

# CITY OF HIGH POINT

## AGENDA ITEM



<b>TITLE:</b> Upper Boulding Branch Sanitary Sewer Evaluation— Professional Engineering Services CHA Consulting Inc.	
<b>FROM:</b> Robby Stone – Public Services Director Derrick Boone – Asst. Public Services Director	<b>MEETING DATE:</b> February 19, 2024
<b>PUBLIC HEARING:</b> n/a	<b>ADVERTISED DATE/BY:</b> n/a
<b>ATTACHMENTS:</b> Scope of Services Map	

**PURPOSE:** To approve a Task Order with CHA Consulting, Inc. for the professional engineering services to evaluate the sanitary sewer system in the Upper Boulding Branch sewer basin. The City has a Master Agreement for Professional Services with CHA Consulting, Inc.

**BACKGROUND:** The Public Services Department utilized CDM-Smith to update the 2019 Wastewater Master Plan, which included the Upper Boulding Branch sewer basin due to known capacity issues within the basin's gravity system. The expanded master plan includes a more detailed analysis of the Upper Boulding Branch sub-basin following the collection of additional data and hydraulic modeling evaluating inflow and infiltration (I/I) throughout the system that has caused excessive surcharging and increased risks of overflows. The work will include manhole inspections, smoke testing, wet weather inspections, and the development of an engineering and sewer rehabilitation master plan for the basin to further evaluate and detail the anticipated improvements.

**BUDGET IMPACT:** Funds for this project are available in the FY 2023-2024 budget.

**RECOMMENDATION/ACTION REQUESTED:** The Public Services Department recommends Council approve this Task Order for professional engineering services to CHA Consulting, Inc. in the amount of \$293,885 and to authorize appropriate city staff to execute all necessary documents.





TASK ORDER NO. 1 – MANHOLE INSPECTIONS AND SMOKE TESTING  
TO THE MASTER AGREEMENT DATED APRIL 1, 2023

The City of High Point (City) has retained CHA Consulting, Inc. (CHA) to perform sanitary sewer evaluation services (SSES) in the City's Upper Boulding sewer basin. The SSES work will identify inflow and infiltration (I/I defects) throughout the system that are causing system surcharging and increased flow volumes during rain events.

CHA will summarize all SSES work in a Sewer Rehabilitation Master Plan. The Master Plan will include a specific, systematic plan for sewer rehabilitation construction moving forward with estimated rehabilitation costs. CHA will work closely with the City to review budgets and future plans so that the rehabilitation work is phased as necessary. The Master Plan may include a 5-year and/or a 10-year plan depending on the findings from the SSES work.

This Task Order No. 1 outlines our project scope and the associated engineering fees for the SSES work (manhole inspections, smoke testing and wet-weather inspections) and Sewer Rehabilitation Master Plan.

Background

CDM Smith developed a Sanitary Sewer Master Plan for the City in 2019. The Master Plan defined areas with capacity issues and excessive I/I. The Master Plan identified the City's Upper Boulding sewer basin as having excessive I/I and as being the highest priority for I/I reduction due to downstream capacity restraints. CDM Smith recommended that flow monitoring be performed within the Upper Boulding basin to divide the overall basin into mini-basins and further identify the sewers with the highest I/I rates and volumes.

CDM Smith performed the mini-basin flow metering from March 20, 2019 to June 13, 2019 and summarized the results of the metering in a letter/memorandum dated April 28, 2020. Nine flow meters (labeled UB\_1 through UB\_8 and 2018\_B) were installed throughout the Upper Boulding basin. Refer to the CDM Smith letter dated April 28, 2020 for the meter locations and mini-basin boundaries.

The largest metered rain occurred on June 7, 2019. CDM Smith reported wet-weather peaking factors for that rain event at each meter as listed below. The wet-weather peaking factor equals the peak wet-weather flow divided by the typical average dry-weather flow.

