**DRAFT TECHNICAL MEMORANDUM**

**City of Alexandria Storm Sewer Capacity Analysis**

**Task 3.1 – Pilot Study Area**

**Field Verification – Survey and Inspection**

**PREPARED FOR:** CH2M HILL

**PREPARED BY:** Baker

**DATE:** May 25, 2010

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## 1.0 Background

CH2MHILL completed a technical memorandum "Task 3.1 – Field Priority Summarization, December 14, 2009" outlining the process and criteria for facilities to conduct the field survey and inspection. Following further discussion with the City staff, CH2MHILL identified 91 primary structures to be surveyed and forwarded the information to Baker to coordinate the field survey work. The list included 66 manholes, 17 inlets, 4 culverts, 3 nodes and 1 IO. Utilizing the City's GIS information, Baker extracted the attributes associated with each facility identified, to include, XY Coordinates, height, and depth. In addition, Baker assigned addresses to the 91 structures by designating the closest address

point to the facility. The list of the 91 primary structures and associated GIS based information is included in Appendix A and shown on Figure A.

To assist the City in securing the Right of Way (ROW) Permits, required for field personnel to complete their work, Baker provided the City with a ROW submittal package that included; permit applications, a list of the primary structures and addresses, work area maps, and Maintenance of Traffic (MOT) Plans. The City staff secured permits number TES2010-00149 and TES2010-00150 for VPS and RDA, respectively, under which all field work was conducted. A Field Work Plan was developed to outlined standard operating procedures and communications for the field operation and distributed to the project team members (included in Appendix B)

## 2.0 Field Work Summary

RDA was tasked to collect the X, Y, and Z coordinates of the 91 structures. The Z coordinate is the top elevation for the structures, e.g. rim elevation for a manhole. Appendix C shows a summary of data collected by RDA.

VPS was tasked to measure the depth of the structures, including depth to bench if any, inverts of pipes connecting to the structure. In addition, VPS was tasked to conduct preliminary condition assessment ratings using SCREAM database and including internal unconfined manhole inspection and line lamping of the facilities. Field data collected by VPS is included in Appendix D.

## 3.0 Field Data vs. GIS Data Comparison

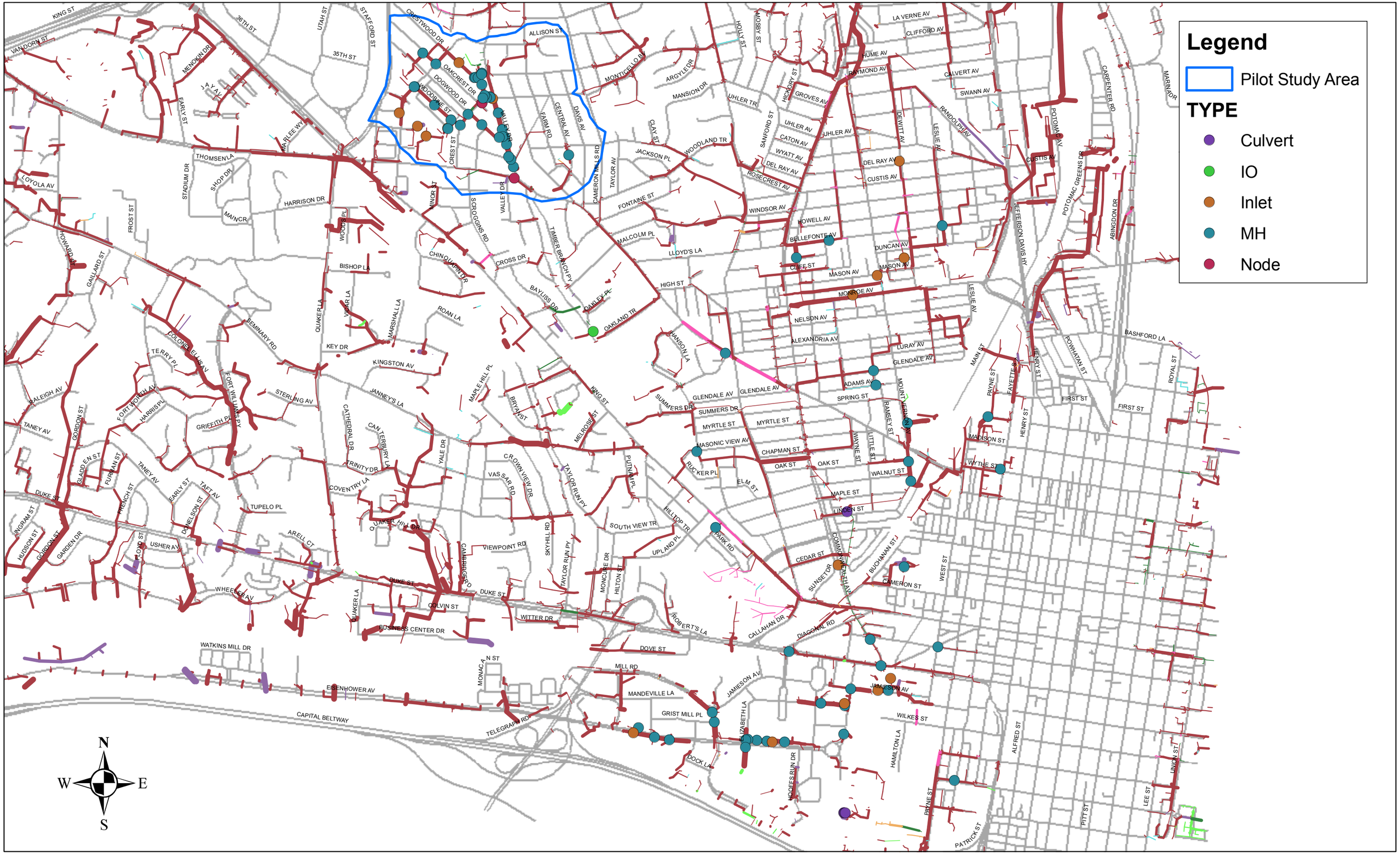
The City of Alexandria's GIS geodatabase of the storm sewer system contains depth information in two separate classes of layers;

- Point feature layers which includes features such as manholes, nodes, inlets…etc
- Line feature layer which includes features such as gravity mains and culverts

The GIS attributes contained within the point feature layers were compared against the same attributes field collected data by computing the following parameters for each structure;

- ***Structure Location:*** *Horizontal difference, in feet, between the location of a structure in GIS and its surveyed location*
- ***Rim Elevation:*** *Vertical difference, in feet, between rim elevation in GIS and its surveyed rim elevation*
- ***Structure's Depth:*** *Vertical difference, in feet, between the structure's depth in GIS and its surveyed depth*
- ***Invert Elevation:*** *Vertical difference, in feet, between the calculated invert in GIS and the calculated invert from the survey data.*

# FIGURE A


Legend
Pilot Study Area
TYPE
Culvert
IO
Inlet
MH
Node
N
S
E
W
KING ST
VANDORN ST
36TH ST
35TH ST
UTAH ST
STAFFORD ST
MENOKIN DR
JAYAY
EARLY ST
MARLEE WY
THOMSEN LA
STADIUM DR
SHOP DR
LOYOLA AV
FROST ST
HARRISON DR
MAINCR
HOWARD ST
GAILLARD ST
WOODS PL
BISHOP LA
QUAKER LA
VICAR LA
MARSHALL LA
SEMINARY RD
KEY DR
KINGSTON AV
COLONEL ELLIS AV
TERRY PL
FORT WILLIAMSBY
HARRIS PL
GRIFFITH PL
STERLING AV
JANNEY'S LA
CATHEDRAL DR
CANTERBURY LA
TRINITY DR
COVENTRY LA
TUPELO PL
ARELL CT
USHER AV
WHEELER AV
DUKE ST
COLVIN ST
BUSINESS CENTER DR
WITTER DR
WATKINS MILL DR
EISENHOWER AV
CAPITAL BELTWAY
TELEGRAPH RD
MONACAN ST
RALEIGH AV
TANEY AV
GORDON ST
GLADDEN ST
FURMAN ST
FRENCH ST
DOMELSON ST
FLOYD ST
INGRAM ST
HUDSON ST
GARDEN DR
CREST ST
CRESTWOOD DR
OAKCREST DR
DOGWOOD DR
WOODBINE ST
VALLEY DR
ALLISON ST
FARM RD
CENTRAL AV
DAVIS AV
CAMERON HILLS RD
TAYLOR AV
MONTICELLO BV
ARGYLE DR
MANSION DR
CLAY ST
JACKSON PL
WOODLAND TR
FONTAINE ST
MALCOLM PL
LLOYD'S LA
CROGGINS RD
CHINQUAPIN DR
CROSS DR
TIMBER BRANCH PY
BAYLISS DR
OAKLEY PL
OAKLAND TR
ROAN LA
HIGH ST
HANSON LA
KING ST
MELROSE ST
BRYANT ST
MAPLE HILL PL
YALE DR
VASSAR RD
CROWN VIEW DR
TAYLOR RUN PY
PUTNAM PL
SKYHILL RD
VIEWPOINT RD
CAMBRIDGE RD
MONCURE DR
HILTON ST
SOUTH VIEW TR
UPLAND PL
HILLTOP TR
PARK RD
ROBERT'S LA
CALLAHAN DR
DIAGONAL RD
DOVE ST
MILL RD
MANDEVILLE LA
GRIST MILL PL
DOCK LA
HOOFERS RUN DR
ELIZABETH LA
JAMIESON AV
HOLLY ST
MOSBY ST
HICKORY ST
SANFORD ST
UHLER TR
UHLER AV
GROVES AV
CATON AV
WYATT AV
DEL RAY AV
ROSECREST AV
WINDSOR AV
HOWELL AV
BELLEFONTE AV
CLIFF ST
MASON AV
MONROE AV
NELSON AV
ALEXANDRIA AV
GLENDALE AV
SUMMERS DR
MYRTLE ST
MASONIC VIEW AV
CHAPMAN ST
OAK ST
RUCKER PL
ELM ST
MAPLE ST
LINDEN ST
CEDAR ST
SUNSET DR
COMMONWEALTH AV
BUCHANAN ST
CAMERON ST
WEST ST
WILKES ST
HAMILTON LA
PAYNE ST
PATRICK ST
ALFRED ST
PITT ST
LEE ST
UNION ST
LA VERNE AV
CLIFFORD AV
HUME AV
RAYMOND AV
CALVERT AV
SWANN AV
DEWITT AV
LESLIE AV
RANDOLPH AV
CUSTIS AV
DUNCAN AV
JEFFERSON DAVIS HY
POTOMAC AV
POTOMAC GREENS DR
CARPENTER RD
ABINGDON DR
MARINADR
BASHFORD LA
POWHATAN ST
ROYAL ST
FIRST ST
MAIN ST
FAYETTE ST
HENRY ST
JERRY ST
MADISON ST
WYTHE ST
WAYNE ST
LITTLE ST
RAMSEY ST
MOUNT VERNON AV
SPRING ST

In addition, Baker conducted a comparison between the attributes contained within the GIS line feature layer and the field surveyed data relative to the parameter structure's depth.

It is to be noted that a total of twelve structures were excluded from the comparative evaluation described above, as follows;

- Three Nodes (000741ND, 000697ND, 000679ND) that were not located in the field
- Four culvert structures (000132CP, 000090CP, 000089CP, 0000088CP) that are analyzed and presented separately
- Five manholes
    - 002563SMH was buried
    - 001653SMH was measured incorrectly
    - 002564SMH, 002612SMH, and 002427SMH were not measured by VPS

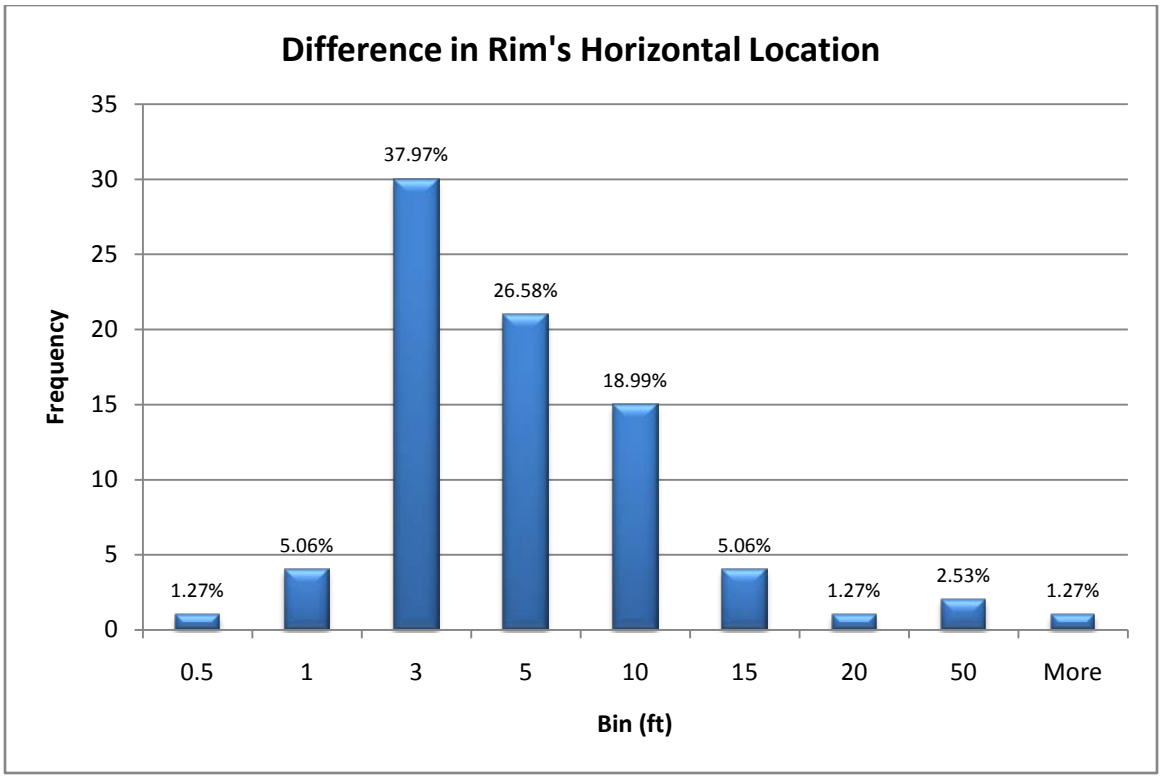
The tables including the comparison of the field data to the GIS point feature layer and line feature layer are included in Appendix E.

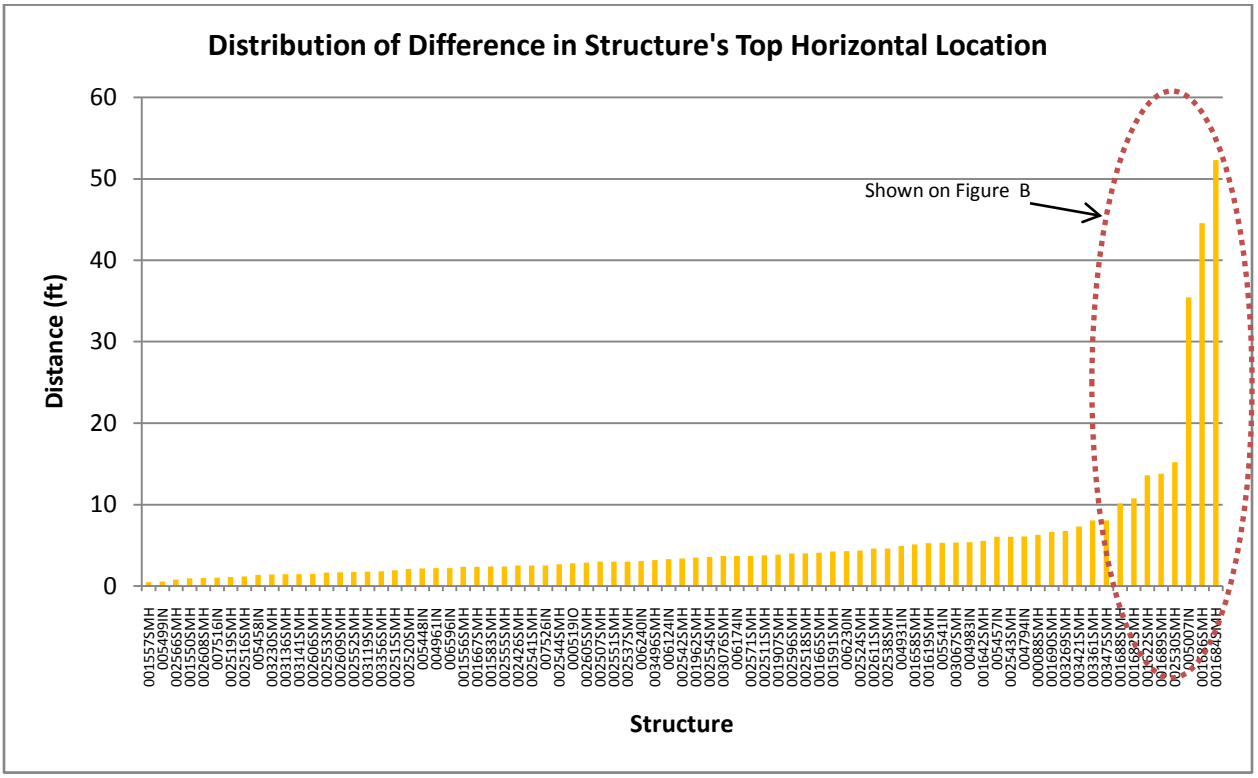
### *3.1* ***Field Data vs. GIS Point Feature Layer Comparison***

*3.1.1* ***Structure Location:*** The horizontal distance, in feet, between the location of a structure, as computed from GIS, is subtracted from its location as computed from the field data.

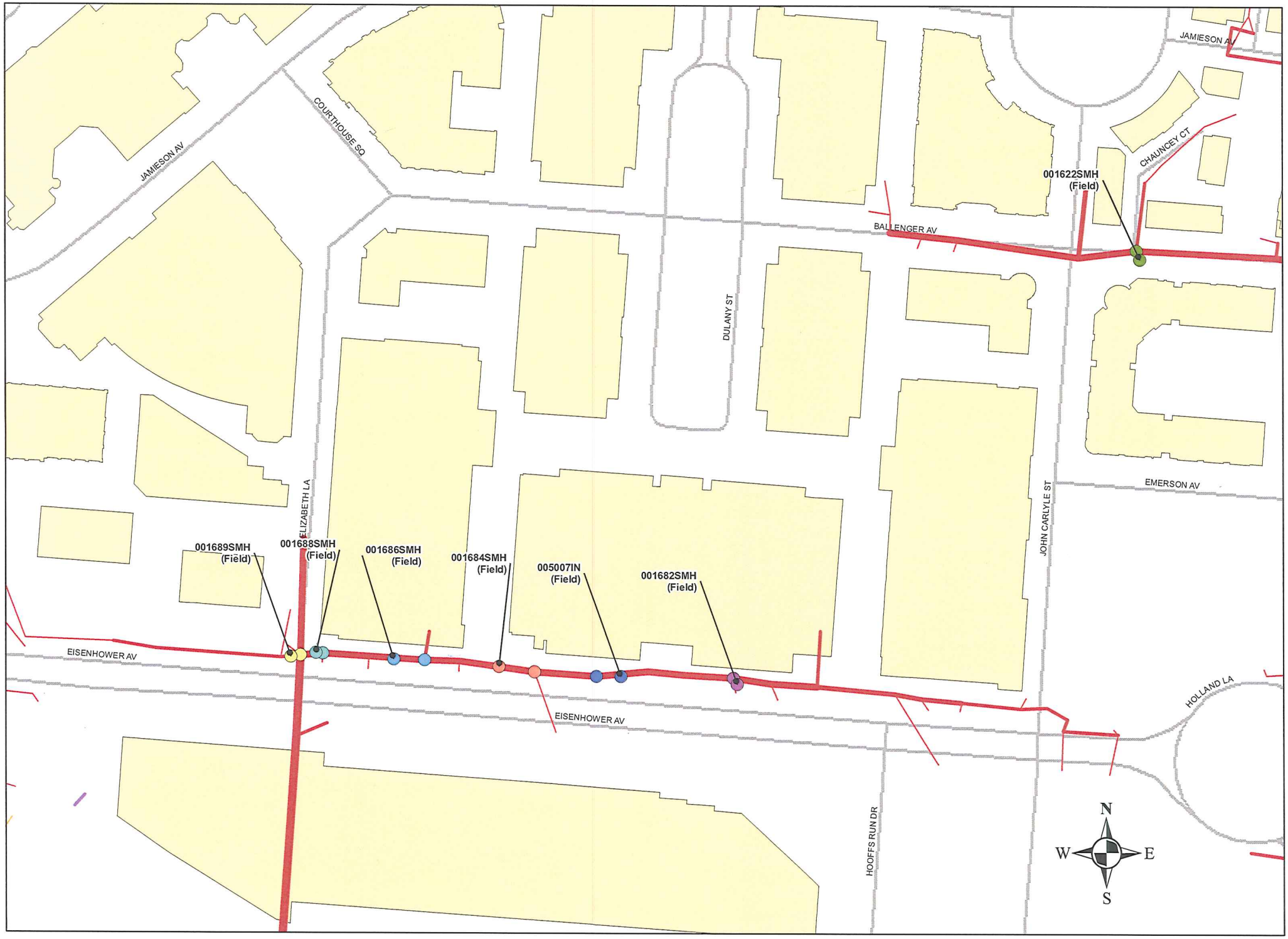
| ***Statistics*** | Mean | Median | SD | Minimum | Maximum | Count |
|---|---|---|---|---|---|---|
| | 5.50 | 3.39 | 8.37 | 0.48 | 52.32 | 79 |

| ***Bin*** | ***Frequency*** | ***%*** |
|---|---|---|
| 0.5 | 1 | 1.3% |
| 1 | 4 | 5.1% |
| 3 | 30 | 38.0% |
| 5 | 21 | 26.6% |
| 10 | 15 | 19.0% |
| 15 | 4 | 5.1% |
| 20 | 1 | 1.4% |
| 50 | 2 | 2.5% |
| More | 1 | 1.3% |


Difference in Rim's Horizontal Location
Frequency
35
30
25
20
15
10
5
0
1.27%
5.06%
37.97%
26.58%
18.99%
5.06%
1.27%
2.53%
1.27%
0.5
1
3
5
10
15
20
50
More
Bin (ft)


Distribution of Difference in Structure's Top Horizontal Location
Distance (ft)
60
50
40
30
20
10
0
Shown on Figure B
Structure

# FIGURE B

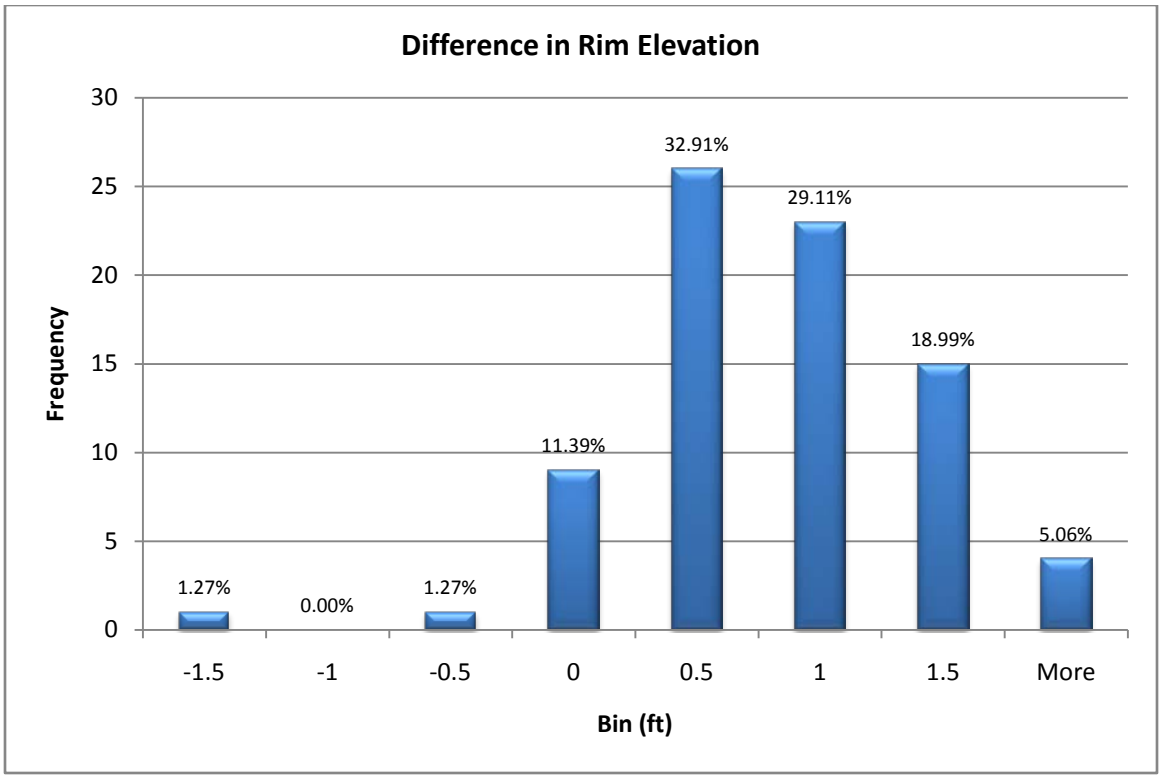

JAMIESON AV
COURTHOUSE SQ
JAMIESON AV
CHAUNCEY CT
001622SMH
(Field)
BALLENGER AV
DULANY ST
EMERSON AV
JOHN CARLYLE ST
ELIZABETH LA
001689SMH
(Field)
001688SMH
(Field)
001686SMH
(Field)
001684SMH
(Field)
005007IN
(Field)
001682SMH
(Field)
EISENHOWER AV
EISENHOWER AV
HOLLAND LA
HOOFFS RUN DR
N
W
E
S

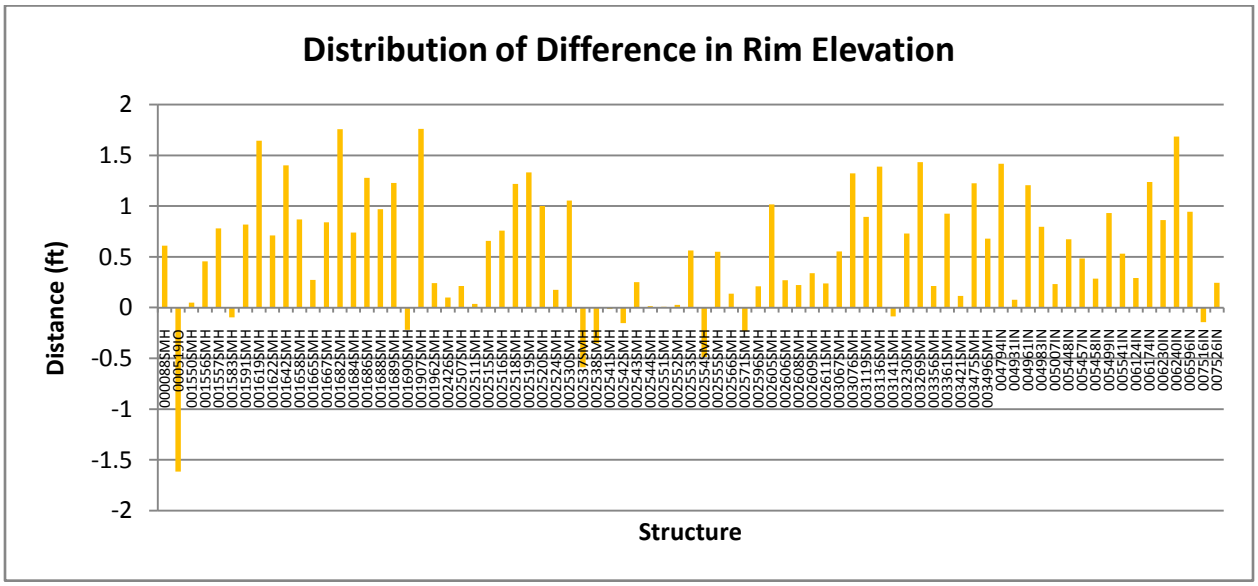
The field collected data matched reasonablly well with the GIS data. As can be seen from the graphs, approximatley 70% of the of the field data fell within a 5-ft radius of the GIS point layer data. The facilities that fell outside a 20-ft radius (3.8%) are all along adjacent to tall builiding that might have impacted the accuracy of the GIS information.

