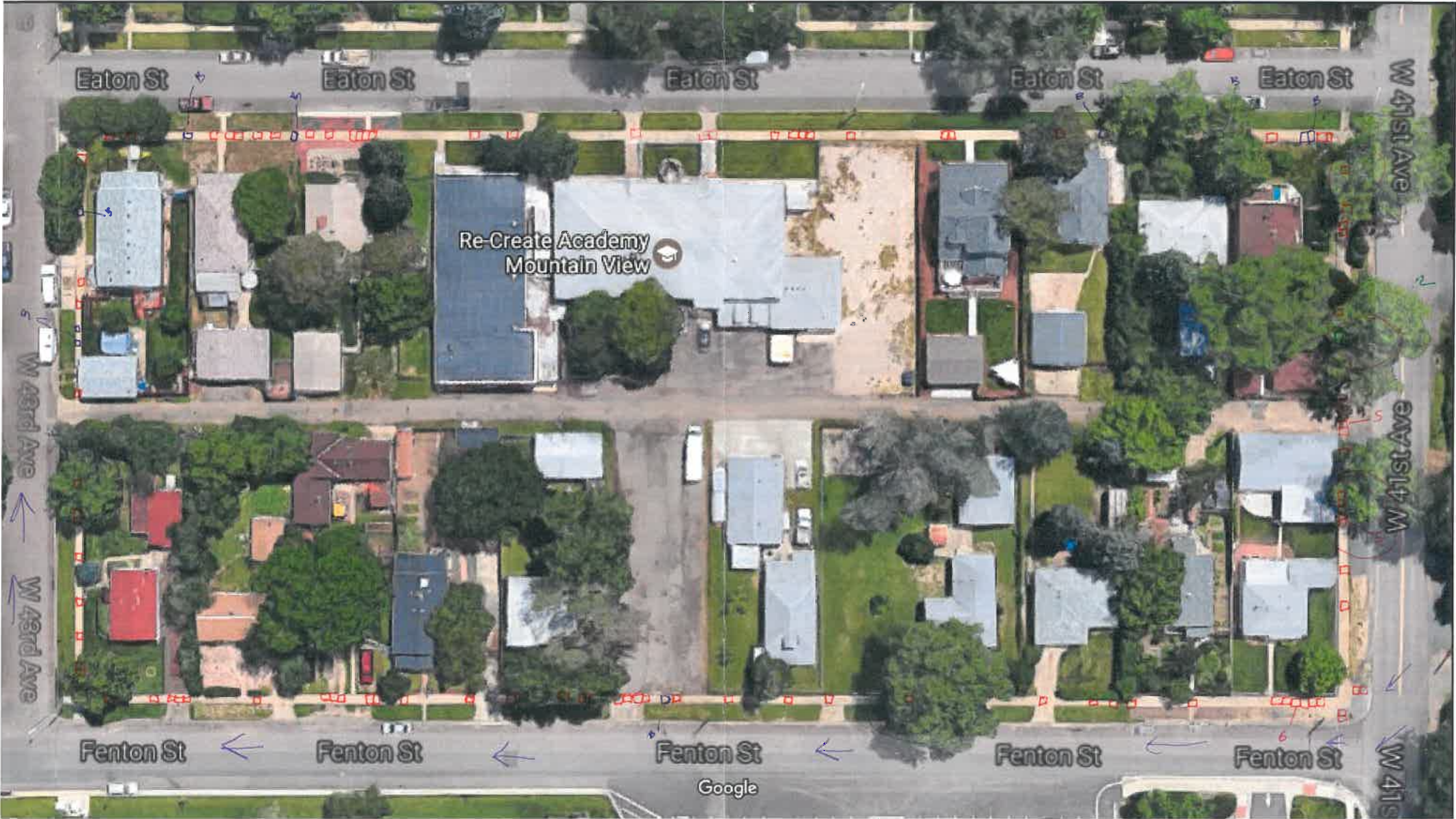




MAJOR RAISED -13  
MINOR RAISED -6  
MAJOR DETERIORATION -75  
MINOR DETERIORATION -2

Bck 11





MAJOR RAISED - 2  
MINOR RAISED - 10  
MAJOR DETERIORATION - 100  
MINOR DETERIORATION - 1