

2016 Stormwater Pipe System Masterplan Update Mission Hills, Kansas



Water Resources Solutions



11-30-2016

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November 30, 2016

Ms. Courtney Christensen
City Administrator
City of Mission Hills
6300 State Line Road
Mission Hills, Kansas 66208

Subject: Mission Hills Stormwater Pipe System Masterplan Update

Dear Ms. Christensen:

Water Resources Solutions, LLC is pleased to present the Mission Hills Stormwater Pipe System Masterplan Update to the City of Mission Hills, Kansas.

Within this Masterplan, you will find the final report, maps, project summaries, opinions of probable project costs, and the GIS data package.

If you have any questions or require additional information, please contact me at 913-302-1030.

Sincerely,
Water Resources Solutions, LLC



Donald W. Baker, P.E., D. WRE, CPESC
Principal and Owner



11-30-2016

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Mission Hills Stormwater Pipe System Masterplan Update

Final Report

Prepared for the City of Mission Hills, Kansas

November 30, 2016

Prepared By:



Water Resources Solutions

8800 Linden Drive
Prairie Village, Kansas 66207
913-302-1030



11-30-2016

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Executive Summary

This report is an update to the 2009 Mission Hills Stormwater Pipe System Masterplan Update. Over the period from 2009 to now, there have been many upgrades, replacements and changes to the stormwater pipe systems of the City.

System Inventory

The stormwater structures for the entire City were inventoried and catalogued in 2009. The results of the 2009 structure inventory were used for this masterplan update. The structures that were replaced since the 2009 Masterplan were considered in good condition. The information on these new structures were obtained from design plans. No as-built drawings or surveys were available at the time of this report.

Some structure properties were obtained from historic records and plans. These structures included those on private property that could not be accessed, structures located within the driving lanes of 63rd Street and State Line Road, and structures that could not be physically opened.

A total of 752 structures are included in this masterplan. A total of 725 structures were inventoried for the City in 2009, and this number was updated to include the structures replaced and added between 2009 and now. The structures are comprised of 473 inlets, 175 junctions, and 104 outfalls. Inlets are structures that allow water into the stormwater pipe system. Junctions are manholes or concrete boxes used to change elevation or direction of the pipe. Outfalls are the outlets of the pipe system into the creeks.

The structures were ranked based on their condition during the inventorying process. Structures listed in “Good” condition are structures that are either relatively new or have been reconstructed so that they are new in terms of their useful life. Structures in the “Fair” condition are structures defined as having some structural deficiencies, but appear to have more than 10 years of useful service left. Structures in “Poor” condition are structures that are in imminent danger of failure or have critical structure deficiencies that reduce its ability function. These structures require immediate attention, repair and/or replacement.

System Capacity

The stormwater systems were evaluated on their ability to convey runoff. The design storm event that was evaluated was the 10-year storm, or storm that has a 10 percent chance of occurrence in any year. This is generally accepted level of protection for stormwater pipe systems, unlike channels which are typically designed for the 100-year runoff. The results of this capacity analysis are presented and stormwater systems and pipe segments that have insufficient capacity to convey the runoff from the 10-year design storm.

In order to complete the System Capacity analysis, the hydrology, or amount of runoff, flowing to each of the stormwater inlets was calculated using the procedures outlined in the Kansas City Chapter of the American Public Works Association Section 5600 Storm Drainage Systems and Facilities (APWA, 2006).

Based on this criteria, the hydrology was made up of four main components: precipitation, losses (infiltration), runoff and transport/routing.

The precipitation data from the 2009 Masterplan was updated using the most current precipitation data from the National Oceanic and Atmospheric Administration. The hydrologic model from the 2009 Masterplan was updated using the most current precipitation data to generate updated hydrographs for each inlet.

Once the hydrographs for each inlet were updated using the new rain fall data, the resulting runoff flows were routed through each pipe system to determine if the capacity of each pipe is adequate to convey the runoff from the 10-year storm. The updated hydrographs were entered into the 2009 Masterplan hydraulic models to compute the hydraulic parameters of the pipe systems.

The pipe systems upgraded since the 2009 Masterplan were not modeled as part of this 2016 Masterplan, but the pipe systems partially upgraded since the 2009 Masterplan were modeled. The partially upgraded pipe system hydraulic models were modified to include the upgrades.

The computer model uses the pipe system characteristics, such as pipe material, diameter and slope, entered by the user to determine the capacity of each pipe segment. The model also determines the required elevation of the water in each inlet and manhole necessary to push the runoff calculated in previous steps through the pipe. If this elevation exceeds the top or opening of the structure, the structure is identified as flooding and the pipe is identified as having insufficient capacity.

Based on the updated capacity analysis of all the pipe systems in the City, it was determined that 197 pipes do not have adequate capacity to convey the runoff from the 10-year storm event.

System Improvement Costs

This 2016 System Inventory identified 752 stormwater structures in the City's stormwater systems. Of these, 502, or 66.8 percent, were judged to be in good condition. The 502 good condition structures included the structures replaced since the 2009 Masterplan. It was estimated that it would cost approximately \$753,000 to repair and replace the "Fair" and "Poor" conditions structures to put them in "Good" condition.

Approximately 300 feet of CMP have been replaced between 2009 and now. More than 2,000 feet of corrugated metal pipe (CMP) still remain throughout the City likely nearing the end of its useful life. The cost to replace this pipe with reinforced concrete pipe is approximately \$665,000.

Based on the updated system capacity analysis, it was determined that 197 segments of stormwater pipe do not have sufficient capacity to convey the 10-year storm runoff. These segments are located in 41 pipe systems throughout the City. In order to get these pipe systems to have adequate capacity to convey the 10-year storm runoff, approximately \$19,565,000 of improvements are required.

The resulting funding required to get the City's stormwater pipe systems to a "Good" condition will require approximately \$20,983,000.

Conclusions & Recommendations

It is important to note that the costs presented in this report are based on replacing and upgraded stormwater pipe systems using traditional methods. It is equally important to realize that other structural and non-structural best management practices should be investigated prior to constructing improvements. Often, BMPs can be constructed for less than traditional infrastructure and offer the added benefit of improving stormwater quality.

Based on the state of the stormwater system in the City, it is recommended that a maintenance plan be developed and adopted by the City as soon as possible. The condition of the stormwater infrastructure will only worsen as time goes on. Addressing the deficiencies and maintenance issues sooner rather than later will save the City a great deal of money over the long-term.

It is also recommended that the City investigate other revenue sources to help address the needed stormwater improvements. Many cities in the metro area have adopted stormwater utilities and other stormwater fees to help replace and maintain their stormwater infrastructure.

Introduction

This report is an update to the 2009 Mission Hills Stormwater Pipe System Masterplan Update. It outlines the inventory and capacity analysis of the City of Mission Hills' stormwater pipe system. Over the period from 2009 to now, there have been many upgrades, replacements and changes to the stormwater pipe systems of the City.

The following report outlines the methodology used to inventory the City's stormwater pipe systems and the results of the inventory. The stormwater structures are characterized by their type and condition. They are illustrated on Stormwater Structures Inventory Map in Appendix A of this report. In addition, the pipe segments of the stormwater system are also characterized by pipe type and illustrated on Pipe Segment Inventory Map in Appendix A of this report.

Following the Inventory section, the methodology used to analyze the capacity of the stormwater systems is outlined. The results of this capacity analysis are presented and stormwater systems and pipe segments that have insufficient capacity to convey the runoff from the 10-year design storm (storm that has a 10 percent chance of occurrence in any year).

Finally, the costs of system improvements are presented based on the inventory and capacity analysis.

Structure Inventory

The results of the 2009 structure inventory were used for this masterplan update. The structures that were replaced since the 2009 Masterplan were considered in good condition. The information on these new structures were obtained from design plans. No as-built drawings or surveys were available at the time of this report.

Some structure properties were obtained from historic records and plans. These structures included those on private property that could not be accessed, structures located within the driving lanes of 63rd Street and State Line Road, and structures that could not be physically opened.

Inlets

The properties and attributes for each stormwater inlet collected during the inventory in 2009 are listed below.

- Location
- Inlet type (curb, area, grate, or combination)
- Inlet condition (good, fair, poor)
- Inlet material (concrete, brick, other)
- Inlet dimensions
- Inlet opening dimensions
- Top elevations

- Pipe material
- Pipe elevations
- Pipe dimensions

These properties and attributes were used to evaluate the condition and capacity of the inlet.

Junctions

Junction structures in the stormwater pipe system serve to connect pipe systems together or provide access to points where the pipe system changes direction or elevation and no inlet has been constructed. Junction structures typically include manholes and junction boxes. There are multiple locations in the City where pipes have been connected directly to other pipes without benefit of a junction structure. The locations of these underground junctions have been estimated based on historic maps and physical observations.

Properties and attributes of the junction structures that were collected are listed below.

- Location
- Junction type (manhole or junction box)
- Junction condition (good fair, poor)
- Junction material (concrete, brick, other)
- Junction dimensions
- Top elevation
- Pipe material
- Pipe elevations
- Pipe dimensions

Outfalls

Outfalls are the structures located at the end of the pipe systems as they discharge into the City's streams. The pipe outfalls typically terminate with headwalls made of concrete, stone or brick. Others terminate with flared-end sections on the pipe. Occasionally the pipe system terminates with a pipe simply protruding from the streambank.

Properties and attributes collected for the pipe outfalls include the following.

- Outfall type (flared-end section, headwall, protruding)
- Outfall material (concrete, brick, stone)
- Outfall condition (good, fair, poor)
- Elevation
- Pipe material
- Pipe elevation
- Pipe dimensions

Structure Inventory Results

A total of 752 structures are included in this masterplan. A total of 725 structures were inventoried for the City in 2009, and this number was updated to include the structures replaced and added between 2009 and now. The structures are comprised of 473 inlets, 175 junctions, and 104 outfalls. The inventoried structures are illustrated in Stormwater Structures Inventory Map in Appendix A of this report.

Structure Condition

The structures were ranked based on their condition during the inventorying process in 2009. The new structures were given a ranking of “Good” condition. Structures listed in “Good” condition are structures that are either relatively new or have been reconstructed so that they are new in terms of their useful life. Structures in the “Fair” condition are structures defined as having some structural deficiencies, but appear to have more than 10 years of useful service left. Repairs to these structures could extend the useful life of the structure to something well over ten years. Structures in “Poor” condition are structures that are in imminent danger of failure or have critical structure deficiencies that reduce its ability function. These structures require immediate attention, repair and/or replacement.

Inlets

A total of 473 inlets are included in this masterplan, 97 of which are new inlets added or replaced since 2009, and the remaining 376 were inventoried in 2009. Table 1 illustrates the number of inlets in the three condition categories. Inlets that were not physically inspected have been given a condition rating of fair.

Table 1: Inlet Condition

Condition	Number of Inlets
Good	336
Fair	110
Poor	27

The Inlet Conditions Map is in Appendix A of this report. As the inlets were inspected in 2009, it was noted that several had sediment and debris accumulations in them that reduced their functional capacity. Those inlets are illustrated on the Sediment and Debris Inlets Map in Appendix A of this report.

Junctions

A total of 175 junctions are included in this masterplan, 44 of which are new junctions added or replaced since 2009, and the remaining 131 were inventoried in 2009. Table 2 illustrates the number of junction in the three condition categories. Junctions that were not physically inspected have been given a condition rating of fair. In addition, there were 13 pipe connections made without a junction structure. These direct connections were labeled “hidden” junctions.

Table 2: Junction Condition

Condition	Number of Inlets
Good	117

Condition	Number of Inlets
Fair	47
Poor	11

The Junction Conditions Map in Appendix A of this report shows the location and condition of the junctions.

Outfalls

A total of 104 junctions are included in this masterplan, 23 of which are new outfalls added or replaced since 2009, and the remaining 81 were inventoried in 2009. Table 3 illustrates the number of outfalls in the three condition categories. Outfalls that were not physically inspected have been given a condition rating of fair.

Table 3: Outfall Condition

Condition	Number of Inlets
Good	49
Fair	44
Poor	11

The Outlet Conditions Map in Appendix A of this report shows the location and condition of the outfalls.

Pipes

As each structure was inspected in 2009, the type of pipe entering and leaving the structure was recorded along with the pipe's dimensions. The Pipe Segment Inventory Map is located in Appendix A of this report. Pipe types identified include reinforced concrete pipe (RCP), reinforced concrete box culvert (RCB), polyvinyl chloride pipe (PVC), vitrified clay pipe (VCP), corrugated metal pipe (CMP), and high-density polyethylene pipe (HDPE).

A total of 125 pipes have been replaced or added between 2009 to now, and these pipes were added to the inventory. Approximately 65.3 percent of the pipes identified were RCP. This constitutes the majority of the pipes in the City. PVC pipe, with approximately 23.2 percent of the pipes inventoried, exhibited the next highest occurrence within the City. Table 4 shows the percentage of pipe by category in the City and compares the 2009 percentages and 2016 percentages. The increase in percentage of RCP and HDPE and decrease in percentage of the other pipe materials is a result of the pipe system improvements made since 2009.

Table 4: Pipe Materials

Pipe Material	2016 Percentage	2009 Percentage
RCP/RCB	65.3	56.5
PVC	23.2	29.3
VCP	4.6	8.2
CMP	3.8	5.3
HDPE	2.6	0.1

Pipe Material	2016 Percentage	2009 Percentage
Unknown	0.6	0.6

There were 25 segments of CMP identified in the system. These pipe segments are illustrated in the Corrugated Metal Pipe Segments Map in Appendix A of this report. The maintenance issues associated with these segments will be discussed in a later section.

Hydrology

The hydrology, or amount of runoff, flowing to each of the stormwater inlets was calculated using the procedures outlined in the Kansas City Chapter of the American Public Works Association Section 5600 Storm Drainage Systems and Facilities (APWA, 2006). Based on this criteria, the hydrology was made up of four main components: precipitation, losses (infiltration), runoff and transport/routing.

The precipitation data was updated using the most current precipitation data from the National Oceanic and Atmospheric Administration. Design storm events for this study include storms with the return interval of 2-year, 5-year, 10-year, and 100-year storm events as defined in Table 5.

Table 5: Precipitation Return Interval and Depth

Return Interval	Precipitation (in)
2-year	3.67
5-year	4.66
10-year	5.54
100-year	8.91

The hydrologic model from the 2009 Masterplan was updated using the above precipitation data to generate updated hydrographs for each inlet. The drainage areas to each inlet are shown on the Inlet Drainage Area Map in Appendix A of this report.

System Capacity

Once the hydrographs for each inlet were updated using the new rain fall data, the resulting runoff flows were routed through each pipe system to determine if the capacity of each pipe is adequate to convey the runoff from the 10-year storm. The updated hydrographs were entered into the 2009 Masterplan hydraulic models to compute the hydraulic parameters of the pipe systems.

The pipe systems upgraded since the 2009 Masterplan were not modeled as part of this 2016 Masterplan, but the pipe systems partially upgraded since the 2009 Masterplan were modeled. The partially upgraded pipe system hydraulic models were modified to include the upgrades.

Based on the updated capacity analysis of all the pipe systems in the City, it was determined that 197 pipes do not have adequate capacity to convey the runoff from the 10-year storm event. These pipes are shown on the Undersized Stormwater Pipe Segment Map located in Appendix A.

Table 6 illustrates an updated list of the systems that require replacement due to capacity limitations. This list was reduced by 27 pipe systems because of upgrades and replacements. The structures and pipes replaced since the 2009 Masterplan are illustrated in the Upgraded Structures and Pipes Map located in Appendix A. Three pipe systems were added to the list because they now do not have adequate capacity to convey the updated runoff from the 10-yr storm event due to updated hydrology. The table shows the common name assigned to the project and the name of the hydraulic model used to evaluate the project. The locations of the pipes systems are shown in the Insufficient Capacity Pipe System and Project Map located in Appendix A.

Table 6: Pipes Systems with Insufficient Capacity

Pipe System Number	SWMM File	Location
2	260-83	69 th Terrace and State Line Road
3	310-43	69 th Terrace and Overhill Road to 69 th Street and Belinder
4	268-44	70 th Terrace and Belinder Road
5	315-316	Arno Road and State Line Road
6	311-103	69 th Street and State Line Road
7	238-39	69 th Street and Belinder
8	331-40	68 th Street
9	328-84	68 th Street to 69 th Street, East of Tomahawk
11	400-399	67 th Street and State Line Road
12	288-42	67 th Terrace
14	421-55	Indian Lane, Tomahawk Road to 66 th Street
17	383-50	65 th Street and High Drive
18	372-95	65 th Street and Willow Lane
19	438-54	Tomahawk Road from Verona Road to 66 th Street
20	340-101	66 th Terrace near Tomahawk Road
21	433-99	65 th Street and Tomahawk Road
22	431-53	Tomahawk Road and 66 th Terrace
23	455-57	Wenonga Road from Wenonga Terr. To Tomahawk Road
24	464-60	Aberdeen to Seneca
25	490-9	66 th Street between Indian Lane and Mission Road
26	489-8	65 th Terrace and Indian Lane
27	483-6	65 th Street and Indian Lane
29	296-96	Tomahawk Road, Sagamore Road to Mission Drive
30	409-13	Ensley Lane and Tomahawk Road
32	462-61	Wenonga, South of 63 rd Street
34	479-4	Indian Lane, South of 64 th Street
39	469-27	Belinder Avenue from 64 th Street to Mission Drive
42	536-22	Drury Lane and Brookwood Road
48	572-31	Oakwood Drive, 59 th Street to Mission Drive

Pipe System Number	SWMM File	Location
49	576-32	Mission Drive between Overhill Road and Indian Lane
53	585-34	Overhill Road and Guilford Lane
54	640-71	State Line Road, South of Pembroke Lane
55	608-65	Oakwood and Mission Drive
58	616-103	Mission Drive between Oakwood Drive and 56 th Street
59	605-64	Mission Drive between Oakwood Drive and Overhill Road
62	660-78	Mission Drive, North of 55 th Street
66	290-41	67 th Terrace between 67 th Street & Belinder
68	559-29	Overhill Road and Mission Drive
69	440-12	Verona Road, Aberdeen Street and 63 rd Street
70	MH 527-18	Mission Drive between 61 st Terrace and Brookwood Road
71	MH 598-62	Verona Road, South of Verona Terrace

System Improvement Costs

System improvement costs were determined based on structures and pipes recommended for replacement in the previous section. It was assumed that the structures at both the upstream and downstream ends of any replaced pipe segment would also be replaced regardless of condition. While this may, or may not, actually happen, accounting for it at this stage of the project will help limit budget surprises later.