*3.1.2* ***Rim Elevation:*** The vertical difference, in feet, between the elevation of a structure as computed from field data is subtracted from its elevation as computed from GIS data.

| ***Statistics*** | Mean | Median | SD | Minimum | Maximum | Count |
|---|---|---|---|---|---|---|
| | 0.56 | 0.55 | 0.61 | -1.62 | 1.76 | 79 |

| ***Bin*** | ***Frequency*** | ***%*** |
|---|---|---|
| -1.5 | 1 | 1.3% |
| -1 | 0 | 0.0% |
| -0.5 | 1 | 1.3% |
| 0 | 9 | 11.4% |
| 0.5 | 26 | 32.9% |
| 1 | 23 | 29.1% |
| 1.5 | 15 | 19.0% |
| More | 4 | 5.1% |



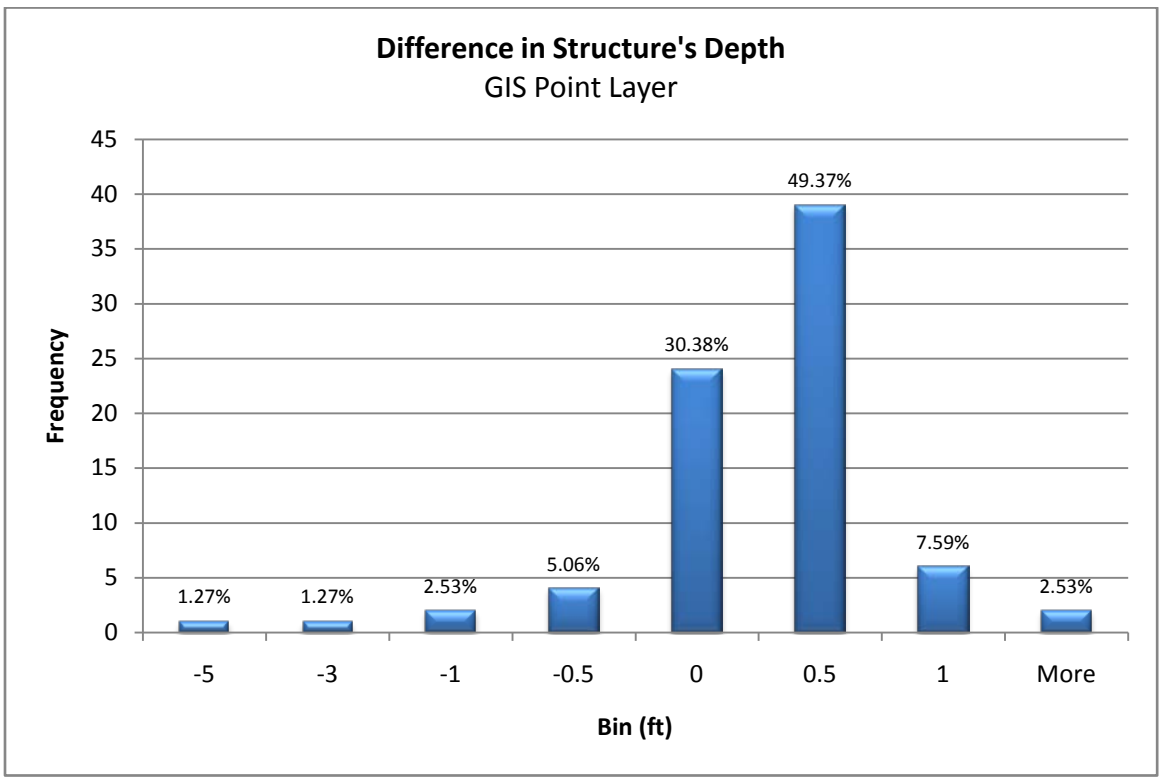

Approximately 53% of the structures are showing more than 0.5 ft differnce in rim elevation. Couple of factors may have contributed to the variations exhibited in the statistcs of this analysis. Rim elevations in the City's GIS point layers were extrapolated from the City's 2-ft contour digital elvation model topographic GIS data, and not from field surveyed rim elevations. The facility 000519IO is showing more than 1.5-ft difference in rim elevation and the inlet strucutres are generally showing a difference of more than 0.5 ft.

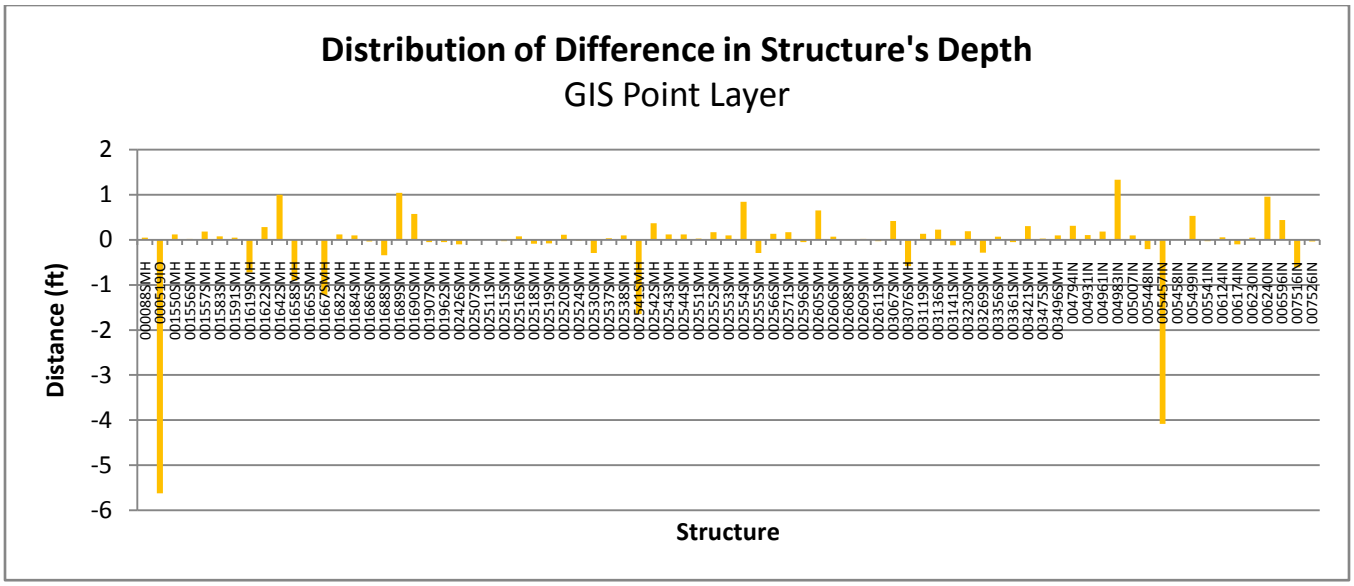
As explained later, these differences in rim elevations translate to differences in node and pipe invert eleavations which are measured relative to the manhole rim.

*3.1.3* ***Structure's Depth:*** The difference, in feet, between the depth of a structure (rim minus invert elevations) as computed from the field data (VPS) is subtracted from its depth as computed from the GIS data.

| **Statistics** | Mean | Median | SD | Minimum | Maximum | Count |
|---|---|---|---|---|---|---|
| | -0.07 | 0.05 | 0.89 | -5.63 | 1.33 | 79 |

| *Bin* | *Frequency* | *%* |
|---|---|---|
| -5 | 1 | 1.3% |
| -3 | 1 | 1.3% |
| -1 | 2 | 2.5% |
| -0.5 | 4 | 5.1% |
| 0 | 24 | 30.4% |
| 0.5 | 39 | 49.4% |
| 1 | 6 | 7.6% |
| More | 2 | 2.5% |



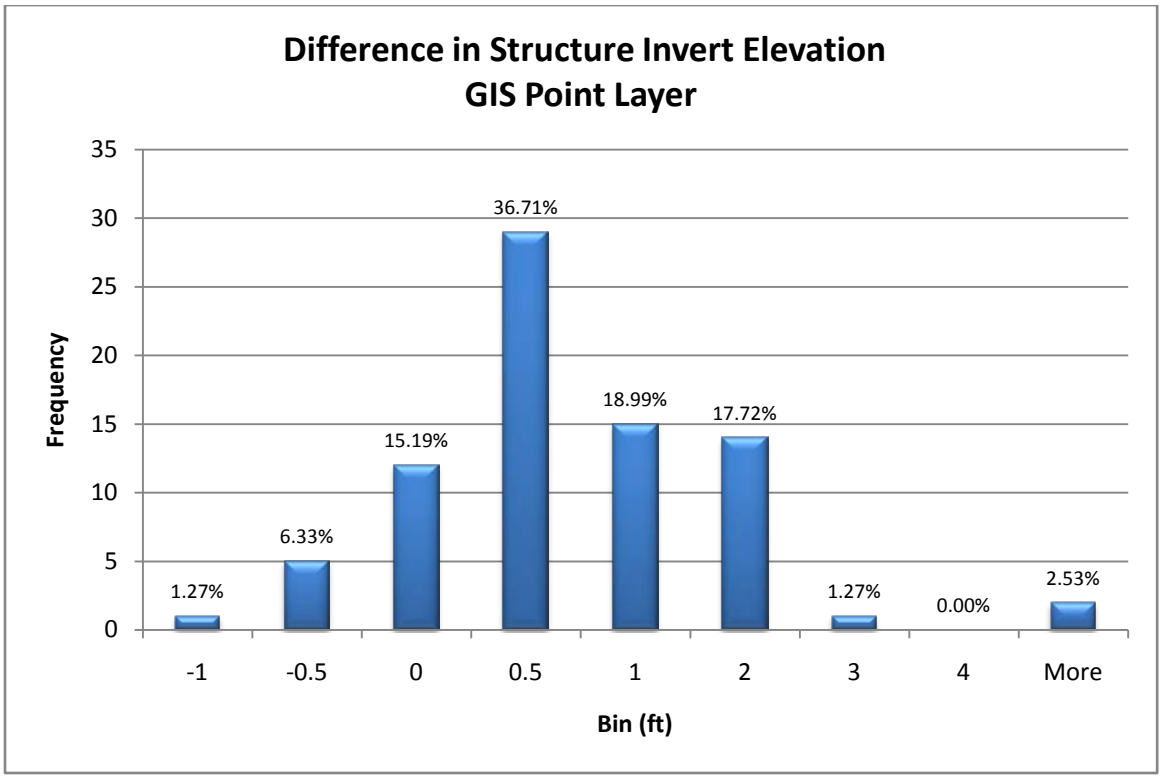


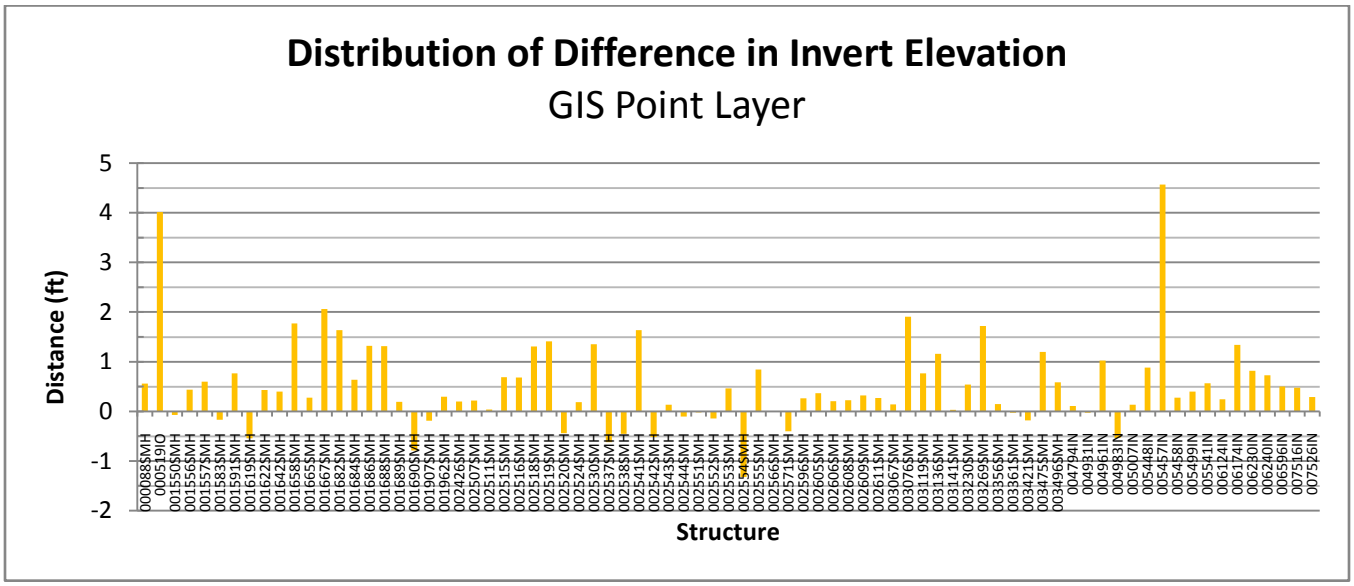

The structure depth comparison is showing reasonablly good match between the GIS data and the field collected data. Approximately 89% of the structures are showing a difference of less than 0.5 ft. Only 000519IO and the inlet 0054557IN are showing a difference of more than 4 ft.

*3.1.4* ***Invert Elevation:*** The invert of a structure was calculated by subtracting the depth from the structure's top elevation. The difference, in feet, between the calculated invert of a structure as computed from the field data is subtracted from its calculated invert as computed from the GIS data.

| ***Statistics*** | Mean | Median | Standard Deviation | Minimum | Maximum | Count |
|---|---|---|---|---|---|---|
| | 0.52 | 0.32 | 0.90 | -1.33 | 4.57 | 79 |

| *Bin* | *Frequency* | *%* |
|---|---|---|
| -1 | 1 | 1.3% |
| -0.5 | 5 | 6.3% |
| 0 | 12 | 15.2% |
| 0.5 | 29 | 36.7% |
| 1 | 15 | 19.0% |
| 2 | 14 | 17.7% |
| 3 | 1 | 1.3% |
| 4 | 0 | 0.0% |
| More | 2 | 2.5% |



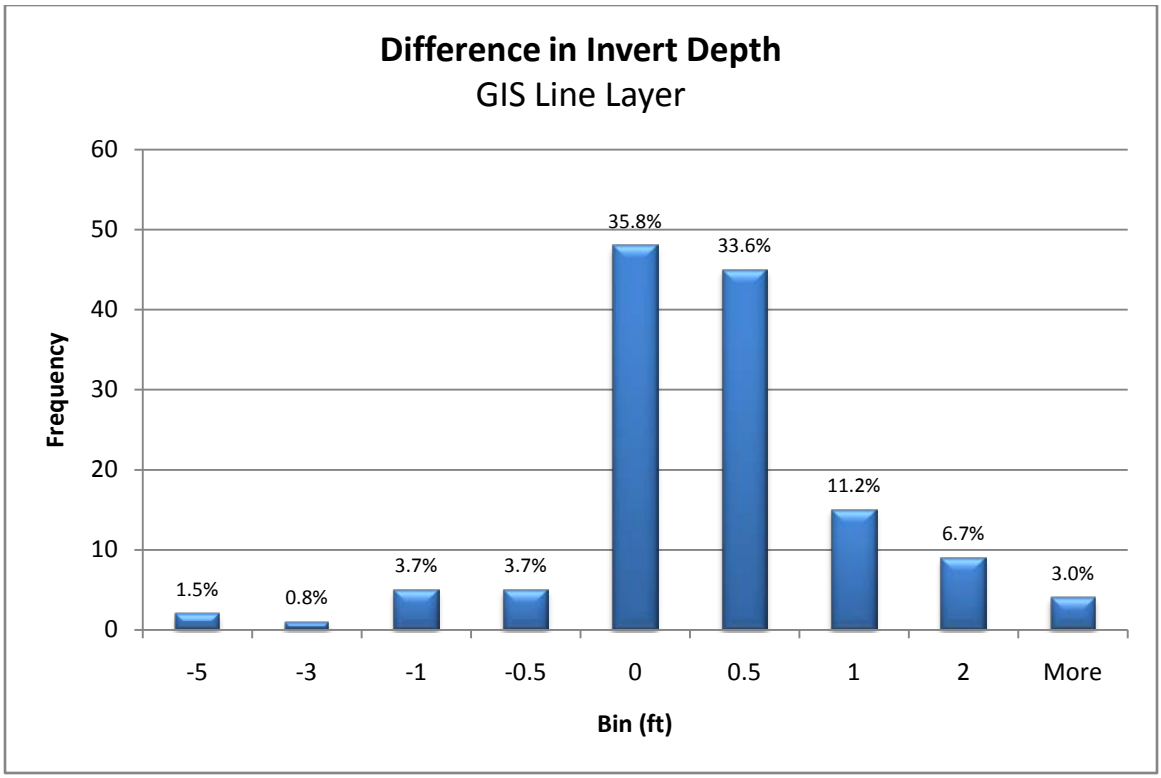

Approximately 41% of the structures are showing a difference in invert elevation of more than 0.5 ft. The inclusion of the rim elevations in calculating the structures inverts can be attributed to increasing the variation in the differences in invert elevation results. Another contributing factor is the fact that the depth information contained in the GIS point layer may not necessarily correspond to the invert of the incoming/outgoing pipes as in the field collected data.

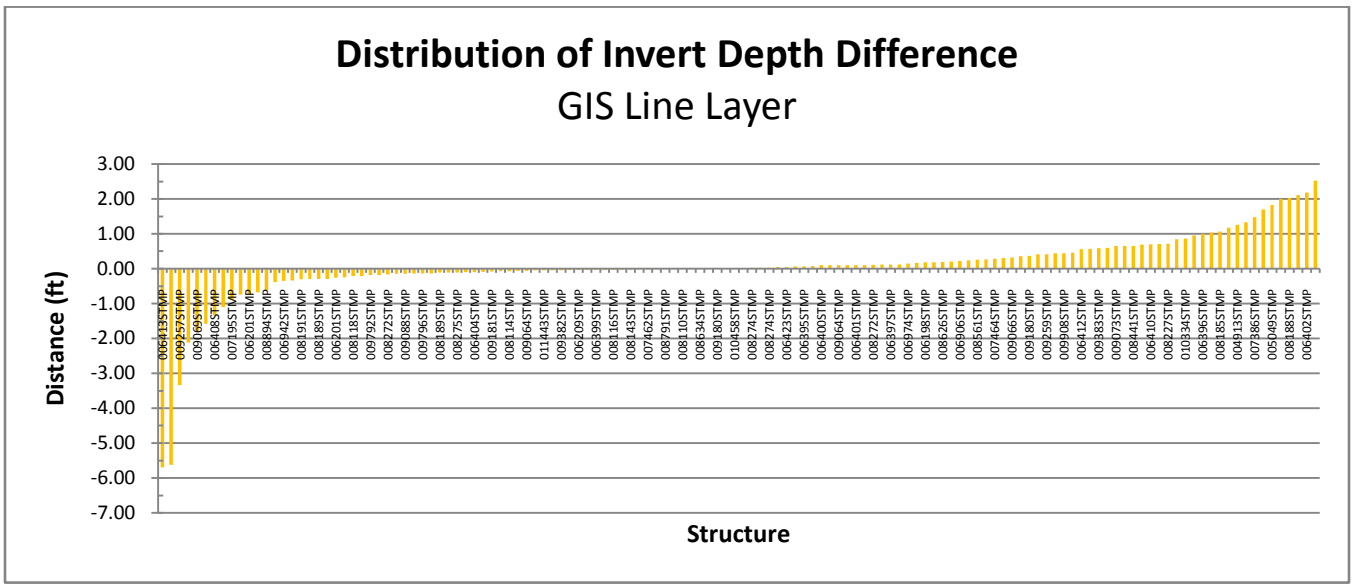
### *3.2* ***Field Data vs. GIS Line Feature Layer Comparison***

The City's GIS line feature layer does not provide Facilities IDs of the u/s or d/s structures to which the pipelines are connecting. To compare invert depth, Baker completed a spatial analysis to link manholes and inlet structures to their associated connecting pipelines. From the 232 pipe invert measurements completed by VPS in the field, 139 pipes were successfully matched and compared with the GIS information. Five pipes of the 139 pipes, did not contain invert depth information in GIS, and therefore, deleted from this analysis. The five pipes were connecting to the following manholes: 001591SMH, 003418SMH, 001550SMH, 003112SMH, and 00069ND.

| ***Statistics*** | Mean | Median | SD | Minimum | Maximum | Count |
|---|---|---|---|---|---|---|
| | 0.06 | 0.02 | 1.03 | -5.7 | 2.53 | 134 |

| ***Bin*** | ***Frequency*** | |
|---|---|---|
| -5 | 2 | 1.5% |
| -3 | 1 | 0.8% |
| -1 | 5 | 3.7% |
| -0.5 | 5 | 3.7% |
| 0 | 48 | 35.8% |
| 0.5 | 45 | 33.6% |
| 1 | 15 | 11.2% |
| 2 | 9 | 6.7% |
| More | 4 | 3.0% |



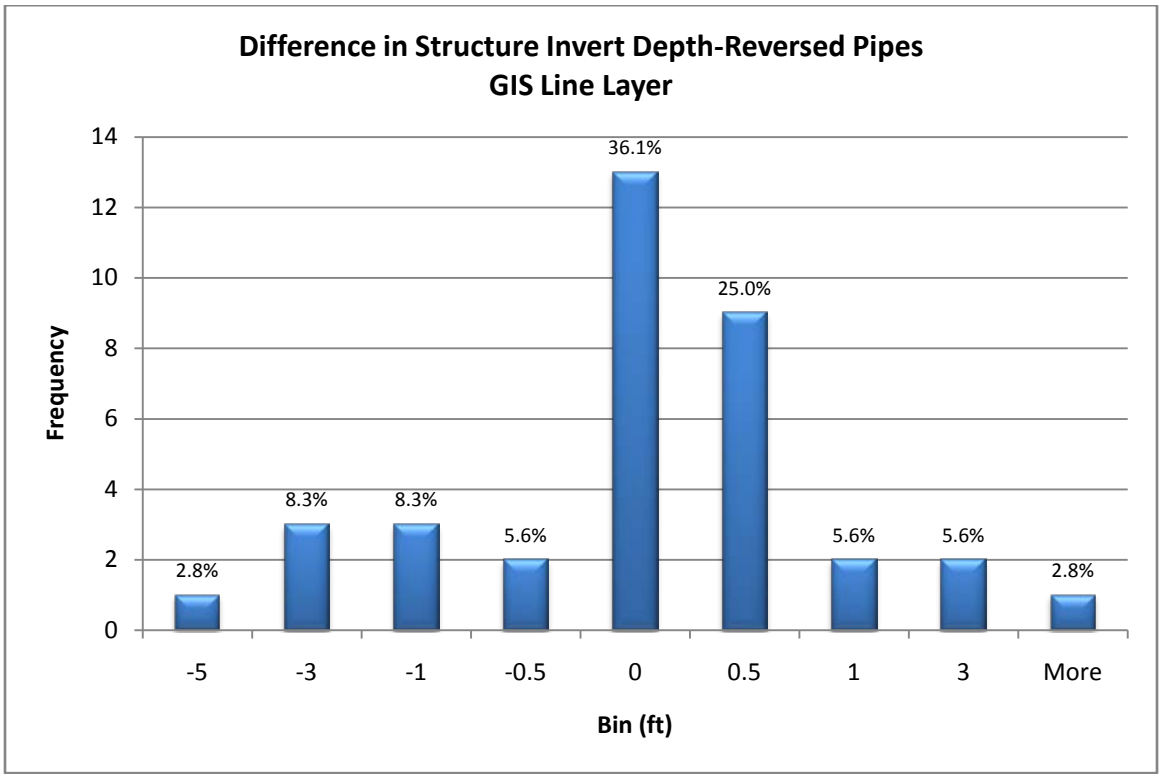




The GIS data matched reasonably well with surveyed data. Approximately 70% of the inverts compared, showed a difference of less than 0.5 ft.

Upon further analysis of the 98 pipe inverts that did not match with GIS data, Baker found that 47 pipes were identified by VPS as “New”, and 36 pipes can be matched with GIS data if direction of flow is reversed (swapping u/s and d/s points). Invert depth comparison for the 36 pips is presented below.

| ***Statistics*** | Mean | Median | SD | Minimum | Maximum | Count |
|---|---|---|---|---|---|---|
| | -0.49 | -0.1 | 2.28 | -9.92 | 5.3 | 36 |

| ***Bin*** | ***Frequency*** | |
|---|---|---|
| -5 | 1 | 2.8% |
| -3 | 3 | 8.3% |
| -1 | 3 | 8.3% |
| -0.5 | 2 | 5.6% |
| 0 | 13 | 36.1% |
| 0.5 | 9 | 25.0% |
| 1 | 2 | 5.6% |
| 3 | 2 | 5.6% |
| More | 1 | 2.8% |



## 4.0 Culvert Comparison

| FACILITYID | GIS HEIGHT | Survey | | Horizontal Difference (ft) | Rim Elevation Difference (ft) |
|---|---|---|---|---|---|
| | | Rim (ft) | Depth (ft) | | |
| 000088CP | 4.98 | 6.19 | 7.20 | 1.41 | -1.21 |
| 000089CP | 3.47 | 6.18 | 7.20 | 1.81 | -2.71 |
| 000090CP | 4.04 | 5.93 | 7.20 | 1.36 | -1.89 |
| 000132CP | 2.31 | 16.50 | 6.58 | 25.54 | -14.19 |
| 000132CP | 2.31 | 16.50 | 6.58 | 25.54 | -14.19 |

Sketches of the field surveyed culverts is provided below.

## 5.0 Condition Assessment Results

Field inspection was completed based on the rating process in the SCREAM database. VPS did not record any significant defects with the inspected structures, except for 005449IN which assigned a defect rating of 4 (the highest) for the cover as being cracked / deteriorated. A table of inspected structures that showed recorded defects is included in Appendix G.

# NOTES

3-19-10
DATE

Rinker Design Associates, P.C.
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Suite 300
Manassas, Virginia 20110
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Fax 703.257.5443
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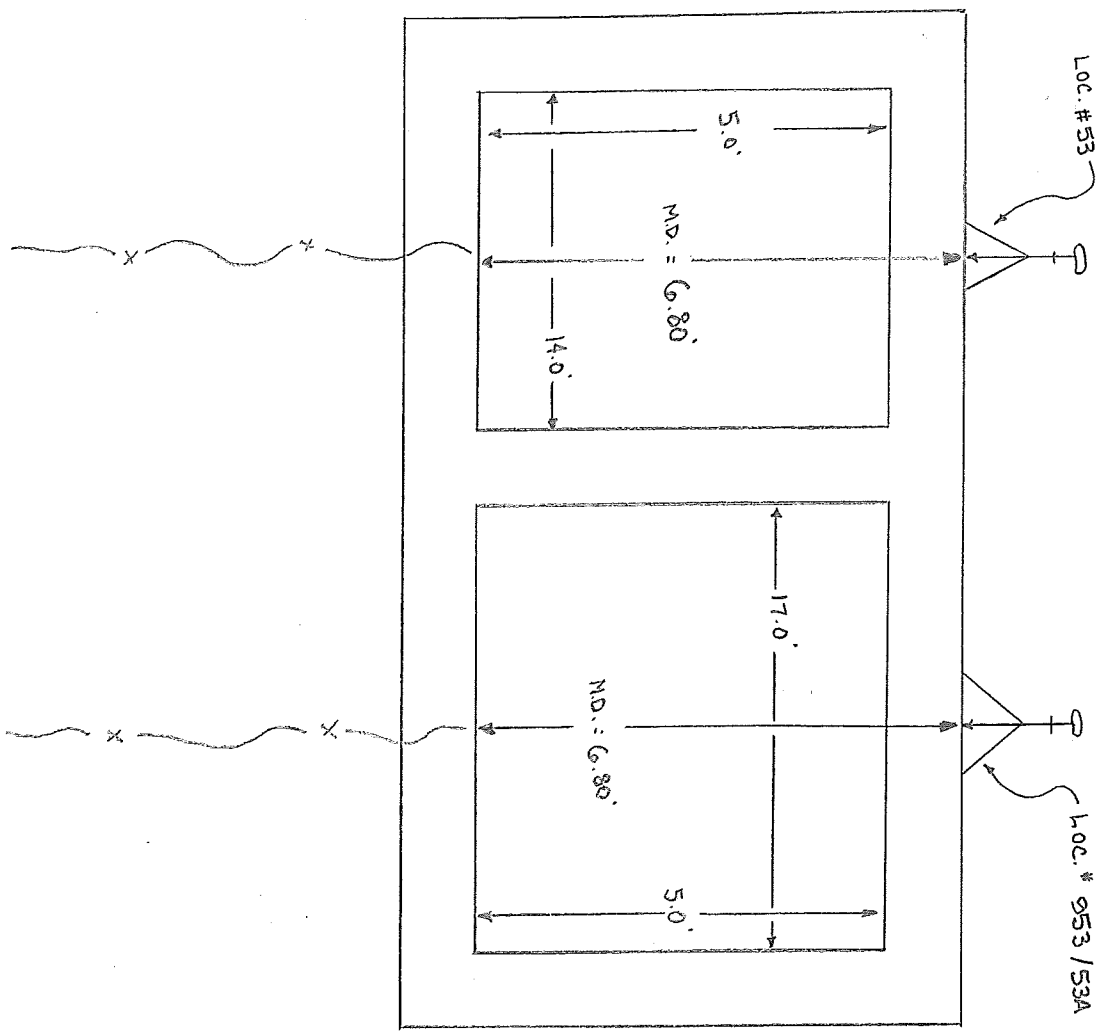
www.rdacivil.com

Project: STR. # 000132 CULVERT SKETCH

Job #: 10-011-H

Sheet 1 of 1

Engineer: T.G. J.G.