<u>Mini-Basin</u>	<u>Wet-Weather Peaking Factor</u>
UB_1	13.0
UB_2	8.6
UB_3	9.0
UB_4	14.8
UB_5	8.3
UB_6	18.7
UB_7	13.4

UB_8	6.5
2018_B	4.5

The wet-weather peaking factor provides an indication of how high the flows increase from typical average flows during the rain event due to I/I, and more specifically due to inflow. Inflow is that surge of water into the system from runoff and direct/quick entry of rainwater into the sewer system. Inflow (high peak flows and peaking factors) leads to sewer system surcharging during rain events.

For the Upper Boulding basin, CDM Smith recommended focusing on I/I reduction in due to downstream capacity restraints. The high wet-weather flows are causing the downstream capacity issues. Thus, the initial focus of the City's sewer rehabilitation program should be to reduce the peak wet-weather flows (reduce the inflow). The focus of this Task Order is to find the inflow defects through targeted SSES and to develop a plan to address the defects and thus remove inflow from the system.

CDM Smith recommended that I/I reduction efforts, SSES and rehabilitation should be performed in all mini-basins except UB\_2. CDM Smith based this conclusion on a cumulative I/I ranking using peaking factors as well as I/I rates and R-values. Refer to CDM Smith's April 28, 2020 letter for more information.

The initial focus of this program will be inflow reduction. CHA considers the wet-weather peaking factors (inflow) to be excessive in all of the mini-basins, including UB\_2. The peaking factor in UB\_2 during the June 7, 2019 rain event was 8.6, which is considered excessive (including in the CDM Smith summary) and should be addressed. As such, we recommend that SSES be performed in all of the mini-basins to maximize the potential inflow reduction.

This Task Order includes manhole inspections and smoke testing which are the primary SSES techniques to locate sources of inflow. Sewer TV inspections will be performed later in the program based on the results of the SSES work. The TV inspections may be included in the construction contract if a find-and-fix type program is undertaken (avoids paying for the same TV inspections twice).

#### Task 1 – Perform Manhole Inspections

CHA will proceed with Manhole Inspections immediately upon authorization. If possible, we prefer to inspect manholes in the wetter winter months under elevated groundwater conditions to identify active infiltration leaks.

All manholes in the Upper Boulding basin will be inspected during this project. The CDM Smith April 28, 2020 letter included the following breakdown of manholes:

<u>Mini-Basin</u>	<u>Number of Manholes</u>
UB_1	122
UB_2	140 (not included in CDM's letter)
UB_3	116
UB_4	126



UB_5	187
UB_6	109
UB_7	65
UB_8	88
2018_B	<u>226</u>
TOTAL	1,179

CHA will perform the manhole inspections as follows:

- Perform a complete inspection of all manholes that can be accessed and located from top to bottom to identify the materials of construction (precast, brick, block, etc.), manhole diameter, depth, cover elevation (flush with grade, raised, etc. – not a surveyed elevation), information on the manhole cover, and all else related to the as-built condition of the manhole.

Identify manhole/structure defects including whether there is evidence of surcharging, information of the flow appearance and color, information on the manhole exterior (if applicable), information as to whether storm water runoff can enter the sanitary manholes (infiltration and inflow), information on the how the frame fits on the manhole, manhole wall condition, bench and invert condition, information on the pipe connections at the manholes, information on the manhole steps, information on any odors or corrosion, and all else that is a visible manhole defect. Any defects requiring immediate attention will be communicated to the City upon discovery.

- Confirm pipe sizes in and out of manholes and structures. The price included herein does not include entering manholes to perform this work. CHA will use best available methods to identify pipes sizes from the top-side inspection. If manholes have to be entered to obtain pipe sizes, cost impacts will be discussed with the City. CHA's crews are fully trained and certified to enter manholes (confined spaces).
- Confirm the City's maps of the manholes and piping and mark any changes on the maps.
- Observe exposed pipes (aerial crossings) and creek erosion issues as the manhole inspections are being performed to identify potential major sewer failures and washouts. CHA will report observations to the City.

All manhole inspections will be stored in field tablets. At the conclusion of the manhole inspection work, CHA will provide the inspections in digital format to the City for integration with the City's GIS if desired. CHA will also provide marked up maps to identify field changes that were noted during the inspections so that the City can update their GIS.