The opinions of probable project costs, including construction costs, contingencies and engineering costs, are attached included Appendix B of this report and show the itemized costs used to determine the project costs. The costs from the 2009 Masterplan were updated based on the May 2016 values with an Engineering News Record cost index of 10315. This index will be required to index these costs to some future cost.

The ranking for each system was computed by dividing the cost of the proposed improvements for the system by its system rating. The system rating is based on two criteria. The first criteria is based on the capacity of the system. All the systems listed have insufficient capacity for the 10-year storm runoff. These systems were furthered analyzed to determine their sufficiency to convey the 5-year storm (storm with a 20 percent chance of occurring any year) runoff and the 2-year storm (storm with a 50 percent chance of occurring in any year) runoff. The Capacity Ratings are listed in Table 7.

Table 7: Capacity Rating

Return Interval Flooding	Rating
10-year	3
5-year	2
2-year	1

The second criteria was based on the condition of the structures in the system. The structures in the systems were given a Condition Rating as shown in Table 8. The ratings were then average based on the number of structures in the system.

Table 8: Condition Rating

Structure Condition	Rating
Good	3
Fair	2
Poor	1

The System Rating was computed by averaging the Capacity and Condition Ratings. The lower Ratings indicate the higher priority system improvements.

Table 9 lists the pipe systems with insufficient capacity to convey the 10-year storm runoff. This table has been listed in order of priority based on a ranking system developed for this masterplan. The table lists the cost of the system improvements, including engineering and contingencies, and System Rating.

Table 9: Project Ranking

Pipe System Number	Location	Cost	System Rating
11	67 th Street and State Line Road	\$163,486	1.25
54	State Line Road, South of Pembroke Lane	\$49,117	1.30
26	65 th Terrace and Indian Lane	\$142,743	1.33
25	66 th Street between Indian Lane and Mission Road	\$41,766	1.50
42	Drury Lane and Brookwood Road	\$139,283	1.61
49	Mission Drive between Overhill Road and Indian Lane	\$172,370	1.67
27	65 th Street and Indian Lane	\$66,401	1.75
32	Wenonga Road, South of 63 rd Street	\$51,564	1.75
34	Indian Lane, South of 64 th Street	\$47,798	1.75
53	Overhill Road and Guilford Lane	\$80,542	1.82
17	65 th Street and High Drive	\$999,639	1.82
14	Indian Lane, Tomahawk Road to 66 th Street	\$1,368,382	1.90
48	Oakwood Drive, 59 th Street to Mission Drive	\$1,142,825	1.97
30	Ensley Lane and Tomahawk Road	\$589,173	1.98
6	69 th Street and State Line Road	\$105,451	2.00
20	66 th Terrace near Tomahawk Road	\$32,203	2.00
66	67 th Terrace between 67 th Street & Belinder	\$21,420	2.00
68	Overhill Road and Mission Drive	\$76,719	2.00
71	Verona Road, South of Verona Terrace	\$59,870	2.00
39	Belinder Avenue from 64 th Street to Mission Drive	\$1,141,612	2.01
23	Wenonga Road from Wenonga Terr. To Tomahawk Road	\$741,119	2.03

Pipe System Number	Location	Cost	System Rating
2	69 th Terrace and State Line Road	\$1,457,182	2.10
4	70 th Terrace and Belinder Road	\$1,412,850	2.11
19	Tomahawk Road from Verona Road to 66 th Street	\$794,461	2.11
5	Arno Road and State Line Road	\$118,310	2.13
3	69 th Terrace and Overhill Road to 69 th Street and Belinder	\$938,391	2.16
22	Tomahawk Road and 66 th Terrace	\$768,901	2.17
18	65 th Street and Willow Lane	\$1,665,387	2.24
8	68 th Street	\$227,030	2.25
9	68 th Street to 69 th Street, East of Tomahawk	\$536,574	2.25
24	Aberdeen to Seneca	\$153,272	2.25
59	Mission Drive between Oakwood Drive and Overhill Road	\$169,072	2.37
29	Tomahawk Road, Sagamore Road to Mission Drive	\$89,414	2.42
69	Verona Road, Aberdeen Street and 63 rd Street	\$401,382	2.42
12	67 th Terrace	\$50,807	2.50
21	65 th Street and Tomahawk Road	\$108,568	2.50
62	Mission Drive, North of 55 th Street	\$268,197	2.50
7	69 th Street and Belinder	\$2,380,666	2.53
58	Mission Drive between Oakwood Drive and 56 th Street	\$137,894	2.75
70	Mission Drive between 61 st Terrace and Brookwood Road	\$30,014	2.75
55	Oakwood and Mission Drive	\$623,150	3.00

The total cost of the improvements necessary for capacity improvements of the system is \$19,565,000.

The System Inventory resulted in 201 structures that are in “Fair” condition. Based on an assumed cost of \$2,500 per structure to repair the structures, it will cost approximately \$503,000. The inventory also identified 49 structures that are in “Poor” condition. Based on an average replacement cost of \$5,100 per structure, it would cost approximately \$250,000 to upgrade the “Poor” structures in the system.

The System Inventory identified more than 2,300 of corrugated metal pipe (CMP) in the City’s stormwater system in 2009. Approximately 300 feet of CMP have been replaced between 2009 and now leaving more than 2,000 feet of corrugated metal pipe (CMP) throughout the City. This type of pipe corrodes in this regions soil conditions. Based on assumptions of when the CMP pipe was constructed in the City, it is likely nearing the end of its useful life. Based on the replacement pipe costs for reinforced concrete pipe, which has a longer life, it is anticipated that the cost to simply replace the CMP would be approximately \$665,000.

Conclusions and Recommendations

This 2016 System Inventory identified 752 stormwater structures in the City's stormwater systems. Of these, 502, or 66.8 percent, were judged to be in good condition. The 502 good condition structures included the structures replaced since the 2009 Masterplan. It was estimated that it would cost approximately \$753,000 to repair and replace the "Fair" and "Poor" conditions structures to put them in "Good" condition.

Approximately 300 feet of CMP have been replaced between 2009 and now. More than 2,000 feet of corrugated metal pipe (CMP) still remain throughout the City likely nearing the end of its useful life. The cost to replace this pipe with reinforced concrete pipe is approximately \$665,000.

Based on the updated system capacity analysis, it was determined that 197 segments of stormwater pipe do not have sufficient capacity to convey the 10-year storm runoff. These segments are located in 41 pipe systems throughout the City. In order to get these pipe systems to have adequate capacity to convey the 10-year storm runoff, approximately \$19,565,000 of improvements are required.

The resulting funding required to get the City's stormwater pipe systems to a "Good" condition will require approximately \$20,983,000.

It is important to note that the costs presented in this report are based on replacing and upgraded stormwater pipe systems using traditional infrastructure improvements. It is equally important to realize that other structural and non-structural best management practices should be investigated. Often BMPs can be constructed for less than traditional infrastructure and offer the added benefit of improving stormwater quality.

Based on the state of the stormwater system in the City, it is recommended that a maintenance plan be developed and adopted by the City as soon as possible. The condition of the stormwater infrastructure will only worsen as time goes on. Addressing the deficiencies and maintenance issues sooner than later will save the City a great deal of money.

It is also recommended that the City investigate other revenue sources to help address the needed stormwater improvements. Many cities in the metro area have adopted stormwater utilities and other stormwater fees to help replace and maintain their stormwater infrastructure.

References

APWA. 2006. "Division V, Section 5600, Storm Drainage Systems and Facilities". Kansas City Metro Chapter American Public Works Association. Kansas City. April 15.

Young, C. Bryan, and Bruce M. McEnroe. 2002, "Precipitation Frequency Estimates for the Kansas City Metropolitan Area," Kansas City Metro Chapter of the American Public Works Association, June.