# NOTES

3-19-10
DATE

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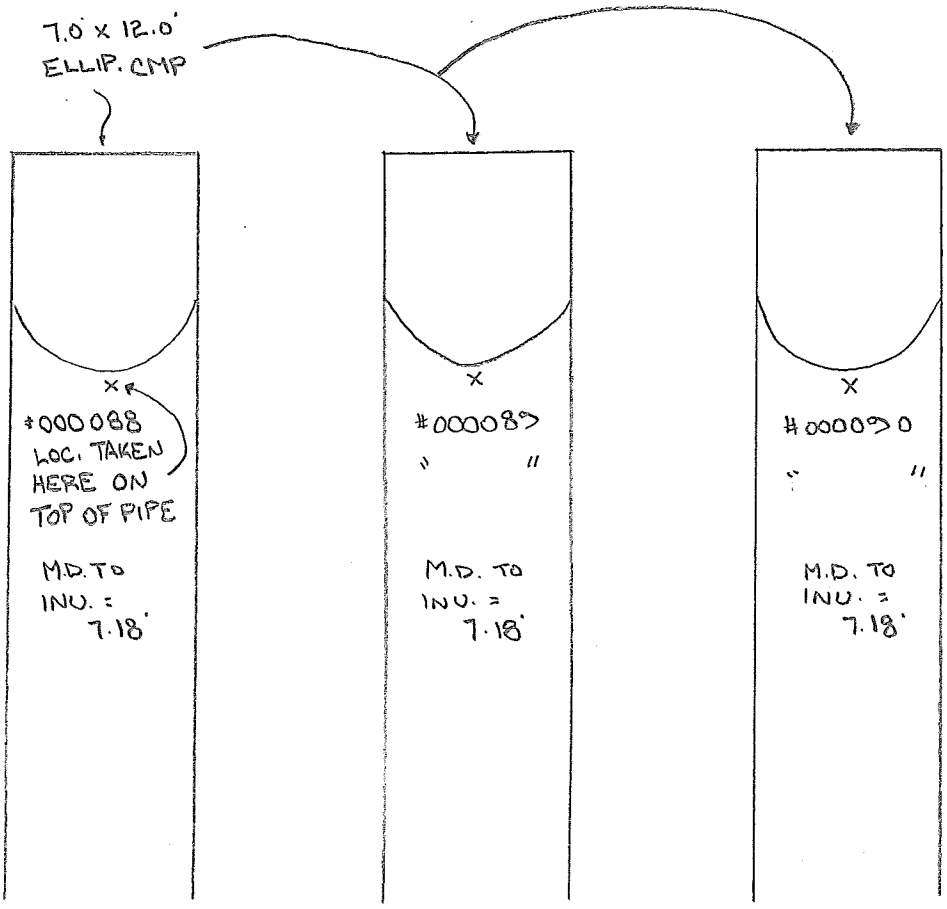
Project: STR. ASBLT. SKETCH

Job #: 10-011-H

Sheet 1 of 1

Engineer: T.G.



## 6.0 Discussion and Path Forward

The pilot program was successful in providing insight to understanding the data structure of the City's GIS and refining the procedure of collecting field data and uploading into the City's GIS. As well, the pilot study provided information on the current physical condition of the facilities within the pilot area.

The results of the comparative analysis conducted in this study, between the field-collected data and GIS information, indicated that the accuracy of measurement of the structure's rim elevation is critical and affects other attributes such as the invert elevation. The depth information in the GIS data matched reasonably well with the surveyed depth. Discrepancies in the rim elevation measurements may be attributed to the fact that the City's GIS information was extrapolated from the City's 2-ft contour digital elevation model topographic GIS data. In addition, the definition of the inlet structures in GIS, and the exact point where the elevation measurement was recorded, may be different from that recorded by the field crews. Therefore, at the minimum, ensuring accurate measurements of the structure's rim elevation is crucial to successfully build the hydrologic model for the City's storm water network and providing useful information.

Field inspection was completed based on the rating system in the SCREAM database. There were no significant defects recorded for the inspected structures within the pilot study area, other than those noted in Appendix G. Unless the City's staff is aware of any specific areas of concern relative to the condition of the facilities, it may not be necessary to continue the condition assessment component of this program. The condition assessment component can be limited to the areas of concern and/or based on the analysis of the results of the hydrologic modeling in the next phase. If it is determined to eliminate or limit the condition assessment component of this program, the use of the SCREAM database will not be necessary in the data collection process. This will simplify the field data collection procedure and eliminate unnecessary steps required to utilize the SCREAM database.

The field data collection procedure can be completed utilizing a GIS-based entry form. The form will clearly map the required information from the field into corresponding data fields in the GIS system. Prior to sending the crews to the field, significant QA/QC review of the GIS data is required for the areas to be surveyed. The review should focus on resolving connectivity and direction of flow issues within the GIS data. It is also critical to establish the spatial link between the pipe layer information and the point layer information and address the mismatches that may result from this process. Therefore, the major role of the crew filed will be to measure and validate information provided to them. In addition, the field crews will need to be provided with a bank of new Facilities IDs to use, in case new structures are located in the field.

# APPENDIX A

| FACILITYID | Address | Easting (ft) | Northing (ft) | Rim Elevation (ft) | Depth (ft) |
|---|---|---|---|---|---|
| 000088CP | 310 HOOFFS RUN DR | 11893234.68 | 6976731.826 | 4.98 | |
| 000088SMH | 631 S FAYETTE ST | 11895021.81 | 6977254.488 | 31.48 | 6.80 |
| 000089CP | 310 HOOFFS RUN DR | 11893248.66 | 6976729.221 | 3.47 | |
| 000090CP | 310 HOOFFS RUN DR | 11893261.86 | 6976728.844 | 4.04 | |
| 000132CP | 20 E LINDEN ST | 11893288.92 | 6981586.24 | 2.31 | |
| 000519IO | 640 W TIMBER BRANCH PY | 11889194.24 | 6984492.096 | 84.52 | 2.54 |
| 000679ND | 1401 OAKCREST DR | 11887403.21 | 6988175.223 | | |
| 000697ND | 2802 VALLEY DR | 11887530.99 | 6988269.915 | | |
| 000741ND | 2317 VALLEY DR | 11887923.38 | 6986962.694 | | |
| 001550SMH | 2451 EISENHOWER AV | 11889925.58 | 6978102.934 | 16.00 | 5.42 |
| 001556SMH | 2381 EISENHOWER AV | 11890423.68 | 6977909.243 | 15.99 | 9.22 |
| 001557SMH | 2401 EISENHOWER AV | 11890185.69 | 6977952.542 | 15.89 | 7.98 |
| 001583SMH | 1446 A DUKE ST | 11893956.54 | 6978704.019 | 22.04 | 16.2 |
| 001591SMH | 370 HOLLAND LA | 11893351.5 | 6978730.4 | 28.02 | 17.8 |
| 001619SMH | 501 HOLLAND LA | 11893251.46 | 6978457.412 | 27.57 | 8.94 |
| 001622SMH | 1865 BALLENGER AV | 11892867.78 | 6978498.693 | 34.39 | 13.78 |
| 001642SMH | 2316 MILL RD | 11891148.2 | 6978192.226 | 15.83 | 10.3 |
| 001653SMH | 1501 DUKE ST | 11893837.04 | 6979103.212 | 14.00 | 11.6 |
| 001658SMH | 1970 DUKE ST | 11892351.83 | 6979331.533 | 44.58 | 6.70 |
| 001665SMH | 2318 MILL RD | 11891112.64 | 6978349.849 | 18.64 | 12.6 |
| 001667SMH | 590 HOLLAND LA | 11893237.35 | 6978001.073 | 24.98 | 13.28 |
| 001682SMH | 2006 EISENHOWER AV | 11892282.62 | 6977875.585 | 27.95 | 11.42 |
| 001684SMH | 2026 EISENHOWER AV | 11891994.71 | 6977883.383 | 23.03 | 11.3 |
| 001686SMH | 2034 EISENHOWER AV | 11891835.17 | 6977900.177 | 21.79 | 11.56 |
| 001688SMH | 2111 EISENHOWER AV | 11891688.21 | 6977910.374 | 20.00 | 14.46 |
| 001689SMH | 2111 EISENHOWER AV | 11891655.83 | 6977907.375 | 19.77 | 15.74 |
| 001690SMH | 2034 EISENHOWER AV | 11891649.83 | 6977790.414 | 20.17 | 18.17 |
| 001907SMH | 320 E BELLEFONTE AV | 11894824.85 | 6986200.343 | 41.86 | 5.70 |
| 001962SMH | 33 E BELLEFONTE AV | 11892999.35 | 6985961.779 | 34.00 | 5.20 |
| 002426SMH | 700 N FAYETTE ST | 11895762.11 | 6982273.414 | 42.04 | 7.90 |
| 002427SMH | 1322 PRINCE ST | 11894757.52 | 6979407.783 | 27.78 | 4.53 |
| 002507SMH | 2606 CREST ST | 11887178.64 | 6987994.483 | 178.63 | 7.41 |
| 002511SMH | 2509 CREST ST | 11887053.81 | 6987818.171 | 183.15 | 9.00 |
| 002515SMH | 1412 WOODBINE ST | 11886902.47 | 6987900.564 | 185.73 | 9.05 |
| 002516SMH | 1408 WOODBINE ST | 11886855.54 | 6987759.694 | 189.58 | 3.41 |
| 002518SMH | 1512 WOODBINE ST | 11886637.16 | 6988141.002 | 189.41 | 8.91 |
| 002519SMH | 1620 KENWOOD AV | 11886320.23 | 6988438.824 | 191.79 | 7.09 |
| 002520SMH | 1620 KENWOOD AV | 11886309.7 | 6988438.995 | 191.70 | 7.11 |
| 002524SMH | 1309 DOGWOOD DR | 11887399.83 | 6987828.628 | 170.20 | 5.82 |
| 002530SMH | 1710 OAKCREST DR | 11886448.71 | 6988980.04 | 179.95 | 3.08 |
| 002537SMH | 2802 VALLEY DR | 11887523.67 | 6988273.766 | 162.50 | 6.70 |
| 002538SMH | 2802 VALLEY DR | 11887536.39 | 6988266.888 | 162.04 | 6.10 |
| 002541SMH | 2802 VALLEY DR | 11887474.97 | 6988261.803 | 164.31 | 4.35 |
| 002542SMH | 2706 VALLEY DR | 11887663.94 | 6988013.528 | 153.23 | 5.70 |
| 002543SMH | 2600 VALLEY DR | 11887729.21 | 6987747.489 | 145.92 | 5.70 |
| 002544SMH | 2603 VALLEY DR | 11887767.21 | 6987628.87 | 143.73 | 5.70 |
| 002551SMH | 1400 CRESTWOOD DR | 11887282.46 | 6988583.538 | 167.91 | 7.11 |
| 002552SMH | 1400 CRESTWOOD DR | 11887295.28 | 6988584.802 | 167.80 | 7.42 |
| 002553SMH | 2812 VALLEY DR | 11887340.09 | 6988586.656 | 167.48 | 7.35 |
| 002554SMH | 2900 VALLEY DR | 11887398.08 | 6988653.364 | 168.58 | 7.84 |
| 002555SMH | 2900 VALLEY DR | 11887395.73 | 6988638.496 | 167.86 | 7.04 |
| 002563SMH | 1205 SUMMIT AV | 11887441.91 | 6988298.516 | 165.92 | 8.42 |
| 002564SMH | 2808 VALLEY DR | 11887400.07 | 6988472.481 | 162.34 | 0.00 |
| 002566SMH | 1612 OAKCREST DR | 11886659.63 | 6988803.109 | 185.58 | 12.30 |
| 002571SMH | 1205 SUMMIT AV | 11887414.24 | 6988252.311 | 167.06 | 4.50 |

| FACILITYID | Address | Easting (ft) | Northing (ft) | Rim Elevation (ft) | Depth (ft) |
|---|---|---|---|---|---|
| 002596SMH | 2425 CENTRAL AV | 11888798.27 | 6987331.968 | 177.12 | 6.53 |
| 002605SMH | 2404 VALLEY DR | 11887905.5 | 6987143.844 | 139.32 | 7.40 |
| 002606SMH | 1202 HILLSIDE TR | 11887870.1 | 6987266.192 | 140.01 | 6.40 |
| 002608SMH | 2504 VALLEY DR | 11887802.22 | 6987509.289 | 142.01 | 5.33 |
| 002609SMH | 2508 VALLEY DR | 11887735.99 | 6987634.436 | 144.59 | 5.10 |
| 002611SMH | 2500 VALLEY DR | 11887833.57 | 6987312.397 | 141.07 | 6.30 |
| 002612SMH | 2508 VALLEY DR | 11887679.1 | 6987622.676 | 149.12 | 7.50 |
| 003067SMH | 402 W MASONIC VIEW AV | 11890865.77 | 6982561.587 | 66.52 | 6.75 |
| 003076SMH | 229 ADAMS AV | 11893752.24 | 6983628.876 | 43.90 | 3.71 |
| 003119SMH | 515 MOUNT VERNON AV | 11894280.9 | 6982397.448 | 25.00 | 9.13 |
| 003136SMH | 710 1/2 MOUNT VERNON AV | 11894263.05 | 6983012.304 | 32.62 | 7.02 |
| 003141SMH | 417 MOUNT VERNON AV | 11894317.62 | 6982075.367 | 21.54 | 7.38 |
| 003230SMH | 1661 PRINCE ST | 11893663.56 | 6979527.094 | 12.05 | 7.39 |
| 003269SMH | 1609 CAMERON ST | 11894208.6 | 6980698.772 | 27.00 | 6.38 |
| 003356SMH | 301 E GLENDALE AV | 11893716.92 | 6983860.296 | 44.00 | 7.40 |
| 003361SMH | 200 W BRADDOCK RD | 11891325.63 | 6984141.325 | 55.11 | 4.70 |
| 003421SMH | 15 E BELLEFONTE AV | 11892474.12 | 6985681.277 | 32.22 | 5.80 |
| 003475SMH | 1320 BRADDOCK PL | 11895559.14 | 6983114.35 | 40.01 | 11.07 |
| 003496SMH | 400 CARLISLE DR | 11891167.08 | 6981328.689 | 124.15 | 4.93 |
| 004794IN | 2451 EISENHOWER AV | 11889841.57 | 6978023.321 | 15.51 | 6.11 |
| 004931IN | 1446 A DUKE ST | 11893787.58 | 6978704.302 | 22.00 | 17.98 |
| 004961IN | 401 HOLLAND LA | 11893246.52 | 6978493.6 | 27.65 | 10.68 |
| 004983IN | 1450 DUKE ST | 11893994.81 | 6978896.013 | 14.47 | 5.50 |
| 005007IN | 2010 EISENHOWER AV | 11892084.08 | 6977877.385 | 23.93 | 11.1 |
| 005448IN | 1408 WOODBINE ST | 11886848.01 | 6987769.173 | 189.39 | 9.79 |
| 005457IN | 1601 CRESTWOOD DR | 11887031.29 | 6988828.773 | 173.33 | 1.00 |
| 005458IN | 2812 VALLEY DR | 11887337.41 | 6988598.995 | 167.29 | 7.51 |
| 005499IN | 1701 CENTRE PZ | 11886068.18 | 6988018.616 | 199.45 | 2.20 |
| 005541IN | 1202 SUMMIT AV | 11887571.09 | 6988244.794 | 161.74 | 5.30 |
| 006124IN | 67 COMMONWEALTH AV | 11893141.46 | 6980723.808 | 15.37 | 4.26 |
| 006174IN | 214 E MONROE AV | 11893379.75 | 6985077.616 | 30.60 | 1.40 |
| 006230IN | 1610 MOUNT VERNON AV | 11893775.9 | 6985393.466 | 36.03 | 2.88 |
| 006240IN | 1702 DEWITT AV | 11894207.22 | 6985676.847 | 33.84 | 3.50 |
| 006596IN | 222 E DEL RAY AV | 11894131.01 | 6987237.645 | 45.99 | 4.65 |
| 007516IN | 1725 KENWOOD AV | 11886360.01 | 6987799.882 | 200.61 | 9.51 |
| 007526IN | 1499 W BRADDOCK RD | 11886502.52 | 6987642.96 | 202.01 | 6.71 |

# APPENDIX B

Michael Baker Jr., Inc.
9400 Innovation Drive
Suite 110
Manassas, VA 20110-2214

703-334-4915
FAX 703-334-4914

**CITY OF ALEXANDRIA**
**FIELD WORK PLAN**
**FEBRUARY 3, 2010**

**Permits**

ROW Permits are secured (attached).

- Permit No. TES2010-00149 – VPS
- Permit No. TES2010-00150 - RDA

**Contacts**

| | |
|---|---|
| • Craige D. Perl, City of Alexandria | 703 746 4057 (O) |
| • George Giuseppe, City of Alexandria | 703 834 4488 (C)<br>571 220 2291 (C) |
| • Mohammed A. Shammet, Baker | 703 334 4932 (O)<br>703 728 4604 (C) |
| • Sidney Thomas, RDA | 703 368 7373 (O) |
| • Tim Griffith, RDA | 703 498 4051 (C) |
| • Rob Hilton, VPS | 301 931 0707 (O)<br>443 864 2567 (C) |

**Facilities List and Maps**

- A list of 89 primary structures is attached. List shows Facilities ID, Address, and priority
- A map of the 89 Primary Facilities is attached. Map shows 7 index sheets for close ups
  - 7 close ups sheets are attached showing facilities with their Facility ID and priority (in parentheses)

**Field Work Plan**

Baker is responsible for the overall coordination of the field work activities.

***Mobilization***

- Tim Griffith (RDA) & Rob Hilton (VPS) are the field superintendants for RDA & VPS.
- RDA will be mobilizing first to establish controls for the study area.
- VPS will be responsible for the execution of the approved MOT plans.
- In areas where MOT Exhibit D is required, VPS and RDA will closely coordinate to do the following:
  - First, VPS will set the required signage and flaggers
  - Then, RDA will proceed with their activities

***Notifications***

- If within ROW, execute applicable Exhibit of the MOT plans
- If within private property, in addition;
  - Knock on the door of the property owner and introduce yourself and purpose
  - Provide a copy of the letter from the City of Alexandria dated February 4, 2010 (attached)

***Missing Facilities***

- If either RDA or VPS are not able to locate a facility in the field
  - Immediately contact Mohammed A. Shammet
  - Mohammed will contact George Giuseppe to investigate
  - Based on findings, directions will be given to VPS and RDA to relocate or substitute with a back up facility

**RDA Data Collection**

- Use 1988 Datum
- X, Y and Z coordinates of each facility. Z will be the top elevation (e.g. rim).
- Provide paint mark for points surveyed
- If significant slope exists on top of MH, RDA will survey center and high end (with paint marks)

**VPS Data Collection**

- Non-confined space inspection
- Use SCREAM database. A review with VPS was conducted 2/2/2010. Another session may be conducted after VPS has a chance to review the database.
- Use SCREAM documentation for rating the condition of the stucture
- Complete inspection forms to include, at a minimum;

**Manhole**

- Surface type
- Condition (Frame, Chimney ... etc)
- Material type (cover, channel, ... etc)
- Depth to Channel
- Depth to Bench (if any)
- Lamping Photos

**Pipe**

- Material type
- Shape
- Dimensions (Diameter, Height, Width)
- Inverts
- Condition
- Lamping Photos

**Inlet**

- Type
- Depth
- Inlet entrance (number and dimensions of throats)
- Condition
- Lamping Photos

**Data Transfer**

- Collected data will be sent, on daily basis, to Mohammed Shammet (mshammet@mbakercorp.com) within less than 24-hour from field work
- QA/QC will be conducted immediately and issues/corrections (if any) will be discussed with CH2, VPS & RDA

# CITY OF ALEXANDRIA

Craig Perl

Transportation and Environmental Services
301 King Street, Suite 4130
Alexandria, Virginia 22314
703.746.4035

# T & ES PERMIT

**CASE NUMBER:** TES2010-00149 **ISSUED:** 2/1/2010 **EXPIRES:** 2/28/2010

**LOCATION:** 301 KING ST 3200 **PROJECT NAME:** LANE CLOSURES

**PROJECT DESCRIPTION:**
Contact: Jody Haislip 301-931-0707, 443-506-4386 (cell). City contact: Craig Perl 703-746-4057. Lane closures and partial sidewalk closures per the attached list of streets. See attached conditions for work description and work hours.

**Primary Contact :**
*CONTRACTOR*
Video Pipe Services
1586 Harding Highway
Newfield NJ 08344--5220

No Phone Number on Record

**License Type and Policy Number:**

**Secondary Contact :**
*PROPERTY OWNER*
City Of Alexandria
Po Box 178
Alexandria VA 22313-1500

No Phone Number on Record

**License Type and Policy Number:**

| | | | |
|---|---|---|---|
| **START DATE:** | 2/1/2010 | **STREET EXCAVATION** | **INGRESS/EGRESS** |
| **END DATE:** | 2/28/2010 | **CRANE** | **SCAFFOLD/ LADDER** |
| **TIME:** | SEE ATTACHED | **DUMPSTER** | **SIDEWALK CLOSING** |
| **INSURANCE:** | | **HAULING:** | **BLOCK PARTY** |
| **POLICY #:** | 377201-08 | **CROSS CURB/ SIDEWALK** | **OTHER** |
| **EXPIRES:** | 10/31/2010 | | |

1. Any damage to the public right-of-way (sidewalk, curb & gutter or street) is the responsibility of the permittee.
2. The permittee is responsible for compliance with the current version of the "Virginia Work Area Protection Manual".
3. Maximum protection must be given to pedestrians and motor vehicles at all times.
4. This permit may be revoked without notice when the privilege hereby granted is abused or exercised contrary to ordinance or regulation. By issuing this permit, the City of Alexandria assumes no liability for injury or damage to persons or property and the permittee shall save the City harmless from any claim resulting.
5. Other specific conditions as attached.

Distribution
Permitee
Police
Traffic
Transportation
Fire Dept
T & ES Inspector
Office Copy

**City Manager** Jean Wagner

By Director of Transportation and Environmental Services

**If there are any questions concerning this permit, call 703.746.4035**

**Conditions of Approval - Permit no.: TES2010-00149**

**For:** VIDEO PIPE SERVICES

1) Any dirt, mud or debris tracked or spilled in the public right-of-way is the responsibility of the applicant and must be cleaned immediately or this permit may be rescinded.

2) A minimum sidewalk width of 4 feet must remain open at all times for pedestrian traffic.

3) Requests for "Reserved Parking/No Parking" must be made no later than 5:00 p.m. three business days prior to the date the parking spaces are needed (weekends and holidays excluded). PARKING SPACES MUST BE RESERVED BEFORE BEING OCCUPIED.

4) If the work granted under this permit is not completed by the expiration date, the applicant must apply for permit renewal. A new application and drawings are required.

5) Normal work hours are Monday through Friday, 7:00 a.m. to 6:00 p.m. and Saturday 9:00 a.m. to 6:00 p.m. No work is permitted on Sundays. Work hours on rush hour routes are limited to 9:00 a.m. to 3:30 p.m. Monday through Friday. Any work to be performed outside of the above hours, requires a Noise Permit from the Office of Environmental Quality.

   Per City Code section 11-5-5(a)(5)a, work is not permitted on the following holidays:
   New Year's Day (the first day of January), Memorial Day (the last Monday in May), Independence Day (July 4), Labor Day (the first Monday in September), Thanksgiving Day (the fourth Thursday in November), and Christmas Day (December 25).

6) Barricades, signage and other traffic control devices must be placed in accordance with the attached Maintenance of Traffic (MOT) Plan, or as modified in the field as directed by the Department of Transportation & Environmental Services inspector. Failure to comply with this condition will result in revocation of this permit.

7) Lane closures and partial sidewalk closures will be performed throughout the city, per the attached list of locations. The purpose of this work is for survey and inspection of the storm sewer system throughout the city.

8) Work will be performed during the hours of 7:00 a.m. to 6:00 p.m., with the exception of streets where work hours are restricted to 9:00 a.m. to 3:30 p.m. A list of streets with this restriction is attached.

Craig Perl

# CITY OF ALEXANDRIA

Transportation and Environmental Services
301 King Street, Suite 4130
Alexandria, Virginia 22314
703.746.4035

# T & ES PERMIT

**CASE NUMBER:** TES2010-00150 **ISSUED:** 2/1/2010 **EXPIRES:** 2/28/2010

**LOCATION:** 301 KING ST 3200 **PROJECT NAME:** LANE CLOSURES

**PROJECT DESCRIPTION:**
Contact: Sidney Thomas 703-368-7373, 703-926-2490 (cell). City contact: Craig Perl 703-746-4057. Lane closures and partial sidewalk closures per the attached list of streets. See attached conditions for work description and work hours.

**Primary Contact :**
*CONTRACTOR*
Rinker Design Associates, Pc
9300 W. Courthouse RoadSuite 300
Manassas VA 20110

Primary Phone - 703-368-7373

**License Type and Policy Number:**

**Secondary Contact :**
*PROPERTY OWNER*
City Of Alexandria
Po Box 178
Alexandria VA 22313-1500

No Phone Number on Record

**License Type and Policy Number:**

| | | | |
|---|---|---|---|
| **START DATE:** | 2/1/2010 | **STREET EXCAVATION** | **INGRESS/EGRESS** |
| **END DATE:** | 2/28/2010 | **CRANE** | **SCAFFOLD/ LADDER** |
| **TIME:** | SEE ATTACHED | **DUMPSTER** | **SIDEWALK CLOSING** |
| **INSURANCE:** | | **HAULING:** | **BLOCK PARTY** |
| **POLICY #:** | C80839710 | | |
| **EXPIRES:** | 6/9/2010 | **CROSS CURB/ SIDEWALK** | **OTHER** |

1. Any damage to the public right-of-way (sidewalk, curb & gutter or street) is the responsibility of the permittee.
2. The permittee is responsible for compliance with the current version of the "Virginia Work Area Protection Manual".
3. Maximum protection must be given to pedestrians and motor vehicles at all times.
4. This permit may be revoked without notice when the privilege hereby granted is abused or exercised contrary to ordinance or regulation. By issuing this permit, the City of Alexandria assumes no liability for injury or damage to persons or property and the permittee shall save the City harmless from any claim resulting.
5. Other specific conditions as attached.

Distribution
Permitee
Police
Traffic
Transportation
Fire Dept
T & ES Inspector
Office Copy

**City Manager** Joan Wag

By Director of Transportation and Environmental Services

**If there are any questions concerning this permit, call 703.746.4035**

**Conditions of Approval - Permit no.: TES2010-00150**

**For:** RINKER DESIGN ASSOCIATES, PC

1) Any dirt, mud or debris tracked or spilled in the public right-of-way is the responsibility of the applicant and must be cleaned immediately or this permit may be rescinded.

2) A minimum sidewalk width of 4 feet must remain open at all times for pedestrian traffic.

3) Requests for "Reserved Parking/No Parking" must be made no later than 5:00 p.m. three business days prior to the date the parking spaces are needed (weekends and holidays excluded). PARKING SPACES MUST BE RESERVED BEFORE BEING OCCUPIED.