CHA will summarize all inspections in a spreadsheet. The spreadsheet will include recommended manhole rehabilitation with estimated costs. The spreadsheet and summary of identified defects will be incorporated into the Master Plan.



This scope of work does not include surveying the manholes. Survey may be added by the City under a future task order. Accurate rim elevations of the manholes are critical when comparing manhole rim elevations along creeks with known flood elevations (to determine if manholes are being inundated during flood events). CHA will perform a review of the manhole as-built data during development of the Master Plan to determine if additional survey is needed for to complete the analysis.

#### Task 2 – Perform Smoke Testing

CHA will proceed with Task 2 upon completion of the manhole inspections. We may begin the smoke testing during the manhole inspections if the conditions are appropriate. We prefer to perform the smoke testing in the dryer summer months during low groundwater conditions to allow the smoke to properly escape from the ground so that defects can be identified.

All sewers in the Upper Boulding basin will be smoke tested during this project. The CDM Smith April 28, 2020 letter included the following breakdown of sewer lengths:

<u>Mini-Basin</u>	<u>Length of Sewer (feet)</u>
UB_1	24,324
UB_2	31,060 (not included in CDM's letter)
UB_3	25,000
UB_4	25,815
UB_5	29,510
UB_6	23,232
UB_7	16,458
UB_8	16,608
2018_B	<u>45,420</u>
TOTAL	237,427

CHA will smoke test all sewer segments in the Upper Boulding basin to locate sources of rainfall dependent I/I (RDII), primarily inflow defects (quick runoff of rainwater into the sewer system). The smoke testing process will follow pre-established schedules and notification procedures as agreed upon with the City. In general, CHA will perform the smoke testing as follows:

- CHA will distribute smoke testing notices (door hangers) two to three days in advance of the work. We typically like to notify on a Thursday or Friday for the smoke testing work being performed the following week. We will submit a sample notice to the City for review and approval. We will include City contact information on the notice as requested.
- CHA will notify dispatch (if available) and all emergency services each day prior to smoke testing.
- CHA will perform the work using Hurco smoke blowers and liquid smoke. The smoke is odorless, non-toxic and non-staining.



- CHA will limit smoke testing setups to 800 feet of sewer at a time to maximize pressurization of the system. Flow will be partially blocked as necessary to pressurize the system. Wastewater flow will not be interrupted.
- CHA will generate a sketch of each leak. All leaks will be located to two or three permanent markers so that the defect can be readily located again. In addition, GPS coordinates of all leaks will be captured. Further, digital pictures of the leaks will be taken. Any defects requiring immediate attention will be communicated to the City upon discovery.
- CHA field crews will also note the characteristics of the area surrounding the defect, including the potential for inflow during rain events. Smoke leaks will be prioritized for repair based on the potential for inflow to enter the leak. Leaks will also be identified as “public side” leaks and “private side” leaks.
- CHA will store all leaks in Trimble GeoXT units and/or Field Tablets. This data will then be transferred into our databases/spreadsheets for storing and merging with other SSES work and/or with the City’s GIS system.
- CHA will develop a final summary spreadsheet that identifies smoke leaks (public side and private side) and presents recommended repairs along with estimated repair costs. The summary spreadsheet will be included in the Master Plan.
- CHA will meet with the City to review the smoke testing defect summary and rehab recommendations. CHA will also deliver the field data and sketches of the defects.

#### Task 3 – Wet-Weather Inspections

CHA field crews will mobilize to the Upper Boulding basin to perform inspections during large rain events. Wet-weather inspections often identify additional I/I defects not visible during traditional SSES (such as flooded roads not draining properly and inundating manhole covers) and also can help isolate sewers with high I/I (inspecting manholes during rain events may help to isolate which segments have high I/I based on flow levels and/or the presence of clear water).

CHA will drive the basin looking at manholes during the rain, will walk easement areas subject to flooding, and will open manholes at key locations to observe flow levels. An upper limit allowance of \$10,000 is included for this Task. Wet-weather inspections will be billed on an hourly basis based on our current rate schedule.

