Request for Proposal
SSES Phase 2 Addendum No. 1 to
RFP No. 179821.78.0007
November 19, 2014

The following information encompasses Addendum No.1 for the above referenced RFP. Bidders shall fully consider and acknowledge this Addendum in the preparation and submittal of its formal Proposal. Failure to do so may result in the rejection of the Proposal.

Section 1 – Pre-Proposal Meeting Questions

Section 2 – Update to Advertisement and RFP Commercial Terms and Conditions

Section 3 – Update to Technical Specifications

All other conditions and requirements remain unchanged.

Section 1 - Pre-Proposal Meeting Questions

Q1: Do the Prime contractors need to meet both 5.2% MBE and 5.2% WBE for SRF compliance or at least show good faith?
SARP10: Yes, contractors should strive to meet both 5.2% on MBE and 5.2% on WBE utilizing subcontractors that are on TDOT's DBE list. This list does not specify if the DBE firms are MBE or WBE. The City's EBO Master List does specify and can be used for reference. If a firm is DBE, SARP10 is credited for meeting the MBE or WBE goal, but not both - even if the MBE is female owned. If the contractor cannot meet these requirements, please provide good faith documentation including record of communication with 10 applicable DBE vendors from the TDOT list.

Q2: What is the overall program M/WBE goal?
SARP10: The overall program M/WBE goal is 30% but on this project the goal is set for 21%.

Q3: Does the proposal have to be 35 pages or less?
SARP10: Yes. The proposal should be no more than 35, single sided pages.

Q4: The specs state that we need to fax the smoke information to the fire department. Can we email this instead?
SARP10: The Fire Department has previously informed SARP10 that they want us to fax them the information. Information has been faxed successfully for the past year by the existing SARP10 contractors. Contractors wishing to propose on these contracts should be prepared to fax smoke test information. Any change to email will solely be at subsequent Fire Department direction.

Q5: You mentioned that it takes roughly 15 minutes to approve heavy cleaning on a segment. In the event that a SARP10 contract inspector is not present, what shall we do to get the heavy cleaning approved?
SARP10: Give the inspector a call and he will come on site to collect the information and send it to the Construction Manager for a determination. Typically, an inspector is located within the contract footprint.

Q6: What happens if while we are removing roots we cause a pipe collapse and our camera becomes lodged in the pipe? Who will be held liable for removing the camera if you directed us to remove the roots after we insisted against it?
SARP10: The contractor is responsible for outcomes resulting from judgments made about their operations in the sewer. However, if you inform us that you believe your camera may become lodged or root cutting will damage the sewer, SARP10 will not force the contractor to attempt the removal.

Q7: If a camera gets stuck whose responsibility is it?
SARP10: It is the contractor's responsibility to get the camera out. SARP10 may assist as deemed necessary and we have assisted in prior cameras that have been stuck.

Q8: Will we receive a copy of the sign in sheets?
SARP10: It is included as an attachment.

Q9: I am having issues registering on the B&V website. What should I do?
SARP10: We will direct you to Aaron Kinkelaar who is our procurement specialist, KinkelaarAB@BV.com.

Q10: During the Phase 1 Pre-Proposal meeting I felt as though the Prime contractors did not attend the meeting with any intent of teaming up with any subs.
SARP10: We understand that some Primes may already have their teams formed before the pre-proposal meeting. However, we would hope that the Primes are inclusive in how they form their teams but once again it is up to the Prime in how they create their team.

Q11: Who were the winning contractors for Phase 1 and are they here?
SARP10: The winners were Compliance EnviroSystems (CES), G2 Engineering and Management (G2E), and Video Industrial Services (VIS).

Q12: Will the emphasis be geared towards local companies for Phase 2?
SARP10: The SARP10 team has elements built into the program to cultivate local vendor participation.

Q13: Does the PE required for the monthly data submittal stamp need to be a Tennessee licensed PE?
SARP10: Yes, they must be a licensed PE in the state of Tennessee or have submitted an application to become a licensed PE in Tennessee and just waiting approval. SARP10 will also revise language in the specification to reflect this requirement for both independent reviewers and internal staff of the Contractor's.

Q14: Will you provide any safety training on this program?
SARP10: No, the training required must be provided by your own company.

Q15: The spec states hazardous waste safety training that requires 40 hours in Section 00585. Will this be required?
SARP10: Section 585.3.2 will be removed (Training requirements). Section 585.3.1 will remain part of the document and requirements.

Q16: I understand SRF has specific MBE and WBE goals. What happens if we reach the overall City 21% goal but do not reach the SRF 5.2% MBE and 5.2% WBE goals? Do we still have to submit good faith if we don't reach the SRF requirements?
SARP10: Yes, you must document your good faith effort if you do not reach the SRF MWBE goals. (See Response to Question #1)

Q17: Do we need to have a TN licensed surveyors to collect the sub-meter GPS locations?
SARP10: No, that is not a requirement.

Q18: Does Type 3 dye testing include CCTV in the cost?
SARP10: A separate CCTV cost will be paid for any Type 3 dye testing directed.