4) If the work granted under this permit is not completed by the expiration date, the applicant must apply for permit renewal. A new application and drawings are required.

5) Normal work hours are Monday through Friday, 7:00 a.m. to 6:00 p.m. and Saturday 9:00 a.m. to 6:00 p.m. No work is permitted on Sundays. Work hours on rush hour routes are limited to 9:00 a.m. to 3:30 p.m. Monday through Friday. Any work to be performed outside of the above hours, requires a Noise Permit from the Office of Environmental Quality.

   Per City Code section 11-5-5(a)(5)a, work is not permitted on the following holidays:
   New Year's Day (the first day of January), Memorial Day (the last Monday in May), Independence Day (July 4), Labor Day (the first Monday in September), Thanksgiving Day (the fourth Thursday in November), and Christmas Day (December 25).

6) Barricades, signage and other traffic control devices must be placed in accordance with the attached Maintenance of Traffic (MOT) Plan, or as modified in the field as directed by the Department of Transportation & Environmental Services inspector. Failure to comply with this condition will result in revocation of this permit.

7) Lane closures and partial sidewalk closures will be performed throughout the city, per the attached list of locations. The purpose of this work is for survey and inspection of the storm sewer system throughout the city.

8) Work will be performed during the hours of 7:00 a.m. to 6:00 p.m., with the exception of streets where work hours are restricted to 9:00 a.m. to 3:30 p.m. A list of streets with this restriction is attached.

Attachment A

| Index | Facility ID | Type | Address | MOT Exhibit | Working Hours |
|---|---|---|---|---|---|
| 1 | 003230SMH | MH | 1661 PRINCE ST | D | 9-3 |
| 2 | 000088SMH | MH | 631 S FAYETTE ST | D | 7-6 |
| 3 | 001550SMH | MH | 2451 EISENHOWER AV | A | 9-3 |
| 4 | 001556SMH | MH | 2381 EISENHOWER AV | A | 9-3 |
| 5 | 001557SMH | MH | 2401 EISENHOWER AV | A | 7-6 |
| 6 | 001558SMH | MH | 2401 EISENHOWER AV | B | 9-3 |
| 7 | 001568SMH | MH | 2375 MILL RD | B | 9-3 |
| 8 | 001583SMH | MH | 1446 A DUKE ST | A | 9-3 |
| 9 | 001591SMH | MH | 370 HOLLAND LA | D | 9-3 |
| 10 | 001592SMH | MH | 370 HOLLAND LA | C | 9-3 |
| 11 | 001619SMH | MH | 501 HOLLAND LA | C | 9-3 |
| 12 | 001620SMH | MH | 1855 BALLENGER AV | C | 7-6 |
| 13 | 001622SMH | MH | 1865 BALLENGER AV | C | 7-6 |
| 14 | 001626SMH | MH | 430 JOHN CARLYLE ST | D | 7-6 |
| 15 | 001642SMH | MH | 2316 MILL RD | B | 9-3 |
| 16 | 001653SMH | MH | 1501 DUKE ST | B | 9-3 |
| 17 | 001658SMH | MH | 1970 DUKE ST | B | 9-3 |
| 18 | 001665SMH | MH | 2318 MILL RD | A | 9-3 |
| 19 | 001667SMH | MH | 590 HOLLAND LA | C | 9-3 |
| 20 | 001680SMH | MH | 2006 EISENHOWER AV | A | 9-3 |
| 21 | 001681SMH | MH | 2006 EISENHOWER AV | A | 9-3 |
| 22 | 001682SMH | MH | 2006 EISENHOWER AV | A | 9-3 |
| 23 | 001683SMH | MH | 2008 EISENHOWER AV | A | 9-3 |
| 24 | 001684SMH | MH | 2026 EISENHOWER AV | A | 9-3 |
| 25 | 001685SMH | MH | 2034 EISENHOWER AV | A | 9-3 |
| 26 | 001686SMH | MH | 2034 EISENHOWER AV | A | 9-3 |
| 27 | 001687SMH | MH | 2034 EISENHOWER AV | A | 9-3 |
| 28 | 001688SMH | MH | 2111 EISENHOWER AV | A | 9-3 |
| 29 | 001689SMH | MH | 2111 EISENHOWER AV | A | 9-3 |
| 30 | 001690SMH | MH | 2034 EISENHOWER AV | A | 9-3 |
| 31 | 001907SMH | MH | 320 E BELLEFONTE AV | D | 7-6 |
| 32 | 001962SMH | MH | 33 E BELLEFONTE AV | A | 7-6 |
| 33 | 001965SMH | MH | 3 E BELLEFONTE AV | A | 7-6 |
| 34 | 002426SMH | MH | 700 N FAYETTE ST | A | 7-6 |
| 35 | 002427SMH | MH | 1322 PRINCE ST | D | 9-3 |
| 36 | 003067SMH | MH | 402 W MASONIC VIEW AV | C | 7-6 |
| 37 | 003076SMH | MH | 229 ADAMS AV | C | 7-6 |
| 38 | 003356SMH | MH | 301 E GLENDALE AV | D | 7-6 |
| 39 | 003361SMH | MH | 200 W BRADDOCK RD | B | 9-3 |
| 40 | 003119SMH | MH | 515 MOUNT VERNON AV | C | 9-3 |
| 41 | 003135SMH | MH | 710 1/2 MOUNT VERNON AV | A | 9-3 |
| 42 | 003136SMH | MH | 710 1/2 MOUNT VERNON AV | C | 9-3 |
| 43 | 003140SMH | MH | 800 S MAIN ST | C | 7-6 |
| 44 | 003141SMH | MH | 417 MOUNT VERNON AV | A | 7-6 |
| 45 | 003268SMH | MH | 1614 BOYLE ST | A | 7-6 |
| 46 | 003269SMH | MH | 1609 CAMERON ST | A | 9-3 |
| 47 | 003421SMH | MH | 15 E BELLEFONTE AV | A | 7-6 |
| 48 | 003450SMH | MH | 515 E BRADDOCK RD | A | 9-3 |
| 49 | 003473SMH | MH | 1261 MADISON ST | A | 9-3 |
| 50 | 003475SMH | MH | 1320 BRADDOCK PL | C | 7-6 |
| 51 | 003479SMH | MH | 1201 BRADDOCK PL | C | 7-6 |
| 52 | 003496SMH | MH | 400 CARLISLE DR | C | 7-6 |
| 53 | 000132CP | Culvert | 20 E LINDEN ST | A | 7-6 |
| 54 | 000088CP | Culvert | 310 HOOFFS RUN DR | A | 7-6 |
| 55 | 000089CP | Culvert | 310 HOOFFS RUN DR | A | 7-6 |
| 56 | 000090CP | Culvert | 310 HOOFFS RUN DR | A | 7-6 |
| 57 | 004794IN | Inlet | 2451 EISENHOWER AV | B | 9-3 |
| 58 | 004928IN | Inlet | 1446 A DUKE ST | A | 9-3 |
| 59 | 004931IN | Inlet | 1446 A DUKE ST | A | 9-3 |
| 60 | 004960IN | Inlet | 401 HOLLAND LA | A | 9-3 |

| | | | | | |
|---|---|---|---|---|---|
| 61 | 004961IN | Inlet | 401 HOLLAND LA | A | 9-3 |
| 62 | 004983IN | Inlet | 1450 DUKE ST | C | 9-3 |
| 63 | 005006IN | Inlet | 2008 EISENHOWER AV | A | 9-3 |
| 64 | 005007IN | Inlet | 2010 EISENHOWER AV | A | 9-3 |
| 65 | 005935IN | Inlet | 415 MOUNT VERNON AV | C | 9-3 |
| 66 | 006124IN | Inlet | 67 COMMONWEALTH AV | A | 9-3 |
| 67 | 006174IN | Inlet | 214 E MONROE AV | A | 9-3 |
| 68 | 006230IN | Inlet | 1610 MOUNT VERNON AV | A | 9-3 |
| 69 | 006240IN | Inlet | 1702 DEWITT AV | C | 7-6 |
| 70 | 006596IN | Inlet | 222 E DEL RAY AV | A | 7-6 |
| 71 | 000519IO | IO | 640 W TIMBER BRANCH PY | A | 7-6 |
| 72 | 000450CB | CB | 2803 VALLEY DR | A | 9-3 |
| 73 | 000679ND | Node | 1401 OAKCREST DR | A | 7-6 |
| 74 | 000680ND | Node | 2513 CREST ST | C | 7-6 |
| 75 | 000697ND | Node | 2802 VALLEY DR | A | 9-3 |
| 76 | 000741ND | Node | 2317 VALLEY DR | C | 9-3 |
| 77 | 005399IN | Inlet | 1311 KENWOOD AV | A | 7-6 |
| 78 | 005444IN | Inlet | 1409 WOODBINE ST | A | 7-6 |
| 79 | 005448IN | Inlet | 1408 WOODBINE ST | A | 7-6 |
| 80 | 005457IN | Inlet | 1601 CRESTWOOD DR | A | 7-6 |
| 81 | 005458IN | Inlet | 2812 VALLEY DR | A | 9-3 |
| 82 | 005499IN | Inlet | 1701 CENTRE PZ | A | 7-6 |
| 83 | 005515IN | Inlet | 2802 VALLEY DR | A | 9-3 |
| 84 | 005541IN | Inlet | 1202 SUMMIT AV | B | 7-6 |
| 85 | 005549IN | Inlet | 2908 FARM RD | C | 7-6 |
| 86 | 005554IN | Inlet | 2911 FARM RD | A | 7-6 |
| 87 | 005561IN | Inlet | 3002 FARM RD | A | 7-6 |
| 88 | 005658IN | Inlet | 1007 W BRADDOCK RD | A | 9-3 |
| 89 | 007516IN | Inlet | 1725 KENWOOD AV | A | 7-6 |
| 90 | 007526IN | Inlet | 1499 W BRADDOCK RD | A | 9-3 |
| 91 | 007560IN | Inlet | 1206 W BRADDOCK RD | A | 9-3 |
| 92 | 007610IN | Inlet | 2508 VALLEY DR | A | 9-3 |
| 93 | 002524SMH | MH | 1309 DOGWOOD DR | C | 7-6 |
| 94 | 002527SMH | MH | 1200 DOGWOOD DR | A | 7-6 |
| 95 | 002530SMH | MH | 1710 OAKCREST DR | A | 7-6 |
| 96 | 002537SMH | MH | 2802 VALLEY DR | A | 9-3 |
| 97 | 002538SMH | MH | 2802 VALLEY DR | A | 9-3 |
| 98 | 002541SMH | MH | 2802 VALLEY DR | A | 9-3 |
| 99 | 002542SMH | MH | 2706 VALLEY DR | C | 9-3 |
| 100 | 002543SMH | MH | 2600 VALLEY DR | A | 9-3 |
| 101 | 002544SMH | MH | 2603 VALLEY DR | D | 9-3 |
| 102 | 002551SMH | MH | 1400 CRESTWOOD DR | A | 7-6 |
| 103 | 002552SMH | MH | 1400 CRESTWOOD DR | A | 7-6 |
| 104 | 002553SMH | MH | 2812 VALLEY DR | A | 9-3 |
| 105 | 002554SMH | MH | 2900 VALLEY DR | A | 9-3 |
| 106 | 002555SMH | MH | 2900 VALLEY DR | A | 9-3 |
| 107 | 002560SMH | MH | 1623 FERN ST | D | 7-6 |
| 108 | 002563SMH | MH | 1205 SUMMIT AV | A | 7-6 |
| 109 | 002564SMH | MH | 2808 VALLEY DR | A | 9-3 |
| 110 | 002566SMH | MH | 1612 OAKCREST DR | D | 7-6 |
| 111 | 002571SMH | MH | 1205 SUMMIT AV | A | 7-6 |
| 112 | 002507SMH | MH | 2606 CREST ST | D | 7-6 |
| 113 | 002508SMH | MH | 1400 SUMMIT AV | D | 7-6 |
| 114 | 002511SMH | MH | 2509 CREST ST | D | 7-6 |
| 115 | 002512SMH | MH | 2513 CREST ST | D | 7-6 |
| 116 | 002514SMH | MH | 1407 WOODBINE ST | C | 7-6 |
| 117 | 002515SMH | MH | 1412 WOODBINE ST | A | 7-6 |
| 118 | 002516SMH | MH | 1408 WOODBINE ST | A | 7-6 |
| 119 | 002518SMH | MH | 1512 WOODBINE ST | A | 7-6 |
| 120 | 002519SMH | MH | 1620 KENWOOD AV | D | 7-6 |
| 121 | 002520SMH | MH | 1620 KENWOOD AV | D | 7-6 |

| | | | | | |
|---|---|---|---|---|---|
| 122 | 002596SMH | MH | 2425 CENTRAL AV | A | 7-6 |
| 123 | 002605SMH | MH | 2404 VALLEY DR | C | 9-3 |
| 124 | 002606SMH | MH | 1202 HILLSIDE TR | D | 7-6 |
| 125 | 002607SMH | MH | 1202 HILLSIDE TR | D | 7-6 |
| 126 | 002608SMH | MH | 2504 VALLEY DR | C | 9-3 |
| 127 | 002609SMH | MH | 2508 VALLEY DR | A | 9-3 |
| 128 | 002610SMH | MH | 2506 VALLEY DR | A | 9-3 |
| 129 | 002611SMH | MH | 2500 VALLEY DR | A | 9-3 |
| 130 | 002612SMH | MH | 2508 VALLEY DR | A | 9-3 |

| TIME RESTRICTION FOR WORK IN STREET | |
|---|---|
| The following streets will be time restricted. No work will be permitted BEFORE 9:00 AM OR AFTER 3:30 PM. This includes digging, entering manholes, pulling cable or any other activity which disrupts traffic. | |
| Abingdon Drive, E & W | Washington Street to Slaters Lane |
| Bashford Lane | E. Abingdon Drive to N. Royal Street |
| Beauregard Street, N. | Western corporate limits to King Street |
| Braddock Road | Beauregard Street to N. West Street |
| Callahan Drive | Duke Street to King Street |
| Cameron Station Flyover | Duke Street to Cameron Station |
| Cameron Street | Commonwealth Avenue to N. Union Street |
| Church Street | Ramp from Beltway to S. Washington Street |
| Commonwealth Avenue | King Street to Mt. Vernon Avenue |
| Daingerfield Road | Duke Street to King Street |
| Diagonal Road | Duke Street to King Street |
| Duke Street | Western corporate limits to Rt. 1 (Patrick Street) |
| Edsall Road | Western corporate limits to Cameron Station |
| Eisenhower Avenue | S. Van Dorn Street to Holland Lane |
| Fairfax Street, N & S | Franklin Street to Third Street |
| Franklin Street | Rt. 1 (Patrick Street) to S. Union Street |
| Gibbon Street | Rt. 1 (Patrick Street) to Washington Street |
| Glebe Road, E & W | Northern corporate limits to Jefferson Davis Highway |
| Gunston Road | N. Quaker Lane to Valley Drive |
| Henry Street (Route 1) | Southern corporate limits to northern corporate limits |
| Holland Lane | Eisenhower Avenue to Duke Street |
| Howard Street, N. | N. Jordan Street to W. Braddock Road |
| Janneys Lane | Quaker Lane to King Street |
| Jefferson Davis Hy (Route 1) | Southern corporate limits to northern corporate limits |
| Jordan Street, N. | Duke Street to Seminary Road |
| Kenmore Avenue | All Inclusive |
| King Street | Western corporate limits to The Strand |
| Lincolnia Road | Western corporate limits to Quantrell Avenue |
| Madison Street | N. West Street to N. Fairfax Street |
| Menokin Street | N. Van Dorn Street to King Street |
| Metro Road | S. Van Dorn Street to Eisenhower Avenue |
| Mill Road | Eisenhower Avenue west of Telegraph Rd. to east cul-de-sac |
| Monroe Avenue, E & W | Russell Road to Jefferson Davis Highway |
| Montgomery Street | Rt. 1 (N. Henry Street) to N. Fairfax Street |
| Mt. Vernon Avenue | E. Braddock Road to northern corporate limits |
| Patrick Street (Route 1) | Southern corporate limits to northern corporate limits |
| Pendleton Street | N. West Street to N. Union Street |
| Pershing Avenue | Telegraph Road to Stovall Street |
| Pickett Street, S. | Western corporate limits to Duke Street |
| Prince Street | Daingerfield Road to Strand Street |
| Quaker Lane, N. | Duke Street to Shirley Highway |
| Quantrell Avenue | Shirley Highway to N. Beauregard Street |
| Royal Street, N. | Third Street to Bashford Lane |
| Russell Road | King Street to Mt. Vernon Avenue |
| Seminary Road | Western corporate limits to Quaker Lane |
| Slaters Lane | Route 1 to Washington Street |

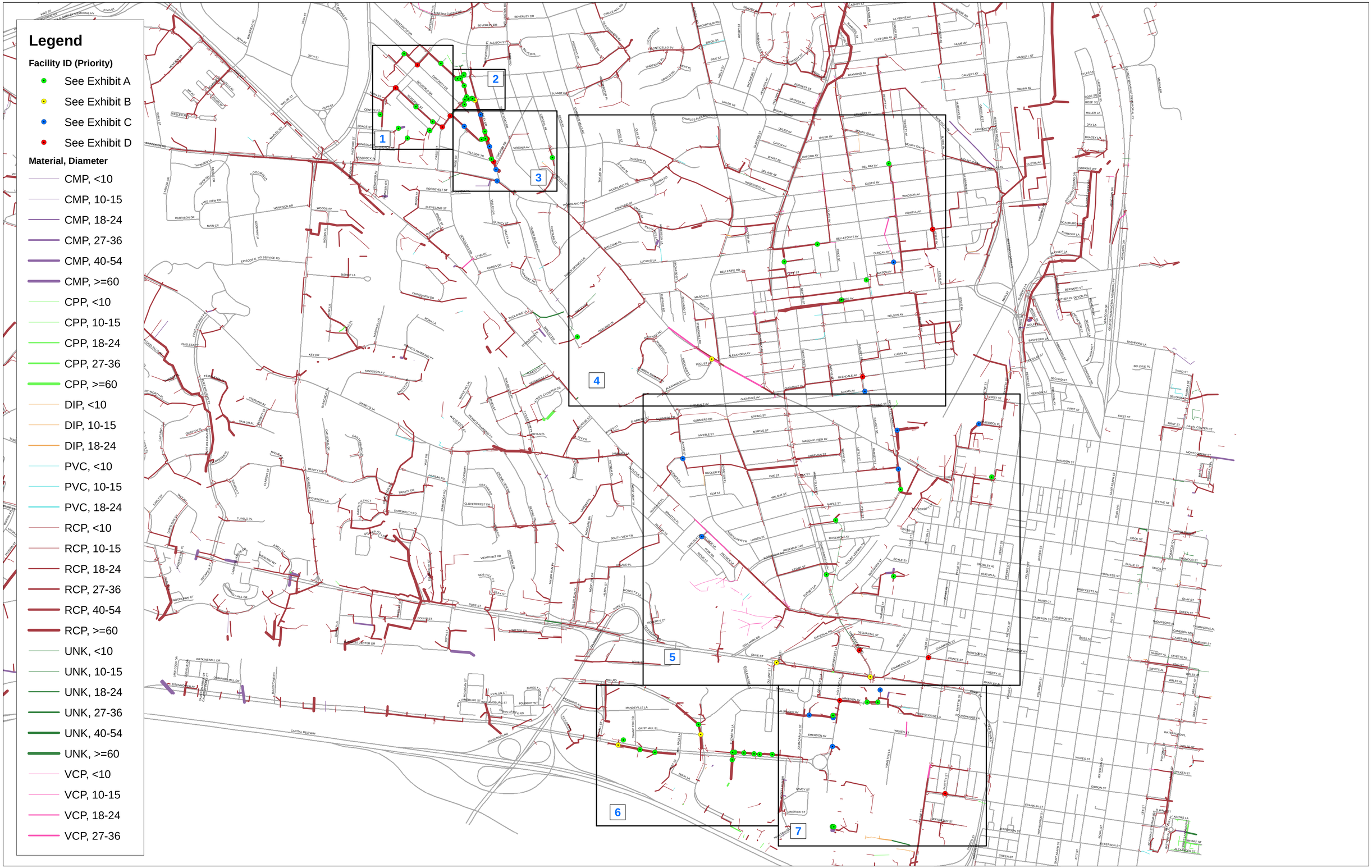
| | |
|---|---|
| Stevenson Avenue | Yoakum Parkway to S. Van Dorn Street |
| Stovall Street | Eisenhower Avenue to Mill Road |
| Telegraph Road | Capital Beltway to Duke Street |
| Third Street | N. Royal Street to N. Fairfax Street |
| Union Street | Franklin Street to Pendleton Street |
| Valley Drive | Kenwood Avenue to W. Glebe Road |
| Van Dorn Street, N & S | Southern corporate limits to Menokin Drive |
| Walker Street, S. | Duke Street to Stevenson Avenue |
| Washington Street, N & S | Southern corporate limits to Slaters Lane |
| West Street, N. | King Street to Madison Street |
| Wheeler Avenue | Western end to Duke Street |
| Wythe Street | N. West Street to N. Fairfax Street |
| Yoakum Parkway | Edsall Road to Stevenson Avenue |

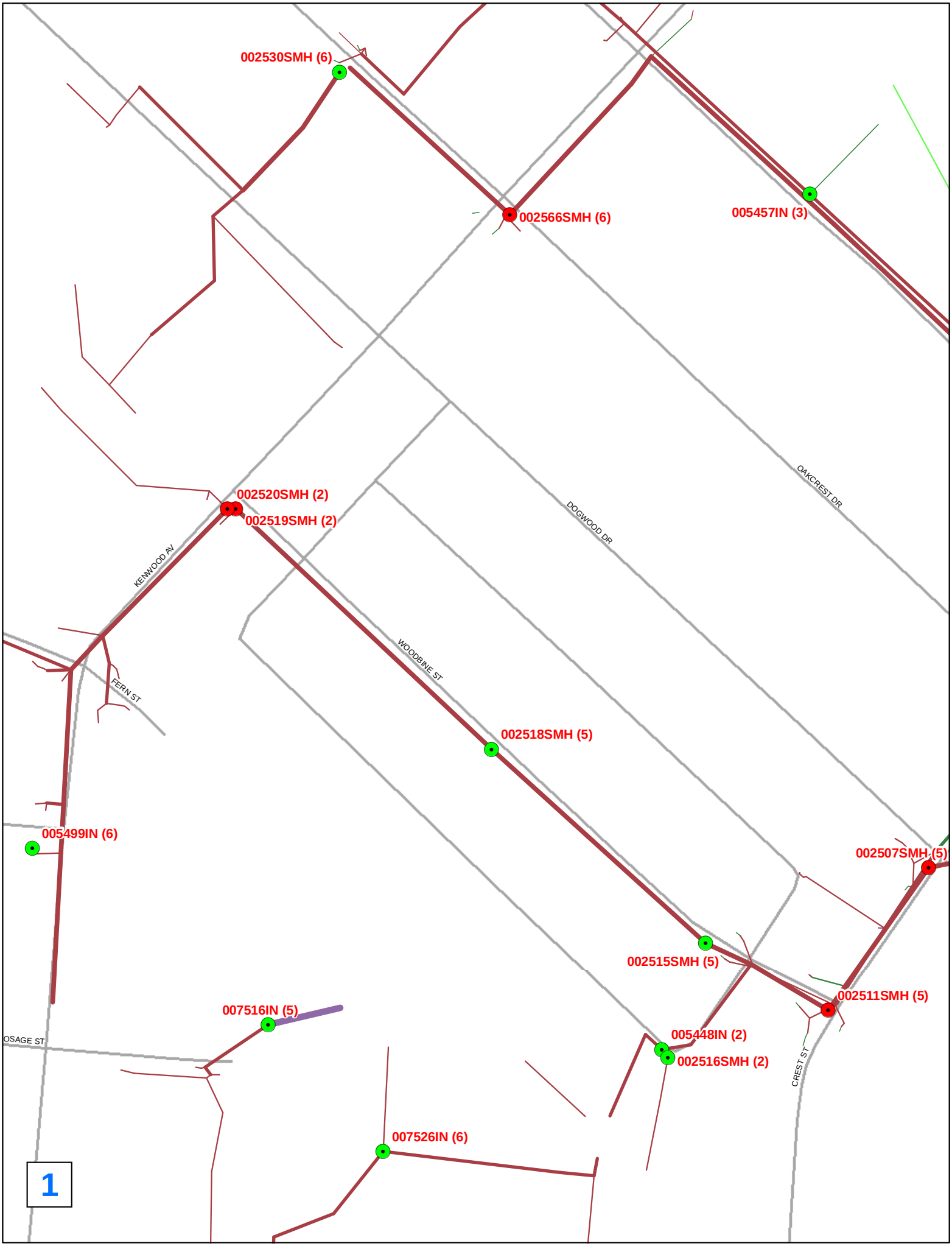
# Priority List

| FACILITYID | TYPE | FULL_ADDS | Priority | MOT |
|---|---|---|---|---|
| 000132CP | Culvert | 20 E LINDEN ST | 0 | A |
| 003230SMH | MH | 1661 PRINCE ST | 0 | D |
| 005541IN | Inlet | 1202 SUMMIT AV | 1 | B |
| 002537SMH | MH | 2802 VALLEY DR | 1 | A |
| 002538SMH | MH | 2802 VALLEY DR | 1 | A |
| 002541SMH | MH | 2802 VALLEY DR | 1 | A |
| 002544SMH | MH | 2603 VALLEY DR | 1 | D |
| 002564SMH | MH | 2808 VALLEY DR | 1 | A |
| 002571SMH | MH | 1205 SUMMIT AV | 1 | A |
| 000679ND | Node | 1401 OAKCREST DR | 1 | A |
| 005448IN | Inlet | 1408 WOODBINE ST | 2 | A |
| 005458IN | Inlet | 2812 VALLEY DR | 2 | A |
| 002553SMH | MH | 2812 VALLEY DR | 2 | A |
| 002554SMH | MH | 2900 VALLEY DR | 2 | A |
| 002555SMH | MH | 2900 VALLEY DR | 2 | A |
| 002563SMH | MH | 1205 SUMMIT AV | 2 | A |
| 002516SMH | MH | 1408 WOODBINE ST | 2 | A |
| 002519SMH | MH | 1620 KENWOOD AV | 2 | D |
| 002520SMH | MH | 1620 KENWOOD AV | 2 | D |
| 000697ND | Node | 2802 VALLEY DR | 2 | A |
| 000741ND | Node | 2317 VALLEY DR | 2 | C |
| 005457IN | Inlet | 1601 CRESTWOOD DR | 3 | A |
| 007516IN | Inlet | 1725 KENWOOD AV | 5 | A |
| 002524SMH | MH | 1309 DOGWOOD DR | 5 | C |
| 002542SMH | MH | 2706 VALLEY DR | 5 | C |
| 002543SMH | MH | 2600 VALLEY DR | 5 | A |
| 002551SMH | MH | 1400 CRESTWOOD DR | 5 | A |
| 002552SMH | MH | 1400 CRESTWOOD DR | 5 | A |
| 002507SMH | MH | 2606 CREST ST | 5 | D |
| 002511SMH | MH | 2509 CREST ST | 5 | D |
| 002515SMH | MH | 1412 WOODBINE ST | 5 | A |
| 002518SMH | MH | 1512 WOODBINE ST | 5 | A |
| 002605SMH | MH | 2404 VALLEY DR | 5 | C |
| 002606SMH | MH | 1202 HILLSIDE TR | 5 | D |
| 002608SMH | MH | 2504 VALLEY DR | 5 | C |
| 002609SMH | MH | 2508 VALLEY DR | 5 | A |
| 002611SMH | MH | 2500 VALLEY DR | 5 | A |
| 002612SMH | MH | 2508 VALLEY DR | 5 | A |
| 005499IN | Inlet | 1701 CENTRE PZ | 6 | A |
| 007526IN | Inlet | 1499 W BRADDOCK RD | 6 | A |
| 002530SMH | MH | 1710 OAKCREST DR | 6 | A |
| 002566SMH | MH | 1612 OAKCREST DR | 6 | D |
| 002596SMH | MH | 2425 CENTRAL AV | 6 | A |
| 004983IN | Inlet | 1450 DUKE ST | 7 | C |

| | | | | |
|---|---|---|---|---|
| 006124IN | Inlet | 67 COMMONWEALTH AV | 7 | A |
| 006174IN | Inlet | 214 E MONROE AV | 7 | A |
| 006230IN | Inlet | 1610 MOUNT VERNON AV | 7 | A |
| 006240IN | Inlet | 1702 DEWITT AV | 7 | C |
| 006596IN | Inlet | 222 E DEL RAY AV | 7 | A |
| 000519IO | IO | 640 W TIMBER BRANCH PY | 7 | A |
| 000088SMH | MH | 631 S FAYETTE ST | 7 | D |
| 001550SMH | MH | 2451 EISENHOWER AV | 7 | A |
| 001583SMH | MH | 1446 A DUKE ST | 7 | A |
| 001658SMH | MH | 1970 DUKE ST | 7 | B |
| 001667SMH | MH | 590 HOLLAND LA | 7 | C |
| 001907SMH | MH | 320 E BELLEFONTE AV | 7 | D |
| 001962SMH | MH | 33 E BELLEFONTE AV | 7 | A |
| 002426SMH | MH | 700 N FAYETTE ST | 7 | A |
| 002427SMH | MH | 1322 PRINCE ST | 7 | D |
| 003067SMH | MH | 402 W MASONIC VIEW AV | 7 | C |
| 003076SMH | MH | 229 ADAMS AV | 7 | C |
| 003356SMH | MH | 301 E GLENDALE AV | 7 | D |
| 003361SMH | MH | 200 W BRADDOCK RD | 7 | B |
| 003269SMH | MH | 1609 CAMERON ST | 7 | A |
| 003421SMH | MH | 15 E BELLEFONTE AV | 7 | A |
| 003496SMH | MH | 400 CARLISLE DR | 7 | C |
| 004794IN | Inlet | 2451 EISENHOWER AV | 9 | B |
| 004931IN | Inlet | 1446 A DUKE ST | 9 | A |
| 004961IN | Inlet | 401 HOLLAND LA | 9 | A |
| 005007IN | Inlet | 2010 EISENHOWER AV | 9 | A |
| 001556SMH | MH | 2381 EISENHOWER AV | 9 | A |
| 001557SMH | MH | 2401 EISENHOWER AV | 9 | A |
| 001591SMH | MH | 370 HOLLAND LA | 9 | D |
| 001619SMH | MH | 501 HOLLAND LA | 9 | C |
| 001622SMH | MH | 1865 BALLENGER AV | 9 | C |
| 001642SMH | MH | 2316 MILL RD | 9 | B |
| 001653SMH | MH | 1501 DUKE ST | 9 | B |
| 001665SMH | MH | 2318 MILL RD | 9 | A |
| 001682SMH | MH | 2006 EISENHOWER AV | 9 | A |
| 001684SMH | MH | 2026 EISENHOWER AV | 9 | A |
| 001686SMH | MH | 2034 EISENHOWER AV | 9 | A |
| 001688SMH | MH | 2111 EISENHOWER AV | 9 | A |
| 001689SMH | MH | 2111 EISENHOWER AV | 9 | A |
| 001690SMH | MH | 2034 EISENHOWER AV | 9 | A |
| 003119SMH | MH | 515 MOUNT VERNON AV | 9 | C |
| 003136SMH | MH | 710 1/2 MOUNT VERNON AV | 9 | C |
| 003141SMH | MH | 417 MOUNT VERNON AV | 9 | A |
| 003475SMH | MH | 1320 BRADDOCK PL | 9 | C |
| 000088CP | Culvert | 310 HOOFFS RUN DR | 9 | A |
| 000089CP | Culvert | 310 HOOFFS RUN DR | 9 | A |
| 000090CP | Culvert | 310 HOOFFS RUN DR | 9 | A |

