Drainage System Evaluation and Recommendation

Prepared for:

City of Mountain Park

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ACRONYMS/DEFINITIONS

RCP	Reinforced Concrete Pipe
HDPE	High Density Polyethylene Pipe
CMP	Corrugated Metal Pipe
CIPP	Cured-in-Place Pipe

1. PURPOSE OF ASSESSMENT

In 2013 Integrated Science and Engineering (ISE) completed an MS4 infrastructure assessment for the City of Mountain Park (City). The assessment identified 6 major drainage systems. A major drainage system was defined as having a pipe diameter of at least 36-inches or greater and lie beneath a roadway surface. These 6 drainage systems are now projects for the City's TSPLOST funds.

2. AREAS OF CONCERN

2.1. MAJOR DRAINAGE SYSTEMS

A major drainage system for the purposes of this report is identified as having a pipe diameter of at least 36-inches or greater and lie beneath a roadway surface. The primary concern with these systems is the fact that failure of the systems will potentially cause flooding upstream of the roadway and the roadway may become impassable due to a collapse of the roadway. ISE has identified at least 6 systems which could be classified as a major drainage system. Figure 2 below illustrates the locations of the systems described here.

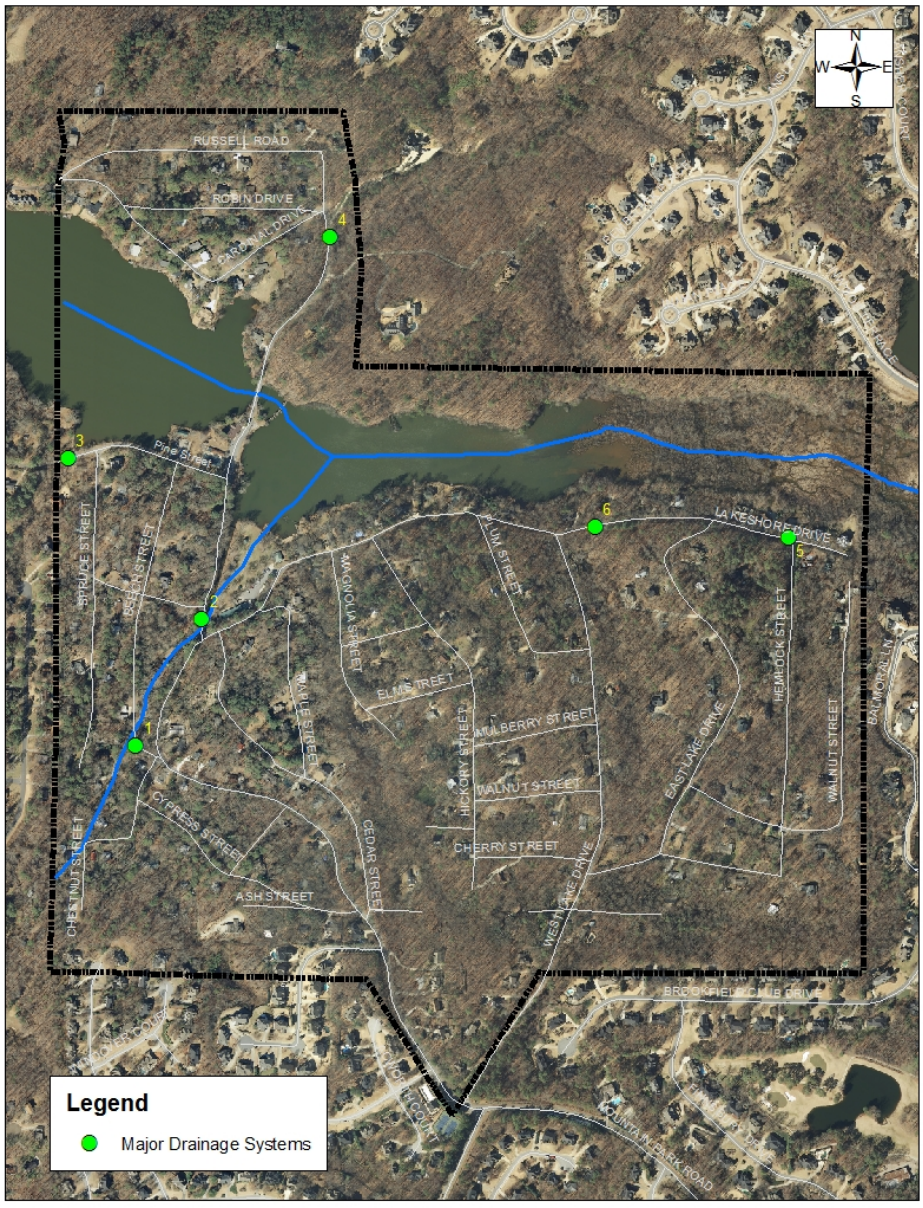

Figure 2 – Major Systems Location Map

2.2. RE-ASSESSMENT AND COST ANALYSIS

Below is a summary of the re-assessments conducted by ISE on the City's 6 identified major drainage systems. It should be noted that the cost estimates provided are for budgetary only purposes. A more detailed formal quote would require a site visit and detailed site inspection. If the City decides to complete all of these projects at the same time then a formal bid process would need to be followed. If the City takes this approach then an additional fee for bonds and insurance would need to be applied to each cost estimate.