Q19: What determines how we will get paid for each type of dye testing?
SARP10: "Dye Testing will be paid on a per unit basis. Dye testing will only be paid on an hourly basis for the entire crew when the Construction Manager determines there are extraordinary circumstances that make determining the scope of effort required to complete the dye testing difficult to determine."

Q20: How accurate are the maps that the SARP10 team provides the contractors?
SARP10: The maps were created by digitizing existing paper maps, some over 100 years old. Sewer lines and manholes have been found up to 50 feet off in prior field phases.

Q21: I am a WBE PE can I work for more than 1 Prime?

SARP10: Yes.

Q22: Can a company prime and sub?
SARP10: Yes.

Q23: Would you like us to submit the CCTV/sonar combination as one video showing CCTV on top and sonar on the bottom or separate videos?
SARP10: SARP10 requires them to be together.

Q24: Did you address bonding in the proposal?
SARP10: Yes.

Q25: Who has to apply for the pre-qualification process?
SARP10: Only Primes need to be pre-qualified.

Sign-In Sheet

Project:	SARP10	**Meeting Date:**	November 12, 2014
Meeting:	Phase 2 Pre-Proposal	**Time:**	1:30 PM- 3:00PM
Facilitator:	Bently Green	**Place/Room:**	Benjamin Hooks Library

Name	Company	Phone	E-Mail
Alfred Dyson	DYSON ENGR & Tech	901 4823397	a-dyson@msn.com
Tony McCulley	Hydrostructures SVS	828 273 7099	tony.mcculley@hydrostructures.com
G.K. Taylor	BBT-INC.	901 218-2298	GKTaylorr@gmail.com
David Guillory	CES	(225)939-3019	dguillory@ces-sses.com
Solomon Akinduro	ACOT	901-266-1653	DSA@ACOTASSOCIATES.COM
LEE LAMBERT	Stragistics/ESTES	901 309-5550	llambert@stragistics.com
Scott Helfrick	ADS	770-639-7795	SHELFRICK@idexcorp.com
Vince Malavasi	Neel-Schaffer	662-890-6404	vince.malavasi@neel-schaffer.com
Tommy Sander	White Const. & Assoc./Memphis Road Boring	(901) 755-3700	sanduci@bellsouth.net
Ashraf Elsayed	Geotechnology	901-353-1981	a_elsayed@geotechnology.com
Jackie McLaughlin	G2 Engineering & Management	865 924-5962	jackie.mclaughlin@g2em.com
Kendenck Norris	G2 Engineering & Mang.	865-523-4750	k.norris@g2em.com
Dewey Lee	Video Industrial	205-281-2319	Dlee@videoindustrial.com
Floyd Veasley	Veasley Rubbish / Asphalt	901-301-4606	Veasleyf@bellsouth.net
Dock White	Asphalt	901 791586	[illegible]
Willie Nelson	Nelson LLC	Cell 901 331-0221 901 332-5670	wnelson@nelson-Inc.Net
Michael Jenkins	MJ contracting	901-690-2684	Jjenkins18@comcast.Net

Name	Company	Phone	E-Mail
John Brick	BSV	—	—
Michael Hooks	ALLWORLD PM		MAH3R@ALLW
Ron Hooks	AWPM	901 336 6859	ronald@allworldmail.com

Name	Company	Phone	E-Mail
Linda Prather, P.E.	Foundation Engineering Mgmt	901-870-2700	lprather@ymail.com
Winston Gipson	Gipson Mechanical Contractors Inc	(901)388-6149	WSgipson@gipsonmech.com
Heather Murdock	H & K Plumbing & Heating	901-942-3158	Pkrag1@comcast.net
Wesley Goodnight	Ensafe Inc.	901-372-7962	wgoodnight@ensafe.com
Dino Hull	MBDA Business Center	901-528-1432	dhull@mmbc-Memphis.org
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Will Christian III	MMBC Continuum	901-525-6515	wchristian@mmbc-memphis.org
Pierre Mikhail	Wachs Water Services	813-763-2807	PMIKHAIL@WACHSWS.com
Alberto Delgado	Delgado General	901-326-3127	albertodelgadogeneralcorp@gmail.com
Kiara Ayala	Delgado General	901-308-0786	albertodelgadogeneralcorp@gmail.com
Tony Russo	Trekk Design Group	314 435 3779	Trusso@TrekkLLC.com
Cynthia Williams	A+H Contracting	901 6840160	cynthiaw@aandhcontractors.com
Bob Pitts	Pickering Firm, Inc.	901-729-5507	bpitts@pickeringfirm.com
Tim Jacobs	CES	404-886-1520	TJacobs@CES-SSES.Com
Kieu-Anh Tran	QS Solutions, Inc	404-579-5779	ka.tran@QSIWORLD.com
Eddie Moore	Cambridge	678-595-2741	emoore@ccminc.us
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David Sanders	SMS Contractors	901.771.7141	David.Sanders@smscontractors.com
Lorenzo Myrick	APS	901 297 8988	lmyrick@apsmemphis.com
Scott McAmis	GSP	865-804-8618	scott.mcamis@gspnet.com
Gary Older	OCI	813-323-0502	oldergs@bv.com

Section 2 – Update to Advertisement and RFP Commercial Terms and Conditions

Delete these lines from the advertisement (applies to construction only):
Please note there is a local contractor preference of 5% per City of Memphis requirements. For evaluation purposes the 5% will be applied to the Total Construction Price.