# Primary List

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WOODBINE ST
FERN ST
002518SMH (5)
005499IN (6)
002507SMH (5)
002515SMH (5)
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OSAGE ST
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CREST ST
007526IN (6)
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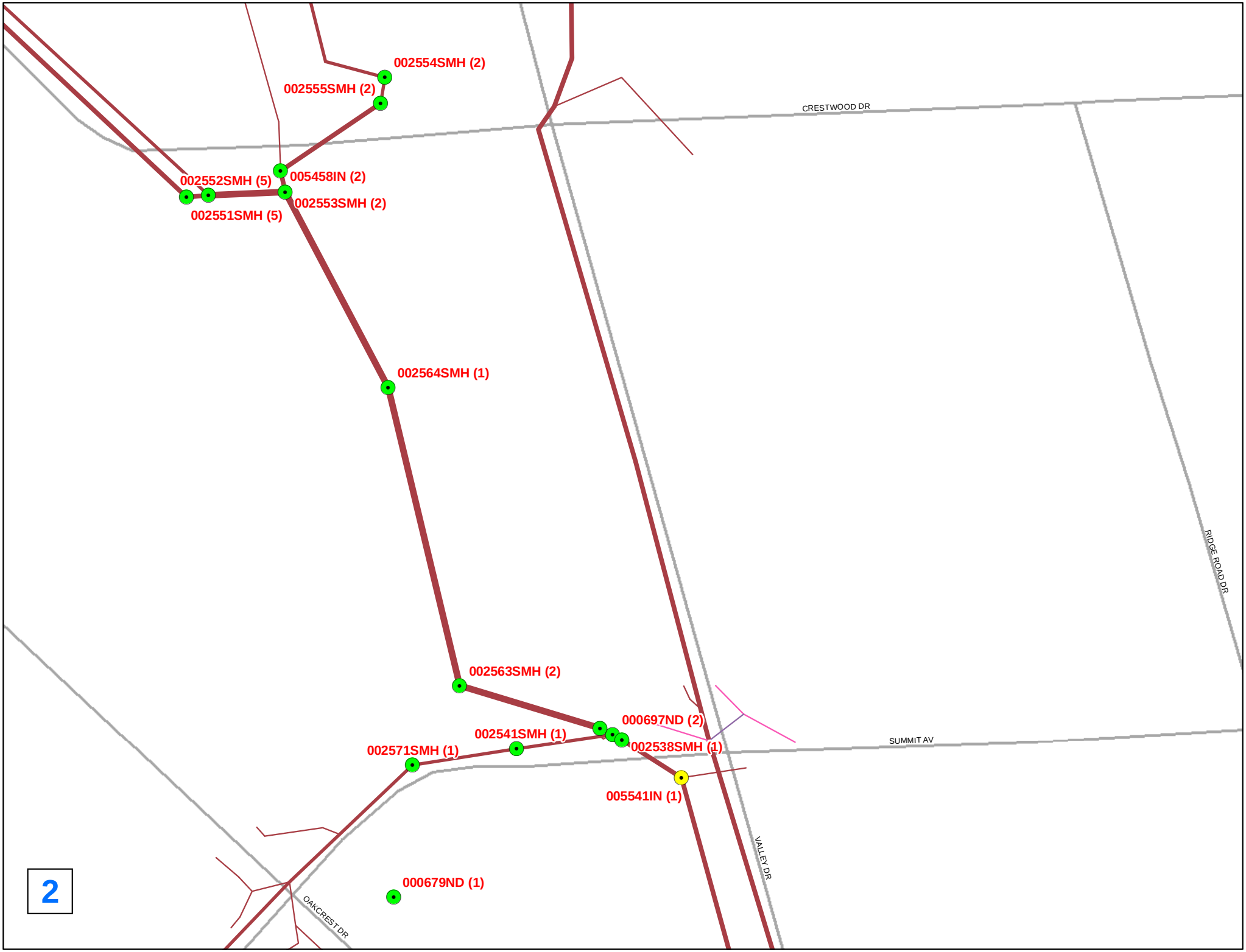
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CRESTWOOD DR
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RIDGE ROAD DR
002563SMH (2)
000697ND (2)
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SUMMIT AV
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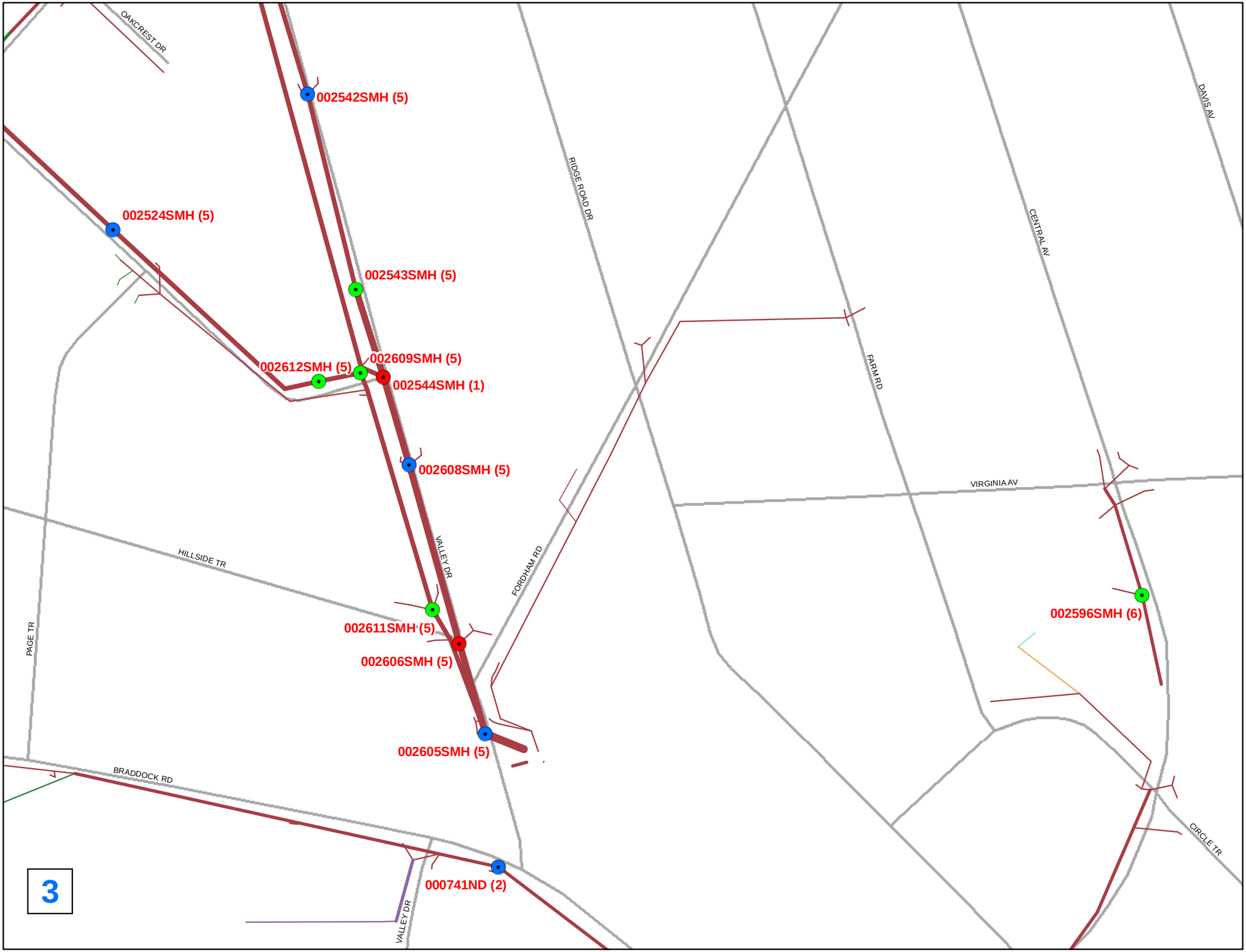
VALLEY DR
000679ND (1)
OAKCREST DR
2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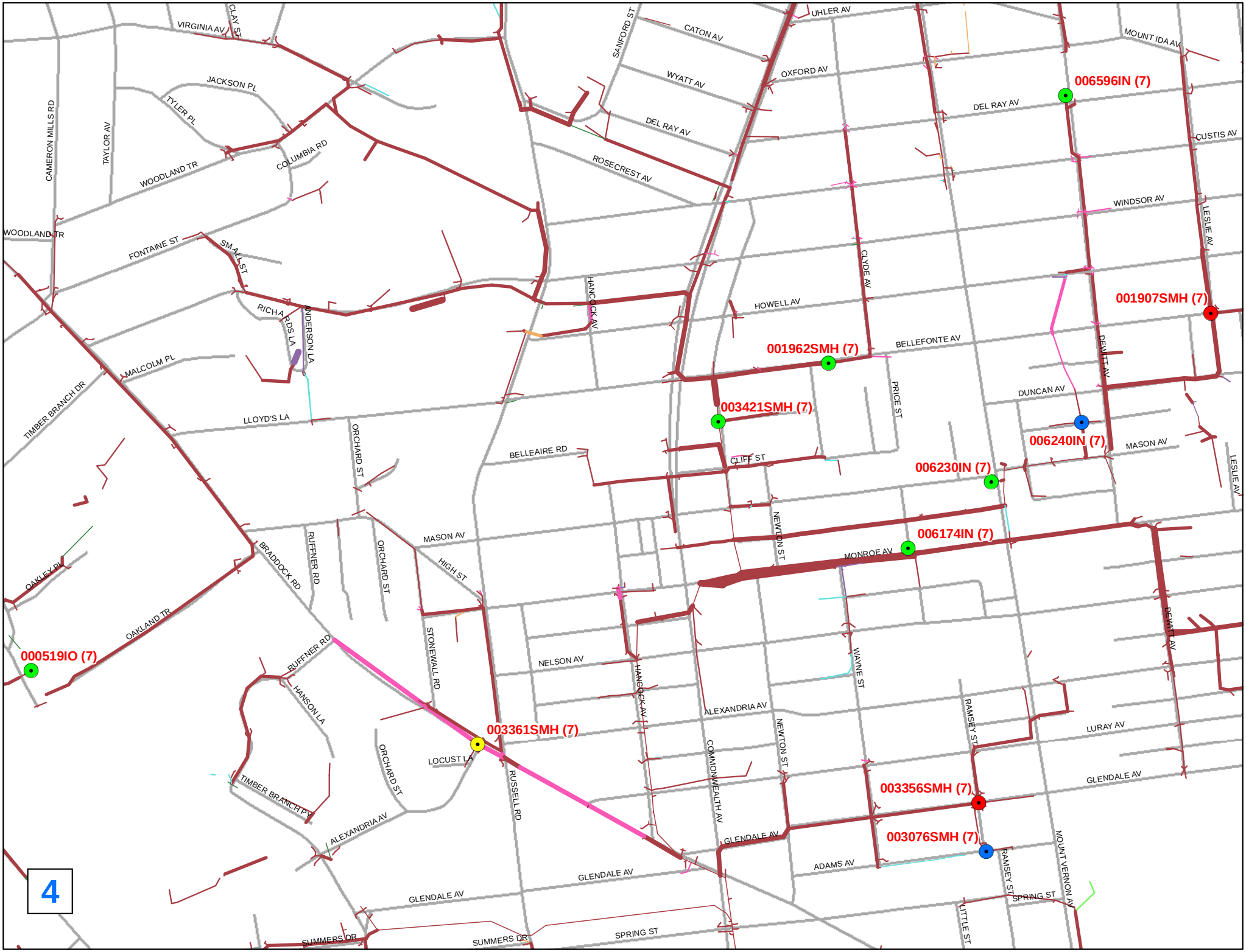
002608SMH (5)
RIDGE ROAD DR
FARM RD
CENTRAL AV
DAVIS AV
VIRGINIA AV
HILLSIDE TR
VALLEY DR
FORDHAM RD
PAGE TR
002611SMH (5)
002606SMH (5)
002596SMH (6)
002605SMH (5)
BRADDOCK RD
CIRCLE TR
000741ND (2)
VALLEY DR
3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VIRGINIA AV
CLAY ST
JACKSON PL
TYLER PL
CAMERON MILLS RD
TAYLOR AV
WOODLAND TR
COLUMBIA RD
WOODLAND TR
FONTAINE ST
SMALL ST
RICHARDS LA
ANDERSON LA
MALCOLM PL
TIMBER BRANCH DR
LLOYD'S LA
ORCHARD ST
BELLEAIRE RD
SANFORD ST
CATON AV
WYATT AV
DEL RAY AV
ROSECREST AV
HANCOCK AV
UHLER AV
OXFORD AV
HOWELL AV
CLYDE AV
BELLEFONTE AV
PRICE ST
CLIFF ST
NEWTON ST
MONROE AV
WAYNE ST
MOUNT IDA AV
DEL RAY AV
CUSTIS AV
WINDSOR AV
LESLIE AV
DEWITT AV
DUNCAN AV
MASON AV
LESLIE AV
DEWITT AV
MASON AV
HIGH ST
BRADDOCK RD
RUFFNER RD
ORCHARD ST
OAKLEY PL
OAKLAND TR
RUFFNER RD
HANSON LA
STONEWALL RD
NELSON AV
HANCOCK AV
ALEXANDRIA AV
COMMONWEALTH AV
NEWTON ST
RAMSEY ST
LURAY AV
LOCUST LA
ORCHARD ST
TIMBER BRANCH PY
ALEXANDRIA AV
RUSSELL RD
GLENDALE AV
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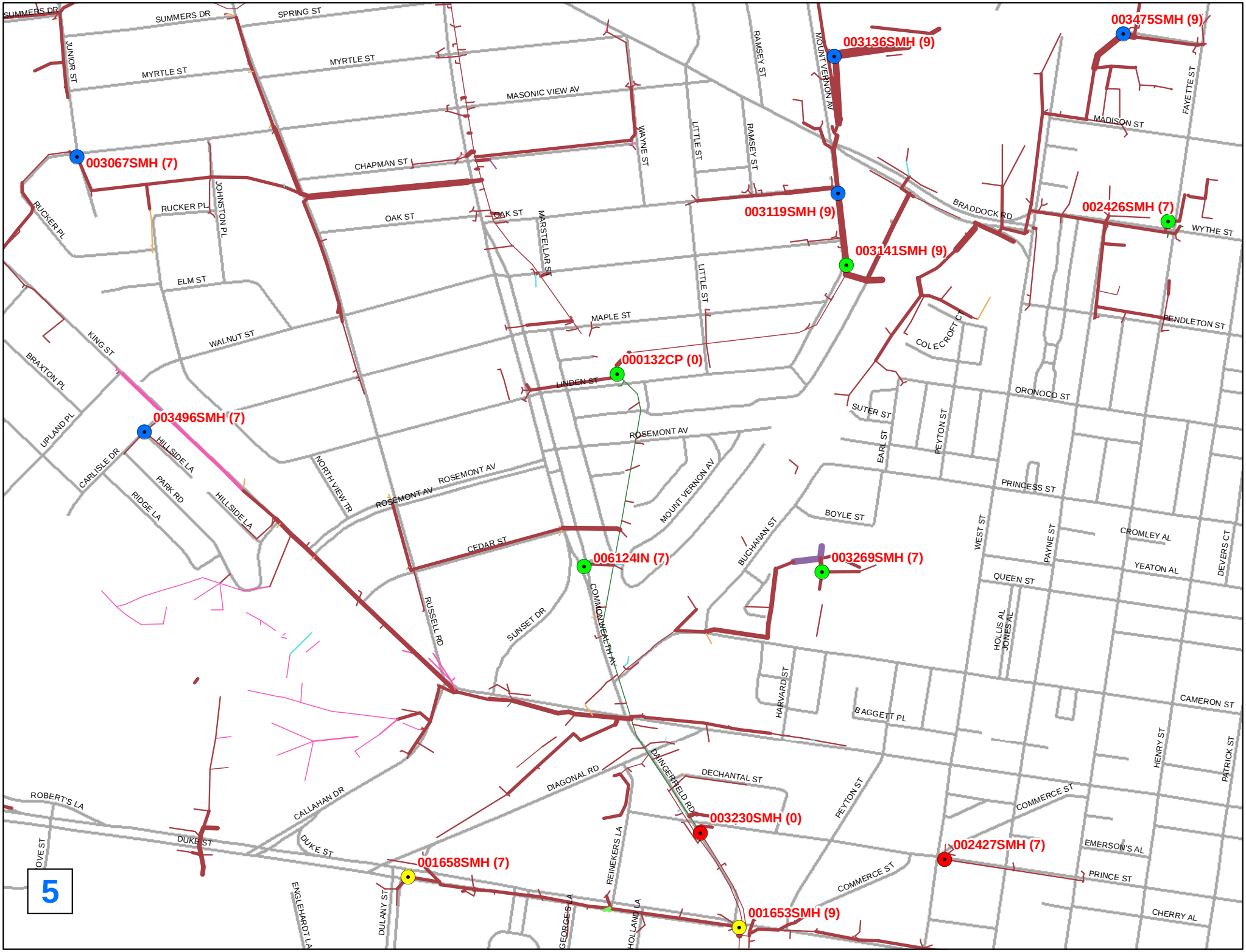
GLENDALE AV
SUMMERS DR
SUMMERS DR
SPRING ST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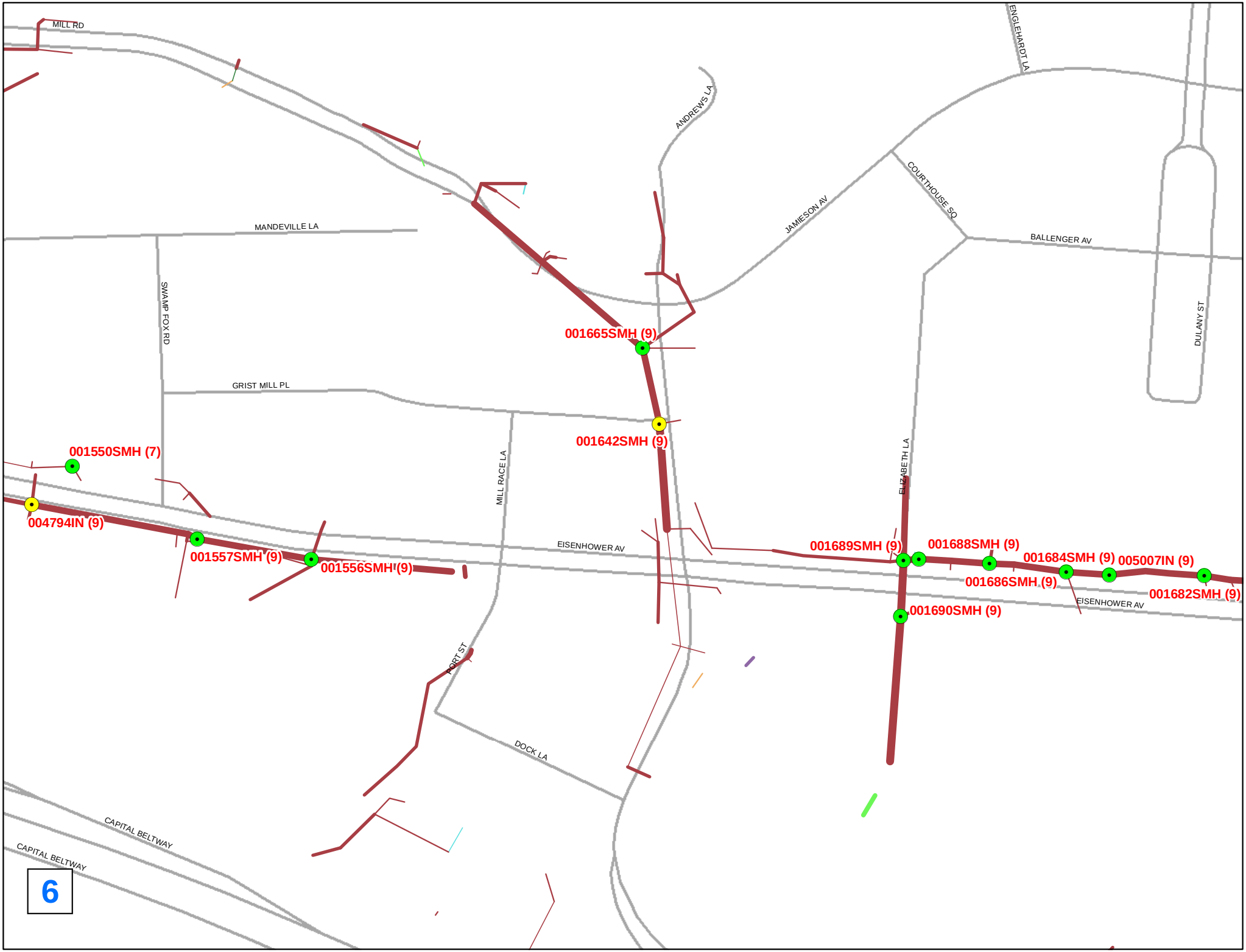
JUNIOR ST
MYRTLE ST
MASONIC VIEW AV
CHAPMAN ST
RUCKER PL
JOHNSTON PL
OAK ST
MARSTELLAR ST
WAYNE ST
LITTLE ST
RAMSEY ST
MOUNT VERNON AV
MADISON ST
FAYETTE ST
BRADDOCK RD
WYTHE ST
ELM ST
WALNUT ST
MAPLE ST
KING ST
BRAXTON PL
UPLAND PL
LINDEN ST
PENDLETON ST
COLECROFT CT
ORONOCO ST
SUTER ST
EARL ST
PEYTON ST
ROSEMONT AV
CARLISLE DR
HILLSIDE LA
PARK RD
RIDGE LA
NORTH VIEW TR
PRINCESS ST
BOYLE ST
WEST ST
PAYNE ST
CROMLEY AL
DEVERS CT
YEATON AL
QUEEN ST
CEDAR ST
BUCHANAN ST
RUSSELL RD
SUNSET DR
COMMONWEALTH AV
HOLLIS AL
JONES AL
HARVARD ST
BAGGETT PL
CAMERON ST
HENRY ST
PATRICK ST
DINGERFIELD RD
DECHANTAL ST
DIAGONAL RD
CALLAHAN DR
ROBERT'S LA
DUKE ST
COMMERCE ST
EMERSON'S AL
PRINCE ST
CHERRY AL
REINEKERS LA
ENGLEHARDT LA
DULANY ST
GEORGE LA
HOLLAND LA
5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ANDREWS LA
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JAMIESON AV
BALLENGER AV
MANDEVILLE LA
SWAMP FOX RD
DULANY ST
001665SMH (9)
GRIST MILL PL
001642SMH (9)
001550SMH (7)
MILL RACE LA
ELIZABETH LA
004794IN (9)
EISENHOWER AV
001689SMH (9)
001688SMH (9)
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005007IN (9)
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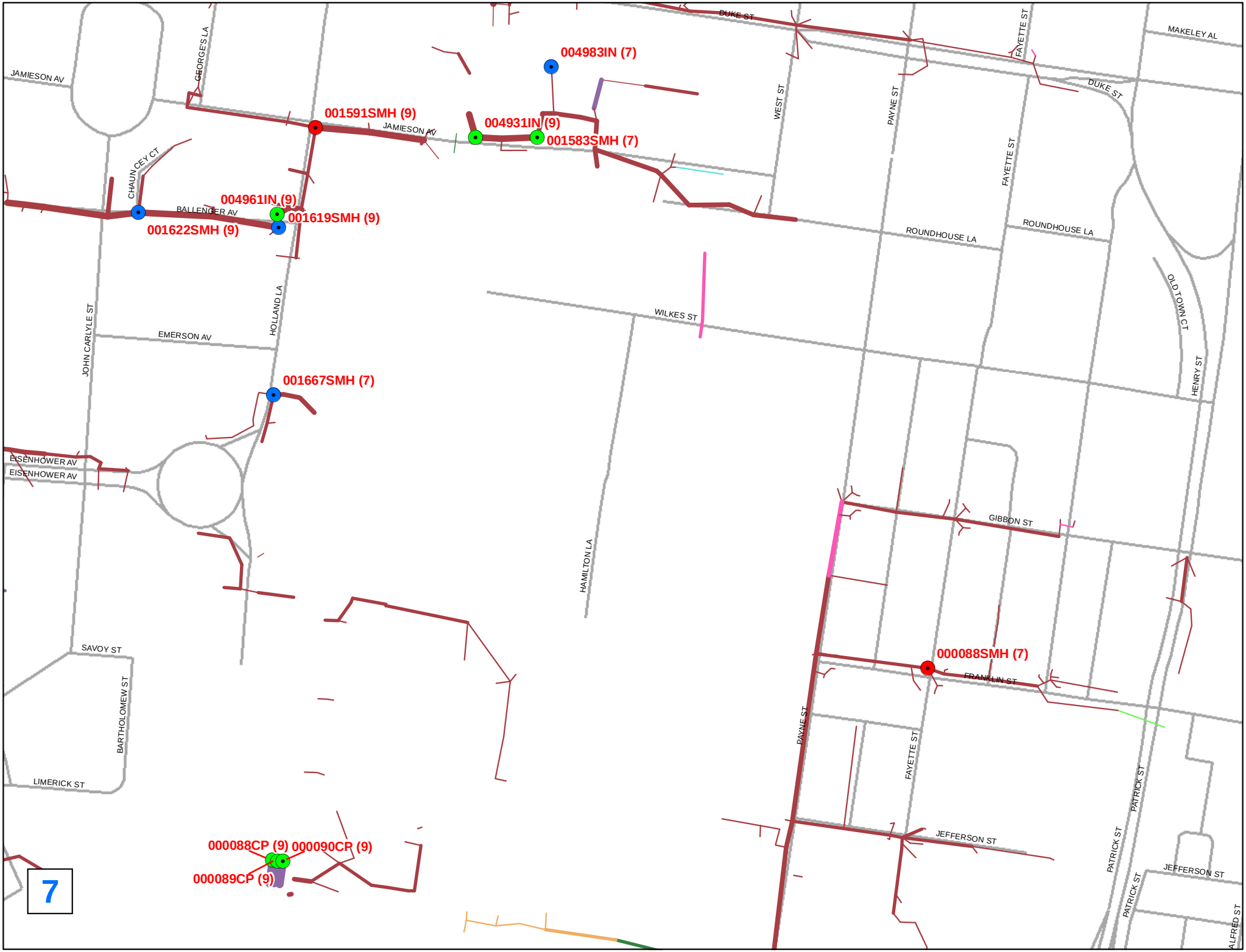
PORT ST
DOCK LA
CAPITAL BELTWAY
CAPITAL BELTWAY
6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PAYNE ST
001591SMH (9)
JAMIESON AV
004931IN (9)
001583SMH (7)
CHAUN CEY CT
004961IN (9)
BALLENGER AV
001619SMH (9)
001622SMH (9)
ROUNDHOUSE LA
ROUNDHOUSE LA
OLD TOWN CT
WILKES ST
JOHN CARLYLE ST
EMERSON AV
HOLLAND LA
HENRY ST
001667SMH (7)
EISENHOWER AV
EISENHOWER AV
GIBBON ST
HAMILTON LA
SAVOY ST
000088SMH (7)
FRANKLIN ST
BARTHOLOMEW ST
PAYNE ST
FAYETTE ST
LIMERICK ST
PATRICK ST
JEFFERSON ST
PATRICK ST
JEFFERSON ST
PATRICK ST
000088CP (9) 000090CP (9)
000089CP (9)
ALFRED ST
7

DEPARTMENT OF TRANSPORTATION
AND ENVIRONMENTAL SERVICES
P.O. Box 178 - City Hall
Alexandria, Virginia 22313

alexandriava.gov

Engineering & Design Division
703-746-4045

Site Plan Section
703-746-4064

February 4, 2010

Dear Property Owners and Tenants:

The City of Alexandria has contracted a team including Michael Baker Jr., Inc., Rinker Design Associates (RDA), and Video Pipe Services (VPS), study the storm drainage system throughout the City. This study will be used to identify and prioritize drainage improvement projects.