Appendix A

Maps

Stormwater Structures Inventory Map

Pipe Segment Inventory Map

Inlet Conditions Map

Sediment and Debris Inlets Map

Junction Conditions Map

Outlet Conditions Map

Corrugated Metal Pipe Segments Map

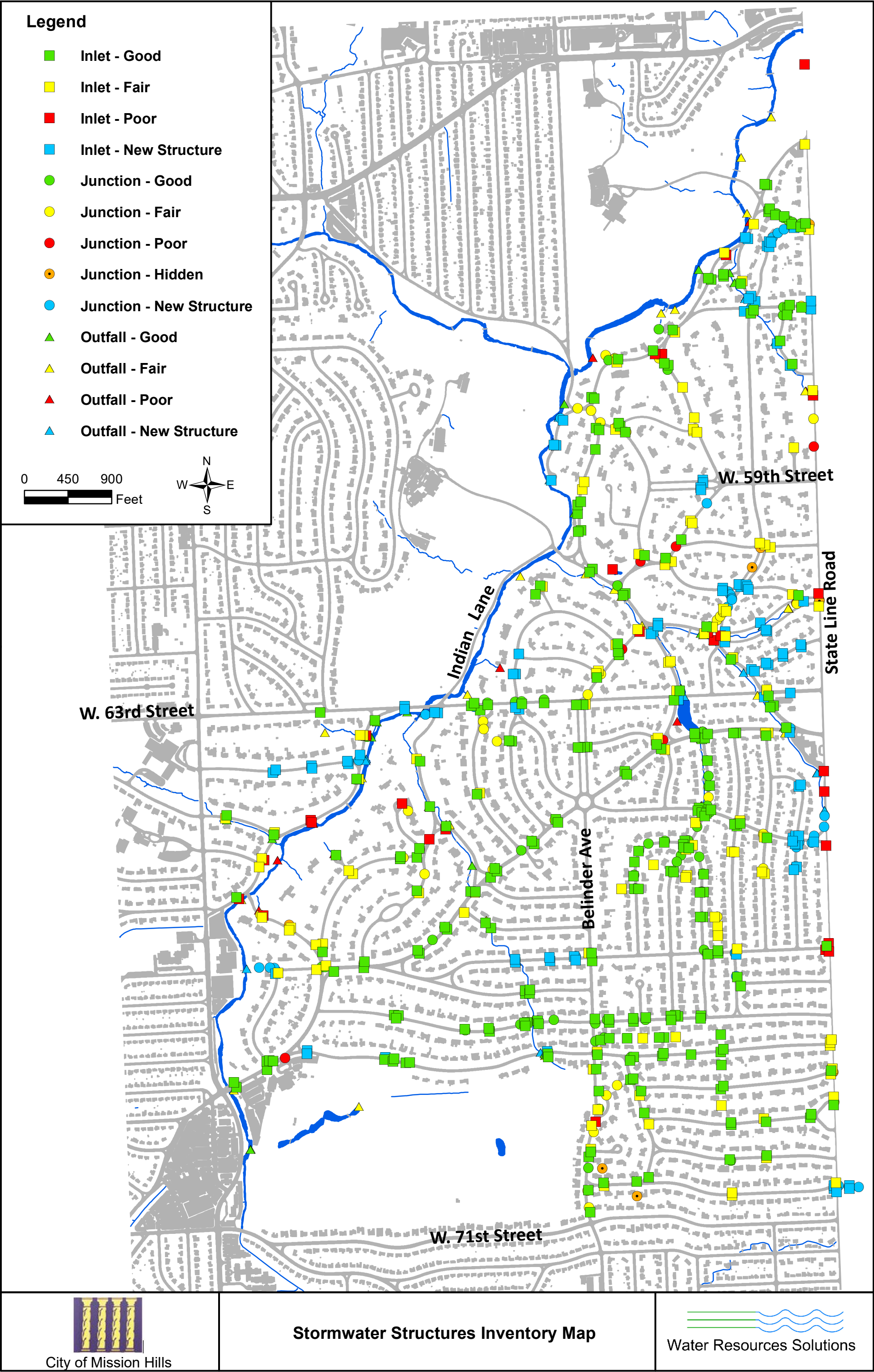
Inlet Drainage Area Map

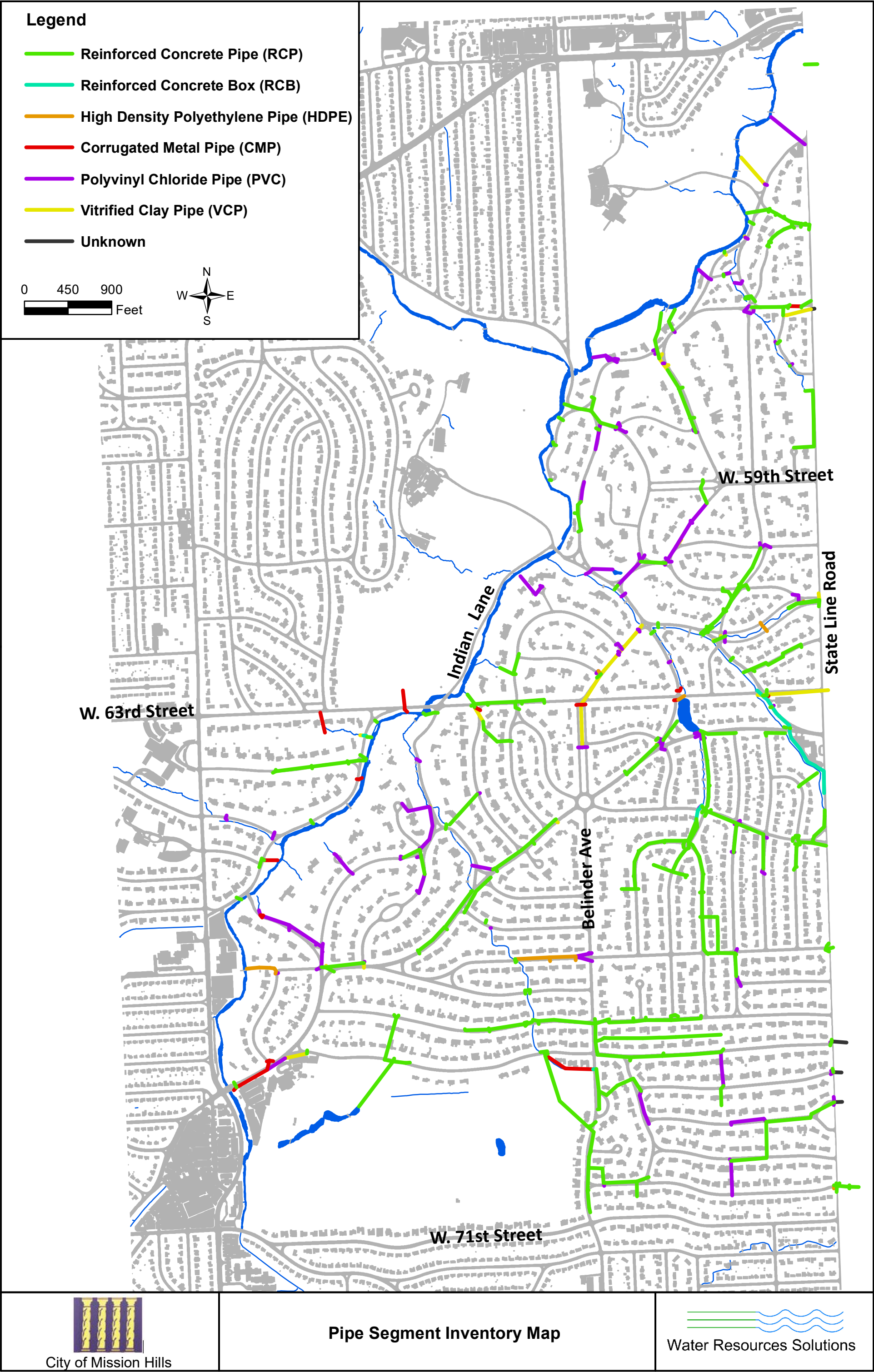
Undersized Stormwater Pipe Segments Map

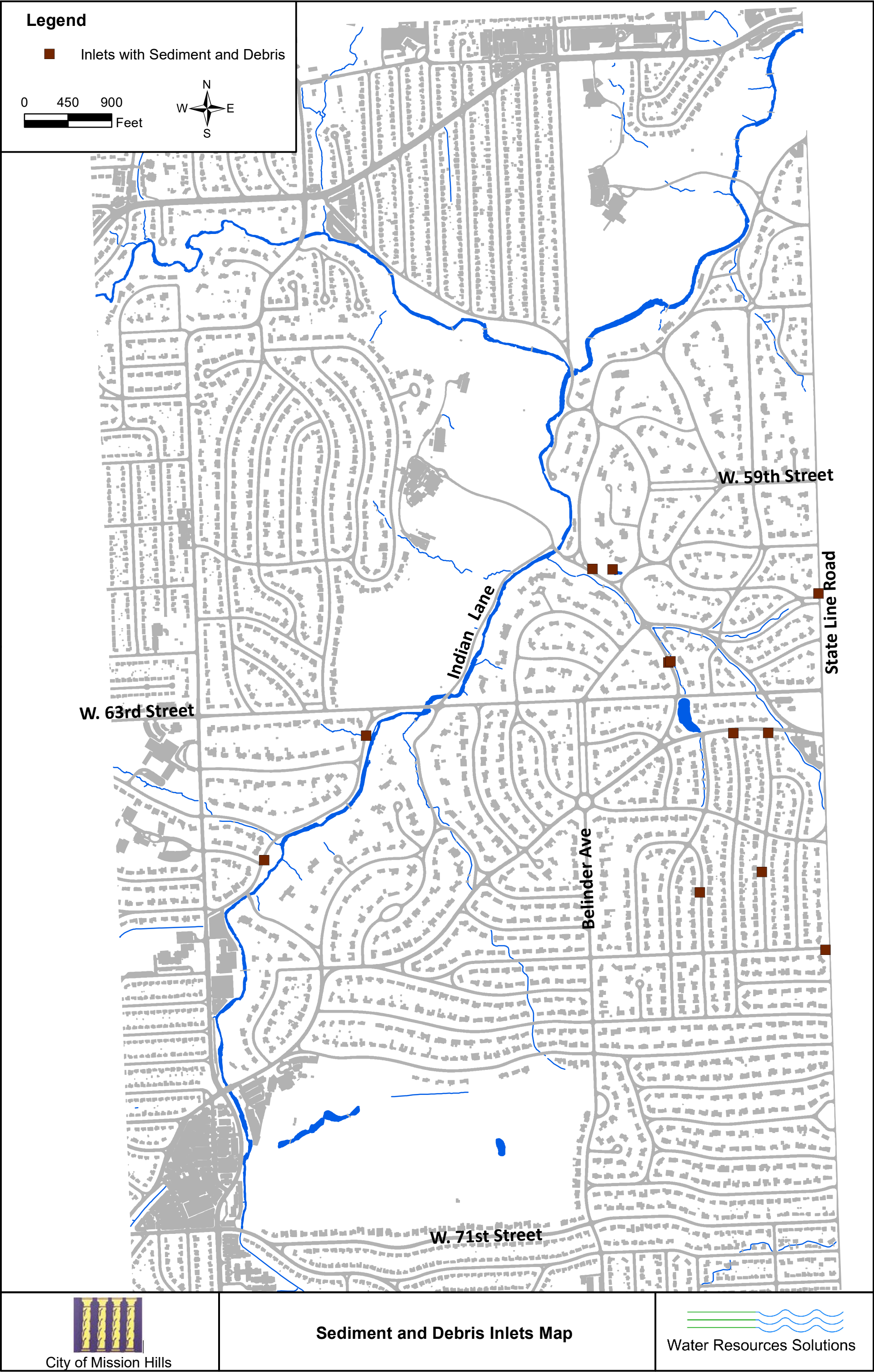
Upgraded Structures and Pipes Map

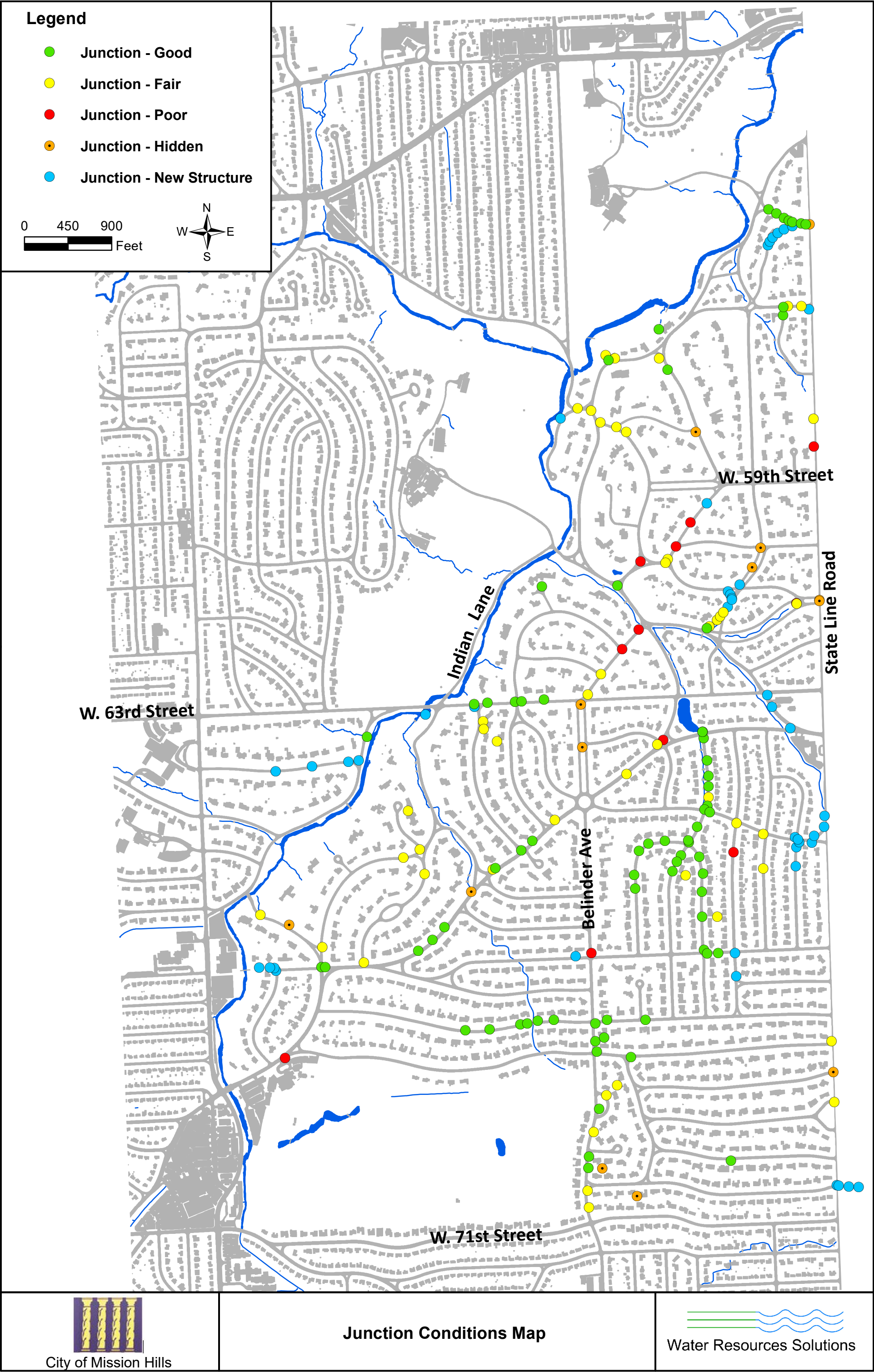
Insufficient Capacity Pipe System and Project Map

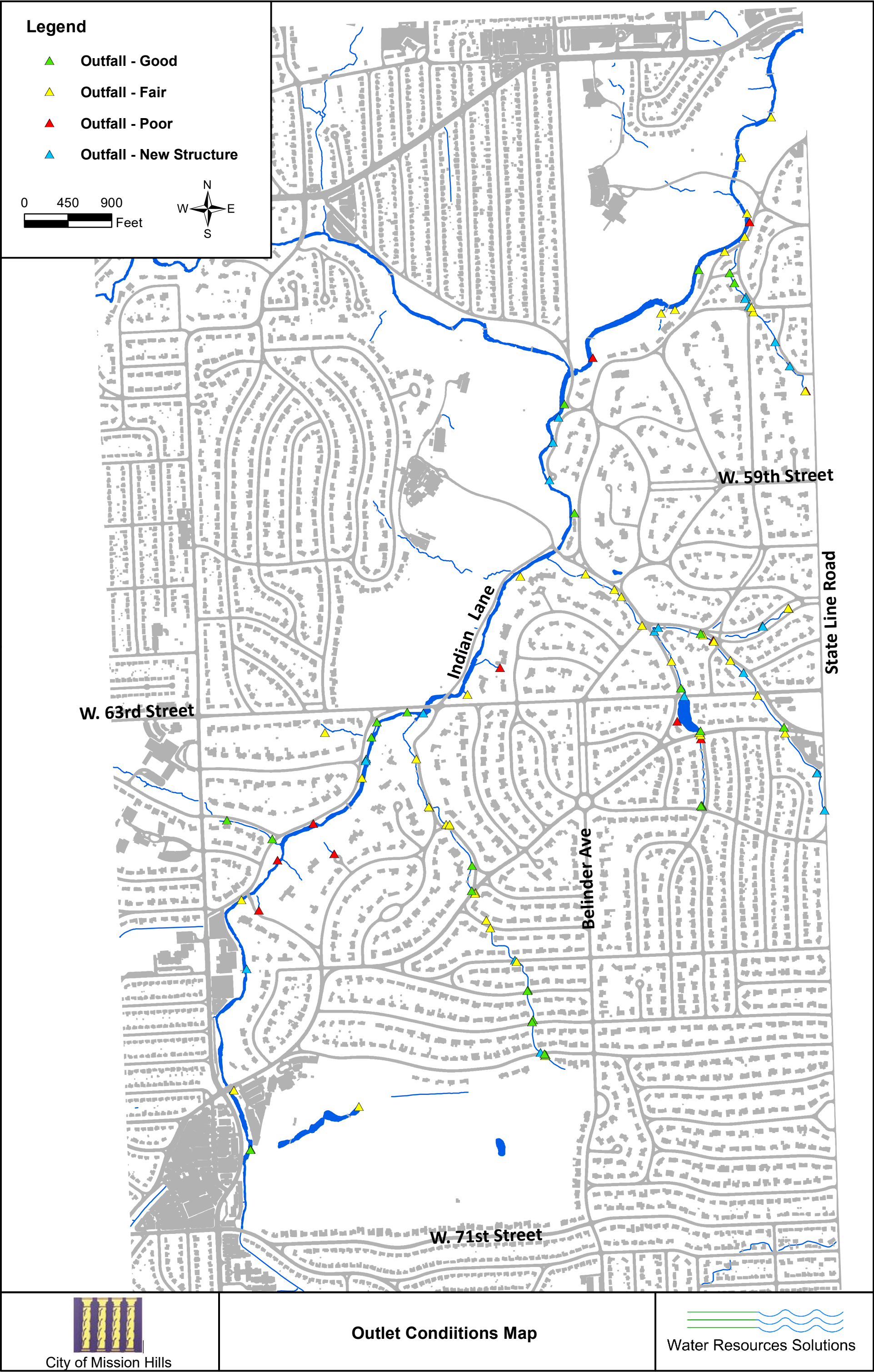
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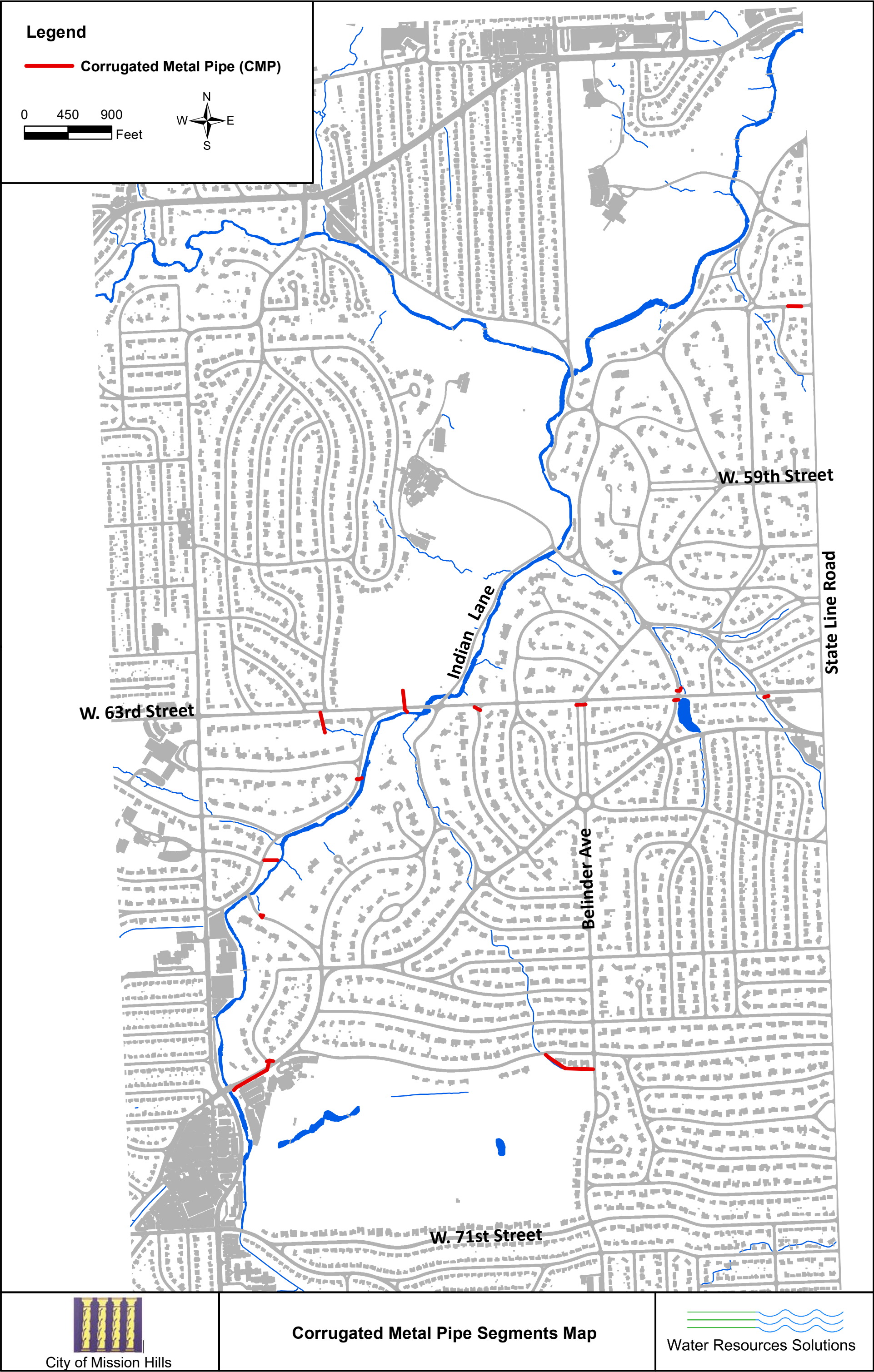