Delete these lines from the advertisement (applies to construction only):
Davis-Bacon Act Requirements
This project is being funded by a State Revolving Fund loan from FY 2010 (or later) EPA Capitalization Grant Funds. The loan recipient must be in compliance with all applicable Davis-Bacon Act requirements.

Delete this line from the advertisement:
Sealed proposals will be received at the Office of the City of Memphis Environmental Administration, Room 620, City Hall, 125 N. Main, Memphis, TN 38103, until **3:00 p.m., December 4th, 2014** for furnishing the City of Memphis with the following: FOR THE DIVISION OF: PUBLIC WORKS FOR THE CONSTRUCTION OF: **SARP10 179821.78.0007 Sewer System Evaluation Survey (SSES) Phase 2 Project.** Late proposals will be rejected and will not be considered for award.

Correction to RFP Section 00180.4 Proposal Submission Instructions
Submit proposals to:
SARP10 (Black & Veatch / OCI)
Attention: Bently Green, Program Manager
3485 Poplar Avenue, Suite #230
Memphis, TN, 38111

Delete this paragraph from RFP Section 00180.19 Mandatory Pre-Proposal Meeting:
Note that a Diversity Workshop will be held from 3:15 P.M. to 4:00 P.M. in the same room as the Pre-Proposal Meeting. This meeting will include local M/WBE firms that are interested in supporting the SARP10 Program. Attendance by prime contractors interested in the condition assessment projects is encouraged.

Delete from RFP all of Section 00180.20 Public Opening of Proposals, Refer to Section 00180.4 Proposal Submission Instructions.

Correction to RFP Section 00561.4.3 Construction Milestone Completion Dates
Beginning on the first calendar day after the specified milestone completion date for each milestone and continuing for ~~seven~~ thirty calendar days or until the milestone is completed, whichever is earlier, delay liquidated damages will be assessed at the rate of five hundred ($500) dollars per calendar day.

Delete from the RFP 00582.5.4 Violation of this Article 00582.5 is a material breach of this Service Contract.

Delete from the RFP 00585.3.2 and sub articles (a) (b) and (c). This training is not required.

Section 3 - Update to Technical Specifications

See attached updates to Sections 00002, 00003, and the included map.

PART 1 – SCOPE

1.01 This Work will consist of smoke testing of sanitary sewer manholes, sewer pipes, sewer laterals and interceptors and confirming dyed water flooding of specified defects to identify and confirm sources of infiltration and inflow, including necessary public notices to areas affected by the smoke test and dye testing operations, notifications to individual buildings and residences, police, and fire, providing necessary barriers around access points to prevent injury to the public, securing the access to the sewer pipes to be tested, providing and operating blowers and smoke generators for performing the smoke test, and furnishing of all inspection documentation of observations concerning smoke test results.

1.02 The Work covered by this section includes furnishing all labor, competent technicians/crew leads, equipment, tools, accessories, and materials required to execute the smoke testing, sub-meter GPS of smoke defect sources and directed dye tracing of the identified sewer segments and associated sewer laterals. Work is included on public and private property. Smoke testing performed under this specification shall follow The National Association of Sewer Service Companies (NASSCO) Manhole Assessment and Certification Program (MACP) Level 2 manhole inspections performed of the asset and shall precede any subsequent CCTV inspection associated with this pipe asset in the scope of work. Dye testing of specified defects associated with the manhole or sewer asset shall be performed in conjunction with subsequent CCTV of the same asset.

1.03 GPS coordinates of the smoke located defects, photo records of the smoking defects, and associated record data shall be delivered to the Program Manager (from hereon Program Manager shall be interpreted as “Program Manager or his designee”) on external hard drive(s) which will become property of the Program Manager. Data files and photos shall be formatted to facilitate upload into a compatible Exchange ACCESS database or internet upload to an FTP site using procedures approved by the Program Manager.

1.04 Contractor will be provided two Geo-databases; one will have supporting records (aerial photo overlays, outfall and block maps, as-builts as available), and the second will be a maiden database which will include the asset ID for each manhole.