As part of this study, contractor staff will need to examine the pipes and manholes of the public storm drainage system. They will be making measurements using survey equipment, as well as inspecting inside manholes.

The bulk of the work will be performed on public property, though some of it will take place within easements on private property. An easement is recorded in the land records, and allows City staff and contractors to enter private property to inspect, maintain or repair the sewer system.

The current work is only inspection, will take less than 1 hour, and will not cause any damage. Contractor staff has been instructed to knock on doors before entering, and to ensure the safety and security of residents.

If you have specific requirements to be considered by the field crews, please contact Tim Griffith at 703 498 4051 or Rob Hilton at 443 864 2567.

If you have any questions about this study, please call me at 703-746-4057.

Sincerely,

Craig Perl

Craig D. Perl, P.E.
Civil Engineer III

# APPENDIX C

| FACILITYID | Northing (ft) | Easting (ft) | Rim Elevation (ft) |
|---|---|---|---|
| 000088CP | 6976733.013 | 11893233.91 | 6.19 |
| 000088SMH | 6977248.798 | 11895024.47 | 30.87 |
| 000089CP | 6976731.026 | 11893248.85 | 6.18 |
| 000090CP | 6976728.516 | 11893263.18 | 5.93 |
| 000132CP | 6981576.138 | 11893312.38 | 16.5 |
| 000519IO | 6984489.329 | 11889194.06 | 86.14 |
| 000679ND | | | not found |
| 000697ND | | | not found |
| 000741ND | | | not found |
| 001550SMH | 6978103.623 | 11889924.95 | 15.95 |
| 001556SMH | 6977908.772 | 11890426 | 15.53 |
| 001557SMH | 6977952.353 | 11890186.13 | 15.11 |
| 001583SMH | 6978704.32 | 11893954.18 | 22.13 |
| 001591SMH | 6978733.717 | 11893348.87 | 27.2 |
| 001619SMH | 6978460.088 | 11893246.92 | 25.93 |
| 001622SMH | 6978485.889 | 11892872.33 | 33.68 |
| 001642SMH | 6978190.659 | 11891142.9 | 14.43 |
| 001653SMH | 6979104.303 | 11893831.92 | 12.94 |
| 001658SMH | 6979329.41 | 11892356.47 | 43.71 |
| 001665SMH | 6978346.913 | 11891115.49 | 18.37 |
| 001667SMH | 6978003.203 | 11893238.39 | 24.14 |
| 001682SMH | 6977866.337 | 11892288.14 | 26.19 |
| 001684SMH | 6977891.342 | 11891943 | 22.29 |
| 001686SMH | 6977902.13 | 11891790.64 | 20.51 |
| 001688SMH | 6977910.666 | 11891678.07 | 19.03 |
| 001689SMH | 6977905.45 | 11891642.15 | 18.54 |
| 001690SMH | 6977784.669 | 11891646.52 | 20.39 |
| 001907SMH | 6986201.683 | 11894821.22 | 40.1 |
| 001962SMH | 6985960.91 | 11892995.97 | 33.76 |
| 002426SMH | 6982274.126 | 11895759.72 | 41.94 |
| 002427SMH | 6979405.601 | 11894757.8 | 27 |
| 002507SMH | 6987996.737 | 11887180.58 | 178.42 |
| 002511SMH | 6987816.726 | 11887057.29 | 183.12 |
| 002515SMH | 6987898.669 | 11886902.78 | 185.07 |
| 002516SMH | 6987758.925 | 11886856.42 | 188.82 |
| 002518SMH | 6988145.027 | 11886637.09 | 188.19 |
| 002519SMH | 6988438.789 | 11886321.32 | 190.46 |
| 002520SMH | 6988438.932 | 11886307.62 | 190.7 |
| 002524SMH | 6987826.994 | 11887403.88 | 170.03 |
| 002530SMH | 6988984.612 | 11886463.22 | 178.9 |
| 002537SMH | 6988272.878 | 11887520.8 | 163.09 |
| 002538SMH | 6988262.391 | 11887535.47 | 162.39 |
| 002541SMH | 6988261.027 | 11887477.35 | 164.32 |
| 002542SMH | 6988013.652 | 11887660.55 | 153.38 |
| 002543SMH | 6987749.646 | 11887734.88 | 145.67 |
| 002544SMH | 6987631.325 | 11887768.31 | 143.72 |

| FACILITYID | Northing (ft) | Easting (ft) | Rim Elevation (ft) |
|---|---|---|---|
| 002551SMH | 6988586.394 | 11887281.56 | 167.9 |
| 002552SMH | 6988586.224 | 11887294.27 | 167.77 |
| 002553SMH | 6988585.542 | 11887341.29 | 166.92 |
| 002554SMH | 6988656.432 | 11887396.26 | 169.07 |
| 002555SMH | 6988636.449 | 11887396.96 | 167.31 |
| 002563SMH | | | Buried |
| 002564SMH | 6988471.626 | 11887404.67 | 162.16 |
| 002566SMH | 6988803.53 | 11886658.96 | 185.44 |
| 002571SMH | 6988248.665 | 11887413.56 | 167.29 |
| 002596SMH | 6987333.359 | 11888794.5 | 176.91 |
| 002605SMH | 6987141.336 | 11887906.89 | 138.3 |
| 002606SMH | 6987267.638 | 11887870.54 | 139.74 |
| 002608SMH | 6987508.442 | 11887802.71 | 141.79 |
| 002609SMH | 6987636.129 | 11887735.78 | 144.25 |
| 002611SMH | 6987310.495 | 11887829.4 | 140.83 |
| 002612SMH | 6987627.319 | 11887680.48 | 148.13 |
| 003067SMH | 6982558.884 | 11890870.39 | 65.97 |
| 003076SMH | 6983629.164 | 11893748.55 | 42.58 |
| 003119SMH | 6982396.98 | 11894282.62 | 24.11 |
| 003136SMH | 6983011.013 | 11894262.4 | 31.23 |
| 003141SMH | 6982075.016 | 11894319.04 | 21.63 |
| 003230SMH | 6979526.697 | 11893662.21 | 11.32 |
| 003269SMH | 6980692.701 | 11894211.61 | 25.57 |
| 003356SMH | 6983861.811 | 11893717.89 | 43.79 |
| 003361SMH | 6984134.478 | 11891329.85 | 54.18 |
| 003421SMH | 6985688.181 | 11892476.48 | 32.1 |
| 003475SMH | 6983114.394 | 11895567.2 | 38.78 |
| 003496SMH | 6981325.679 | 11891168.1 | 123.47 |
| 004794IN | 6978018.918 | 11889837.35 | 14.09 |
| 004931IN | 6978703.985 | 11893782.66 | 21.92 |
| 004961IN | 6978494.525 | 11893244.53 | 26.45 |
| 004983IN | 6978901.31 | 11893993.75 | 13.67 |
| 005007IN | 6977877.287 | 11892119.52 | 23.7 |
| 005448IN | 6987770.928 | 11886849.29 | 188.72 |
| 005457IN | 6988823.787 | 11887034.7 | 172.85 |
| 005458IN | 6988597.919 | 11887338.28 | 167.01 |
| 005499IN | 6988018.792 | 11886067.67 | 198.52 |
| 005541IN | 6988240.294 | 11887568.3 | 161.21 |
| 006124IN | 6980723.644 | 11893138.16 | 15.08 |
| 006174IN | 6985079.918 | 11893382.65 | 29.36 |
| 006230IN | 6985390.224 | 11893778.67 | 35.17 |
| 006240IN | 6985675.398 | 11894204.51 | 32.16 |
| 006596IN | 6987235.431 | 11894131.01 | 45.04 |
| 007516IN | 6987800.782 | 11886360.45 | 200.75 |
| 007526IN | 6987644.811 | 11886500.82 | 201.76 |

# APPENDIX D

| FACILITYID | Measured Depth | Measured Pipe Diameter (in) | Measured Depth to Bench | Depth to Invert (ft) | Depth to Bench (ft) | Notes |
|---|---|---|---|---|---|---|
| 000088CP | 7.20 | 86 | | 7.20 | | |
| 000088SMH | 81.00 | 12 | | 6.75 | | |
| 000088SMH | 81.00 | 18 | | 6.75 | | |
| 000088SMH | 81.00 | 24 | | 6.75 | | |
| 000089CP | 7.20 | 86 | | 7.20 | | |
| 000090CP | 7.20 | 86 | | 7.20 | | |
| 000132CP | 79.00 | 192 | | 6.58 | | |
| 000132CP | 79.00 | 234 | | 6.58 | | |
| 000519IO | 98.00 | 18 | 90 | 8.17 | 7.5 | |
| 000679ND | 0.00 | 0 | | 0.00 | | Not found |
| 000697ND | 27.00 | 12 | 21 | 2.25 | 1.75 | |
| 000741ND | 46.00 | 12 | | 3.83 | | |
| 001550SMH | 4.90 | 12 | 5 | 4.90 | 5 | |
| 001550SMH | 5.30 | 18 | 5 | 5.30 | 5 | |
| 001556SMH | 5.00 | 8 | 8 | 5.00 | 8 | |
| 001556SMH | 6.00 | 12 | 8 | 6.00 | 8 | |
| 001556SMH | 6.00 | 15 | 8 | 6.00 | 8 | |
| 001556SMH | 9.20 | 42 | 8 | 9.20 | 8 | |
| 001556SMH | 9.20 | 48 | 8 | 9.20 | 8 | |
| 001557SMH | 3.00 | 8 | | 3.00 | | |
| 001557SMH | 4.00 | 12 | | 4.00 | | |
| 001557SMH | 7.80 | 36 | | 7.80 | | |
| 001557SMH | 7.80 | 42 | | 7.80 | | |
| 001583SMH | 58.00 | 15 | | 4.83 | | |
| 001583SMH | 193.50 | 42 | | 16.13 | | |
| 001583SMH | 193.50 | 48 | | 16.13 | | |
| 001591SMH | 213.00 | 60 | 95 | 17.75 | 7.916666667 | |
| 001619SMH | 81.00 | 8 | 93 | 6.75 | 7.75 | |
| 001619SMH | 116.00 | 48 | 93 | 9.67 | 7.75 | |
| 001622SMH | 12.50 | 27 | 9.9 | 12.50 | 9.9 | |
| 001622SMH | 13.50 | 44 | 9.9 | 13.50 | 9.9 | |
| 001642SMH | 5.80 | 8 | | 5.80 | | |
| 001642SMH | 9.30 | 48 | | 9.30 | | |
| 001653SMH | 0.00 | 0 | | 0.00 | | Measured Inaccurately |
| 001658SMH | 7.60 | 15 | | 7.60 | | |
| 001665SMH | 7.00 | 24 | 10 | 7.00 | 10 | |
| 001665SMH | 12.60 | 48 | 10 | 12.60 | 10 | |
| 001665SMH | 12.60 | 60 | 10 | 12.60 | 10 | |
| 001667SMH | 109.00 | 18 | 127 | 9.08 | 10.58333333 | |
| 001667SMH | 142.00 | 24 | 127 | 11.83 | 10.58333333 | |
| 001667SMH | 155.00 | 18 | 127 | 12.92 | 10.58333333 | |
| 001667SMH | 174.00 | 24 | 127 | 14.50 | 10.58333333 | |
| 001682SMH | 5.30 | 15 | 10.5 | 5.30 | 10.5 | |

| FACILITYID | Measured Depth | Measured Pipe Diameter (in) | Measured Depth to Bench | Depth to Invert (ft) | Depth to Bench (ft) | Notes |
|---|---|---|---|---|---|---|
| 001682SMH | 11.30 | 36 | 10.5 | 11.30 | 10.5 | |
| 001684SMH | 5.60 | 15 | 7.8 | 5.60 | 7.8 | |
| 001684SMH | 11.20 | 36 | 7.8 | 11.20 | 7.8 | |
| 001686SMH | 6.60 | 18 | 8.5 | 6.60 | 8.5 | |
| 001686SMH | 11.60 | 46 | 8.5 | 11.60 | 8.5 | |
| 001688SMH | 5.40 | 15 | 9.6 | 5.40 | 9.6 | |
| 001688SMH | 12.20 | 46 | 9.6 | 12.20 | 9.6 | |
| 001688SMH | 14.80 | 60 | 9.6 | 14.80 | 9.6 | |
| 001689SMH | 13.90 | 24 | 13.5 | 13.90 | 13.5 | |
| 001689SMH | 14.50 | 60 | 13.5 | 14.50 | 13.5 | |
| 001689SMH | 14.60 | 60 | 13.5 | 14.60 | 13.5 | |
| 001689SMH | 14.70 | 48 | 13.5 | 14.70 | 13.5 | |
| 001690SMH | 5.60 | 8 | 16 | 5.60 | 16 | |
| 001690SMH | 10.60 | 18 | 16 | 10.60 | 16 | |
| 001690SMH | 17.60 | 53 | 16 | 17.60 | 16 | |
| 001690SMH | 17.60 | 60 | 16 | 17.60 | 16 | |
| 001907SMH | 45.00 | 15 | 59 | 3.75 | 4.916666667 | |
| 001907SMH | 69.00 | 24 | 59 | 5.75 | 4.916666667 | |
| 001907SMH | 69.00 | 27 | 59 | 5.75 | 4.916666667 | |
| 001962SMH | 63.00 | 12 | 57 | 5.25 | 4.75 | |
| 001962SMH | 63.00 | 27 | 57 | 5.25 | 4.75 | |
| 002426SMH | 96.00 | 18 | 92 | 8.00 | 7.666666667 | |
| 002426SMH | 96.00 | 24 | 92 | 8.00 | 7.666666667 | |
| 002507SMH | 89.00 | 30 | 77 | 7.42 | 6.416666667 | |
| 002511SMH | 108.00 | 12 | 96 | 9.00 | 8 | |
| 002511SMH | 108.00 | 30 | 96 | 9.00 | 8 | |
| 002515SMH | 109.00 | 36 | 97 | 9.08 | 8.083333333 | |
| 002516SMH | 40.00 | 15 | 34 | 3.33 | 2.833333333 | |
| 002518SMH | 108.00 | 36 | 96 | 9.00 | 8 | |
| 002519SMH | 86.00 | 15 | 74 | 7.17 | 6.166666667 | |
| 002519SMH | 86.00 | 36 | 74 | 7.17 | 6.166666667 | |
| 002520SMH | 68.00 | 15 | 72 | 5.67 | 6 | |
| 002520SMH | 84.00 | 36 | 72 | 7.00 | 6 | |
| 002524SMH | 70.00 | 24 | 58 | 5.83 | 4.833333333 | |
| 002530SMH | 40.50 | 12 | 34 | 3.38 | 2.833333333 | |
| 002530SMH | 40.50 | 24 | 34 | 3.38 | 2.833333333 | |
| 002530SMH | 40.50 | 27 | 34 | 3.38 | 2.833333333 | |
| 002537SMH | 80.00 | 36 | 68 | 6.67 | 5.666666667 | |
| 002538SMH | 42.00 | 12 | 55 | 3.50 | 4.583333333 | |
| 002538SMH | 72.00 | 30 | 55 | 6.00 | 4.583333333 | |
| 002541SMH | 72.00 | 21 | 60 | 6.00 | 5 | |
| 002541SMH | 72.00 | 24 | 60 | 6.00 | 5 | |
| 002542SMH | 30.00 | 8 | 47 | 2.50 | 3.916666667 | |
| 002542SMH | 64.00 | 36 | 47 | 5.33 | 3.916666667 | |

| FACILITYID | Measured Depth | Measured Pipe Diameter (in) | Measured Depth to Bench | Depth to Invert (ft) | Depth to Bench (ft) | Notes |
|---|---|---|---|---|---|---|
| 002543SMH | 67.00 | 36 | 59 | 5.58 | 4.916666667 | |
| 002543SMH | 67.00 | 42 | 59 | 5.58 | 4.916666667 | |
| 002544SMH | 67.00 | 30 | 59 | 5.58 | 4.916666667 | |
| 002544SMH | 67.00 | 36 | 59 | 5.58 | 4.916666667 | |
| 002551SMH | 49.00 | 18 | 70 | 4.08 | 5.833333333 | |
| 002551SMH | 85.00 | 30 | 70 | 7.08 | 5.833333333 | |
| 002552SMH | 87.00 | 12 | | 7.25 | | |
| 002552SMH | 87.00 | 30 | | 7.25 | | |
| 002552SMH | 87.00 | 36 | | 7.25 | | |
| 002553SMH | 63.00 | 8 | | 5.25 | | |
| 002553SMH | 87.00 | 36 | | 7.25 | | |
| 002554SMH | 84.00 | 18 | | 7.00 | | |
| 002554SMH | 84.00 | 21 | | 7.00 | | |
| 002555SMH | 88.00 | 18 | | 7.33 | | |
| 002555SMH | 88.00 | 24 | | 7.33 | | |
| 002563SMH | 0.00 | 0 | | 0.00 | | Not found |
| 002564SMH | 0.00 | 0 | | 0.00 | | Not found |
| 002566SMH | 72.00 | 12 | 134 | 6.00 | 11.16666667 | |
| 002566SMH | 146.00 | 30 | 134 | 12.17 | 11.16666667 | |
| 002571SMH | 52.00 | 21 | 40 | 4.33 | 3.333333333 | |
| 002596SMH | 79.00 | 10 | 68 | 6.58 | 5.666666667 | |
| 002596SMH | 79.00 | 18 | 68 | 6.58 | 5.666666667 | |
| 002605SMH | 81.00 | 48 | | 6.75 | | |
| 002605SMH | 81.00 | 60 | | 6.75 | | |
| 002606SMH | 76.00 | 15 | 52 | 6.33 | 4.333333333 | |
| 002606SMH | 76.00 | 36 | 52 | 6.33 | 4.333333333 | |
| 002606SMH | 76.00 | 48 | 52 | 6.33 | 4.333333333 | |
| 002608SMH | 40.00 | 8 | 46 | 3.33 | 3.833333333 | |
| 002608SMH | 64.00 | 36 | 46 | 5.33 | 3.833333333 | |
| 002609SMH | 61.00 | 30 | 49 | 5.08 | 4.083333333 | |
| 002611SMH | 30.00 | 12 | | 2.50 | | |
| 002611SMH | 76.00 | 36 | | 6.33 | | |
| 002612SMH | 0.00 | 0 | | 0.00 | | Buried and Marked |
| 003067SMH | 76.00 | 10 | | 6.33 | | |
| 003067SMH | 76.00 | 24 | | 6.33 | | |
| 003076SMH | 51.50 | 12 | 45 | 4.29 | 3.75 | |
| 003119SMH | 9.00 | 21 | | 9.00 | | |
| 003119SMH | 9.00 | 42 | | 9.00 | | |
| 003119SMH | 9.00 | 48 | | 9.00 | | |
| 003136SMH | 81.50 | 30 | 76 | 6.79 | 6.333333333 | |
| 003141SMH | 90.00 | 36 | | 7.50 | | |
| 003230SMH | 3.60 | 8 | | 3.60 | | |
| 003230SMH | 7.20 | 62 | | 7.20 | | |
| 003269SMH | 80.00 | 24 | 68 | 6.67 | 5.666666667 | |

| FACILITYID | Measured Depth | Measured Pipe Diameter (in) | Measured Depth to Bench | Depth to Invert (ft) | Depth to Bench (ft) | Notes |
|---|---|---|---|---|---|---|
| 003269SMH | 80.00 | 36 | 68 | 6.67 | 5.666666667 | |
| 003356SMH | 88.00 | 8 | 80 | 7.33 | 6.666666667 | |
| 003356SMH | 88.00 | 12 | 80 | 7.33 | 6.666666667 | |
| 003356SMH | 88.00 | 15 | 80 | 7.33 | 6.666666667 | |
| 003361SMH | 45.00 | 8 | | 3.75 | | |
| 003361SMH | 45.00 | 15 | | 3.75 | | |
| 003361SMH | 57.00 | 24 | | 4.75 | | |
| 003421SMH | 66.00 | 48 | | 5.50 | | |
| 003450SMH | 0.00 | 0 | | 0.00 | | Not found |
| 003475SMH | 132.50 | 44 | 108 | 11.04 | 9 | |
| 003475SMH | 132.50 | 46 | 108 | 11.04 | 9 | |
| 003496SMH | 58.00 | 12 | 50 | 4.83 | 4.166666667 | |
| 004794IN | 4.80 | 12 | 5 | 4.80 | 5 | |
| 004794IN | 4.80 | 18 | 5 | 4.80 | 5 | |
| 004794IN | 5.80 | 27 | 5 | 5.80 | 5 | |
| 004794IN | 5.80 | 42 | 5 | 5.80 | 5 | |
| 004931IN | 214.50 | 48 | 190 | 17.88 | 15.83333333 | |
| 004961IN | 90.00 | 12 | 98 | 7.50 | 8.166666667 | |
| 004961IN | 126.00 | 42 | 98 | 10.50 | 8.166666667 | |
| 004983IN | 50.00 | 12 | 35 | 4.17 | 2.916666667 | |
| 004983IN | 50.00 | 15 | 35 | 4.17 | 2.916666667 | |
| 005007IN | 11.00 | 48 | 7.1 | 11.00 | 7.1 | |
| 005448IN | 35.00 | 15 | 108 | 2.92 | 9 | |
| 005448IN | 120.00 | 24 | 108 | 10.00 | 9 | |
| 005457IN | 61.00 | 12 | | 5.08 | | |
| 005458IN | 90.00 | 18 | | 7.50 | | |
| 005458IN | 90.00 | 24 | | 7.50 | | |
| 005458IN | 90.00 | 36 | | 7.50 | | |
| 005499IN | 20.00 | 12 | | 1.67 | | |
| 005541IN | 64.00 | 15 | 52 | 5.33 | 4.333333333 | |
| 005541IN | 64.00 | 30 | 52 | 5.33 | 4.333333333 | |
| 006124IN | 50.50 | 12 | | 4.21 | | |
| 006124IN | 50.50 | 15 | | 4.21 | | |
| 006174IN | 18.00 | 8 | 12 | 1.50 | 1 | |
| 006174IN | 18.00 | 10 | 12 | 1.50 | 1 | |
| 006230IN | 34.00 | 12 | | 2.83 | | |
| 006240IN | 30.50 | 15 | | 2.54 | | |
| 006596IN | 50.50 | 12 | 43 | 4.21 | 3.583333333 | |
| 007516IN | 80.00 | 18 | 92 | 6.67 | 7.666666667 | |
| 007516IN | 121.50 | 55 | 92 | 10.13 | 7.666666667 | |
| 007526IN | 81.00 | 15 | 72 | 6.75 | 6 | |
| 007526IN | 81.00 | 24 | 72 | 6.75 | 6 | |