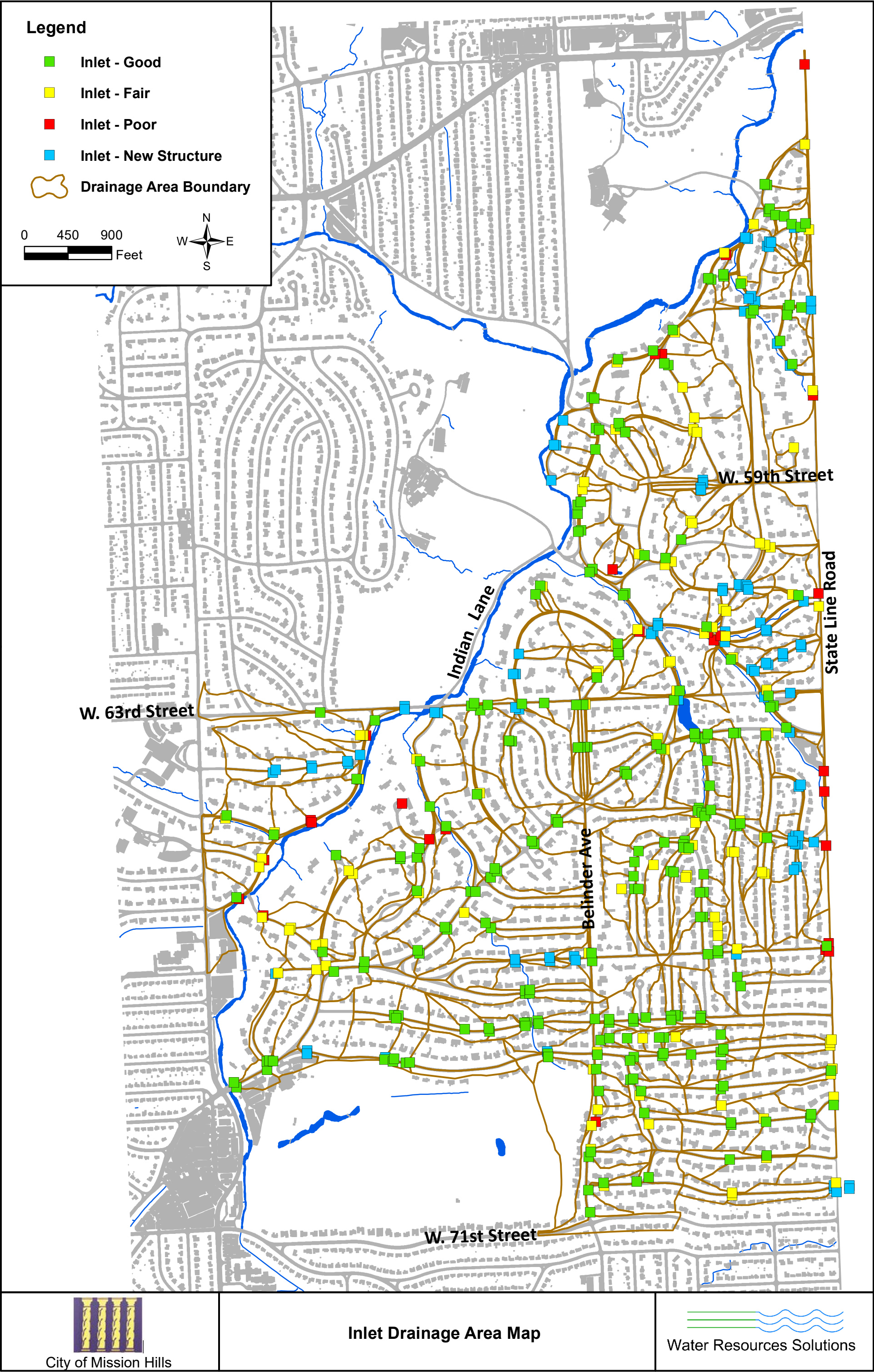


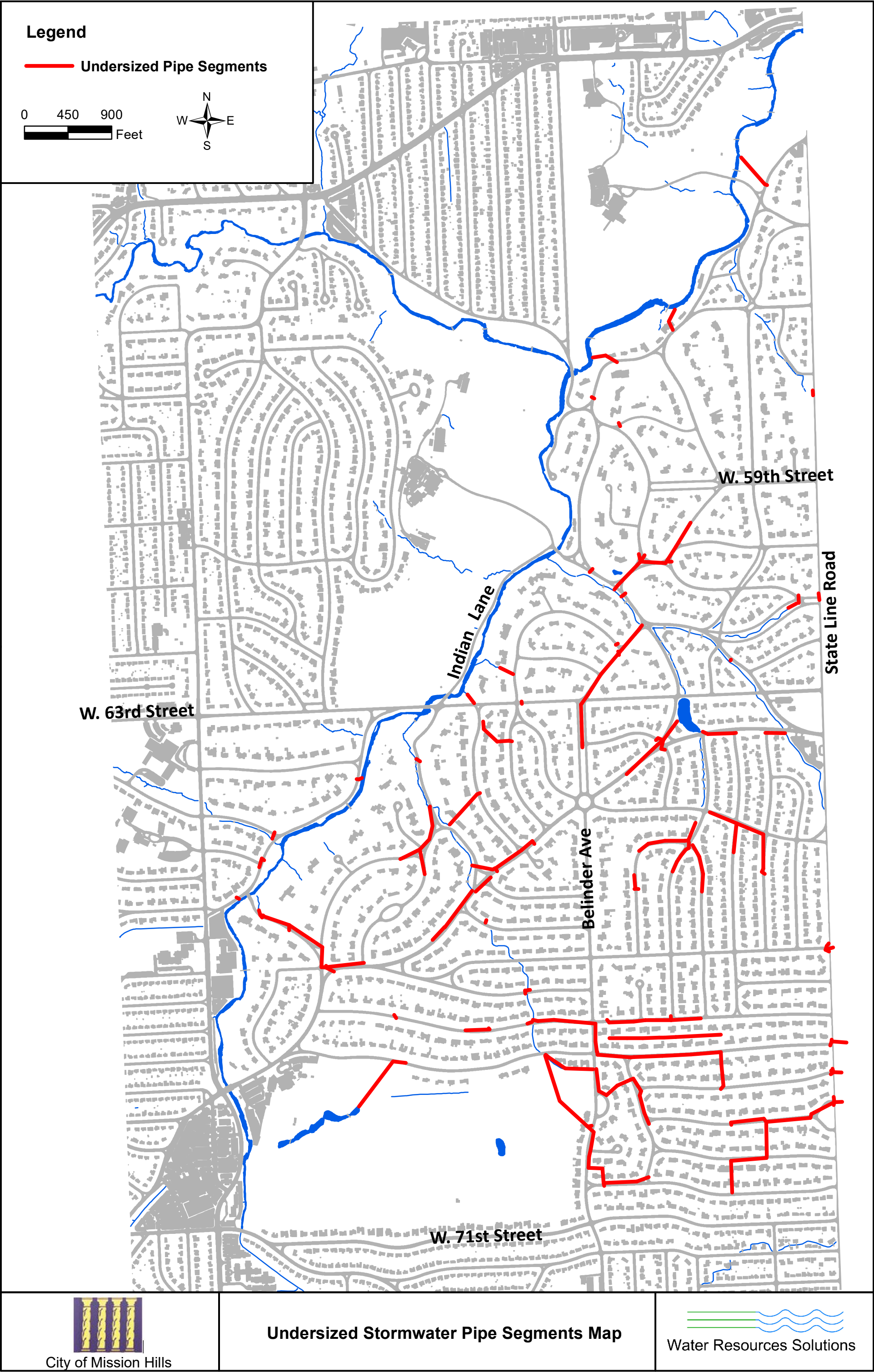




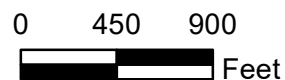


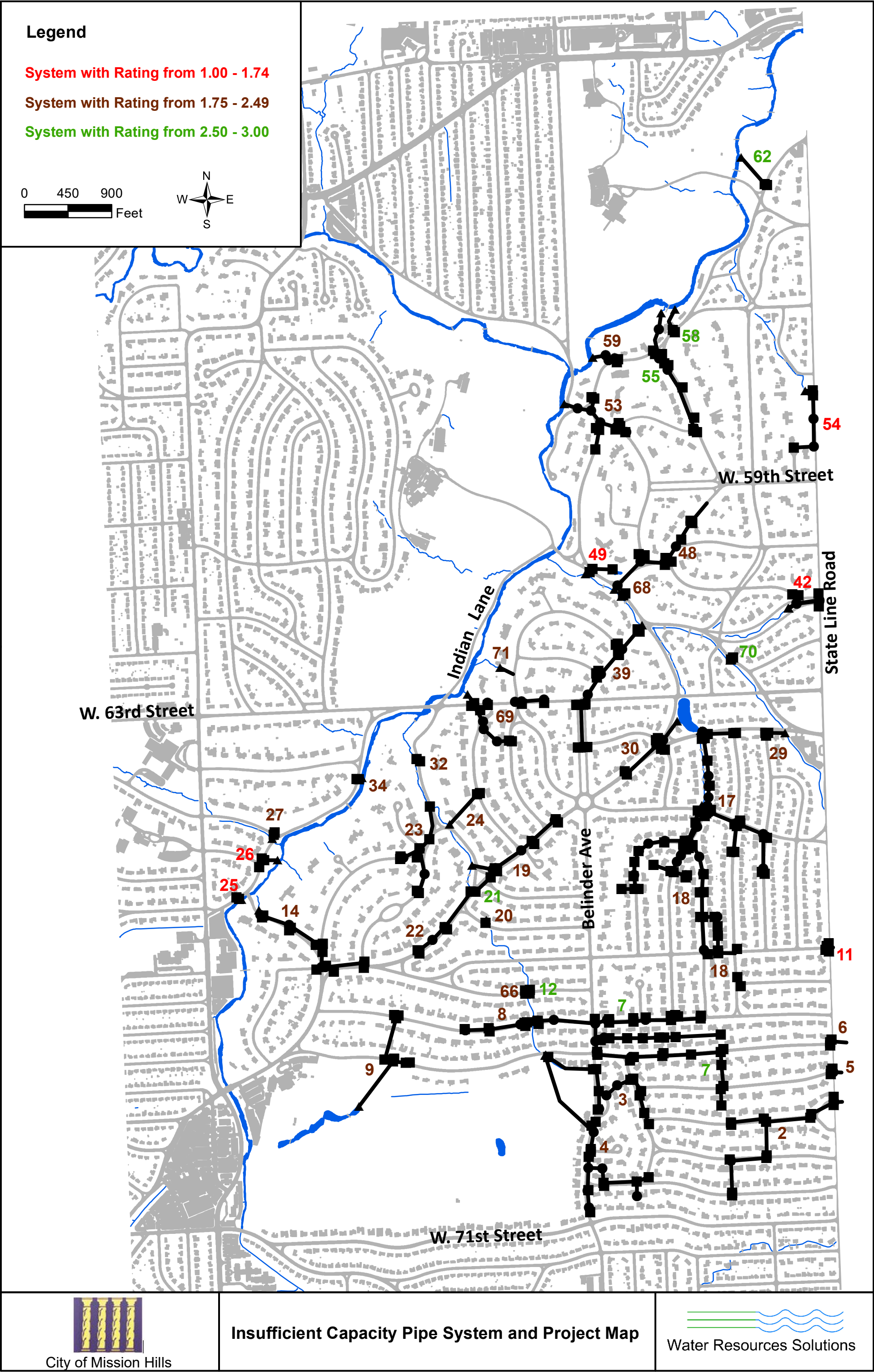






— Polyvinyl Chloride Pipe (PVC)





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Appendix B

Project Summaries and Opinions of Probable Project Costs

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System 2

69th Terrace and State Line Road

SWMM file: 260-83.inp

Summary of Findings

Structure numbers 261, 88, 258, 240, 241, 242, 243, 244, 246, and 247 are currently flooding during the 10-yr rainfall event. Structure 88 is a junction that does not receive runoff. Structure 240 is a 4' x 4' curb inlet receiving runoff with a peak flow of approximately 16cfs. Structure 241 is a 4' x 4' curb inlet receiving runoff with a peak flow of approximately 5cfs. Structure 242 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 11cfs. Structure 243 is a 4' x 4' curb inlet receiving runoff with a peak flow of approximately 11cfs. Structure 244 is a 4' x 4' curb inlet receiving runoff with a peak flow of approximately 24cfs. Structure 246 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 19cfs. Structure 247 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 17cfs. Structure 258 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 26cfs. Structure 261 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 5cfs.

To solve the flooding issues it is recommended that thirteen pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
447	12" PVC	18" RCP
34	15" RCP	24" RCP
35	18" RCP	24" RCP
36	24" RCP	30" RCP
38	12" PVC	18" RCP
39	12" PVC	24" RCP
448	12" PVC	24" RCP

Pipe ID	Existing Pipe	Proposed Pipe
37	27" RCP	42" RCP
40	27" RCP	42" RCP
156	30" RCP	48" RCP
449	36" RCP	60" RCP
155	14" PVC	24" RCP
154	14" PVC	18" RCP

The overall system rating is 2.10 out of 3. The estimated total cost of replacing this system is \$1,457,182.

Mission Hills, Kansas
69th Terrace and State Line Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

69th Terrace and State Line Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$172,703.00	\$ 172,703.00
2	Mobilization	LS	1	\$55,265.00	\$ 55,265.00
3	Traffic Control	LS	1	\$13,816.00	\$ 13,816.00
4	Inlet - 6' x 3'	EA	9	\$4,835.00	\$ 43,515.00
5	Inlet - 8' x 3'	EA	2	\$5,077.00	\$ 10,154.00
6	Manhole	EA	1	\$5,077.00	\$ 5,077.00
7	Junction Box	EA	1	\$5,077.00	\$ 5,077.00
8	RCP - 18"	LF	373	\$127.00	\$ 47,371.00
9	RCP - 24"	LF	804	\$145.00	\$ 116,580.00
10	RCP - 30"	LF	344	\$163.00	\$ 56,072.00
11	RCP - 42"	LF	491	\$242.00	\$ 118,822.00
12	RCP - 48"	LF	261	\$308.00	\$ 80,388.00
13	RCP - 60"	LF	51	\$387.00	\$ 19,737.00
14	Asphaltic Concrete Pavement	SY	2320	\$73.00	\$ 169,360.00
15	Curb & Gutter	LF	195	\$48.00	\$ 9,360.00
16	Sodding	SY	1550	\$6.00	\$ 9,300.00

Subtotal Construction Cost \$ 932,597.00

Contingencies @ 25% \$ 233,149.00

Total Construction Cost \$ 1,165,746.00

Engineering @ 18% \$ 209,834.00

Construction Administration @ 7% \$ 81,602.00

Total Cost for 69th Terrace and State Line Road \$ 1,457,182.00

System 3

69th Terrace and Overhill Road to 69th Street and Belinder

SWMM file: 310-43.inp

Summary of Findings

Structure numbers 319, 102, 305, 306, 307, 308, 309, and 310 are currently flooding during the 10-yr rainfall event. Structure 102 is a junction that does not receive runoff. Structure 319 is an 8' x 2' grate inlet receiving runoff with a peak flow of approximately 56cfs. Structure 305 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 6cfs. Structure 306 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 5cfs. Structure 307 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 10cfs. Structure 308 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 6cfs. Structure 309 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 4cfs. Structure 310 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 13cfs.

To solve the flooding issues it is recommended that eleven pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
60	14" PVC	18" RCP
62	14" PVC	24" RCP
53	18" RCP	24" RCP
54	18" RCP	24" RCP
55	18" RCP	24" RCP
59	14" PVC	15" RCP

Pipe ID	Existing Pipe	Proposed Pipe
56	18" RCP	30" RCP
57	18" RCP	30" RCP
517	30" RCP	36" RCP
518	36" CMP	36" RCP
519	36" CMP	36" RCP

The overall system rating is 2.16 out of 3. The estimated total cost of replacing this system is \$938,391.

3
Mission Hills, Kansas
69th Terrace and Overhill Road to 69th Street and Belinder

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

69th Terrace and Overhill Road to 69th Street and Belinder

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$111,217.00	\$ 111,217.00
2	Mobilization	LS	1	\$35,589.00	\$ 35,589.00
3	Traffic Control	LS	1	\$8,897.00	\$ 8,897.00
4	Inlet - 6' x 3'	EA	8	\$4,835.00	\$ 38,680.00
5	Inlet - 8' x 3'	EA	2	\$5,077.00	\$ 10,154.00
6	Manhole	EA	2	\$5,077.00	\$ 10,154.00
7	RCP - 15"	LF	120	\$115.00	\$ 13,800.00
8	RCP - 18"	LF	181	\$127.00	\$ 22,987.00
9	RCP - 24"	LF	368	\$145.00	\$ 53,360.00
10	RCP - 30"	LF	227	\$163.00	\$ 37,001.00
11	RCP - 36"	LF	759	\$199.00	\$ 151,041.00
12	Outfall	SF	36	\$60.00	\$ 2,160.00
13	Asphaltic Concrete Pavement	SY	1250	\$73.00	\$ 91,250.00
14	Curb & Gutter	LF	135	\$48.00	\$ 6,480.00
15	Sodding	SY	1300	\$6.00	\$ 7,800.00
Subtotal Construction Cost					\$ 600,570.00
Contingencies @ 25%					\$ 150,143.00
Total Construction Cost					\$ 750,713.00
Engineering @ 18%					\$ 135,128.00
Construction Administration @ 7%					\$ 52,550.00
Total Cost for 69th Terrace and Overhill Road to 69th Street and Belinder					\$ 938,391.00

System 4

70th Terrace and Belinder Road

SWMM file: 268-44.inp

Summary of Findings

Structure numbers 264, 265, 266, and 299 are currently flooding during the 10-yr rainfall event. Structure 264 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 14cfs. Structure 265 is a 4' x 4' curb inlet receiving runoff with a peak flow of approximately 2cfs. Structure 266 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 28cfs.

To solve the flooding issues it is recommended that ten pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe	Pipe ID	Existing Pipe	Proposed Pipe
41	12" RCP	18" RCP	48	24" RCP	36" RCP
45	15" RCP	24" RCP	49	30" RCP	36" RCP
46	12" PVC	24" RCP	50	30" RCP	42" RCP
354	24" RCP	30" RCP	361	12" RCP	30" RCP
355	24" RCP	30" RCP	360	36" RCP	48" RCP

The overall system rating is 2.11 out of 3. The estimated total cost of replacing this system is \$1,412,850.