PART 2 - MATERIALS AND EQUIPMENT

2.01 MATERIALS

A. Submittals

1. Unless otherwise specified all sample submittals shall be delivered to the Program Manager within two weeks of the NTP.
2. A Traffic Control Plan shall be submitted to the Program Manager, including the following items:
    a. Outline of permit acquisition procedure for lane closures.
    b. Methods for proper signing and barricades, which comply with local requirements and the City.
    c. Major streets (e.g. Shelby County Principal Arterial & Minor Arterial) requiring a City approved permit if taking a lane for mobile operations, secured through Traffic Control Plan submittal to the City and signed by a TN PE. The City requires 2-week lead time for permit processing.
        i. The Contractor will be required to deliver a sample primary/arterial road Traffic Control Plan for review by the City.
        ii. If the City determines that the nature of the work operation or the type of road in which the Contractor is working requires a permit, the Contractor will be required to modify the sample Traffic Control Plan to obtain a permit from the City.
    d. For everywhere else where a permit is not required, the Contractor shall develop, provide, and implement a Traffic Control Plan for all mobile operations in accordance with standard MUTCD specifications.
    e. The Contractor is also responsible for acquiring all necessary disposal and/or landfill site permits required to perform this work.
    f. Railroad Rights of Way: The Contractor shall notify the Program Manager when work or access to manholes and sanitary sewers lie within 25 feet of the railroad easement as measured by 25 feet outside the nearest rail of the tracks. To access sewer facilities within the 25 feet of the railroad right of way the Contractor shall contact the Program Manager 48 hours in advance who will alert the City's Zone Construction Inspector to coordinate individual railroad direction and guidance.
3. Site Contractor emergency phone numbers.
4. Schedules of work on a weekly basis that will be delivered no later than 2:00 PM on Thursday for the week following, and daily AM email updates of approximate crew locations each day.
    a. Weekly schedule format shall contain the following elements:
        i. Map format.

ii. Sufficient streets labeled and identified at a scale to provide clarity.
iii. Nature and type of crew location by map area.

b. Contractor shall fax smoke test locations to local Memphis Fire Department station by 7:00 AM on each day of smoke testing.

5. Proposed electronic field documentation format, including provisions for capture and recording of GPS coordinates of smoke sources and photo records of sources.
6. GPS calibration standards, including frequency, are to be followed in the field; specify which available base stations will be used for the work.
7. Sample of sub-meter GPS coordinates delivered in electronic and pdf format.
8. Equipment list, including GPS and camera manufacturer and model equipment to be used.
9. Sample of the digital inspection data delivery in MS ACCESS database format.
10. Manufacturer specification sheets and any associated material safety data sheets (SDS) for the smoke source and dye source to be used.
11. Proposed public notification process including daily police and fire contacts, neighborhood doorhanger canvassing, and other project and public contacts. All public notification shall be coordinated with the Program Manager.
12. Proposed rapid response to smoke in buildings including the Contractor's use of whole house fans and other mechanisms to clear smoke form affected properties
13. Digital inspection data delivery will be in MS ACCESS database format

B. Smoke

The smoke used in smoke testing shall be acceptable for both indoor and outdoor use, shall be non-contaminating, and shall leave no residue to stain clothing, drapes, carpeting or other fabrics in building interiors. Smoke shall be non-hazardous to humans and pets and shall be generated from liquid smoke (Hurco's LiquiSmoke™, or equal), as approved by Program Manager. The liquid smoke product shall be accompanied by Material Safety Data Sheets (MSDS) for both the liquid used to generate the smoke and the smoke itself that demonstrates these product qualities. If two MSDS's are not available for the contractor's proposed liquid smoke product, the contractor shall use Hurco's LiquiSmoke™

~~The smoke used in smoke testing shall be acceptable for both indoor and outdoor use, shall be non-contaminating, and shall leave no residue to stain clothing, drapes, carpeting or other fabrics in building interiors.~~

~~Smoke shall be non-hazardous to humans and pets and shall be generated from liquid smoke solution and shall be Hurco's LiquiSmoke™, or equal, as approved by Program Manager.~~

C. Dye

Tracer dyes may be in tablet, powder or liquid form. The Contractor shall secure several colors to distinguish multiple tracings within the same sewer pipe segment. Fluorescent yellow/green, fluorescent red, and/or fluorescent orange are preferred indicator colors.

2.02 EQUIPMENT

A. Blowers

The smoke blower shall be specifically designed for the purpose intended and be a high volume air blower capable of producing a minimum capacity of 4,000 cfm at a single manhole or the Contractor shall use two minimum 2,000 cfm blowers in a double blower configuration on two manholes at each end of the set-up. The blower base shall be gasketed with foam or other suitable sealing material to restrict the escape of smoke from between the manhole structure and frame and blower. A backup blower of equal capacity shall be available onsite at all times.

B. Cameras

All cameras used shall be digital format color cameras specifically designed or modified for use in sewer manhole inspection work. All cameras used during inspections shall have a minimum of 5 mega pixels .jpg format for sufficient clarity and detail in the photos, and photos of at least 2 MB shall be submitted.

C. Sewer Plugs

Inflatable sewer plugs, sandbags, or other air flow restrictors or baffles shall be used to isolate individual sewer pipe segments for smoke testing. Any items used to restrict flow shall be removed immediately after intended use.

D. Ventilation Blower

The Contractor shall maintain a high capacity, whole house ventilation fan onsite during the smoke testing should any customer's building inadvertently fill with the smoke from the testing. The Contractor must be immediately responsive to any customer's smoke concerns or problems.

E. Dye Water Injectors

For localized sources of smoke to be confirmed by dyed water, the Contractor shall provide dye water injectors. These may be modified tree root fertilizer feeders or apparatuses developed by the Contractor. The injector shall be fitted with a garden hose, and a feed cup shall be capable of dispensing or dosing dye to the tip of the injector. The shaft of the dye water injector shall be a minimum of four feet long to enable injection directly into the soil adjacent to the smoke source.