# APPENDIX E

| FACILITYID | Easting (ft), GIS | Northing (ft), GIS | Rim Elevation (ft), GIS | Manhole Depth (ft), GIS | Northing (ft), RDA | Easting (ft), RDA | Rim Elevation (ft), RDA | Depth to Invert (ft), VPS | Pipe Diameter (in), VPS | Bench Depth (ft), VPS | Notes, VPS | Difference in Horizontal Location (ft) | Difference in Rim Elevation (ft) | Difference in Depth (ft) | Calculated Bench Height (ft) | Calculated Invert Elevation (ft), GIS | Calculated Invert Elevation (ft), RDA/VPS | Difference in Calculated Invert Elevations (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 000088CP | 11893234.68 | 6976731.83 | 4.98 | | 6976733.01 | 11893233.91 | 6.19 | 7.20 | 86 | | | 1.41 | -1.21 | | | | -1.01 | |
| 000088SMH | 11895021.81 | 6977254.49 | 31.48 | 6.80 | 6977248.80 | 11895024.47 | 30.87 | 6.75 | 24 | | | 6.28 | 0.61 | 0.05 | | 24.68 | 24.12 | 0.56 |
| 000088SMH | 11895021.81 | 6977254.49 | 31.48 | 6.80 | 6977248.80 | 11895024.47 | 30.87 | 6.75 | 18 | | | 6.28 | 0.61 | 0.05 | | 24.68 | 24.12 | 0.56 |
| 000088SMH | 11895021.81 | 6977254.49 | 31.48 | 6.80 | 6977248.80 | 11895024.47 | 30.87 | 6.75 | 12 | | | 6.28 | 0.61 | 0.05 | | 24.68 | 24.12 | 0.56 |
| 000089CP | 11893248.66 | 6976729.22 | 3.47 | | 6976731.03 | 11893248.85 | 6.18 | 7.20 | 86 | | | 1.81 | -2.71 | | | | -1.02 | |
| 000090CP | 11893261.86 | 6976728.84 | 4.04 | | 6976728.52 | 11893263.18 | 5.93 | 7.20 | 86 | | | 1.36 | -1.89 | | | | -1.27 | |
| 000132CP | 11893288.92 | 6981586.24 | 2.31 | | 6981576.14 | 11893312.38 | 16.50 | 6.58 | 234 | | | 25.54 | -14.19 | | | | 9.92 | |
| 000132CP | 11893288.92 | 6981586.24 | 2.31 | | 6981576.14 | 11893312.38 | 16.50 | 6.58 | 192 | | | 25.54 | -14.19 | | | | 9.92 | |
| 000519IO | 11889194.24 | 6984492.10 | 84.52 | 2.54 | 6984489.33 | 11889194.06 | 86.14 | 8.17 | 18 | 7.5 | | 2.77 | -1.62 | -5.63 | 0.67 | 81.98 | 77.97 | 4.01 |
| 000679ND | 11887403.21 | 6988175.22 | | | | | | | | | | | | | | | | |
| 000697ND | 11887530.99 | 6988269.91 | | | | | | | | | | | | | | | | |
| 000741ND | 11887923.38 | 6986962.69 | | | | | | | | | | | | | | | | |
| 001550SMH | 11889925.58 | 6978102.93 | 16.00 | 5.42 | 6978103.62 | 11889924.95 | 15.95 | 5.30 | 18 | 5 | | 0.93 | 0.05 | 0.12 | 0.30 | 10.58 | 10.65 | -0.07 |
| 001550SMH | 11889925.58 | 6978102.93 | 16.00 | 5.42 | 6978103.62 | 11889924.95 | 15.95 | 4.90 | 12 | 5 | | 0.93 | 0.05 | 0.52 | -0.10 | 10.58 | 11.05 | -0.47 |
| 001556SMH | 11890423.68 | 6977909.24 | 15.99 | 9.22 | 6977908.77 | 11890426.00 | 15.53 | 6.00 | 12 | 8 | | 2.37 | 0.46 | 3.22 | -2.00 | 6.77 | 9.53 | -2.76 |
| 001556SMH | 11890423.68 | 6977909.24 | 15.99 | 9.22 | 6977908.77 | 11890426.00 | 15.53 | 9.20 | 48 | 8 | | 2.37 | 0.46 | 0.02 | 1.20 | 6.77 | 6.33 | 0.44 |
| 001556SMH | 11890423.68 | 6977909.24 | 15.99 | 9.22 | 6977908.77 | 11890426.00 | 15.53 | 6.00 | 15 | 8 | | 2.37 | 0.46 | 3.22 | -2.00 | 6.77 | 9.53 | -2.76 |
| 001556SMH | 11890423.68 | 6977909.24 | 15.99 | 9.22 | 6977908.77 | 11890426.00 | 15.53 | 5.00 | 8 | 8 | | 2.37 | 0.46 | 4.22 | -3.00 | 6.77 | 10.53 | -3.76 |
| 001556SMH | 11890423.68 | 6977909.24 | 15.99 | 9.22 | 6977908.77 | 11890426.00 | 15.53 | 9.20 | 42 | 8 | | 2.37 | 0.46 | 0.02 | 1.20 | 6.77 | 6.33 | 0.44 |
| 001557SMH | 11890185.69 | 6977952.54 | 15.89 | 7.98 | 6977952.35 | 11890186.13 | 15.11 | 7.80 | 36 | | | 0.48 | 0.78 | 0.18 | | 7.91 | 7.31 | 0.60 |
| 001557SMH | 11890185.69 | 6977952.54 | 15.89 | 7.98 | 6977952.35 | 11890186.13 | 15.11 | 7.80 | 42 | | | 0.48 | 0.78 | 0.18 | | 7.91 | 7.31 | 0.60 |
| 001557SMH | 11890185.69 | 6977952.54 | 15.89 | 7.98 | 6977952.35 | 11890186.13 | 15.11 | 4.00 | 12 | | | 0.48 | 0.78 | 3.98 | | 7.91 | 11.11 | -3.20 |
| 001557SMH | 11890185.69 | 6977952.54 | 15.89 | 7.98 | 6977952.35 | 11890186.13 | 15.11 | 3.00 | 8 | | | 0.48 | 0.78 | 4.98 | | 7.91 | 12.11 | -4.20 |
| 001583SMH | 11893956.54 | 6978704.02 | 22.04 | 16.20 | 6978704.32 | 11893954.18 | 22.13 | 16.13 | 48 | | | 2.38 | -0.09 | 0.07 | | 5.84 | 6.01 | -0.17 |
| 001583SMH | 11893956.54 | 6978704.02 | 22.04 | 16.20 | 6978704.32 | 11893954.18 | 22.13 | 4.83 | 15 | | | 2.38 | -0.09 | 11.37 | | 5.84 | 17.30 | -11.46 |
| 001583SMH | 11893956.54 | 6978704.02 | 22.04 | 16.20 | 6978704.32 | 11893954.18 | 22.13 | 16.13 | 42 | | | 2.38 | -0.09 | 0.07 | | 5.84 | 6.01 | -0.17 |
| 001591SMH | 11893351.50 | 6978730.40 | 28.02 | 17.80 | 6978733.72 | 11893348.87 | 27.20 | 17.75 | 60 | 7.916666667 | | 4.23 | 0.82 | 0.05 | 9.83 | 10.22 | 9.45 | 0.77 |
| 001619SMH | 11893251.46 | 6978457.41 | 27.57 | 8.94 | 6978460.09 | 11893246.92 | 25.93 | 9.67 | 48 | 7.75 | | 5.27 | 1.64 | -0.73 | 1.92 | 18.63 | 16.26 | 2.37 |
| 001619SMH | 11893251.46 | 6978457.41 | 27.57 | 8.94 | 6978460.09 | 11893246.92 | 25.93 | 6.75 | 8 | 7.75 | | 5.27 | 1.64 | 2.19 | -1.00 | 18.63 | 19.18 | -0.55 |
| 001622SMH | 11892867.78 | 6978498.69 | 34.39 | 13.78 | 6978485.89 | 11892872.33 | 33.68 | 13.50 | 44 | 9.9 | | 13.59 | 0.71 | 0.28 | 3.60 | 20.61 | 20.18 | 0.43 |
| 001622SMH | 11892867.78 | 6978498.69 | 34.39 | 13.78 | 6978485.89 | 11892872.33 | 33.68 | 12.50 | 27 | 9.9 | | 13.59 | 0.71 | 1.28 | 2.60 | 20.61 | 21.18 | -0.57 |
| 001642SMH | 11891148.20 | 6978192.23 | 15.83 | 10.30 | 6978190.66 | 11891142.90 | 14.43 | 9.30 | 48 | | | 5.52 | 1.40 | 1.00 | | 5.53 | 5.13 | 0.40 |
| 001642SMH | 11891148.20 | 6978192.23 | 15.83 | 10.30 | 6978190.66 | 11891142.90 | 14.43 | 5.80 | 8 | | | 5.52 | 1.40 | 4.50 | | 5.53 | 8.63 | -3.10 |
| 001653SMH | 11893837.04 | 6979103.21 | 14.00 | 11.60 | 6979104.30 | 11893831.92 | 12.94 | 0.00 | 0 | | Surcharge | 5.24 | 1.06 | 11.60 | | 2.40 | 12.94 | -10.54 |
| 001658SMH | 11892351.83 | 6979331.53 | 44.58 | 6.70 | 6979329.41 | 11892356.47 | 43.71 | 7.60 | 15 | | | 5.10 | 0.87 | -0.90 | | 37.88 | 36.11 | 1.77 |
| 001665SMH | 11891112.64 | 6978349.85 | 18.64 | 12.60 | 6978346.91 | 11891115.49 | 18.37 | 12.60 | 60 | 10 | | 4.09 | 0.27 | 0.00 | 2.60 | 6.04 | 5.77 | 0.27 |
| 001665SMH | 11891112.64 | 6978349.85 | 18.64 | 12.60 | 6978346.91 | 11891115.49 | 18.37 | 12.60 | 48 | 10 | | 4.09 | 0.27 | 0.00 | 2.60 | 6.04 | 5.77 | 0.27 |
| 001665SMH | 11891112.64 | 6978349.85 | 18.64 | 12.60 | 6978346.91 | 11891115.49 | 18.37 | 7.00 | 24 | 10 | | 4.09 | 0.27 | 5.60 | -3.00 | 6.04 | 11.37 | -5.33 |
| 001667SMH | 11893237.35 | 6978001.07 | 24.98 | 13.28 | 6978003.20 | 11893238.39 | 24.14 | 9.08 | 18 | 10.58333333 | | 2.37 | 0.84 | 4.20 | -1.50 | 11.70 | 15.06 | -3.36 |
| 001667SMH | 11893237.35 | 6978001.07 | 24.98 | 13.28 | 6978003.20 | 11893238.39 | 24.14 | 14.50 | 24 | 10.58333333 | | 2.37 | 0.84 | -1.22 | 3.92 | 11.70 | 9.64 | 2.06 |
| 001667SMH | 11893237.35 | 6978001.07 | 24.98 | 13.28 | 6978003.20 | 11893238.39 | 24.14 | 12.92 | 18 | 10.58333333 | | 2.37 | 0.84 | 0.36 | 2.33 | 11.70 | 11.22 | 0.48 |
| 001667SMH | 11893237.35 | 6978001.07 | 24.98 | 13.28 | 6978003.20 | 11893238.39 | 24.14 | 11.83 | 24 | 10.58333333 | | 2.37 | 0.84 | 1.45 | 1.25 | 11.70 | 12.31 | -0.61 |
| 001682SMH | 11892282.62 | 6977875.59 | 27.95 | 11.42 | 6977866.34 | 11892288.14 | 26.19 | 5.30 | 15 | 10.5 | | 10.77 | 1.76 | 6.12 | -5.20 | 16.53 | 20.89 | -4.36 |
| 001682SMH | 11892282.62 | 6977875.59 | 27.95 | 11.42 | 6977866.34 | 11892288.14 | 26.19 | 11.30 | 36 | 10.5 | | 10.77 | 1.76 | 0.12 | 0.80 | 16.53 | 14.89 | 1.64 |
| 001684SMH | 11891994.71 | 6977883.38 | 23.03 | 11.30 | 6977891.34 | 11891943.00 | 22.29 | 5.60 | 15 | 7.8 | | 52.32 | 0.74 | 5.70 | -2.20 | 11.73 | 16.69 | -4.96 |
| 001684SMH | 11891994.71 | 6977883.38 | 23.03 | 11.30 | 6977891.34 | 11891943.00 | 22.29 | 11.20 | 36 | 7.8 | | 52.32 | 0.74 | 0.10 | 3.40 | 11.73 | 11.09 | 0.64 |
| 001686SMH | 11891835.17 | 6977900.18 | 21.79 | 11.56 | 6977902.13 | 11891790.64 | 20.51 | 11.60 | 46 | 8.5 | | 44.57 | 1.28 | -0.04 | 3.10 | 10.23 | 8.91 | 1.32 |
| 001686SMH | 11891835.17 | 6977900.18 | 21.79 | 11.56 | 6977902.13 | 11891790.64 | 20.51 | 6.60 | 18 | 8.5 | | 44.57 | 1.28 | 4.96 | -1.90 | 10.23 | 13.91 | -3.68 |
| 001688SMH | 11891688.21 | 6977910.37 | 20.00 | 14.46 | 6977910.67 | 11891678.07 | 19.03 | 14.80 | 60 | 9.6 | | 10.15 | 0.97 | -0.34 | 5.20 | 5.54 | 4.23 | 1.31 |
| 001688SMH | 11891688.21 | 6977910.37 | 20.00 | 14.46 | 6977910.67 | 11891678.07 | 19.03 | 12.20 | 46 | 9.6 | | 10.15 | 0.97 | 2.26 | 2.60 | 5.54 | 6.83 | -1.29 |
| 001688SMH | 11891688.21 | 6977910.37 | 20.00 | 14.46 | 6977910.67 | 11891678.07 | 19.03 | 5.40 | 15 | 9.6 | | 10.15 | 0.97 | 9.06 | -4.20 | 5.54 | 13.63 | -8.09 |
| 001689SMH | 11891655.83 | 6977907.37 | 19.77 | 15.74 | 6977905.45 | 11891642.15 | 18.54 | 14.60 | 60 | 13.5 | | 13.81 | 1.23 | 1.14 | 1.10 | 4.03 | 3.94 | 0.09 |
| 001689SMH | 11891655.83 | 6977907.37 | 19.77 | 15.74 | 6977905.45 | 11891642.15 | 18.54 | 14.70 | 48 | 13.5 | | 13.81 | 1.23 | 1.04 | 1.20 | 4.03 | 3.84 | 0.19 |
| 001689SMH | 11891655.83 | 6977907.37 | 19.77 | 15.74 | 6977905.45 | 11891642.15 | 18.54 | 13.90 | 24 | 13.5 | | 13.81 | 1.23 | 1.84 | 0.40 | 4.03 | 4.64 | -0.61 |
| 001689SMH | 11891655.83 | 6977907.37 | 19.77 | 15.74 | 6977905.45 | 11891642.15 | 18.54 | 14.50 | 60 | 13.5 | | 13.81 | 1.23 | 1.24 | 1.00 | 4.03 | 4.04 | -0.01 |
| 001690SMH | 11891649.83 | 6977790.41 | 20.17 | 18.17 | 6977784.67 | 11891646.52 | 20.39 | 17.60 | 60 | 16 | | 6.63 | -0.22 | 0.57 | 1.60 | 2.00 | 2.79 | -0.79 |
| 001690SMH | 11891649.83 | 6977790.41 | 20.17 | 18.17 | 6977784.67 | 11891646.52 | 20.39 | 10.60 | 18 | 16 | | 6.63 | -0.22 | 7.57 | -5.40 | 2.00 | 9.79 | -7.79 |
| 001690SMH | 11891649.83 | 6977790.41 | 20.17 | 18.17 | 6977784.67 | 11891646.52 | 20.39 | 17.60 | 53 | 16 | | 6.63 | -0.22 | 0.57 | 1.60 | 2.00 | 2.79 | -0.79 |
| 001690SMH | 11891649.83 | 6977790.41 | 20.17 | 18.17 | 6977784.67 | 11891646.52 | 20.39 | 5.60 | 8 | 16 | | 6.63 | -0.22 | 12.57 | -10.40 | 2.00 | 14.79 | -12.79 |
| 001907SMH | 11894824.85 | 6986200.34 | 41.86 | 5.70 | 6986201.68 | 11894821.22 | 40.10 | 3.75 | 15 | 4.916666667 | | 3.87 | 1.76 | 1.95 | -1.17 | 36.16 | 36.35 | -0.19 |
| 001907SMH | 11894824.85 | 6986200.34 | 41.86 | 5.70 | 6986201.68 | 11894821.22 | 40.10 | 5.75 | 24 | 4.916666667 | | 3.87 | 1.76 | -0.05 | 0.83 | 36.16 | 34.35 | 1.81 |
| 001907SMH | 11894824.85 | 6986200.34 | 41.86 | 5.70 | 6986201.68 | 11894821.22 | 40.10 | 5.75 | 27 | 4.916666667 | | 3.87 | 1.76 | -0.05 | 0.83 | 36.16 | 34.35 | 1.81 |
| 001962SMH | 11892999.35 | 6985961.78 | 34.00 | 5.20 | 6985960.91 | 11892995.97 | 33.76 | 5.25 | 12 | 4.75 | | 3.49 | 0.24 | -0.05 | 0.50 | 28.80 | 28.51 | 0.29 |
| 001962SMH | 11892999.35 | 6985961.78 | 34.00 | 5.20 | 6985960.91 | 11892995.97 | 33.76 | 5.25 | 27 | 4.75 | | 3.49 | 0.24 | -0.05 | 0.50 | 28.80 | 28.51 | 0.29 |
| 002426SMH | 11895762.11 | 6982273.41 | 42.04 | 7.90 | 6982274.13 | 11895759.72 | 41.94 | 8.00 | 24 | 7.666666667 | | 2.50 | 0.10 | -0.10 | 0.33 | 34.14 | 33.94 | 0.20 |
| 002426SMH | 11895762.11 | 6982273.41 | 42.04 | 7.90 | 6982274.13 | 11895759.72 | 41.94 | 8.00 | 18 | 7.666666667 | | 2.50 | 0.10 | -0.10 | 0.33 | 34.14 | 33.94 | 0.20 |
| 002427SMH | 11894757.52 | 6979407.78 | 27.78 | 4.53 | 6979405.60 | 11894757.80 | 27.00 | | | | | 2.20 | 0.78 | | | 23.25 | | |
| 002507SMH | 11887178.64 | 6987994.48 | 178.63 | 7.41 | 6987996.74 | 11887180.58 | 178.42 | 7.42 | 30 | 6.416666667 | | 2.97 | 0.21 | -0.01 | 1.00 | 171.22 | 171.00 | 0.22 |
| 002511SMH | 11887053.81 | 6987818.17 | 183.15 | 9.00 | 6987816.73 | 11887057.29 | 183.12 | 9.00 | 30 | 8 | | 3.77 | 0.03 | 0.00 | 1.00 | 174.15 | 174.12 | 0.03 |
| 002511SMH | 11887053.81 | 6987818.17 | 183.15 | 9.00 | 6987816.73 | 11887057.29 | 183.12 | 9.00 | 12 | 8 | | 3.77 | 0.03 | 0.00 | 1.00 | 174.15 | 174.12 | 0.03 |
| 002515SMH | 11886902.47 | 6987900.56 | 185.73 | 9.05 | 6987898.67 | 11886902.78 | 185.07 | 9.08 | 36 | 8.083333333 | | 1.92 | 0.66 | -0.03 | 1.00 | 176.68 | 175.99 | 0.69 |
| 002516SMH | 11886855.54 | 6987759.69 | 189.58 | 3.41 | 6987758.93 | 11886856.42 | 188.82 | 3.33 | 15 | 2.833333333 | | 1.17 | 0.76 | 0.08 | 0.50 | 186.17 | 185.49 | 0.68 |
| 002518SMH | 11886637.16 | 6988141.00 | 189.41 | 8.91 | 6988145.03 | 11886637.09 | 188.19 | 9.00 | 36 | 8 | | 4.03 | 1.22 | -0.09 | 1.00 | 180.50 | 179.19 | 1.31 |
| 002519SMH | 11886320.23 | 6988438.82 | 191.79 | 7.09 | 6988438.79 | 11886321.32 | 190.46 | 7.17 | 15 | 6.166666667 | | 1.09 | 1.33 | -0.08 | 1.00 | 184.70 | 183.29 | 1.41 |
| 002519SMH | 11886320.23 | 6988438.82 | 191.79 | 7.09 | 6988438.79 | 11886321.32 | 190.46 | 7.17 | 36 | 6.166666667 | | 1.09 | 1.33 | -0.08 | 1.00 | 184.70 | 183.29 | 1.41 |
| 002520SMH | 11886309.70 | 6988439.00 | 191.70 | 7.11 | 6988438.93 | 11886307.62 | 190.70 | 5.67 | 15 | 6 | | 2.08 | 1.00 | 1.44 | -0.33 | 184.59 | 185.03 | -0.44 |
| 002520SMH | 11886309.70 | 6988439.00 | 191.70 | 7.11 | 6988438.93 | 11886307.62 | 190.70 | 7.00 | 36 | 6 | | 2.08 | 1.00 | 0.11 | 1.00 | 184.59 | 183.70 | 0.89 |
| 002524SMH | 11887399.83 | 6987828.63 | 170.20 | 5.82 | 6987826.99 | 11887403.88 | 170.03 | 5.83 | 24 | 4.833333333 | | 4.37 | 0.17 | -0.01 | 1.00 | 164.38 | 164.20 | 0.19 |
| 002530SMH | 11886448.71 | 6988980.04 | 179.95 | 3.08 | 6988984.61 | 11886463.22 | 178.90 | 3.38 | 12 | 2.833333333 | | 15.21 | 1.05 | -0.30 | 0.54 | 176.87 | 175.53 | 1.35 |
| 002530SMH | 11886448.71 | 6988980.04 | 179.95 | 3.08 | 6988984.61 | 11886463.22 | 178.90 | 3.38 | 27 | 2.833333333 | | 15.21 | 1.05 | -0.30 | 0.54 | 176.87 | 175.53 | 1.35 |
| 002530SMH | 11886448.71 | 6988980.04 | 179.95 | 3.08 | 6988984.61 | 11886463.22 | 178.90 | 3.38 | 24 | 2.833333333 | | 15.21 | 1.05 | -0.30 | 0.54 | 176.87 | 175.53 | 1.35 |
| 002537SMH | 11887523.67 | 6988273.77 | 162.50 | 6.70 | 6988272.88 | 11887520.80 | 163.09 | 6.67 | 36 | 5.666666667 | | 3.00 | -0.59 | 0.03 | 1.00 | 155.80 | 156.42 | -0.62 |
| 002538SMH | 11887536.39 | 6988266.89 | 162.04 | 6.10 | 6988262.39 | 11887535.47 | 162.39 | 3.50 | 12 | 4.583333333 | | 4.59 | -0.35 | 2.60 | -1.08 | 155.94 | 158.89 | -2.95 |
| 002538SMH | 11887536.39 | 6988266.89 | 162.04 | 6.10 | 6988262.39 | 11887535.47 | 162.39 | 6.00 | 30 | 4.583333333 | | 4.59 | -0.35 | 0.10 | 1.42 | 155.94 | 156.39 | -0.45 |
| 002541SMH | 11887474.97 | 6988261.80 | 164.31 | 4.35 | 6988261.03 | 11887477.35 | 164.32 | 6.00 | 24 | 5 | | 2.50 | -0.01 | -1.65 | 1.00 | 159.96 | 158.32 | 1.64 |
| 002541SMH | 11887474.97 | 6988261.80 | 164.31 | 4.35 | 6988261.03 | 11887477.35 | 164.32 | 6.00 | 21 | 5 | | 2.50 | -0.01 | -1.65 | 1.00 | 159.96 | 158.32 | 1.64 |
| 002542SMH | 11887663.94 | 6988013.53 | 153.23 | 5.70 | 6988013.65 | 11887660.55 | 153.38 | 2.50 | 8 | 3.916666667 | | 3.39 | -0.15 | 3.20 | -1.42 | 147.53 | 150.88 | -3.35 |
| 002542SMH | 11887663.94 | 6988013.53 | 153.23 | 5.70 | 6988013.65 | 11887660.55 | 153.38 | 5.33 | 36 | 3.916666667 | | 3.39 | -0.15 | 0.37 | 1.42 | 147.53 | 148.05 | -0.52 |
| 002543SMH | 11887729.21 | 6987747.49 | 145.92 | 5.70 | 6987749.65 | 11887734.88 | 145.67 | 5.58 | 36 | 4.916666667 | | 6.07 | 0.25 | 0.12 | 0.67 | 140.22 | 140.09 | 0.13 |
| 002543SMH | 11887729.21 | 6987747.49 | 145.92 | 5.70 | 6987749.65 | 11887734.88 | 145.67 | 5.58 | 42 | 4.916666667 | | 6.07 | 0.25 | 0.12 | 0.67 | 140.22 | 140.09 | 0.13 |
| 002544SMH | 11887767.21 | 6987628.87 | 143.73 | 5.70 | 6987631.33 | 11887768.31 | 143.72 | 5.58 | 36 | 4.916666667 | | 2.69 | 0.01 | 0.12 | 0.67 | 138.03 | 138.14 | -0.10 |
| 002544SMH | 11887767.21 | 6987628.87 | 143.73 | 5.70 | 6987631.33 | 11887768.31 | 143.72 | 5.58 | 30 | 4.916666667 | | 2.69 | 0.01 | 0.12 | 0.67 | 138.03 | 138.14 | -0.10 |
| 002551SMH | 11887282.46 | 6988583.54 | 167.91 | 7.11 | 6988586.39 | 11887281.56 | 167.90 | 4.08 | 18 | 5.833333333 | | 2.99 | 0.01 | 3.03 | -1.75 | 160.80 | 163.82 | -3.02 |
| 002551SMH | 11887282.46 | 6988583.54 | 167.91 | 7.11 | 6988586.39 | 11887281.56 | 167.90 | 7.08 | 30 | 5.833333333 | | 2.99 | 0.01 | 0.03 | 1.25 | 160.80 | 160.82 | -0.02 |
| 002552SMH | 11887295.28 | 6988584.80 | 167.80 | 7.42 | 6988586.22 | 11887294.27 | 167.77 | 7.25 | 36 | | | 1.74 | 0.03 | 0.17 | | 160.38 | 160.52 | -0.14 |
| 002552SMH | 11887295.28 | 6988584.80 | 167.80 | 7.42 | 6988586.22 | 11887294.27 | 167.77 | 7.25 | 30 | | | 1.74 | 0.03 | 0.17 | | 160.38 | 160.52 | -0.14 |
| 002552SMH | 11887295.28 | 6988584.80 | 167.80 | 7.42 | 6988586.22 | 11887294.27 | 167.77 | 7.25 | 12 | | | 1.74 | 0.03 | 0.17 | | 160.38 | 160.52 | -0.14 |