Mission Hills, Kansas
70th Terrace & Belinder Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

70th Terrace & Belinder Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$167,449.00	\$ 167,449.00
2	Mobilization	LS	1	\$53,584.00	\$ 53,584.00
3	Traffic Control	LS	1	\$13,396.00	\$ 13,396.00
4	Inlet - 6' x 3'	EA	6	\$4,835.00	\$ 29,010.00
5	Manhole	EA	2	\$5,077.00	\$ 10,154.00
6	Junction Box	EA	3	\$5,077.00	\$ 15,231.00
7	RCP - 18"	LF	128	\$127.00	\$ 16,256.00
8	RCP - 24"	LF	368	\$145.00	\$ 53,360.00
9	RCP - 30"	LF	328	\$163.00	\$ 53,464.00
10	RCP - 36"	LF	190	\$199.00	\$ 37,810.00
11	RCP - 42"	LF	165	\$242.00	\$ 39,930.00
12	RCP - 48"	LF	975	\$308.00	\$ 300,300.00
13	Outfall	SF	53	\$60.00	\$ 3,180.00
14	Asphaltic Concrete Pavement	SY	1240	\$73.00	\$ 90,520.00
15	Curb & Gutter	LF	135	\$48.00	\$ 6,480.00
16	Sodding	SY	2350	\$6.00	\$ 14,100.00

Subtotal Construction Cost \$ 904,224.00

Contingencies @ 25% \$ 226,056.00

Total Construction Cost \$ 1,130,280.00

Engineering @ 18% \$ 203,450.00

Construction Administration @ 7% \$ 79,120.00

Total Cost for 70th Terrace & Belinder Road \$ 1,412,850.00

System 5

Arno Road & State Line Road

SWMM file: 315-316.inp

Summary of Findings

Structure numbers 316, 7, 314, and 315 are currently flooding during the 10-yr rainfall event. Structure 7 is a junction that does not receive runoff. Structure 314 is a 4' x 3' curbinlet receiving runoff with a peak flow of approximately 21cfs. Structure 315 is a 5' x 3' curbinlet receiving runoff with a peak flow of approximately 8cfs. Structure 316 is a 4' x 3' curbinlet receiving runoff with a peak flow of approximately 12cfs.

To solve the flooding issues it is recommended that four pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
452	12" PVC	18" RCP
453	12" PVC	30" RCP
451	12" PVC	18" RCP
450	15" RCP	18" RCP

The overall system rating is 2.13 out of 3. The estimated total cost of replacing this system is \$118,310.

Mission Hills, Kansas
Arno Road & State Line Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Arno Road & State Line Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$14,022.00	\$ 14,022.00
2	Mobilization	LS	1	\$4,487.00	\$ 4,487.00
3	Traffic Control	LS	1	\$1,122.00	\$ 1,122.00
4	Inlet - 8' x 3'	EA	3	\$5,077.00	\$ 15,231.00
5	Junction	EA	1	\$5,077.00	\$ 5,077.00
6	RCP - 18"	LF	88	\$127.00	\$ 11,176.00
7	RCP - 30"	LF	40	\$163.00	\$ 6,520.00
8	Asphaltic Concrete Pavement	SY	215	\$73.00	\$ 15,695.00
9	Curb & Gutter	LF	45	\$48.00	\$ 2,160.00
10	Sodding	SY	38	\$6.00	\$ 228.00

Subtotal Construction Cost \$ 75,718.00

Contingencies @ 25% \$ 18,930.00

Total Construction Cost \$ 94,648.00

Engineering @ 18% \$ 17,037.00

Construction Administration @ 7% \$ 6,625.00

Total Cost for Arno Road & State Line Road \$ 118,310.00

System 6

69th Street and State Line Road

SWMM file: 311-103.inp

Summary of Findings

Structure numbers 311, 313, and 103 are currently flooding during the 10-yr rainfall event. Structure 103 is a junction that does not receive runoff. Structure 311 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 7cfs. Structure 313 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 20cfs.

To solve the flooding issues it is recommended that three pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
159	12" RCP	18" RCP
454	15" RCP	24" RCP
157	12" RCP	15" RCP

The overall system rating is 2.00 out of 3. The estimated total cost of replacing this system is \$105,451.

Mission Hills, Kansas
69th Street and State Line Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

69th Street and State Line Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$12,498.00	\$ 12,498.00
2	Mobilization	LS	1	\$3,999.00	\$ 3,999.00
3	Traffic Control	LS	1	\$1,000.00	\$ 1,000.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	Manhole	EA	1	\$5,077.00	\$ 5,077.00
7	RCP - 15"	LF	40	\$115.00	\$ 4,600.00
8	RCP - 18"	LF	14	\$127.00	\$ 1,778.00
9	RCP - 24"	LF	69	\$145.00	\$ 10,005.00
10	Asphaltic Concrete Pavement	SY	200	\$73.00	\$ 14,600.00
11	Curb & Gutter	LF	80	\$48.00	\$ 3,840.00
12	Sodding	SY	30	\$6.00	\$ 180.00

Subtotal Construction Cost \$ 67,489.00

Contingencies @ 25% \$ 16,872.00

Total Construction Cost \$ 84,361.00

Engineering @ 18% \$ 15,185.00

Construction Administration @ 7% \$ 5,905.00

Total Cost for 69th Street and State Line Road \$ 105,451.00

System 7

69th Street and Belinder

SWMM file: 238-39.inp

Summary of Findings

Structure numbers 87, 86, 238, 668, 672, 673, 278, 94, 275, 276, 272, and 271 are currently flooding during the 10-yr rainfall event. Structures 86, 87, and 94 are junctions that do not receive runoff. Structure 238 is a 6' x 4' curb inlet receiving runoff with a peak flow of approximately 9cfs. Structure 278 is a 6' x 4' curb inlet receiving runoff with a peak flow of approximately 4cfs. Structure 276 is a 6' x 4' curb inlet receiving runoff with a peak flow of approximately 3cfs. Structure 272 is a 6' x 3' curb inlet receiving runoff with a peak flow of approximately 6cfs. Structure 271 is an 8' x 3' curb inlet receiving runoff with a peak flow of approximately 16cfs. Structure 668 is a 4' x 3' area inlet receiving runoff with a peak flow of approximately 4cfs. Structure 672 is a 3' x 2' area inlet receiving runoff with a peak flow of approximately 10cfs. Structure 673 is a 3' x 2' curb inlet receiving runoff with a peak flow of approximately 7cfs. Structure 275 is a 6' x 3' curb inlet receiving runoff with a peak flow of approximately 5cfs.

To solve the flooding issues it is recommended that twenty-seven pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe	Pipe ID	Existing Pipe	Proposed Pipe
145	12" RCP	36" RCP	84	18" RCP	24" RCP
146	18" PVC	36" RCP	79	27" RCP	36" RCP
147	18" PVC	36" RCP	78	27" RCP	30" RCP
149	24" RCP	36" RCP	76	30" RCP	36" RCP
151	27" RCP	36" RCP	73	30" RCP	36" RCP
152	27" RCP	36" RCP	85	42" RCP	54" RCP
153	36" RCP	36" RCP	88	42" RCP	54" RCP
607	24" x 36" RCPE	36" RCP	89	42" RCP	54" RCP
1	30" x 45" RCPE	36" RCP	63	18" RCP	24" RCP
2	30" x 45" RCPE	36" RCP	64	18" RCP	24" RCP
3	30" x 45" RCPE	42" RCP	65	21" RCP	24" RCP
4	30" x 45" RCPE	54" RCP	66	24" RCP	30" RCP
82	18" RCP	24" RCP	67	24" RCP	36" RCP
62	15" RCP	18" RCP			

The overall system rating is 2.53 out of 3. The estimated total cost of replacing this system is \$2,380,666.

Mission Hills, Kansas
69th Street and Belinder

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

69th Street and Belinder

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$282,153.00	\$ 282,153.00
2	Mobilization	LS	1	\$90,289.00	\$ 90,289.00
3	Traffic Control	LS	1	\$22,572.00	\$ 22,572.00
4	Inlet - 6' x 3'	EA	17	\$4,835.00	\$ 82,195.00
5	Inlet - 8' x 3'	EA	4	\$5,077.00	\$ 20,308.00
6	Manhole	EA	4	\$5,077.00	\$ 20,308.00
7	Junction Box	EA	4	\$5,077.00	\$ 20,308.00
8	RCP - 18"	LF	465	\$127.00	\$ 59,055.00
8	RCP - 24"	LF	670	\$145.00	\$ 97,150.00
9	RCP - 30"	LF	282	\$163.00	\$ 45,966.00
10	RCP - 36"	LF	1109	\$199.00	\$ 220,691.00
11	RCP - 42"	LF	107	\$242.00	\$ 25,894.00
13	RCP - 54"	LF	819	\$338.00	\$ 276,822.00
14	Asphaltic Concrete Pavement	SY	3235	\$73.00	\$ 236,155.00
15	Curb & Gutter	LF	285	\$48.00	\$ 13,680.00
16	Sodding	SY	1680	\$6.00	\$ 10,080.00

Subtotal Construction Cost \$ 1,523,626.00

Contingencies @ 25% \$ 380,907.00

Total Construction Cost \$ 1,904,533.00

Engineering @ 18% \$ 342,816.00

Construction Administration @ 7% \$ 133,317.00

Total Cost for 69th Street and Belinder \$ 2,380,666.00

System 8

68th Street

SWMM file: 331-40.inp

Summary of Findings

Structure numbers 105 and 322 are currently flooding during the 10-yr rainfall event. Structure 105 is a junction that does not receive runoff. Structure 327 is a 6' x 3' curb inlet receiving approximately 9cfs.

To solve the flooding issues it is recommended that three pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
95	18" RCP	24" RCP
91	18" RCP	24" RCP
365	24" RCP	30" RCP

The overall system rating is 2.25 out of 3. The estimated total cost of replacing this system is \$227,030.

8
Mission Hills, Kansas
68th Street

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

68th Street

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$26,907.00	\$ 26,907.00
2	Mobilization	LS	1	\$8,610.00	\$ 8,610.00
3	Traffic Control	LS	1	\$2,153.00	\$ 2,153.00
4	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
5	Manhole	EA	2	\$5,077.00	\$ 10,154.00
6	Junction Box	EA	1	\$5,077.00	\$ 5,077.00
7	RCP - 24"	LF	259	\$145.00	\$ 37,555.00
8	RCP - 30"	LF	52	\$163.00	\$ 8,476.00
9	Outfall	SF	30	\$60.00	\$ 1,800.00
10	Asphaltic Concrete Pavement	SY	520	\$73.00	\$ 37,960.00
11	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
12	Sodding	SY	15	\$6.00	\$ 90.00
				Subtotal Construction Cost	\$ 145,299.00
				Contingencies @ 25%	\$ 36,325.00
				Total Construction Cost	\$ 181,624.00
				Engineering @ 18%	\$ 32,692.00
				Construction Administration @ 7%	\$ 12,714.00
				Total Cost for 68th Street	\$ 227,030.00

System 9

68th Street to 69th Street, East of Tomahawk

SWMM file: 328-84.inp

Summary of Findings

Structure numbers 328, 320, and 322 are currently flooding during the 10-yr rainfall event. Structure 320 is a 5' x 4' curb inlet receiving approximately 2.5cfs. Structure 328 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 16cfs. Structure 322 is a 5' x 4' curb inlet receiving runoff with a peak flow of approximately 2cfs.

To solve the flooding issues it is recommended that three pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
97	18" RCP	24" RCP
102	30" RCP	36" RCP
366	36" RCP	54" RCP

The overall system rating is 2.25 out of 3. The estimated total cost of replacing this system is \$536,574.

Mission Hills, Kansas

68th Street to 69th Street, East of Tomahawk

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

68th Street to 69th Street, East of Tomahawk

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$63,594.00	\$ 63,594.00
2	Mobilization	LS	1	\$20,350.00	\$ 20,350.00
3	Traffic Control	LS	1	\$5,088.00	\$ 5,088.00
4	Inlet - 6' x 3'	EA	3	\$4,835.00	\$ 14,505.00
5	Inlet - 10' x 3'	EA	1	\$5,318.00	\$ 5,318.00
6	RCP - 24"	LF	37	\$145.00	\$ 5,365.00
7	RCP - 36"	LF	83	\$199.00	\$ 16,517.00
8	RCP - 54"	LF	578	\$338.00	\$ 195,364.00
9	Outfall	SF	81	\$60.00	\$ 4,860.00
10	Asphaltic Concrete Pavement	SY	62	\$73.00	\$ 4,526.00
11	Curb & Gutter	LF	45	\$48.00	\$ 2,160.00
12	Sodding	SY	960	\$6.00	\$ 5,760.00

Subtotal Construction Cost \$ 343,407.00

Contingencies @ 25% \$ 85,852.00

Total Construction Cost \$ 429,259.00

Engineering @ 18% \$ 77,267.00

Construction Administration @ 7% \$ 30,048.00

Total Cost for 68th Street to 69th Street, East of Tomahawk \$ 536,574.00

System 11

67th Street & State Line Road

SWMM file: 400-399.inp

Summary of Findings

Structure numbers 397, 398, 399, and 400 are currently flooding during the 10-yr rainfall event.

Structure 397 is a 4' x 2' curb inlet receiving runoff with a peak flow of approximately 8cfs.

Structure 398 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 9cfs.

Structure 399 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 16cfs.

Structure 400 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 38cfs.

To solve the flooding issues it is recommended that four pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
160	12" RCP	18" RCP
161	12" RCP	24" RCP
455	12" RCP	30" RCP
456	15" RCP	42" RCP

The overall system rating is 1.25 out of 3. The estimated total cost of replacing this system is \$163,486.

11
Mission Hills, Kansas
67th Street & State Line Road

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

67th Street & State Line Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$19,376.00	\$ 19,376.00
2	Mobilization	LS	1	\$6,200.00	\$ 6,200.00
3	Traffic Control	LS	1	\$1,550.00	\$ 1,550.00
4	Inlet - 6' x 3'	EA	4	\$4,835.00	\$ 19,340.00
5	Junction Box	EA	1	\$5,077.00	\$ 5,077.00
6	RCP - 18"	LF	33	\$127.00	\$ 4,191.00
7	RCP - 24"	LF	40	\$145.00	\$ 5,800.00
8	RCP - 30"	LF	31	\$163.00	\$ 5,053.00
9	RCP - 42"	LF	82	\$242.00	\$ 19,844.00
10	Asphaltic Concrete Pavement	SY	200	\$73.00	\$ 14,600.00
11	Curb & Gutter	LF	60	\$48.00	\$ 2,880.00
12	Sodding	SY	120	\$6.00	\$ 720.00

Subtotal Construction Cost	\$	104,631.00
Contingencies @ 25%	\$	26,158.00
Total Construction Cost	\$	130,789.00
Engineering @ 18%	\$	23,542.00
Construction Administration @ 7%	\$	9,155.00

Total Cost for 67th Street & State Line Road \$ 163,486.00

System 12

67th Terrace

SWMM file: 288-42.inp

Summary of Findings

Structure numbers 288 and 289 are currently flooding during the 10-yr rainfall event. Structure 288 is a 6' x 3' curb inlet receiving runoff with a peak flow of approximately 13cfs. Structure 289 is a 6' x 3' curb inlet receiving runoff with a peak flow of approximately 4cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
238	15" RCP	24" RCP
239	15" RCP	18" RCP

The overall system rating is 2.50 out of 3. The estimated total cost of replacing this system is \$50,807.

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Mission Hills, Kansas
67th Terrace

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

67th Terrace

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$6,022.00	\$ 6,022.00
2	Mobilization	LS	1	\$1,927.00	\$ 1,927.00
3	Traffic Control	LS	1	\$482.00	\$ 482.00
4	Inlet - 8' x 3'	EA	2	\$5,077.00	\$ 10,154.00
5	RCP - 18"	LF	32	\$127.00	\$ 4,064.00
6	RCP - 24"	LF	21	\$145.00	\$ 3,045.00
7	Outfall	SF	18	\$60.00	\$ 1,080.00
8	Asphaltic Concrete Pavement	SY	55	\$73.00	\$ 4,015.00
9	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
10	Sodding	SY	48	\$6.00	\$ 288.00

Subtotal Construction Cost	\$	32,517.00
Contingencies @ 25%	\$	8,129.00
Total Construction Cost	\$	40,646.00
Engineering @ 18%	\$	7,316.00
Construction Administration @ 7%	\$	2,845.00

Total Cost for 67th Terrace \$ 50,807.00

System 14

Indian Lane, Tomahawk Road to 66th Street

SWMM file: 421-55.inp

Summary of Findings

Structure numbers 151, 420, 149, 150, 446, 8, 447, 448, 419, and 165 are currently flooding during the 10-yr rainfall event. Structures 8, 149, 150, 151, and 165 are junctions that do not receive runoff. Structure 420 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 17cfs. Structure 446 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 14cfs. Structure 447 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 13cfs. Structure 448 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 10cfs. Structure 419 is a 4' x 2' curb inlet receiving runoff with a peak flow of approximately 7cfs.

To solve the flooding issues it is recommended that twelve pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe	Pipe ID	Existing Pipe	Proposed Pipe
369	12" RCP	18" RCP	375	12" CMP	15" RCP
120	12" RCP	18" RCP	376	21" PVC	42" RCP
121	12" RCP	24" RCP	370A	16" PVC	30" RCP
119	15" VCP	18" RCP	370B	16" PVC	24" RCP
473	14" PVC	24" RCP	471	20" PVC	30" RCP
374	14" CMP	12" RCP	474	20" PVC	30" RCP

The overall system rating is 1.90 out of 3. The estimated total cost of replacing this system is \$1,368,382.