F. GPS Equipment

GPS equipment shall be sub-meter grade, Trimble Pro Series Receivers with Floodlight technology capability, Top Con GRS-1 Series equipment or equal. GPS coordinates are to be real-time or post-processed to achieve sub-meter accuracy.
GPS coordinates must be in NAD83 TN State Plane Coordinates horizontal, NAVD88 vertical in US Survey feet using properly-calibrated GPS equipment.

G. Retrieval of Stuck Equipment

The Contractor is responsible for hiring a licensed sub-contractor to retrieve any equipment/foreign objects that get stuck in the sewer system through the execution of the scope of work (fallen cameras, jet nozzles, inflatable plugs, sandbags etc.) at the Contractor's own cost. Such retrieval by an appropriately licensed sub-contractor shall be made within 72 hours to avoid interfering with the City of Memphis sewer system operations. Any and all impacts and related costs due to the Contractor's equipment in the line shall be the responsibility of the Contractor.

PART 3 – CONSTRUCTION REQUIREMENTS

3.01. NOTIFICATIONS

A. Public

1. Prior to conducting smoke testing field work, the Contractor shall provide notification to every residence and business that may be affected. The Contractor shall distribute the Program Manager approved door hangers between 48 and 72 hours prior to the start of the smoke testing effort. Door hangers shall be double-sided with the notification information in the English language on one side and in the

Spanish language on the reverse side. The local fire department shall be notified of the smoke testing at least seven days in advance.

2. At a minimum, the notifications shall advise residents of what to expect during the smoke testing, to run water into all drains to ensure traps are not dry, and to alert them that they will observe smoke escaping from the roof plumbing vent. The notice shall also describe what to do should smoke escape to the interior of the house. The notice shall also describe any side effects of the smoke (e.g. potential for residual odor) and make SDS information available.
3. Door hanger notifications shall use a fluorescent color for visibility and incorporate any City-specific logo (if available and agreed upon by the Program Manager) to link the smoke testing to the City's sewer improvement effort.
4. One week (seven calendar days) prior to the scheduled smoke testing of public and health facilities such as schools, daycares, hospitals, and nursing homes, the Contractor and Program Manager shall meet in person and advise in writing the responsible person in charge of the facility of the expected activities and potential impacts to the facility. 24-hours before the test, the Contractor must advise the responsible person in charge by telephone of the scheduled tests the following day. At the conclusion of the test, a representative of the Contractor shall advise the responsible person in charge of the facility that testing has concluded and there will not be further impact. Records of the meetings with these facilities shall be maintained and shall include the date and time of the contact and the person contacted and shall be available for inspection at the Program Manager's request.

B. Program Manager

The Contractor shall provide daily morning updates prior to beginning daily field operations to the Program Manager, fire, police, or other agencies as directed by the Program Manager. List of entities and individuals requiring notification will be distributed prior to work commencing.

3.02 SMOKE TESTING

A. Field Operations

1. Testing shall not be done during rainy weather, and testing shall be closely monitored on windy days. If smoke coming out of the ground is blown away so quickly as to escape accurate detection, testing shall cease until such time that conditions permit.
   a. Precipitation that creates active runoff along the curb and gutter shall be sufficient to suspend active smoke testing. The

Contractor shall wait 24 hours after a rain event of ½ inch or greater before beginning smoke testing.

b. Should precipitation interrupt scheduled testing and cause a delay, the public notification procedures must be repeated.

2. The sewer pipe segments to be tested shall be isolated by means of air flow restrictors, sewer plugs, sandbags, or other devices in the upstream and downstream manholes that limit the smoke travel to only the segment being tested. Bypass pumping is not required but flow-through plugs can be utilized. Contractor shall exercise care in the restricting of flow so as not to create backups into private property or overflow of wastewater. The blowers and the smoke addition shall begin simultaneously and be continuous for the entire time of the field inspection for determining sources of smoke. The Contractor shall be responsible for cleanup, repair, fines, property damage costs, and claims for any sewage backup, spillage, or sanitary sewer overflow during or as a result of the smoke testing operations.
3. The maximum length of sewer pipe segment(s) to be tested shall be 500 linear feet at a time. Adjacent sewers with a combined length of 500 linear feet or less may be tested together. Any adjustments to the length of testing shall be approved by the Program Manager. Contractor shall monitor the air volume used, particularly on shorter segments tested so as not to blow water from the private property plumbing traps.
4. The minimum smoke blowing duration shall be 5 minutes to enable full coverage of the properties and backyards adjacent to sewer and to enable sufficient time for the smoke to filter out of the sewer defects and reach the surface.