Major Drainage System #1
This drainage system consists of a double 36-inch high by 54-inch CMP elliptical pipe system conveying stormwater runoff under Beech Street approximately 120 feet west of the intersection of Beech Street with Mountain Park Road. The condition assessment of the corrosion of each pipe invert remains severe with holes present along the inverts. Due to the pipes displaying high ovality or are not round, ISE recommends re-lining these pipes using the Spin Casting method. It should be noted that the rehab costs include bypass of the live stream, traffic control, and mobilization. Below are the approximate costs associated with this rehab:

Spin-Cast Rehab Fees	$ 40,500
Engineering Fees	$ 5,670
Legal Fees	$ 810
Contingency	$ 6,075
Total	**$ 53,055**

Major Drainage System #2
This drainage system consists of a triple 42-inch CMP pipe system conveying stormwater runoff under Mountain Park Road approximately 80 feet north of the intersection of Mountain Park Road with Lakeshore Drive. The condition assessment remains the same as it did in 2013. Corrosion and sedimentation of the pipe inverts was noted as none or minor in all three pipes.

Major Drainage System #3
This drainage system consists of a single 36-inch high by 54-inch CMP elliptical pipe system conveying stormwater runoff under Pine Street approximately 150 feet west of the intersection of Pine Street with Spruce Street. The condition assessment remains the same as it did in 2013. Corrosion of pipe invert was noted as moderate of the corrosion of the pipe inverts was noted as moderate. Although the corrosion is only moderate; due to the constant flow of water ISE recommends re-lining the pipe as the corrosion will only get worse. Due to the pipe displaying high ovality or is not round, ISE recommends re-lining this pipe using the Spin Casting method. It should be noted that the rehab costs include bypass of the live stream, traffic control, and mobilization. Below are the approximate costs associated with this rehab:

Spin-Cast Rehab Fees	$ 18,000
Engineering Fees	$ 2,520
Legal Fees	$ 360
Contingency	$ 2,700
Total	**$ 23,580**

Major Drainage System #4

This drainage system consists of a double 36-inch CMP/RCP pipe system conveying stormwater runoff under Russell Road approximately 140 feet south of the intersection of Russell Road with Cardinal Drive. For the purpose of this assessment only the CMP pipes located on the upstream end of the system was re-assessed. These 36-inch CMP pipes are attached to 36-inch RCP pipes which are located under the road and downstream embankment. A re-inspection of the pipes revealed severe corrosion and significant sedimentation present. Additionally, one pipe is crushed and needs to be replaced at some point. There are two options to consider with this system:

1. Due to existing pipe damage, lining the pipes could be difficult and would need a site visit from a re-lining contractor to determine if the pipes could be re-lined. Another issue with the system is that since the culvert is a combination of RCP/CMP the whole pipe would have to be re-lined which also increases the price. Additionally, due to the significant amount of sedimentation present, a heavy cleaning will be required. It should be noted that the rehab costs include bypass of the live stream, traffic control, and mobilization. Below are the approximate costs associated with this rehab.

2. If re-lining is not an option then the pipes would have to be replaced which would be more expensive. In order to do the job right, it would be recommended that if the pipes were to be replaced then a headwall would need designed and constructed in order to prevent any future problems. Due to the funds and considering that the pipes under the road are RCP and appear to be in good condition and there is no threat to flooding upstream, ISE would consider full out replacement a lower priority. ISE would recommend inspecting this site annually to determine if replacement of the pipes has become a higher priority.

CIPP Rehab Fees	$ 76,500
Heavy Cleaning	$ 9,000
Engineering Fees	$ 10,710
Legal Fees	$ 1,530
Contingency	$ 11,475
Total	**$ 109,215**

Major Drainage System #5

This drainage system consists of a single 42-inch RCP pipe system conveying stormwater runoff under Lakeshore Drive approximately 350 feet east of the intersection of Lakeshore Drive with East Lake Drive. Additionally, the system also has a 42-inch CMP which is located within 10 ft of a residential home. The condition assessment of the 42-inch CMP pipe indicated severe corrosion present. Due to the proximity of the residential structure, ISE recommends relining the 42-CMP with CIPP. A buried junction is located in the front yard of 220 Lakeshore Dr and would need to be uncovered by the City in order to complete the work. Below are the approximate costs associated with this rehab:

CIPP Rehab Fees	$ 35,175
Engineering Fees	$ 4,925
Legal Fees	$ 704
Contingency	$ 5,276
Total	**$ 46,080**

Major Drainage System #6

This drainage system consists of a single 48-inch CMP pipe system conveying stormwater runoff under Lakeshore Drive approximately 190 feet east of the intersection of Lakeshore Drive with West Lake Drive. The condition assessment of the corrosion of the pipe invert indicated severe corrosion on the downstream end along with severe scouring at the outlet. The field inspector noted that the "entire bottom was missing" in the field notes. It should be noted that the upstream end of this pipe is RCP. It could not be determined at what point the RCP changed to CMP, but from the pipe photo it appears that a buried junction box is located along the embankment. In order to minimize costs the junction box would need to be located and uncovered for the re-lining in order to avoid having to re-line both the RCP and CMP. ISE recommends relining the 48-CMP with CIPP. It should be noted that the rehab costs include bypass of the live stream, traffic control, and mobilization. Below are the approximate costs associated with this rehab:

CIPP Rehab Fees	$ 18,375
Engineering Fees	$ 2,573
Legal Fees	$ 368
Contingency	$ 2,756
Total	**$ 24,072**