Mission Hills, Kansas
Indian Lane, Tomahawk Road to 66th Street

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Indian Lane, Tomahawk Road to 66th Street

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$162,179.00	\$ 162,179.00
2	Mobilization	LS	1	\$51,897.00	\$ 51,897.00
3	Traffic Control	LS	1	\$12,974.00	\$ 12,974.00
4	Inlet - 4' x 3'	EA	4	\$4,835.00	\$ 19,340.00
4	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
5	Manhole	EA	8	\$5,077.00	\$ 40,616.00
6	Junction Box	EA	1	\$5,077.00	\$ 5,077.00
7	Outfall	EA	1	\$1,589.00	\$ 1,589.00
8	RCP - 12"	LF	26	\$115.00	\$ 2,990.00
9	RCP - 15"	LF	26	\$115.00	\$ 2,990.00
10	RCP - 18"	LF	515	\$127.00	\$ 65,405.00
11	RCP - 24"	LF	130	\$145.00	\$ 18,850.00
12	RCP - 30"	LF	881	\$163.00	\$ 143,603.00
13	RCP - 42"	LF	52	\$242.00	\$ 12,584.00
14	Asphaltic Concrete Pavement	SY	3690	\$73.00	\$ 269,370.00
15	Curb & Gutter	LF	1266	\$48.00	\$ 60,768.00
16	Sodding	SY	76	\$6.00	\$ 456.00

Subtotal Construction Cost \$ 875,765.00

Contingencies @ 25% \$ 218,941.00

Total Construction Cost \$ 1,094,706.00

Engineering @ 18% \$ 197,047.00

Construction Administration @ 7% \$ 76,629.00

Total Cost for Indian Lane, Tomahawk Road to 66th Street \$ 1,368,382.00

System 17

65th Street & High Drive

SWMM file: 383-50.inp

Summary of Findings

Structure numbers 383, 384, 381, 376, 375, 377, 380, and 401 are currently flooding during the 10-yr rainfall event. Structure 375 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 7cfs. Structure 376 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 13cfs. Structure 377 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 11cfs. Structure 380 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 2cfs. Structure 381 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 4cfs. Structure 383 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 7cfs. Structure 384 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 12cfs. Structure 401 is a 4' x 2' curb inlet receiving runoff with a peak flow of approximately 19cfs.

To solve the flooding issues it is recommended that nine pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
463	10" PVC	24" RCP
552	12" RCP	24" RCP
481	12" RCP	24" RCP
482	15" RCP	30" RCP
462	10" PVC	12" RCP

Pipe ID	Existing Pipe	Proposed Pipe
461	12" RCP	24" RCP
209	12" RCP	24" RCP
210	12" RCP	24" RCP
574	12" RCP	24" RCP

The overall system rating is 1.82 out of 3. The estimated total cost of replacing this system is \$999,639.

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Mission Hills, Kansas
65th Street & High Drive

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

65th Street & High Drive

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$118,476.00	\$ 118,476.00
2	Mobilization	LS	1	\$37,912.00	\$ 37,912.00
3	Traffic Control	LS	1	\$9,478.00	\$ 9,478.00
4	Inlet - 6' x 3'	EA	4	\$4,835.00	\$ 19,340.00
5	Manhole	EA	4	\$5,077.00	\$ 20,308.00
6	Junction Box	EA	3	\$5,077.00	\$ 15,231.00
7	RCP - 15"	LF	33	\$115.00	\$ 3,795.00
8	RCP - 24"	LF	1314	\$145.00	\$ 190,530.00
9	RCP - 30"	LF	293	\$163.00	\$ 47,759.00
10	Asphaltic Concrete Pavement	SY	2280	\$73.00	\$ 166,440.00
11	Curb & Gutter	LF	150	\$48.00	\$ 7,200.00
12	Sodding	SY	550	\$6.00	\$ 3,300.00

Subtotal Construction Cost	\$	639,769.00
Contingencies @ 25%	\$	159,942.00
Total Construction Cost	\$	799,711.00
Engineering @ 18%	\$	143,948.00
Construction Administration @ 7%	\$	55,980.00

Total Cost for 65th Street & High Drive \$ 999,639.00

System 18

65th Street and Willow Lane

SWMM file: 371-95.inp

Summary of Findings

Structure numbers 127, 136, 135, 359, 123, and 120 are currently flooding during the 10-yr rainfall event. Structures 120, 123, 127, 135, and 136 are junction boxes that do not receive runoff. Structure 359 is a combination inlet having a 6' x 4' curb inlet and a 6' area inlet on the back and receives runoff with a peak flow of approximately 7cfs.

To solve the flooding issues it is recommended that sixteen pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe	Pipe ID	Existing Pipe	Proposed Pipe
194	15" RCP	30" RCP	569	42" RCP	60" RCP
192	18" RCP	30" RCP	539	24" RCP	36" RCP
186	30" RCP	42" RCP	540	24" RCP	36" RCP
187	30" RCP	42" RCP	566	30" RCP	36" RCP
185	36" RCP	42" RCP	567	30" RCP	36" RCP
181	36" RCP	42" RCP	568	36" RCP	42" RCP
178	42" RCP	60" RCP	570	36" RCP	48" RCP
180	42" RCP	60" RCP	193	15" RCP	18" RCP

The overall system rating is 2.24 out of 3. The estimated total cost of replacing this system is \$1,665,387.

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Mission Hills, Kansas
65th Street and Willow Lane

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

65th Street and Willow Lane

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$197,379.00	\$ 197,379.00
2	Mobilization	LS	1	\$63,161.00	\$ 63,161.00
3	Traffic Control	LS	1	\$15,790.00	\$ 15,790.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	Inlet - 10' x 3'	EA	3	\$5,077.00	\$ 15,231.00
7	Manhole	EA	3	\$5,077.00	\$ 15,231.00
8	Junction Box	EA	10	\$5,077.00	\$ 50,770.00
9	RCP - 18"	LF	30	\$127.00	\$ 3,810.00
10	RCP - 30"	LF	144	\$163.00	\$ 23,472.00
11	RCP - 36"	LF	282	\$199.00	\$ 56,118.00
12	RCP - 42"	LF	571	\$242.00	\$ 138,182.00
13	RCP - 48"	LF	193	\$308.00	\$ 59,444.00
14	RCP - 60"	LF	491	\$387.00	\$ 190,017.00
15	Asphaltic Concrete Pavement	SY	2870	\$73.00	\$ 209,510.00
16	Curb & Gutter	LF	320	\$48.00	\$ 15,360.00
17	Sodding	SY	410	\$6.00	\$ 2,460.00

Subtotal Construction Cost	\$	1,065,847.00
Contingencies @ 25%	\$	266,462.00
Total Construction Cost	\$	1,332,309.00
Engineering @ 18%	\$	239,816.00
Construction Administration @ 7%	\$	93,262.00

Total Cost for 65th Street and Willow Lane \$ 1,665,387.00

System 19

Tomahawk Road from Verona Road to 66th Street

SWMM file: 438-54.inp

Summary of Findings

Structure numbers 436, 158, 435, 434, and 157 are currently flooding during the 10-yr rainfall event. Structures 158 and 157 are junctions that do not receive runoff. Structure 436 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 17cfs. Structure 435 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 7cfs. Structure 434 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 45cfs.

To solve the flooding issues it is recommended that seven pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
398	12" RCP	15" RCP
399	15" RCP	30" RCP
400	15" RCP	24" RCP
401	18" RCP	30" RCP
402	18" RCP	30" RCP
403	18" RCP	36" RCP
404	16" PVC	36" RCP

The overall system rating is 2.11 out of 3. The estimated total cost of replacing this system is \$794,461.

OPINION OF PROBABLE CONSTRUCTION COST**Tomahawk Road from Verona Road to 66th Street**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$94,158.00	\$ 94,158.00
2	Mobilization	LS	1	\$30,131.00	\$ 30,131.00
3	Traffic Control	LS	1	\$7,533.00	\$ 7,533.00
4	Inlet - 4' x 3'	EA	3	\$4,835.00	\$ 14,505.00
5	Manhole	EA	4	\$5,077.00	\$ 20,308.00
6	Outfall - Headwall	EA	1	\$2,176.00	\$ 2,176.00
7	RCP - 15"	LF	32	\$115.00	\$ 3,680.00
8	RCP - 24"	LF	322	\$145.00	\$ 46,690.00
9	RCP - 30"	LF	181	\$163.00	\$ 29,503.00
10	RCP - 36"	LF	236	\$199.00	\$ 46,964.00
11	Asphaltic Concrete Pavement	SY	2201	\$73.00	\$ 160,673.00
12	Curb & Gutter	LF	1079	\$48.00	\$ 51,792.00
13	Sodding	SY	57	\$6.00	\$ 342.00

Subtotal Construction Cost \$ 508,455.00

Contingencies @ 25% \$ 127,114.00

Total Construction Cost \$ 635,569.00

Engineering @ 18% \$ 114,402.00

Construction Administration @ 7% \$ 44,490.00

Total Cost for Tomahawk Road from Verona Road to 66th Street \$ 794,461.00

System 20

66th Terrace near Tomahawk Road

SWMM file: 340-101.inp

Summary of Findings

Structure number 340 is currently flooding during the 10-yr rainfall event. Structure 340 is a 4' x 4' curb inlet receiving runoff with a peak flow of approximately 22cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
596	12" RCP	24" RCP

The overall system rating is 2.00 out of 3. The estimated total cost of replacing this system is \$32,203.

Mission Hills, Kansas
66th Terrace Near Tomahawk Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

66th Terrace Near Tomahawk Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$3,817.00	\$ 3,817.00
2	Mobilization	LS	1	\$1,221.00	\$ 1,221.00
3	Traffic Control	LS	1	\$305.00	\$ 305.00
4	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
5	RCP - 24"	LF	30	\$145.00	\$ 4,350.00
6	Outfall	SF	20	\$60.00	\$ 1,200.00
7	Asphaltic Concrete Pavement	SY	50	\$73.00	\$ 3,650.00
8	Curb & Gutter	LF	15	\$48.00	\$ 720.00
9	Sodding	SY	45	\$6.00	\$ 270.00
Subtotal Construction Cost					\$ 20,610.00
Contingencies @ 25%					\$ 5,153.00
Total Construction Cost					\$ 25,763.00
Engineering @ 18%					\$ 4,637.00
Construction Administration @ 7%					\$ 1,803.00
Total Cost for 66th Terrace Near Tomahawk Road					\$ 32,203.00

System 21

65th Street & Tomahawk Road

SWMM file: 433-99.inp

Summary of Findings

Structure number 433 is currently flooding during the 10-yr rainfall event. Structure 433 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 11cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
405	15" RCP	24" RCP

The overall system rating is 2.50 out of 3. The estimated total cost of replacing this system is \$108,568.

Mission Hills, Kansas
65th Street and Tomahawk Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

65th Street and Tomahawk Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$12,867.00	\$ 12,867.00
2	Mobilization	LS	1	\$4,118.00	\$ 4,118.00
3	Traffic Control	LS	1	\$1,029.00	\$ 1,029.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	RCP - 24"	LF	207	\$145.00	\$ 30,015.00
7	Asphaltic Concrete Pavement	SY	112	\$73.00	\$ 8,176.00
8	Curb & Gutter	LF	60	\$48.00	\$ 2,880.00
9	Sodding	SY	81	\$6.00	\$ 486.00
Subtotal Construction Cost					\$ 69,483.00
Contingencies @ 25%					\$ 17,371.00
Total Construction Cost					\$ 86,854.00
Engineering @ 18%					\$ 15,634.00
Construction Administration @ 7%					\$ 6,080.00
Total Cost for 65th Street and Tomahawk Road					\$ 108,568.00

System 22

Tomahawk Road and 66th Terrace

SWMM file: 431-53.inp

Summary of Findings

Structure numbers 430, 155, and 154 are currently flooding during the 10-yr rainfall event. Structures 155 and 154 are junctions that do not receive runoff. Structure 430 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 17cfs.

To solve the flooding issues it is recommended that three pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
113	15" RCP	24" RCP
112	15" RCP	18" RCP
110	18" RCP	30" RCP

The overall system rating is 2.17 out of 3. The estimated total cost of replacing this system is \$768,901.

Mission Hills, Kansas
Tomahawk Road and 66th Terrace

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Tomahawk Road and 66th Terrace

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$91,129.00	\$ 91,129.00
2	Mobilization	LS	1	\$29,161.00	\$ 29,161.00
3	Traffic Control	LS	1	\$7,290.00	\$ 7,290.00
4	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
5	Manhole	EA	3	\$5,077.00	\$ 15,231.00
6	Outfall	EA	1	\$1,589.00	\$ 1,589.00
7	RCP - 18"	LF	5	\$127.00	\$ 635.00
8	RCP - 24"	LF	176	\$145.00	\$ 25,520.00
9	RCP - 30"	LF	472	\$163.00	\$ 76,936.00
10	Asphaltic Concrete Pavement	SY	2415	\$73.00	\$ 176,295.00
11	Curb & Gutter	LF	1315	\$48.00	\$ 63,120.00
12	Sodding	SY	19	\$6.00	\$ 114.00

Subtotal Construction Cost \$ 492,097.00

Contingencies @ 25% \$ 123,024.00

Total Construction Cost \$ 615,121.00

Engineering @ 18% \$ 110,722.00

Construction Administration @ 7% \$ 43,058.00

Total Cost for Tomahawk Road and 66th Terrace \$ 768,901.00

System 23

Wenonga Road from Wenonga Terr. To Tomahawk Road

SWMM file: 455-57.inp

Summary of Findings

Structure numbers 452, 168, 167, 458, and 459 are currently flooding during the 10-yr rainfall event. Structures 168 and 167 are junctions that do not receive runoff. Structure 452 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 30cfs. Structure 458 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 3cfs. Structure 459 is a 3' x 3' curb inlet receiving runoff with a peak flow of approximately 8cfs.

To solve the flooding issues it is recommended that six pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
141	15" PVC	24" RCP
547	15" RCP	24" RCP
550	15" PVC	30" RCP
551	15" PVC	36" RCP
548	15" RCP	18" RCP
468	18" VCP	24" RCP

The overall system rating is 2.03 out of 3. The estimated total cost of replacing this system is \$741,119.

Mission Hills, Kansas

Wenonga Road from Wenonga Terr. to Tomahawk Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**Wenonga Road from Wenonga Terr. to Tomahawk Road**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$87,836.00	\$ 87,836.00
2	Mobilization	LS	1	\$28,108.00	\$ 28,108.00
3	Traffic Control	LS	1	\$7,027.00	\$ 7,027.00
4	Inlet - 4' x 3'	EA	2	\$4,835.00	\$ 9,670.00
4	Inlet - 5' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Manhole	EA	4	\$5,077.00	\$ 20,308.00
6	Outfall - Headwall	EA	1	\$1,589.00	\$ 1,589.00
8	RCP - 18"	LF	249	\$127.00	\$ 31,623.00
9	RCP - 24"	LF	226	\$145.00	\$ 32,770.00
10	RCP - 30"	LF	137	\$163.00	\$ 22,331.00
10	RCP - 36"	LF	340	\$199.00	\$ 67,660.00
11	Asphaltic Concrete Pavement	SY	1547	\$73.00	\$ 112,931.00
12	Curb & Gutter	LF	985	\$48.00	\$ 47,280.00
13	Sodding	SY	58	\$6.00	\$ 348.00
Subtotal Construction Cost					\$ 474,316.00
Contingencies @ 25%					\$ 118,579.00
Total Construction Cost					\$ 592,895.00
Engineering @ 18%					\$ 106,721.00
Construction Administration @ 7%					\$ 41,503.00
Total Cost for Wenonga Road from Wenonga Terr. to Tomahawk Road					\$ 741,119.00

System 24

Aberdeen to Seneca

SWMM file: 464-60.inp

Summary of Findings

Structure number 464 is currently flooding during the 10-yr rainfall event. Structure 464 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 21cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
469	14" PVC	24" RCP
470	15" RCP	18" RCP

The overall system rating is 2.250 out of 3. The estimated total cost of replacing this system is \$153,272.

OPINION OF PROBABLE CONSTRUCTION COST**Aberdeen to Seneca**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$18,166.00	\$ 18,166.00
2	Mobilization	LS	1	\$5,813.00	\$ 5,813.00
3	Traffic Control	LS	1	\$1,453.00	\$ 1,453.00
4	Inlet - 4' x 3'	EA	2	\$4,835.00	\$ 9,670.00
5	Outfall - Headwall	EA	1	\$695.00	\$ 695.00
6	RCP - 18"	LF	419	\$127.00	\$ 53,213.00
7	RCP - 24"	LF	30	\$145.00	\$ 4,350.00
8	Asphaltic Concrete Pavement	SY	42	\$73.00	\$ 3,066.00
9	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
10	Sodding	SY	38	\$6.00	\$ 228.00
Subtotal Construction Cost					\$ 98,094.00
Contingencies @ 25%					\$ 24,524.00
Total Construction Cost					\$ 122,618.00
Engineering @ 18%					\$ 22,071.00
Construction Administration @ 7%					\$ 8,583.00
Total Cost for Aberdeen to Seneca					\$ 153,272.00

System 25

66th Street between Indian Lane and Mission Road

SWMM file: MH 490-9.INP

Summary of Findings

Structure number 490 is currently flooding during the 10-yr rainfall event. Structure 490 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 16cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
124	18" RCP	30" RCP

The overall system rating is 1.50 out of 3. The estimated total cost of replacing this system is \$41,766.