B. Smoke Observations and GPS Source Documentation

1. The area near each manhole and along the length of the isolated test segment shall be visually checked for the appearance of smoke. Sufficient staff shall be onsite to enable the inspection of the entire perimeter around each building connected to the sewer pipe while the blowers and smoke are continuously operating in the segment being tested. Storm drain inlets, curb boxes, cleanouts, building laterals, downspouts, areaway drains, foundation drains, and other potential sources of smoke shall be visually checked. The blowers and smoke injection shall continue until all suspect sources have been evaluated, but for no less than 5 minutes.
2. The Contractor shall document observations regarding each leak identified. The locations where smoke is observed shall be recorded using handheld, sub-meter accuracy GPS data collectors. Information regarding the characteristics of the defect and its surrounding tributary

area shall also be recorded. The information shall include the smoke source location (street, curb, swale, sidewalk, driveway, front yard, side yard, backyard, field, parking lot, downspout, etc.), the unique asset identification of manhole or sewer segment, the house address that is nearest to the discharge point of the smoke, type of property (public or private), surface cover (asphalt, concrete, grass, paver, or other), date, mini-basin number, test number, date, crew, weather condition, wind condition, smoke intensity, susceptibility to ponding, and other comments. Specific data fields and allowable values (as applicable) will be provided to Contractor by the Program Manager.

C. Digital Photographs

The Contractor shall take two date and time stamped pictures of each defect. Photo 1 shall be taken to identify the general area of the defect, and Photo 2 shall be a close up picture of the defect. The precise location of the defect shall be identified using GPS equipment. The digital image files shall be linked to the field data gathering and observation form.

All cameras used shall be digital format color cameras specifically designed or modified for use in sewer manhole inspection work. All cameras used during inspections shall have a minimum of 5 mega pixels .jpg format for sufficient clarity and detail in the photos, and photos of at least 2 MB shall be submitted.

File naming must be consistent. Additional instructions, naming conventions, file structures, etc. will be provided after contract award.

3.03 DYE TESTING

A. Field Operations

Suspected sources identified by smoke testing and directed by the Program Manager shall be confirmed through dyed water tracing or flooding during this portion of the project for Type 1 sources or during the CCTV portion of the investigations for Type 2 or 3 sources. Verification of the suspect source is achieved when dyed water is introduced at the suspect source and observed at the downstream manhole. The dye mixing, pouring, or flooding procedure will be governed by the type of source to be tested. The Contractor shall immediately notify the Program Manager of any dye that reaches a receiving stream. The Program Manager reserves the right to direct water flooding with no dye to minimize the impact to the receiving water body.

Contractor shall be responsible for cleanup, repair, fines, property damage costs, and claims for any sewage backup, spillage or sanitary sewer overflow during or as a result of the field operations.

B. Type "1" Sources

1. Type 1 sources generally will be able to be dye traced by mixing limited quantities of dye colored water (e.g. maximum of five gallons) and pouring the water in the immediate vicinity of the suspect source, either in private or public space. Examples of Type 1 smoke sources generally are direct cross-connections to the sanitary sewer and include the following:
    a. Driveway drain.
    b. Stairwell or areaway drain.
    c. Window well drain.
    d. Downspout connection.
    e. Sanitary sewer manhole :
        i. With soil or grass surface cover.
        ii. With cracked or deteriorated paving.
2. Dye will generally be poured into the source where smoke was observed. A positive confirmation results when the wastewater flow observed in the downstream manhole contains the transferred dye color.

C. Type "2" Sources

1. Type 2 sources generally include injecting dye water for a minimum of 5 minutes duration into soil to affect the transfer of the dyed water to underground sewer defect, either in private or public space. The injection is achieved by using a root fertilizing type spike attached to a garden hose with a fertilizer cup filled with dye to affect the transfer of color, and pressure injecting the dyed solution into the ground at the source of the smoke. The Contractor must comply with all appropriate backflow prevention requirements if the hose is connected to the public water supply.
2. Examples of Type 2 sources include the following:
    a. Drainage swales.
    b. Public/private lateral connection transitions (generally at the property line).
    c. Building lateral (public or private).
    d. Sanitary sewer manhole:
        i. With soil or grass surface cover.
        ii. With cracked or deteriorated paving.

3. Dye will be injected into the soil at the location where smoke was observed. A positive confirmation results when the wastewater flow observed in the downstream manhole contains the transferred dye color.

D. Type "3" Sources

1. Type 3 sources are generally public sector sources which require the plugging of storm sewers. The downstream storm sewer pipe, which includes the catch basin or storm sewer pipe segment which smoked, is plugged and filled with dyed water. The downstream sanitary manhole is observed for dye. If dye is observed, the parallel or adjacent sanitary sewer is televised concurrently to identify the specific sources of dye transfer.
2. The Contractor is responsible for meeting all requirements for dechlorinating the water used for dye flooding in accordance with local regulatory requirements so as not to create a problem with chlorinated water in receiving streams.
3. Examples of Type 3 sources include the following:
   a. Catch basins.
   b. Storm sewer pipes.

PART 4 – DELIVERABLES

4.01 RECORDS

A. Smoke Testing Logs, Record Sketch, and Digital Photo Documentation

1. Smoke testing records shall be submitted to the Program Manager by the close of business on the Monday following a week after data acquisition.
2. The address or house number shall be recorded. A description of the leak and possible cause shall also be recorded on the field data gathering and observation form.
3. The reports shall provide a north arrow orientation. A sketch of the building and/or structure shall be drawn. A reference to the GPS documented field location shall be generally shown in the sketch.
4. The Contractor shall also submit an electronic database in an MS ACCESS database on an external hard drive that summarizes all of the information recorded on the field data gathering and observation forms and recorded via the GPS data collectors during smoke testing.
   a. The electronic database shall include the information recorded on the forms and the sub-meter GPS coordinates obtained at the defect locations where smoke was observed.

b. The external hard drive shall also include the digital pictures taken during smoke testing in .jpg file format which shall be linked to the defect locations where the pictures were taken via the GPS coordinates obtained.
c. Inspection data is to be delivered to the Program Manager by the close of business on the Monday following a week after data acquisition.