| FACILITYID | Easting (ft), GIS | Northing (ft), GIS | Rim Elevation (ft), GIS | Manhole Depth (ft), GIS | Northing (ft), RDA | Easting (ft), RDA | Rim Elevation (ft), RDA | Depth to Invert (ft), VPS | Pipe Diameter (in), VPS | Bench Depth (ft), VPS | Notes, VPS | Difference In Horizontal Location (ft) | Difference in Rim Elevation (ft) | Difference in Depth (ft) | Calculated Bench Height (ft) | Calculated Invert Elevation (ft), GIS | Calculated Invert Elevation (ft), RDA/VPS | Difference In Calculated Invert Elevations (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 002553SMH | 11887340.09 | 6988586.66 | 167.48 | 7.35 | 6988585.54 | 11887341.29 | 166.92 | 7.25 | 36 | | | 1.64 | 0.56 | 0.10 | | 160.13 | 159.67 | 0.46 |
| 002553SMH | 11887340.09 | 6988586.66 | 167.48 | 7.35 | 6988585.54 | 11887341.29 | 166.92 | 5.25 | 8 | | | 1.64 | 0.56 | 2.10 | | 160.13 | 161.67 | -1.54 |
| 002554SMH | 11887398.08 | 6988653.36 | 168.58 | 7.84 | 6988656.43 | 11887396.26 | 169.07 | 7.00 | 21 | | | 3.57 | -0.49 | 0.84 | | 160.74 | 162.07 | -1.33 |
| 002554SMH | 11887398.08 | 6988653.36 | 168.58 | 7.84 | 6988656.43 | 11887396.26 | 169.07 | 7.00 | 18 | | | 3.57 | -0.49 | 0.84 | | 160.74 | 162.07 | -1.33 |
| 002555SMH | 11887395.73 | 6988638.50 | 167.86 | 7.04 | 6988636.45 | 11887396.96 | 167.31 | 7.33 | 18 | | | 2.39 | 0.55 | -0.29 | | 160.82 | 159.98 | 0.84 |
| 002555SMH | 11887395.73 | 6988638.50 | 167.86 | 7.04 | 6988636.45 | 11887396.96 | 167.31 | 7.33 | 24 | | | 2.39 | 0.55 | -0.29 | | 160.82 | 159.98 | 0.84 |
| 002563SMH | 11887441.91 | 6988298.52 | 165.92 | 8.42 | | | | | | | | | | | | 157.50 | | |
| 002564SMH | 11887400.07 | 6988472.48 | 162.34 | 0.00 | 6988471.63 | 11887404.67 | 162.16 | 0.00 | 0 | | Not found | 4.68 | 0.18 | 0.00 | | 162.34 | 162.16 | 0.18 |
| 002566SMH | 11886659.63 | 6988803.11 | 185.58 | 12.30 | 6988803.53 | 11886658.96 | 185.44 | 6.00 | 12 | 11.16666667 | | 0.79 | 0.14 | 6.30 | -5.17 | 173.28 | 179.44 | -6.16 |
| 002566SMH | 11886659.63 | 6988803.11 | 185.58 | 12.30 | 6988803.53 | 11886658.96 | 185.44 | 12.17 | 30 | 11.16666667 | | 0.79 | 0.14 | 0.13 | 1.00 | 173.28 | 173.27 | 0.00 |
| 002571SMH | 11887414.24 | 6988252.31 | 167.06 | 4.50 | 6988248.67 | 11887413.56 | 167.29 | 4.33 | 21 | 3.333333333 | | 3.71 | -0.23 | 0.17 | 1.00 | 162.56 | 162.96 | -0.40 |
| 002596SMH | 11888798.27 | 6987331.97 | 177.12 | 6.53 | 6987333.36 | 11888794.50 | 176.91 | 6.58 | 18 | 5.666666667 | | 4.02 | 0.21 | -0.05 | 0.92 | 170.59 | 170.33 | 0.26 |
| 002596SMH | 11888798.27 | 6987331.97 | 177.12 | 6.53 | 6987333.36 | 11888794.50 | 176.91 | 6.58 | 10 | 5.666666667 | | 4.02 | 0.21 | -0.05 | 0.92 | 170.59 | 170.33 | 0.26 |
| 002605SMH | 11887905.50 | 6987143.84 | 139.32 | 7.40 | 6987141.34 | 11887906.89 | 138.30 | 6.75 | 60 | | | 2.87 | 1.02 | 0.65 | | 131.92 | 131.55 | 0.37 |
| 002605SMH | 11887905.50 | 6987143.84 | 139.32 | 7.40 | 6987141.34 | 11887906.89 | 138.30 | 6.75 | 48 | | | 2.87 | 1.02 | 0.65 | | 131.92 | 131.55 | 0.37 |
| 002606SMH | 11887870.10 | 6987266.19 | 140.01 | 6.40 | 6987267.64 | 11887870.54 | 139.74 | 6.33 | 15 | 4.333333333 | | 1.51 | 0.27 | 0.07 | 2.00 | 133.61 | 133.41 | 0.20 |
| 002606SMH | 11887870.10 | 6987266.19 | 140.01 | 6.40 | 6987267.64 | 11887870.54 | 139.74 | 6.33 | 36 | 4.333333333 | | 1.51 | 0.27 | 0.07 | 2.00 | 133.61 | 133.41 | 0.20 |
| 002606SMH | 11887870.10 | 6987266.19 | 140.01 | 6.40 | 6987267.64 | 11887870.54 | 139.74 | 6.33 | 48 | 4.333333333 | | 1.51 | 0.27 | 0.07 | 2.00 | 133.61 | 133.41 | 0.20 |
| 002608SMH | 11887802.22 | 6987509.29 | 142.01 | 5.33 | 6987508.44 | 11887802.71 | 141.79 | 3.33 | 8 | 3.833333333 | | 0.98 | 0.22 | 2.00 | -0.50 | 136.68 | 138.46 | -1.77 |
| 002608SMH | 11887802.22 | 6987509.29 | 142.01 | 5.33 | 6987508.44 | 11887802.71 | 141.79 | 5.33 | 36 | 3.833333333 | | 0.98 | 0.22 | 0.00 | 1.50 | 136.68 | 136.46 | 0.23 |
| 002609SMH | 11887735.99 | 6987634.44 | 144.59 | 5.10 | 6987636.13 | 11887735.78 | 144.25 | 5.08 | 30 | 4.083333333 | | 1.71 | 0.34 | 0.02 | 1.00 | 139.49 | 139.17 | 0.32 |
| 002611SMH | 11887833.57 | 6987312.40 | 141.07 | 6.30 | 6987310.50 | 11887829.40 | 140.83 | 6.33 | 36 | | | 4.58 | 0.24 | -0.03 | | 134.77 | 134.50 | 0.27 |
| 002611SMH | 11887833.57 | 6987312.40 | 141.07 | 6.30 | 6987310.50 | 11887829.40 | 140.83 | 2.50 | 12 | | | 4.58 | 0.24 | 3.80 | | 134.77 | 138.33 | -3.56 |
| 002612SMH | 11887679.10 | 6987622.68 | 149.12 | 7.50 | 6987627.32 | 11887680.48 | 148.13 | 0.00 | 0 | | Buried and Marked | 4.84 | 0.99 | 7.50 | | 141.62 | 148.13 | -6.51 |
| 003067SMH | 11890865.77 | 6982561.59 | 66.52 | 6.75 | 6982558.88 | 11890870.39 | 65.97 | 6.33 | 24 | | | 5.36 | 0.55 | 0.42 | | 59.77 | 59.64 | 0.14 |
| 003067SMH | 11890865.77 | 6982561.59 | 66.52 | 6.75 | 6982558.88 | 11890870.39 | 65.97 | 6.33 | 10 | | | 5.36 | 0.55 | 0.42 | | 59.77 | 59.64 | 0.14 |
| 003076SMH | 11893752.24 | 6983628.88 | 43.90 | 3.71 | 6983629.16 | 11893748.55 | 42.58 | 4.29 | 12 | 3.75 | | 3.70 | 1.32 | -0.58 | 0.54 | 40.19 | 38.29 | 1.90 |
| 003119SMH | 11894280.90 | 6982397.45 | 25.00 | 9.13 | 6982396.98 | 11894282.62 | 24.11 | 9.00 | 42 | | | 1.78 | 0.89 | 0.13 | | 15.87 | 15.11 | 0.76 |
| 003119SMH | 11894280.90 | 6982397.45 | 25.00 | 9.13 | 6982396.98 | 11894282.62 | 24.11 | 9.00 | 21 | | | 1.78 | 0.89 | 0.13 | | 15.87 | 15.11 | 0.76 |
| 003119SMH | 11894280.90 | 6982397.45 | 25.00 | 9.13 | 6982396.98 | 11894282.62 | 24.11 | 9.00 | 48 | | | 1.78 | 0.89 | 0.13 | | 15.87 | 15.11 | 0.76 |
| 003136SMH | 11894263.05 | 6983012.30 | 32.62 | 7.02 | 6983011.01 | 11894262.40 | 31.23 | 6.79 | 30 | 6.333333333 | | 1.45 | 1.39 | 0.23 | 0.46 | 25.60 | 24.44 | 1.16 |
| 003141SMH | 11894317.62 | 6982075.37 | 21.54 | 7.38 | 6982075.02 | 11894319.04 | 21.63 | 7.50 | 36 | | | 1.46 | -0.09 | -0.12 | | 14.16 | 14.13 | 0.03 |
| 003230SMH | 11893663.56 | 6979527.09 | 12.05 | 7.39 | 6979526.70 | 11893662.21 | 11.32 | 3.60 | 8 | | | 1.41 | 0.73 | 3.79 | | 4.66 | 7.72 | -3.06 |
| 003230SMH | 11893663.56 | 6979527.09 | 12.05 | 7.39 | 6979526.70 | 11893662.21 | 11.32 | 7.20 | 62 | | | 1.41 | 0.73 | 0.19 | | 4.66 | 4.12 | 0.54 |
| 003269SMH | 11894208.60 | 6980698.77 | 27.00 | 6.38 | 6980692.70 | 11894211.61 | 25.57 | 6.67 | 36 | 5.666666667 | | 6.77 | 1.43 | -0.29 | 1.00 | 20.62 | 18.90 | 1.72 |
| 003269SMH | 11894208.60 | 6980698.77 | 27.00 | 6.38 | 6980692.70 | 11894211.61 | 25.57 | 6.67 | 24 | 5.666666667 | | 6.77 | 1.43 | -0.29 | 1.00 | 20.62 | 18.90 | 1.72 |
| 003356SMH | 11893716.92 | 6983860.30 | 44.00 | 7.40 | 6983861.81 | 11893717.89 | 43.79 | 7.33 | 8 | 6.666666667 | | 1.80 | 0.21 | 0.07 | 0.67 | 36.60 | 36.46 | 0.15 |
| 003356SMH | 11893716.92 | 6983860.30 | 44.00 | 7.40 | 6983861.81 | 11893717.89 | 43.79 | 7.33 | 12 | 6.666666667 | | 1.80 | 0.21 | 0.07 | 0.67 | 36.60 | 36.46 | 0.15 |
| 003356SMH | 11893716.92 | 6983860.30 | 44.00 | 7.40 | 6983861.81 | 11893717.89 | 43.79 | 7.33 | 15 | 6.666666667 | | 1.80 | 0.21 | 0.07 | 0.67 | 36.60 | 36.46 | 0.15 |
| 003361SMH | 11891325.63 | 6984141.32 | 55.11 | 4.70 | 6984134.48 | 11891329.85 | 54.18 | 3.75 | 15 | | | 8.04 | 0.93 | 0.95 | | 50.41 | 50.43 | -0.02 |
| 003361SMH | 11891325.63 | 6984141.32 | 55.11 | 4.70 | 6984134.48 | 11891329.85 | 54.18 | 4.75 | 24 | | | 8.04 | 0.93 | -0.05 | | 50.41 | 49.43 | 0.98 |
| 003361SMH | 11891325.63 | 6984141.32 | 55.11 | 4.70 | 6984134.48 | 11891329.85 | 54.18 | 3.75 | 8 | | | 8.04 | 0.93 | 0.95 | | 50.41 | 50.43 | -0.02 |
| 003421SMH | 11892474.12 | 6985681.28 | 32.22 | 5.80 | 6985688.18 | 11892476.48 | 32.10 | 5.50 | 48 | | | 7.30 | 0.12 | 0.30 | | 26.42 | 26.60 | -0.18 |
| 003475SMH | 11895559.14 | 6983114.35 | 40.01 | 11.07 | 6983114.39 | 11895567.20 | 38.78 | 11.04 | 46 | 9 | | 8.06 | 1.23 | 0.03 | 2.04 | 28.94 | 27.74 | 1.20 |
| 003475SMH | 11895559.14 | 6983114.35 | 40.01 | 11.07 | 6983114.39 | 11895567.20 | 38.78 | 11.04 | 44 | 9 | | 8.06 | 1.23 | 0.03 | 2.04 | 28.94 | 27.74 | 1.20 |
| 003496SMH | 11891167.08 | 6981328.69 | 124.15 | 4.93 | 6981325.68 | 11891168.10 | 123.47 | 4.83 | 12 | 4.166666667 | | 3.18 | 0.68 | 0.10 | 0.67 | 119.22 | 118.64 | 0.58 |
| 004794IN | 11889841.57 | 6978023.32 | 15.51 | 6.11 | 6978018.92 | 11889837.35 | 14.09 | 5.80 | 42 | 5 | | 6.10 | 1.42 | 0.31 | 0.80 | 9.40 | 8.29 | 1.11 |
| 004794IN | 11889841.57 | 6978023.32 | 15.51 | 6.11 | 6978018.92 | 11889837.35 | 14.09 | 5.80 | 27 | 5 | | 6.10 | 1.42 | 0.31 | 0.80 | 9.40 | 8.29 | 1.11 |
| 004794IN | 11889841.57 | 6978023.32 | 15.51 | 6.11 | 6978018.92 | 11889837.35 | 14.09 | 4.80 | 18 | 5 | | 6.10 | 1.42 | 1.31 | -0.20 | 9.40 | 9.29 | 0.11 |
| 004794IN | 11889841.57 | 6978023.32 | 15.51 | 6.11 | 6978018.92 | 11889837.35 | 14.09 | 4.80 | 12 | 5 | | 6.10 | 1.42 | 1.31 | -0.20 | 9.40 | 9.29 | 0.11 |
| 004931IN | 11893787.58 | 6978704.30 | 22.00 | 17.98 | 6978703.99 | 11893782.66 | 21.92 | 17.88 | 48 | 15.83333333 | | 4.93 | 0.08 | 0.11 | 2.04 | 4.02 | 4.05 | -0.03 |
| 004961IN | 11893246.52 | 6978493.60 | 27.65 | 10.68 | 6978494.53 | 11893244.53 | 26.45 | 7.50 | 12 | 8.166666667 | | 2.20 | 1.20 | 3.18 | -0.67 | 16.97 | 18.95 | -1.98 |
| 004961IN | 11893246.52 | 6978493.60 | 27.65 | 10.68 | 6978494.53 | 11893244.53 | 26.45 | 10.50 | 42 | 8.166666667 | | 2.20 | 1.20 | 0.18 | 2.33 | 16.97 | 15.95 | 1.02 |
| 004983IN | 11893994.81 | 6978896.01 | 14.47 | 5.50 | 6978901.31 | 11893993.75 | 13.67 | 4.17 | 12 | 2.916666667 | | 5.40 | 0.80 | 1.33 | 1.25 | 8.97 | 9.50 | -0.54 |
| 004983IN | 11893994.81 | 6978896.01 | 14.47 | 5.50 | 6978901.31 | 11893993.75 | 13.67 | 4.17 | 15 | 2.916666667 | | 5.40 | 0.80 | 1.33 | 1.25 | 8.97 | 9.50 | -0.54 |
| 005007IN | 11892084.08 | 6977877.38 | 23.93 | 11.10 | 6977877.29 | 11892119.52 | 23.70 | 11.00 | 48 | 7.1 | | 35.44 | 0.23 | 0.10 | 3.90 | 12.83 | 12.70 | 0.13 |
| 005448IN | 11886848.01 | 6987769.17 | 189.39 | 9.79 | 6987770.93 | 11886849.29 | 188.72 | 10.00 | 24 | 9 | | 2.17 | 0.67 | -0.21 | 1.00 | 179.60 | 178.72 | 0.88 |
| 005448IN | 11886848.01 | 6987769.17 | 189.39 | 9.79 | 6987770.93 | 11886849.29 | 188.72 | 2.92 | 15 | 9 | | 2.17 | 0.67 | 6.87 | -6.08 | 179.60 | 185.80 | -6.20 |
| 005457IN | 11887031.29 | 6988828.77 | 173.33 | 1.00 | 6988823.79 | 11887034.70 | 172.85 | 5.08 | 12 | | | 6.04 | 0.48 | -4.08 | | 172.33 | 167.77 | 4.57 |
| 005458IN | 11887337.41 | 6988599.00 | 167.29 | 7.51 | 6988597.92 | 11887338.28 | 167.01 | 7.50 | 36 | | | 1.38 | 0.28 | 0.01 | | 159.78 | 159.51 | 0.27 |
| 005458IN | 11887337.41 | 6988599.00 | 167.29 | 7.51 | 6988597.92 | 11887338.28 | 167.01 | 7.50 | 18 | | | 1.38 | 0.28 | 0.01 | | 159.78 | 159.51 | 0.27 |
| 005458IN | 11887337.41 | 6988599.00 | 167.29 | 7.51 | 6988597.92 | 11887338.28 | 167.01 | 7.50 | 24 | | | 1.38 | 0.28 | 0.01 | | 159.78 | 159.51 | 0.27 |
| 005499IN | 11886068.18 | 6988018.62 | 199.45 | 2.20 | 6988018.79 | 11886067.67 | 198.52 | 1.67 | 12 | | | 0.54 | 0.93 | 0.53 | | 197.25 | 196.85 | 0.40 |
| 005541IN | 11887571.09 | 6988244.79 | 161.74 | 5.30 | 6988240.29 | 11887568.30 | 161.21 | 5.33 | 15 | 4.333333333 | | 5.30 | 0.53 | -0.03 | 1.00 | 156.44 | 155.88 | 0.56 |
| 005541IN | 11887571.09 | 6988244.79 | 161.74 | 5.30 | 6988240.29 | 11887568.30 | 161.21 | 5.33 | 30 | 4.333333333 | | 5.30 | 0.53 | -0.03 | 1.00 | 156.44 | 155.88 | 0.56 |
| 006124IN | 11893141.46 | 6980723.81 | 15.37 | 4.26 | 6980723.64 | 11893138.16 | 15.08 | 4.21 | 15 | | | 3.31 | 0.29 | 0.05 | | 11.11 | 10.87 | 0.24 |
| 006124IN | 11893141.46 | 6980723.81 | 15.37 | 4.26 | 6980723.64 | 11893138.16 | 15.08 | 4.21 | 12 | | | 3.31 | 0.29 | 0.05 | | 11.11 | 10.87 | 0.24 |
| 006174IN | 11893379.75 | 6985077.62 | 30.60 | 1.40 | 6985079.92 | 11893382.65 | 29.36 | 1.50 | 8 | 1 | | 3.70 | 1.24 | -0.10 | 0.50 | 29.20 | 27.86 | 1.34 |
| 006174IN | 11893379.75 | 6985077.62 | 30.60 | 1.40 | 6985079.92 | 11893382.65 | 29.36 | 1.50 | 10 | 1 | | 3.70 | 1.24 | -0.10 | 0.50 | 29.20 | 27.86 | 1.34 |
| 006230IN | 11893775.90 | 6985393.47 | 36.03 | 2.88 | 6985390.22 | 11893778.67 | 35.17 | 2.83 | 12 | | | 4.26 | 0.86 | 0.05 | | 33.15 | 32.34 | 0.82 |
| 006240IN | 11894207.22 | 6985676.85 | 33.84 | 3.50 | 6985675.40 | 11894204.51 | 32.16 | 2.54 | 15 | | | 3.07 | 1.68 | 0.96 | | 30.34 | 29.62 | 0.73 |
| 006596IN | 11894131.01 | 6987237.65 | 45.99 | 4.65 | 6987235.43 | 11894131.01 | 45.04 | 4.21 | 12 | 3.583333333 | | 2.21 | 0.95 | 0.44 | 0.63 | 41.34 | 40.83 | 0.50 |
| 007516IN | 11886360.01 | 6987799.88 | 200.61 | 9.51 | 6987800.78 | 11886360.45 | 200.75 | 10.13 | 55 | 7.666666667 | | 1.00 | -0.14 | -0.62 | 2.46 | 191.10 | 190.63 | 0.47 |
| 007516IN | 11886360.01 | 6987799.88 | 200.61 | 9.51 | 6987800.78 | 11886360.45 | 200.75 | 6.67 | 18 | 7.666666667 | | 1.00 | -0.14 | 2.84 | -1.00 | 191.10 | 194.08 | -2.99 |
| 007526IN | 11886502.52 | 6987642.96 | 202.01 | 6.71 | 6987644.81 | 11886500.82 | 201.76 | 6.75 | 15 | 6 | | 2.51 | 0.25 | -0.04 | 0.75 | 195.30 | 195.01 | 0.29 |
| 007526IN | 11886502.52 | 6987642.96 | 202.01 | 6.71 | 6987644.81 | 11886500.82 | 201.76 | 6.75 | 24 | 6 | | 2.51 | 0.25 | -0.04 | 0.75 | 195.30 | 195.01 | 0.29 |

# APPENDIX F

| Structure | Direction | Measured Invert Depth (ft), VPS | Pipe ID | Invert Depth (ft), GIS | Difference between GIS and VPS (ft) |
|---|---|---|---|---|---|
| 001591SMH | In | 17.75 | 006474STMP | 0.00 | -17.75 |
| 001689SMH | In | 13.90 | 006413STMP | 8.20 | -5.70 |
| 000519IO | In | 8.17 | 008578STMP | 2.54 | -5.63 |
| 003421SMH | Out | 5.50 | 010036STMP | 0.00 | -5.50 |
| 003067SMH | In | 6.33 | 009257STMP | 2.99 | -3.34 |
| 001689SMH | In | 14.50 | 006408STMP | 13.16 | -1.34 |
| 001658SMH | In | 7.60 | 007196STMP | 6.50 | -1.10 |
| 001658SMH | Out | 7.60 | 007195STMP | 6.70 | -0.90 |
| 001619SMH | In | 9.67 | 006202STMP | 8.92 | -0.75 |
| 001619SMH | Out | 9.67 | 006201STMP | 8.94 | -0.73 |
| 003356SMH | In | 7.33 | 010382STMP | 6.65 | -0.68 |
| 003076SMH | In | 4.29 | 008894STMP | 3.66 | -0.63 |
| 001665SMH | In | 12.60 | 006942STMP | 12.25 | -0.35 |
| 001688SMH | Out | 14.80 | 006412STMP | 14.46 | -0.34 |
| 002426SMH | In | 8.00 | 008191STMP | 7.70 | -0.30 |
| 004961IN | In | 10.50 | 006201STMP | 10.24 | -0.26 |
| 001667SMH | In | 12.92 | 007220STMP | 12.71 | -0.21 |
| 003356SMH | In | 7.33 | 009792STMP | 7.15 | -0.18 |
| 001684SMH | In | 11.20 | 006400STMP | 11.06 | -0.14 |
| 003356SMH | Out | 7.33 | 009796STMP | 7.20 | -0.13 |
| 001686SMH | In | 11.60 | 006404STMP | 11.50 | -0.10 |
| 000088SMH | In | 6.75 | 000479STMP | 6.70 | -0.05 |
| 001962SMH | Out | 5.25 | 011443STMP | 5.20 | -0.05 |
| 003361SMH | Out | 4.75 | 010402STMP | 4.70 | -0.05 |
| 001622SMH | In | 12.50 | 006209STMP | 12.46 | -0.04 |
| 001686SMH | Out | 11.60 | 006405STMP | 11.56 | -0.04 |
| 005007IN | In | 11.00 | 006399STMP | 10.96 | -0.04 |
| 001556SMH | In | 9.20 | 006906STMP | 9.17 | -0.03 |
| 001665SMH | Out | 12.60 | 006235STMP | 12.60 | 0.00 |
| 004931IN | In | 17.88 | 006975STMP | 17.88 | 0.00 |
| 003119SMH | In | 9.00 | 008634STMP | 9.01 | 0.01 |
| 003496SMH | In | 4.83 | 010458STMP | 4.85 | 0.02 |
| 000088SMH | Out | 6.75 | 000487STMP | 6.80 | 0.05 |
| 001591SMH | Out | 17.75 | 006423STMP | 17.80 | 0.05 |
| 001682SMH | In | 11.30 | 006395STMP | 11.36 | 0.06 |
| 001690SMH | In | 17.60 | 006414STMP | 17.66 | 0.06 |
| 002426SMH | Out | 8.00 | 007778STMP | 8.10 | 0.10 |
| 005007IN | Out | 11.00 | 006400STMP | 11.10 | 0.10 |
| 001642SMH | In | 5.80 | 006245STMP | 5.90 | 0.10 |
| 001684SMH | Out | 11.20 | 006401STMP | 11.30 | 0.10 |
| 004931IN | Out | 17.88 | 006978STMP | 17.98 | 0.11 |
| 001682SMH | Out | 11.30 | 006397STMP | 11.42 | 0.12 |
| 001557SMH | In | 7.80 | 006903STMP | 7.92 | 0.12 |
| 001583SMH | In | 4.83 | 006974STMP | 4.98 | 0.15 |
| 004961IN | Out | 10.50 | 006198STMP | 10.68 | 0.18 |
| 001688SMH | In | 12.20 | 006409STMP | 12.38 | 0.18 |
| 003136SMH | In | 6.79 | 008626STMP | 6.98 | 0.19 |
| 003421SMH | In | 5.50 | 010037STMP | 5.70 | 0.20 |
| 001557SMH | Out | 7.80 | 006906STMP | 8.02 | 0.22 |
| 004794IN | In | 5.80 | 006817STMP | 6.04 | 0.24 |
| 003136SMH | Out | 6.79 | 008561STMP | 7.05 | 0.26 |
| 006596IN | In | 4.21 | 009909STMP | 4.51 | 0.30 |
| 004794IN | Out | 5.80 | 006908STMP | 6.16 | 0.36 |
| 003067SMH | In | 6.33 | 009259STMP | 6.75 | 0.42 |
| 003067SMH | Out | 6.33 | 009258STMP | 6.75 | 0.42 |
| 004794IN | In | 4.80 | 006866STMP | 5.24 | 0.44 |
| 006596IN | Out | 4.21 | 009908STMP | 4.65 | 0.44 |
| 001689SMH | In | 14.60 | 006412STMP | 15.16 | 0.56 |
| 001690SMH | Out | 17.60 | 006416STMP | 18.17 | 0.57 |
| 001688SMH | In | 5.40 | 006410STMP | 6.10 | 0.70 |

| Structure | Direction | Measured Invert Depth (ft), VPS | Pipe ID | Invert Depth (ft), GIS | Difference between GIS and VPS (ft) |
|---|---|---|---|---|---|
| 006240IN | In | 2.54 | 010334STMP | 3.40 | 0.86 |
| 006240IN | Out | 2.54 | 010299STMP | 3.50 | 0.96 |
| 001682SMH | In | 5.30 | 006396STMP | 6.30 | 1.00 |
| 001689SMH | Out | 14.70 | 006414STMP | 15.74 | 1.04 |
| 001962SMH | In | 5.25 | 011441STMP | 6.42 | 1.17 |
| 004794IN | In | 4.80 | 004913STMP | 6.06 | 1.26 |
| 004983IN | Out | 4.17 | 006971STMP | 5.50 | 1.33 |
| 001907SMH | In | 3.75 | 011131STMP | 5.45 | 1.70 |
| 001556SMH | In | 6.00 | 005049STMP | 7.83 | 1.83 |
| 001665SMH | In | 7.00 | 006236STMP | 9.00 | 2.00 |
| 001619SMH | In | 6.75 | 006203STMP | 8.86 | 2.11 |
| 001684SMH | In | 5.60 | 006402STMP | 7.78 | 2.18 |
| 006230IN | Out | 2.83 | 009717STMP | 5.36 | 2.53 |

# APPENDIX G

| Manhole | Section | Defect | Rank |
|---|---|---|---|
| 005499IN | Cover | Cracked / deteriorated | 4 |
| 000088SMH | Chamber | Cracked | 3 |
| 001658SMH | Riser Ring | Cracked or Bent | 3 |
| 001689SMH | Frame | Offset | 3 |
| 002515SMH | Frame | Offset | 3 |
| 002571SMH | Chimney/Shaft | Cracked | 3 |
| 002596SMH | Bench | Broken/Hole | 3 |
| 003356SMH | Frame | Cracked / broken / deteriorated | 3 |
| 003356SMH | Chimney/Shaft | Cracked | 3 |
| 005499IN | Frame | Offset | 3 |
| 006174IN | Chamber | Cracked | 3 |
| 006240IN | Chamber | Cracked | 3 |
| 001556SMH | Chamber | Corroded, pitted, spalled | 2 |
| 001653SMH | Cover | Cracked / deteriorated | 2 |
| 001658SMH | Chamber | Mortar missing | 2 |
| 001658SMH | Frame | Offset | 2 |
| 001658SMH | Chimney/Shaft | Mortar missing | 2 |
| 001665SMH | Frame | Offset | 2 |
| 001684SMH | Frame | Offset | 2 |
| 001686SMH | Chimney/Shaft | Bricks displaced or missing | 2 |
| 001686SMH | Chimney/Shaft | Cracked | 2 |
| 001686SMH | Frame | Offset | 2 |
| 001690SMH | Frame | Offset | 2 |
| 002611SMH | Chamber | Cracked | 2 |
| 003356SMH | Chimney/Shaft | Mortar missing | 2 |
| 003356SMH | Chamber | Cracked | 2 |
| 003356SMH | Chimney/Shaft | Bricks displaced or missing | 2 |
| 003475SMH | Channel | Debris/deposition | 2 |
| 004794IN | Chamber | Cracked | 2 |
| 005007IN | Chimney/Shaft | Cracked | 2 |
| 006174IN | Chamber | Broken/Hole | 2 |
| 006240IN | Chamber | Broken/Hole | 2 |
| 001550SMH | Chamber | Corroded, pitted, spalled | 1 |
| 001557SMH | Chimney/Shaft | Cracked | 1 |
| 001557SMH | Chamber | Cracked | 1 |
| 001658SMH | Chimney/Shaft | Bricks displaced or missing | 1 |
| 001658SMH | Chamber | Bricks displaced or missing | 1 |
| 001665SMH | Chimney/Shaft | Cracked | 1 |
| 001667SMH | Chamber | Cracked | 1 |
| 001686SMH | Chimney/Shaft | Mortar missing | 1 |
| 001690SMH | Chimney/Shaft | Cracked | 1 |
| 001962SMH | Chimney/Shaft | Corroded, pitted, spalled | 1 |
| 002530SMH | Frame | Corroded, pitted, spalled | 1 |
| 002543SMH | Chimney/Shaft | I/I evidence | 1 |
| 002605SMH | Cover | Fit in Frame | 1 |
| 002606SMH | Frame | Cracked / broken / deteriorated | 1 |

| Manhole | Section | Defect | Rank |
|---|---|---|---|
| 003136SMH | Frame | Offset | 1 |
| 003269SMH | Chimney/Shaft | Cracked | 1 |
| 003356SMH | Bench | Cracked | 1 |
| 003361SMH | Chamber | Mortar missing | 1 |
| 003361SMH | Chimney/Shaft | Mortar missing | 1 |
| 003475SMH | Chimney/Shaft | Mortar missing | 1 |
| 003475SMH | Frame | Offset | 1 |
| 003475SMH | Chamber | I/I evidence | 1 |
| 003496SMH | Chimney/Shaft | Cracked | 1 |
| 003496SMH | Chamber | Cracked | 1 |
| 004931IN | Chimney/Shaft | I/I evidence | 1 |
| 004931IN | Chamber | I/I evidence | 1 |
| 004961IN | Chamber | I/I evidence | 1 |
| 004983IN | Chamber | Mortar missing | 1 |
| 004983IN | Chamber | Bricks displaced or missing | 1 |
| 005007IN | Chimney/Shaft | Corroded, pitted, spalled | 1 |
| 005448IN | Chimney/Shaft | Cracked | 1 |
| 005448IN | Chamber | Cracked | 1 |
| 005541IN | Chamber | Cracked | 1 |
| 006124IN | Chamber | Cracked | 1 |