Mission Hills, Kansas

66th Street between Indian Lane and Mission Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**66th Street between Indian Lane and Mission Road**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$4,950.00	\$ 4,950.00
2	Mobilization	LS	1	\$1,584.00	\$ 1,584.00
3	Traffic Control	LS	1	\$396.00	\$ 396.00
4	Inlet - 6' x 3'	EA	2	\$4,835.00	\$ 9,670.00
5	RCP - 30"	LF	30	\$163.00	\$ 4,890.00
6	Asphaltic Concrete Pavement	SY	50	\$73.00	\$ 3,650.00
7	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
8	Sodding	SY	25	\$6.00	\$ 150.00
Subtotal Construction Cost					\$ 26,730.00
Contingencies @ 25%					\$ 6,683.00
Total Construction Cost					\$ 33,413.00
Engineering @ 18%					\$ 6,014.00
Construction Administration @ 7%					\$ 2,339.00
Total Cost for 66th Street between Indian Lane and Mission Road					\$ 41,766.00

System 26

65th Terrace and Indian Lane

SWMM file: MH 489-8.INP

Summary of Findings

Structure number 489 is currently flooding during the 10-yr rainfall event. Structure 489 is a 4' x 3' curb inlet receiving a runoff with a peak flow of approximately 16cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
126	10" RCP	24" RCP
127	18" RCP	24" RCP

The overall system rating is 1.33 out of 3. The estimated total cost of replacing this system is \$142,743.

Mission Hills, Kansas
65th Terrace and Indian Lane

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

65th Terrace and Indian Lane

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$16,918.00	\$ 16,918.00
2	Mobilization	LS	1	\$5,414.00	\$ 5,414.00
3	Traffic Control	LS	1	\$1,353.00	\$ 1,353.00
4	Inlet - 6' X 3'	EA	3	\$4,835.00	\$ 14,505.00
5	RCP - 24"	LF	255	\$145.00	\$ 36,975.00
6	Asphaltic Concrete Pavement	SY	200	\$73.00	\$ 14,600.00
7	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
8	Sodding	SY	25	\$6.00	\$ 150.00
Subtotal Construction Cost					\$ 91,355.00
Contingencies @ 25%					\$ 22,839.00
Total Construction Cost					\$ 114,194.00
Engineering @ 18%					\$ 20,555.00
Construction Administration @ 7%					\$ 7,994.00
Total Cost for 65th Terrace and Indian Lane					\$ 142,743.00

System 27

65th Street and Indian Lane

SWMM file: MH 483-6.INP

Summary of Findings

Structure number 483 is currently flooding during the 10-yr rainfall event. Structure 483 is a 4' x 2' curb inlet receiving runoff with a peak flow of approximately 26 cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
131	15" PVC	42" RCP
132	14" PVC	24" RCP

The overall system rating is 1.75 out of 3. The estimated total cost of replacing this system is \$66,401.

Mission Hills, Kansas
65th Street and Indian Lane

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

65th Street and Indian Lane

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$7,870.00	\$ 7,870.00
2	Mobilization	LS	1	\$2,518.00	\$ 2,518.00
3	Traffic Control	LS	1	\$630.00	\$ 630.00
4	Inlet - 6' x 3'	EA	2	\$4,835.00	\$ 9,670.00
5	RCP - 24"	LF	43	\$145.00	\$ 6,235.00
6	RCP - 42"	LF	24	\$242.00	\$ 5,808.00
7	Asphaltic Concrete Pavement	SY	112	\$73.00	\$ 8,176.00
8	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
9	Sodding	SY	25	\$6.00	\$ 150.00
Subtotal Construction Cost					\$ 42,497.00
Contingencies @ 25%					\$ 10,624.00
Total Construction Cost					\$ 53,121.00
Engineering @ 18%					\$ 9,562.00
Construction Administration @ 7%					\$ 3,718.00
Total Cost for 65th Street and Indian Lane					\$ 66,401.00

System 29

Tomahawk Road, Sagamore Road to Mission Drive

SWMM file: 296-96.inp

Summary of Findings

Structure numbers 295 and 294 are currently flooding during the 10-yr rainfall event. Structure 294 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 2cfs. Structure 295 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 9cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
342	12" RCP	18" RCP
577	12" RCP	18" RCP

The overall system rating is 2.42 out of 3. The estimated total cost of replacing this system is \$89,414.

Mission Hills, Kansas

Tomahawk Road, Sagamore Road to Mission Drive

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**Tomahawk Road, Sagamore Road to Mission Drive**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$10,597.00	\$ 10,597.00
2	Mobilization	LS	1	\$3,391.00	\$ 3,391.00
3	Traffic Control	LS	1	\$848.00	\$ 848.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 6' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	RCP - 18"	LF	201	\$127.00	\$ 25,527.00
7	Asphaltic Concrete Pavement	SY	50	\$73.00	\$ 3,650.00
8	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
9	Sodding	SY	310	\$6.00	\$ 1,860.00
Subtotal Construction Cost					\$ 57,225.00
Contingencies @ 25%					\$ 14,306.00
Total Construction Cost					\$ 71,531.00
Engineering @ 18%					\$ 12,876.00
Construction Administration @ 7%					\$ 5,007.00
Total Cost for Tomahawk Road, Sagamore Road to Mission Drive					\$ 89,414.00

System 30

Ensley Lane and Tomahawk Road

SWMM file: 409-13.inp

Summary of Findings

Structure numbers 147, 498, 499, 146, 407, and 406 are currently flooding during the 10-yr rainfall event. Structures 147 and 146 are junctions that do not receive runoff. Structure 406 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 10cfs. Structure 407 is a 6' x 3' curb inlet receiving runoff with a peak flow of approximately 17cfs. Structure 498 is a 4' x 2' curb inlet receiving runoff with a peak flow of approximately 21cfs. Structure 499 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 8cfs.

To solve the flooding issues it is recommended that seven pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
488	12" RCP	18" RCP
211	15" RCP	18" RCP
486	15" PVC	18" RCP
487	15" PVC	18" RCP
489	18" RCP	36" RCP
483	12" PVC	18" RCP
484	12" PVC	18" RCP

The overall system rating is 1.98 out of 3. The estimated total cost of replacing this system is \$589,173.

Mission Hills, Kansas
Ensley Lane and Tomahawk Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Ensley Lane and Tomahawk Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$69,828.00	\$ 69,828.00
2	Mobilization	LS	1	\$22,345.00	\$ 22,345.00
3	Traffic Control	LS	1	\$5,586.00	\$ 5,586.00
4	Inlet - 8' x 3'	EA	4	\$5,077.00	\$ 20,308.00
5	Junction Box	EA	3	\$5,077.00	\$ 15,231.00
6	RCP - 18"	LF	717	\$127.00	\$ 91,059.00
7	RCP - 36"	LF	242	\$199.00	\$ 48,158.00
8	Outfall	SF	36	\$60.00	\$ 2,160.00
9	Asphaltic Concrete Pavement	SY	1295	\$73.00	\$ 94,535.00
10	Curb & Gutter	LF	120	\$48.00	\$ 5,760.00
11	Sodding	SY	350	\$6.00	\$ 2,100.00

Subtotal Construction Cost \$ 377,070.00

Contingencies @ 25% \$ 94,268.00

Total Construction Cost \$ 471,338.00

Engineering @ 18% \$ 84,841.00

Construction Administration @ 7% \$ 32,994.00

Total Cost for Ensley Lane and Tomahawk Road \$ 589,173.00

System 32

Wenonga Road, South of 63rd Street

SWMM file: 462-61.inp

Summary of Findings

Structure number 462 is currently flooding during the 10-yr rainfall event. Structure 462 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 24cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
466	14" PVC	30" RCP
467	15" PVC	30" RCP

The overall system rating is 1.75 out of 3. The estimated total cost of replacing this system is \$51,564.

Mission Hills, Kansas
Wenonga Road, South of 63th Street

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Wenonga Road, South of 63th Street

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$6,111.00	\$ 6,111.00
2	Mobilization	LS	1	\$1,956.00	\$ 1,956.00
3	Traffic Control	LS	1	\$489.00	\$ 489.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	Outfall - Headwall	EA	1	\$1,589.00	\$ 1,589.00
7	RCP - 30"	LF	43	\$163.00	\$ 7,009.00
8	Asphaltic Concrete Pavement	SY	55	\$73.00	\$ 4,015.00
9	Curb & Gutter	LF	35	\$48.00	\$ 1,680.00
10	Sodding	SY	40	\$6.00	\$ 240.00
Subtotal Construction Cost					\$ 33,001.00
Contingencies @ 25%					\$ 8,250.00
Total Construction Cost					\$ 41,251.00
Engineering @ 18%					\$ 7,425.00
Construction Administration @ 7%					\$ 2,888.00
Total Cost for Wenonga Road, South of 63th Street					\$ 51,564.00

System 34

Indian Lane, South of 64th Street

SWMM file: 479-4.inp

Summary of Findings

Structure numbers 479 and 480 are currently flooding during the 10-yr rainfall event. Structure 479 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 24cfs. Structure 480 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 1cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
229	15" CMP	18" RCP
230	15" CMP	24" RCP

The overall system rating is 1.75 out of 3. The estimated total cost of replacing this system is \$47,798.

Mission Hills, Kansas
Indian Lane, South of 64th Street

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Indian Lane, South of 64th Street

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$5,665.00	\$ 5,665.00
2	Mobilization	LS	1	\$1,813.00	\$ 1,813.00
3	Traffic Control	LS	1	\$453.00	\$ 453.00
4	Inlet - 4' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	Outfall - Headwall	EA	1	\$1,088.00	\$ 1,088.00
7	RCP - 18"	LF	22	\$127.00	\$ 2,794.00
8	RCP - 24"	LF	30	\$145.00	\$ 4,350.00
9	Asphaltic Concrete Pavement	SY	39	\$73.00	\$ 2,847.00
10	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
11	Sodding	SY	38	\$6.00	\$ 228.00
Subtotal Construction Cost					\$ 30,590.00
Contingencies @ 25%					\$ 7,648.00
Total Construction Cost					\$ 38,238.00
Engineering @ 18%					\$ 6,883.00
Construction Administration @ 7%					\$ 2,677.00
Total Cost for Indian Lane, South of 64th Street					\$ 47,798.00

System 39

Belinder Avenue from 64th Street to Mission Drive

SWMM file: MH 469-27.INP

Summary of Findings

The following structures are flooding during the 10-yr rainfall event: 11, 12, 182, 183, 184, 556, 554, 553, and 185. Structures 11, 12, 182, 184, 183, and 185 are junctions that do not receive runoff. Structure 556 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 16cfs. Structure 554 is a 4' x 2' curb inlet receiving runoff with a peak flow of approximately 8cfs. Structure 553 is a 3' x 2' curb inlet receiving runoff with a peak flow of approximately 12cfs.

To solve the flooding issues it is recommended that ten pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe	Pipe ID	Existing Pipe	Proposed Pipe
527	10" VCP	18" RCP	313	10" PVC	18" RCP
528	12" VCP	15" RCP	312	10" PVC	15" RCP
309	12" VCP	18" RCP	311	12" PVC	18" RCP
310A	15" VCP	18" RCP	318	18" VCP	30" RCP
315	18" VCP	30" RCP	310B	15" VCP	24" RCP

The overall system rating is 2.01 out of 3. The estimated total cost of replacing this system is \$1,141,612.

Mission Hills, Kansas

Belinder Avenue from 64th Street to Mission Drive

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**Belinder Avenue from 64th Street to Mission Drive**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$135,302.00	\$ 135,302.00
2	Mobilization	LS	1	\$43,297.00	\$ 43,297.00
3	Traffic Control	LS	1	\$10,824.00	\$ 10,824.00
4	Inlet - 6' x 3'	EA	4	\$4,835.00	\$ 19,340.00
6	Manhole	EA	8	\$5,077.00	\$ 40,616.00
8	RCP - 15"	LF	138	\$115.00	\$ 15,870.00
9	RCP - 18"	LF	1256	\$127.00	\$ 159,512.00
10	RCP - 24"	LF	285	\$145.00	\$ 41,325.00
11	RCP - 30"	LF	317	\$163.00	\$ 51,671.00
6	Outfall	SF	27	\$60.00	\$ 1,620.00
12	Asphaltic Concrete Pavement	SY	2650	\$73.00	\$ 193,450.00
13	Curb & Gutter	LF	360	\$48.00	\$ 17,280.00
14	Sodding	SY	87.5	\$6.00	\$ 525.00

Subtotal Construction Cost \$ 730,632.00

Contingencies @ 25% \$ 182,658.00

Total Construction Cost \$ 913,290.00

Engineering @ 18% \$ 164,392.00

Construction Administration @ 7% \$ 63,930.00

Total Cost for Belinder Avenue from 64th Street to Mission Drive \$ 1,141,612.00

System 42

Drury Lane and Brookwood Road

SWMM Filename: MH 536-22.INP

Summary of Findings

Structure numbers 179a, 542, and 536 are currently flooding during the 10-yr rainfall event. Structure 179a is a junction that does not receive runoff. Structure number 542 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 17cfs. Structure 536 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 5cfs.

To solve the flooding issues it is recommended that three pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
422	12" PVC	24" RCP
415	14" VCP	15" RCP
419	21" RCP	24" RCP

The overall system rating is 1.61 out of 3. The estimated total cost of replacing this system is \$139,283.

Mission Hills, Kansas
Drury Lane and Brookwood Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Drury Lane and Brookwood Road

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$16,508.00	\$ 16,508.00
2	Mobilization	LS	1	\$5,282.00	\$ 5,282.00
3	Traffic Control	LS	1	\$1,321.00	\$ 1,321.00
4	Inlet - 6' x 3'	EA	2	\$4,835.00	\$ 9,670.00
5	Manhole	EA	1	\$4,835.00	\$ 4,835.00
6	RCP - 15"	LF	65	\$115.00	\$ 7,475.00
7	RCP - 24"	LF	172	\$145.00	\$ 24,940.00
8	Asphaltic Concrete Pavement	SY	240	\$73.00	\$ 17,520.00
9	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
10	Sodding	SY	25	\$6.00	\$ 150.00

Subtotal Construction Cost \$ 89,141.00

Contingencies @ 25% \$ 22,285.00

Total Construction Cost \$ 111,426.00

Engineering @ 18% \$ 20,057.00

Construction Administration @ 7% \$ 7,800.00

Total Cost for Drury Lane and Brookwood Road \$ 139,283.00

System 48

Oakwood Drive, 59th Street to Mission Drive

SWMM file: MH 572-31.INP

Summary of Findings

Structure numbers 189, 563, 573, 574, 192, 188, 187, and 191 are currently flooding during the 10-yr rainfall event. Structures 189, 187, 188, 192, and 191 are junctions that do not receive runoff. Structure 563 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 23cfs. Structure 573 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 23cfs. Structure 574 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 24cfs.

To solve the flooding issues it is recommended that eleven pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
304	15" PVC	18" RCP
555	24" PVC	36" RCP
498	16" PVC	24" RCP
501	14" PVC	24" RCP
305	11" PVC	18" RCP

Pipe ID	Existing Pipe	Proposed Pipe
556	24" RCP	36" RCP
330A	15" PVC	24" RCP
500	18" PVC	24" RCP
503	21" RCP	36" RCP

The overall system rating is 1.97 out of 3. The estimated total cost of replacing this system is \$1,142,825.

Mission Hills, Kansas

Oakwood Drive, 59th Street to Mission Drive

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**Oakwood Drive, 59th Street to Mission Drive**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$135,446.00	\$ 135,446.00
2	Mobilization	LS	1	\$43,343.00	\$ 43,343.00
3	Traffic Control	LS	1	\$10,836.00	\$ 10,836.00
4	Inlet - 6' x 3'	EA	4	\$4,835.00	\$ 19,340.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	Manhole	EA	8	\$4,835.00	\$ 38,680.00
7	RCP - 18"	LF	433	\$127.00	\$ 54,991.00
8	RCP - 24"	LF	534	\$145.00	\$ 77,430.00
9	RCP - 36"	LF	645	\$199.00	\$ 128,355.00
10	Outfall	SF	36	\$60.00	\$ 2,160.00
11	Asphaltic Concrete Pavement	SY	2900	\$73.00	\$ 211,700.00
12	Curb & Gutter	LF	75	\$48.00	\$ 3,600.00
13	Sodding	SY	75	\$6.00	\$ 450.00

Subtotal Construction Cost \$ 731,408.00

Contingencies @ 25% \$ 182,852.00

Total Construction Cost \$ 914,260.00

Engineering @ 18% \$ 164,567.00

Construction Administration @ 7% \$ 63,998.00

Total Cost for Oakwood Drive, 59th Street to Mission Drive \$ 1,142,825.00

System 49

Mission Drive between Overhill Road and Indian Lane

SWMM file: MH 576-32.INP

Summary of Findings

Structure number 575 is currently flooding during the 10-yr rainfall event. Structure 575 is a 5' x 3' curb inlet receiving runoff with a peak flow approximately 19cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
302	15" PVC	24" RCP

The overall system rating is 1.67 out of 3. The estimated total cost of replacing the system is \$172,370.