5. The Draft Report shall show the location of each defect, including dimensions referenced to the nearest manhole and pipe segment. For each pipe segment, the Contractor shall submit the electronic database and a report in pdf format that includes the data (including site photos) associated with any leaks that were found and a map showing the location of the pipe segment, nearby manholes, aerial photography, labeled street names, and an approximate location showing how the defect location is oriented with respect to a nearby manhole. GPS coordinates in the electronic database are accepted as the precise location of the defect.
6. Draft Report shall be delivered to the Program Manager within fifteen working days of the last or final inspection.
7. The Program Manager will review and provide comments within two workweeks from receipt of Draft Report. The Contractor shall address all comments provided and shall submit the Final Report within one workweek from receipt of comments. At the discretion of the Program Manager, a meeting will be held so Contractor can explain the processes used to address the comments provided.

B. Dye Tracing Logs, Record Sketch and Digital Photo Documentation

Each dye tracing shall be identified in an observation log which shall include a sketch showing the location and the results, a digital photo of the dye source, and the downstream dye confirmation in the sewer. The sketch shall include direction, street names, address, and relative dye application (Type 1, 2, or 3) to an identifiable feature. A digital photograph shall document the dye transfer in the downstream manhole and include the pipe segment and closest downstream manhole asset ID.

C. Final Report & Deliverable

1. Complete electronic database on an external hard drive of the smoke testing results including GPS coordinates of smoke sources and dye testing results, including linked digital photos. Inspection data is to be delivered to the Program Manager by the close of business on the Monday following a week after data acquisition.

2. Three (3) color copies of the logs, record sketches, and digital photographs shall be submitted within fifteen working days of the last or final inspection.

D. Meetings

The Program Team will arrange bi-weekly meetings (every other week) with the contractor to discuss data management and field issues.

E. Quality

Rejection of deliverables will be submitted to the Contractor via the Program Team in a written communication discussing issues that must be addressed. The Contractor will be required to follow up with a response within three business days upon receipt of the written communication. Contractors will have seven (7) calendar days from the rejection notice date to make the necessary corrections and resubmit the data deliverable in its entirety.

PART 5 – MEASUREMENT

5.01 SMOKE TESTING

Smoke testing shall be measured by the linear foot of smoke testing performed along the centerline of the sanitary sewer pipe from center to center of manholes. For dead-end sewers, the length will be the CCTV inspected length.

5.02 DYE TRACING PER TYPE

Dye tracing shall be measured per each Type “1”, Type “2”, or Type “3” source tested.

5.03 DYE TRACING PER HOUR (ALTERNATE MEASUREMENT TO SECTION 5.02)

Alternatively, Dye Tracing may be measured at the Program Manager’s direction per man-hour supplied by the Contractor to perform Type “1”, Type “2”, or Type “3” source testing.

PART 6 – PAYMENT

6.01 SMOKE TESTING

Smoke testing shall be paid by the linear foot of sanitary sewer pipe actually tested and include all labor, equipment and materials. Payment shall be made at the contract unit price without regard to the size of sewer

pipe inspected. Separate measurement and payment shall not be made for any incidental work including, but not limited to, gaining access to the sewer; jobsite preparation; traffic control; safety provisions; blowers; liquid smoke; and providing of records, documentation, and photos, which shall be subsidiary to the bid price. No Payment shall be made for any smoke testing without receipt of the corresponding records, logs, and photographs.

6.02 DYE TRACING

Dye Tracing shall be paid by the unit actually tested as Type “1”, Type “2”, or Type “3” and will include all labor, equipment and material. Separate measurement and payment shall not be made for any incidental work including, but not limited to, gaining access to the sewer; jobsite preparation; traffic control; safety provisions; dye, injectors; and providing of records, documentation, and photos, which shall be subsidiary to the bid price. Concurrent CCTV inspection (in accordance with Section 00003 CCTV) required for Type “2” (if necessary) or Type “3” dye tracing shall be measured separately for payment. No Payment shall be made for any dye tracing without receipt of the corresponding records, logs and photographs.

6.03 DYE TRACING PER HOUR (ALTERNATE MEASUREMENT TO SECTION 6.02)

Alternately, Dye Tracing shall be paid at the Program Manager’s direction by the man-hour for the Type “1”, Type “2”, or Type “3” testing and will include all associated equipment and material to perform the tests. Separate measurement and payment shall not be made for any incidental work including, but not limited to, gaining access to the sewer; jobsite preparation; traffic control; safety provisions; dye, injectors; and providing of records, documentation, and photos, which shall be subsidiary to the bid price. Concurrent CCTV inspection (in accordance with Section 00003 CCTV) required for Type “2” (if necessary) or Type “3” dye tracing shall be measured separately for payment. No Payment shall be made for any dye tracing without receipt of the corresponding records, logs and photographs.