#### Task 4 – Engineering and Sewer Rehabilitation Master Plan Development

This task includes all project meetings, overall program development, and engineering analysis and evaluations related to Tasks 1, 2 and 3, including reviewing the field data and inspections, summarizing the data, determining the needed and recommended rehabilitation, and estimating rehabilitation costs.



This task also includes development of a Sewer Rehabilitation Master Plan for the Upper Boulding basin. We will meet with the City to discuss any past rehabilitation projects in the basin, any planned sewer work in the basin, known maintenance issues and routine clean areas/hotspots, existing repair backlog (if exists), and any available inspection data (such as TV, SSES, work order history, customer calls, etc.), and any previous or reoccurring dry-weather and wet-weather SSO locations and details/causes to help perform a high-level condition assessment.

CHA will integrate this information with the results of the SSES work being performed under this Task Order No.1 into an overall Sewer Rehabilitation Master Plan for the Upper Boulding basin. The Master Plan will include a specific, systematic plan for sewer rehabilitation construction moving forward with estimated rehabilitation costs. CHA will work closely with the City to review budgets and future plans so that the rehabilitation work is phased as necessary. Specific yearly projects and the recommended construction approach for performing those projects will be included and detailed. The Master Plan may include a 5-year and/or a 10-year plan depending on the findings from the SSES work. The Master Plan will establish goals and objectives for the I/I reduction and rehabilitation work and define timeframes for accomplishing the goals. The goals and timelines will be correlated to the CDM Smith Sewer Master Plan referenced herein.

#### Compensation

This Task Order establishes an upper limit amount that cannot be exceeded unless written authorization is provided by the City. The budgeted upper limit cost for the work defined herein is \$293,885 as follows.

Task 1 – Manhole Inspections = 1,179 manholes at \$135/manhole =	\$159,165
Task 2 – Smoke Testing = 237,427 ft at \$0.42/ft =	\$99,720
Task 3 – Wet-Weather Inspections = (upper limit allowance; billed hourly as/if inspections performed)	\$10,000
Task 4 – Engineering and Master Plan Development = (upper limit allowance; billed hourly)	<u>\$25,000</u>
Total Upper Limit Amount =	\$293,885

#### Additional Services

Services not detailed herein may be performed under a future Task Order. These services may include the following:

- Additional SSES work if the number of manholes to be inspected is greater than estimated and/or additional smoke testing is required
- Inspect manholes using CHA's IBAK Panoramo SI and/or EnviroSight CleverScan manhole scanning equipment to perform high-resolution structural assessment of manholes.



- Survey manholes using survey-grade GPS equipment – locations and rim elevations
- CCTV inspection of portions of the collection sewers.
- Rehabilitation Design, Bidding and Construction Administration Services
- Flow Monitoring Services (Pre- and/or Post-Rehabilitation Flow Monitoring)

#### Work Authorization and Project Implementation

We will begin work immediately when authorized and will provide a project schedule upon authorization. Manhole inspections will commence within two weeks from authorization. The ideal months for manhole inspections are typically the winter and spring months during times of elevated groundwater levels. Smoke testing will follow manhole inspections (or begin during the manhole inspections) and ideally be performed in the drier summer months. We expect the entire project duration to be no more than 8 months. All services and compensation under this Task Order shall be in accordance with the Master Agreement dated April 1, 2023.

IN WITNESS WHEREOF, the CONSULTANT and the OWNER have executed this Contract as of the date written below.

OWNER:

CITY OF HIGH POINT

By: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

CONSULTANT:

CHA CONSULTING, INC.