Mission Hills, Kansas

Mission Drive between Overhill Road and Indian Lane

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**Mission Drive between Overhill Road and Indian Lane**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$20,429.00	\$ 20,429.00
2	Mobilization	LS	1	\$6,537.00	\$ 6,537.00
3	Traffic Control	LS	1	\$1,634.00	\$ 1,634.00
4	Inlet - Area	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 6' X 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' X 3'	EA	1	\$5,077.00	\$ 5,077.00
6	RCP -24"	LF	245	\$145.00	\$ 35,525.00
7	Asphaltic Concrete Pavement	SY	410	\$73.00	\$ 29,930.00
8	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
9	Sodding	SY	12.5	\$6.00	\$ 75.00
Subtotal Construction Cost					\$ 110,317.00
Contingencies @ 25%					\$ 27,579.00
Total Construction Cost					\$ 137,896.00
Engineering @ 18%					\$ 24,821.00
Construction Administration @ 7%					\$ 9,653.00
Total Cost for Mission Drive between Overhill Road and Indian Lane					\$ 172,370.00

System 53

Overhill Road and Guilford Lane

SWMM file: MH 585-34.INP

Summary of Findings

Structure numbers 592 and 595 are currently flooding during the 10-yr rainfall event. Structure 592 is an 8' x 3' curb inlet receiving runoff with a peak flow of approximately 2cfs. Structure 595 is an 8' x 3' curb inlet receiving runoff with a peak flow of approximately 6cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
254	18" RCP	18" RCP
528	9" PVC	15" RCP

The overall system rating is 1.82 out of 3. The estimated total cost of replacing this system is \$80,542.

53
Mission Hills, Kansas
Overhill Road and Guilford Lane

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Overhill Road and Guilford Lane

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$9,546.00	\$ 9,546.00
2	Mobilization	LS	1	\$3,055.00	\$ 3,055.00
3	Traffic Control	LS	1	\$764.00	\$ 764.00
4	Inlet - 8' X 3'	EA	4	\$5,077.00	\$ 20,308.00
5	RCP -15"	LF	31	\$115.00	\$ 3,565.00
6	RCP -18"	LF	29	\$127.00	\$ 3,683.00
7	Asphaltic Concrete Pavement	SY	102	\$73.00	\$ 7,446.00
8	Curb & Gutter	LF	60	\$48.00	\$ 2,880.00
9	Sodding	SY	50	\$6.00	\$ 300.00
Subtotal Construction Cost					\$ 51,547.00
Contingencies @ 25%					\$ 12,887.00
Total Construction Cost					\$ 64,434.00
Engineering @ 18%					\$ 11,598.00
Construction Administration @ 7%					\$ 4,510.00
Total Cost for Overhill Road and Guilford Lane					\$ 80,542.00

System 54

State Line Road, South of Pembroke Lane

SWMM file: MH 640-71.INP

Summary of Findings

Structure number 639 is currently flooding during the 10-yr rainfall event. Structure 639 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 28cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
423	21" RCP	24" RCP

The overall system rating is 1.30 out of 3. The estimated total cost of replacing this system is \$49,117.

Mission Hills, Kansas
State Line Road, South of Pembroke Lane

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

State Line Road, South of Pembroke Lane

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$5,821.00	\$ 5,821.00
2	Mobilization	LS	1	\$1,863.00	\$ 1,863.00
3	Traffic Control	LS	1	\$466.00	\$ 466.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	RCP - 24"	LF	44	\$145.00	\$ 6,380.00
7	Asphaltic Concrete Pavement	SY	74	\$73.00	\$ 5,402.00
8	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
9	Sodding	SY	25	\$6.00	\$ 150.00
Subtotal Construction Cost					\$ 31,434.00
Contingencies @ 25%					\$ 7,859.00
Total Construction Cost					\$ 39,293.00
Engineering @ 18%					\$ 7,073.00
Construction Administration @ 7%					\$ 2,751.00
Total Cost for State Line Road, South of Pembroke Lane					\$ 49,117.00

System 55

Oakwood and Mission Drive

SWMM file: MH 608-65.INP

Summary of Findings

This system is detailed in the design plans prepared by Water Resources Solutions date February 8, 2012. The project was never constructed because agreements could not be made on appropriate construction easements.

The overall system rating is 3.00 out of 3. The estimated total cost of replacing this system is \$623,150.

55

Mission Hills, Kansas
Oakwood and Mission Drive

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

This system is detailed in the design plans prepared by Water Resources Solutions dated February 8, 2012. The project was never constructed because agreements could not be made on appropriate construction easements. The cost of the improvements for this system is \$623,150. The cost was indexed from the March 2009 value to June 2016.

System 58

Mission Drive between Oakwood Drive and 56th Street

SWMM file: MH 616-103.INP

Summary of Findings

Structure number 617 is currently flooding during the 10-yr rainfall event. Structure 617 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 11cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
602	15" RCP	18" RCP

The overall system rating is 2.75 out of 3. The estimated total cost of replacing this system is \$137,894.

OPINION OF PROBABLE CONSTRUCTION COST**Mission Drive between Oakwood Drive and 56th Street**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$16,343.00	\$ 16,343.00
2	Mobilization	LS	1	\$5,230.00	\$ 5,230.00
3	Traffic Control	LS	1	\$1,307.00	\$ 1,307.00
4	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
5	RCP - 18"	LF	232	\$127.00	\$ 29,464.00
6	Outfall	SF	14	\$60.00	\$ 840.00
7	Asphaltic Concrete Pavement	SY	387	\$73.00	\$ 28,251.00
8	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
9	Sodding	SY	50	\$6.00	\$ 300.00
Subtotal Construction Cost					\$ 88,252.00
Contingencies @ 25%					\$ 22,063.00
Total Construction Cost					\$ 110,315.00
Engineering @ 18%					\$ 19,857.00
Construction Administration @ 7%					\$ 7,722.00
Total Cost for Mission Drive between Oakwood Drive and 56th Street					\$ 137,894.00

System 59

Mission Drive between Oakwood Drive and Overhill Road

SWMM file: MH 605-64.INP

Summary of Findings

Structure numbers 200 and 604 are currently flooding during the 10-yr rainfall event. Structure 200 is a junction that does not receive runoff. Structure 604 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 26cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
444	12" PVC	18" RCP
440	12" PVC	18" RCP

The overall system rating is 2.37 out of 3. The estimated total cost of replacing this system is \$169,072.

Mission Hills, Kansas

Mission Drive between Oakwood Drive and Overhill Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**Mission Drive between Oakwood Drive and Overhill Road**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$20,038.00	\$ 20,038.00
2	Mobilization	LS	1	\$6,412.00	\$ 6,412.00
3	Traffic Control	LS	1	\$1,603.00	\$ 1,603.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Manhole	EA	1	\$5,077.00	\$ 5,077.00
6	RCP - 18"	LF	265	\$127.00	\$ 33,655.00
7	Outfall	SF	14	\$60.00	\$ 840.00
8	Asphaltic Concrete Pavement	SY	442	\$73.00	\$ 32,266.00
9	Curb & Gutter	LF	45	\$48.00	\$ 2,160.00
10	Sodding	SY	220	\$6.00	\$ 1,320.00
Subtotal Construction Cost					\$ 108,206.00
Contingencies @ 25%					\$ 27,052.00
Total Construction Cost					\$ 135,258.00
Engineering @ 18%					\$ 24,346.00
Construction Administration @ 7%					\$ 9,468.00
Total Cost for Mission Drive between Oakwood Drive and Overhill Road					\$ 169,072.00

System 62

Mission Drive, North of 55th Street

SWMM Filename: MH 660-78.INP

Summary of Findings

Structure numbers 660 and 661 are currently flooding during the 10-yr rainfall event. Structure 660 is an 8' x 3' curb inlet receiving runoff with a peak flow of approximately 16cfs. Structure 661 is a 5' x 3' curb inlet receiving runoff with a peak flow of approximately 15cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
425	14" PVC	18" RCP
426	15" VCP	30" RCP

The overall system rating is 2.50 out of 3. The estimated total cost of replacing this system is \$268,197.

Mission Hills, Kansas
Mission Drive North of 55th Street

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Mission Drive North of 55th Street

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$31,786.00	\$ 31,786.00
2	Mobilization	LS	1	\$10,172.00	\$ 10,172.00
3	Traffic Control	LS	1	\$2,543.00	\$ 2,543.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
6	RCP - 18"	LF	26	\$127.00	\$ 3,302.00
7	RCP - 30"	LF	365	\$163.00	\$ 59,495.00
8	Outfall	SF	65	\$60.00	\$ 3,900.00
9	Asphaltic Concrete Pavement	SY	652	\$73.00	\$ 47,596.00
10	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
11	Sodding	SY	250	\$6.00	\$ 1,500.00
Subtotal Construction Cost					\$ 171,646.00
Contingencies @ 25%					\$ 42,912.00
Total Construction Cost					\$ 214,558.00
Engineering @ 18%					\$ 38,620.00
Construction Administration @ 7%					\$ 15,019.00
Total Cost for Mission Drive North of 55th Street					\$ 268,197.00

System 66

67th Terrace between 67th Street & Belinder

SWMM file: 290-41.inp

Summary of Findings

Structure number 291 is currently flooding during the 10-yr rainfall event. Structure 291 is a 6' x 3' curb inlet receiving runoff with a peak flow of approximately 4cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
241	15" RCP	24" RCP

The overall system rating is 2.00 out of 3. The estimated total cost of replacing this system is \$21,420.

Mission Hills, Kansas

67th Terrace between 67th Street and Belinder

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**67th Terrace between 67th Street and Belinder**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$2,539.00	\$ 2,539.00
2	Mobilization	LS	1	\$812.00	\$ 812.00
3	Traffic Control	LS	1	\$203.00	\$ 203.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	RCP - 24"	LF	18	\$145.00	\$ 2,610.00
6	Outfall	SF	18	\$60.00	\$ 1,080.00
7	Asphaltic Concrete Pavement	SY	10	\$73.00	\$ 730.00
8	Curb & Gutter	LF	15	\$48.00	\$ 720.00
9	Sodding	SY	30	\$6.00	\$ 180.00
Subtotal Construction Cost					\$ 13,709.00
Contingencies @ 25%					\$ 3,427.00
Total Construction Cost					\$ 17,136.00
Engineering @ 18%					\$ 3,084.00
Construction Administration @ 7%					\$ 1,200.00
Total Cost for 67th Terrace between 67th Street and Belinder					\$ 21,420.00

System 68

Overhill Road and Mission Drive SWMM file: MH 559-29.INP

Summary of Findings

Structure numbers 559 and 560 are currently flooding during the 10-yr rainfall event. Structure 559 is a 5' x 2' curb inlet receiving runoff with a peak flow of approximately 32cfs. Structure 560 is a 5' x 2' curb inlet receiving runoff with a peak flow of approximately 3cfs.

To solve the flooding issues it is recommended that two pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
269	14" PVC	24" RCP
270	14" PVC	27" RCP

The overall system rating is 2.00 out of 3. The estimated total cost of replacing this system is \$76,719.

68
Mission Hills, Kansas
Overhill Road and Mission Drive

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Overhill Road and Mission Drive

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$9,166.00	\$ 9,166.00
2	Mobilization	LS	1	\$2,933.00	\$ 2,933.00
3	Traffic Control	LS	1	\$337.00	\$ 337.00
4	Inlet - 6' x 3'	EA	2	\$4,835.00	\$ 9,670.00
5	Inlet - 8' x 3'	EA	2	\$5,077.00	\$ 10,154.00
6	RCP - 24"	LF	30	\$145.00	\$ 4,350.00
7	RCP - 27"	LF	21	\$145.00	\$ 3,045.00
8	Outfall	SF	27	\$60.00	\$ 1,620.00
9	Asphaltic Concrete Pavement	SY	85	\$73.00	\$ 6,205.00
10	Curb & Gutter	LF	30	\$48.00	\$ 1,440.00
11	Sodding	SY	30	\$6.00	\$ 180.00

Subtotal Construction Cost \$ 49,100.00

Contingencies @ 25% \$ 12,275.00

Total Construction Cost \$ 61,375.00

Engineering @ 18% \$ 11,048.00

Construction Administration @ 7% \$ 4,296.00

Total Cost for Overhill Road and Mission Drive \$ 76,719.00

System 69

Verona Road, Aberdeen Street and 63rd Street

SWMM file: 440-12.INP

Summary of Findings

The following structures are flooding during the 10-yr rainfall event: 440, 506, and 664.

Structure 440 is a 4' x 3' curb inlet receiving runoff with a peak flow of approximately 35cfs.

Structure 506 is a 6' x 3' curb inlet receiving runoff with a peak flow of approximately 4cfs.

Structure 664 is an 8' x 3' curb inlet receiving runoff with a peak flow of approximately 2cfs.

To solve the flooding issues it is recommended that six pipes in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe	Pipe ID	Existing Pipe	Proposed Pipe
5	24" RCPA	36" RCP	380	15" RCP	24" RCP
252	9" RCP	15" RCP	381	15" RCP	24" RCP
378	12" RCP	24" RCP	379	15" RCP	24" RCP

The overall system rating is 2.42 out of 3. The estimated total cost of replacing this system is \$401,382.

Mission Hills, Kansas

Verona Road, Aberdeen Street and 63rd Street

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Verona Road, Aberdeen Street and 63rd Street

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$47,571.00	\$ 47,571.00
2	Mobilization	LS	1	\$15,223.00	\$ 15,223.00
3	Traffic Control	LS	1	\$3,806.00	\$ 3,806.00
4	Inlet - 4' x 3'	EA	2	\$4,835.00	\$ 9,670.00
5	Inlet - 8' x 3'	EA	2	\$5,077.00	\$ 10,154.00
6	Manhole	EA	3	\$5,077.00	\$ 15,231.00
7	RCP - 15"	LF	19	\$127.00	\$ 2,413.00
8	RCP - 24"	LF	403	\$163.00	\$ 65,689.00
9	RCP - 36"	LF	114	\$199.00	\$ 22,686.00
10	FES	EA	1	\$242.00	\$ 242.00
11	Asphaltic Concrete Pavement	SY	750	\$73.00	\$ 54,750.00
12	Curb & Gutter	LF	100	\$48.00	\$ 4,800.00
13	Sodding	SY	775	\$6.00	\$ 4,650.00
Subtotal Construction Cost					\$ 256,885.00
Contingencies @ 25%					\$ 64,221.00
Total Construction Cost					\$ 321,106.00
Engineering @ 18%					\$ 57,799.00
Construction Administration @ 7%					\$ 22,477.00
Total Cost for Verona Road, Aberdeen Street and 63rd Street					\$ 401,382.00

System 70

Mission Drive between 61st Terrace and Brookwood Road

SWMM file: MH 527-18.INP

Summary of Findings

Structure number 526 is currently flooding during the 10-yr rainfall event. Structure 526 is a 4' x 2' curb inlet receiving runoff with a peak flow of approximately 6cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
340	24" RCP	30" RCP

The overall system rating is 2.75 out of 3. The estimated total cost of replacing this system is \$30,014.

Mission Hills, Kansas

Mission Drive between 61st Terrace and Brookwood Road

Date: June 20, 2016

By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST**Mission Drive between 61st Terrace and Brookwood Road**

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$3,557.00	\$ 3,557.00
2	Mobilization	LS	1	\$1,138.00	\$ 1,138.00
3	Traffic Control	LS	1	\$285.00	\$ 285.00
4	Inlet - 6' x 3'	EA	1	\$4,835.00	\$ 4,835.00
5	Inlet - 8' x 3'	EA	1	\$5,077.00	\$ 5,077.00
9	RCP - 30"	LF	10	\$163.00	\$ 1,630.00
5	FES	EA	1	\$242.00	\$ 242.00
12	Asphaltic Concrete Pavement	SY	15	\$73.00	\$ 1,095.00
13	Curb & Gutter	LF	25	\$48.00	\$ 1,200.00
14	Sodding	SY	25	\$6.00	\$ 150.00
Subtotal Construction Cost					\$ 19,209.00
Contingencies @ 25%					\$ 4,802.00
Total Construction Cost					\$ 24,011.00
Engineering @ 18%					\$ 4,322.00
Construction Administration @ 7%					\$ 1,681.00
Total Cost for Mission Drive between 61st Terrace and Brookwood Road					\$ 30,014.00

System 71

Verona Road, South of Verona Terrace

SWMM file: MH 598-62.INP

Summary of Findings

Structure number 600 is currently flooding during the 10-yr rainfall event. Structure 600 is an 8' x 4' curb inlet receiving runoff with a peak flow of approximately 9cfs.

To solve the flooding issues it is recommended that one pipe in the system be replaced or upsized as shown in Table 1.

Table 1

Pipe ID	Existing Pipe	Proposed Pipe
490	9" RCP	24" RCP

The overall system rating is 2.00 out of 3. The estimated total cost of replacing this system is \$59,870.

Mission Hills, Kansas
Verona Road south of Verona Terrace

Date: June 20, 2016
By: MAH

Water Resources Solutions

OPINION OF PROBABLE CONSTRUCTION COST

Verona Road south of Verona Terrace

<u>Item No.</u>	<u>Item Description</u>	<u>Unit</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Total Cost</u>
1	Clearing, Grubbing, & Demolition	LS	1	\$7,096.00	\$ 7,096.00
2	Mobilization	LS	1	\$2,271.00	\$ 2,271.00
3	Traffic Control	LS	1	\$568.00	\$ 568.00
4	RCP - 24"	LF	150	\$163.00	\$ 24,450.00
5	FES	EA	1	\$242.00	\$ 242.00
6	Sodding	SY	615	\$6.00	\$ 3,690.00
Subtotal Construction Cost					\$ 38,317.00
Contingencies @ 25%					\$ 9,579.00
Total Construction Cost					\$ 47,896.00
Engineering @ 18%					\$ 8,621.00
Construction Administration @ 7%					\$ 3,353.00
Total Cost for Verona Road south of Verona Terrace					\$ 59,870.00



Water Resources Solutions

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