By: Aaron M. Frazier

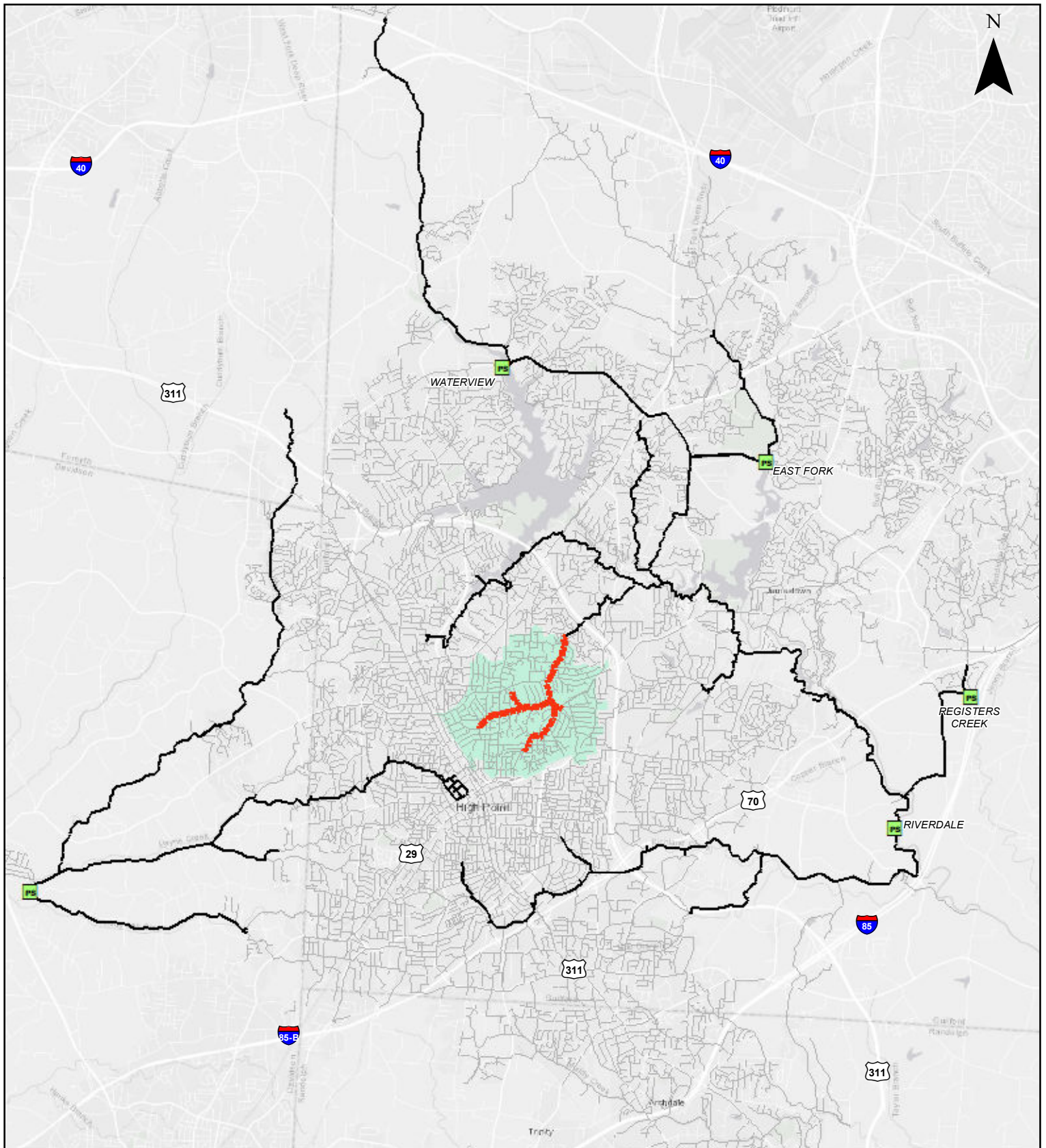
Name: Aaron. M. Frazier

Title: Business Practice Leader






Date: January 30, 2024







### Legend

-  Wastewater Treatment Plant
-  Pump Station
-  Modeled Pipe
-  Upper Boulding Model Expansion
-  Upper Boulding Basin

**Figure 1**  
**Expanded**  
**Upper Boulding**  
**Model**

High Point, NC

1 in = 11 miles

0 5 10  
Miles

**CDM**  
**Smith**