6.04 PAYMENT WILL BE MADE UNDER:

Item No.	Pay Item	Pay Unit
00002-6.01	SMOKE TESTING	LF

00002-6.02.1	DYE TRACING TYPE 1	EACH
00002-6.02.2	DYE TRACING TYPE 2	EACH
00002-6.02.3	DYE TRACING TYPE 3	EACH
00002-6.03.1	DYE TRACING TYPE 1	MAN-HOUR
00002-6.03.2	DYE TRACING TYPE 2	MAN-HOUR
00002-6.03.3	DYE TRACING TYPE 3	MAN-HOUR

END OF SECTION 00002

CITY OF MEMPHIS – STANDARD CONSTRUCTION SPECIFICATIONS
SECTION 00003 - CLOSED CIRCUIT TELEVISION INSPECTION OF SEWER MAINS & CONNECTIONS

PART 1 – SCOPE

1.01 This Work will consist of cleaning and Pipeline Assessment Certification Program (PACP) internal closed circuit television (CCTV) surveys to digitally inspect and record conditions of existing sanitary sewer mains and connections. Sewer pipes and connections to be inspected are located in both improved streets, arterial and primary roads, backyards and unimproved easements.

1.02 The Work covered by this section includes furnishing all labor, competent PACP certified technicians, equipment, tools, accessories, and materials required to clean and inspect the designated sanitary sewer lines.

1.03 PACP compliant inspections, logs, data, and photos shall be delivered to the Program Manager (from hereon Program Manager shall be interpreted as "Program Manager or his designee") on external hard drive(s) which will become property of the Program Manager. Data files shall be formatted to facilitate upload into a PACP compliant Exchange database or internet uploads formats to an FTP site approved by the Program Manager.

PART 2 – MATERIALS & EQUIPMENT

2.01 MATERIALS

A. Submittals

1. Unless otherwise specified all sample submittals shall be delivered to the Program Manager within two weeks of the NTP.
2. Traffic Control Plan shall be submitted to the Program Manager, including the following items:
   a. Outline of permit acquisition procedure for lane closures.
   b. Methods for proper signing and barricades, which comply with City of Memphis requirements.
   c. Major streets (e.g. Shelby County Principal Arterial & Minor Arterial) requiring a City approved permit if taking a lane for mobile operations, secured through Traffic Control Plan submittal to the City and signed by a TN P.E. The City requires two-week lead time for permit processing.
      i. The Contractor will be required to deliver a sample primary/arterial road Traffic Control Plan for review by the City.
      ii. If the City determines that the nature of the work operation or the type of road in which the Contractor is working requires a permit, the Contractor will be required to modify the sample Traffic Control Plan to obtain a permit from the City.

d. For everywhere else where a permit is not required, the Contractor shall develop, provide, and implement a traffic control plan for all mobile operations in accordance with standard MUTCD specifications.
e. The Contractor is also responsible for acquiring all necessary disposal and/or landfill site permits as required to perform this work.
f. Railroad Rights of Way: The Contractor shall notify the Program Manager when work or access to manholes and sanitary sewers lie within the 25 feet railroad easement as measured by 25 feet outside the nearest rail of the tracks. To access sewer facilities within the 25 feet of the railroad right of way the Contractor shall contact the Program Manager 48 hours in advance who will alert the City's Zone Construction Inspector to coordinate individual railroad direction and guidance.

3. Site Contractor emergency phone numbers.
4. Schedules of work on a weekly basis that will be delivered no later than 2:00 PM on Thursday for the week following with daily AM email updates of approximate crew locations each day.
   a. Weekly schedule format shall contain the following elements:
      i. Map format.
      ii. Sufficient streets labeled and identified at a scale to provide clarity.
      iii. Nature and type of crew location by map area.
5. Permit required confined space entry plans in compliance with the Loss Control Manual.
6. Copies of National Association of Sewer Service Companies (NASSCO) certification for all field staff conducting PACP inspections.
7. Sample of PACP compliant television survey log in MS Access format.
8. Sample of PACP compliant video inspection in MP-4 (Web optimized) format.
9. Cleaning and CCTV vehicle, equipment, and cleaning supplies list.
10. Disposal site(s) and appropriate landfill permits for appropriate disposal of all waste materials removed from the sewer during the light and heavy cleaning operations.

2.02 EQUIPMENT

A. General

1. All equipment used for PACP compliant CCTV sewer segment inspections of existing sanitary sewer mains and connections shall be specifically designed and manufactured for the purpose intended under this Contract. The software and hardware for the electronic

capture of the inspection defects and recorded observations must be Version 6.0.1 NASSCO PACP compliant.

2. The Contractor shall submit an equipment list to the Program Manager for approval before the commencement of the Work and shall certify that back-up equipment is available and can be delivered to the worksite within 72 hours.
3. The Contractor shall provide equipment to perform inspections of sewer mains located in streets, street rights-of-way, backyards, easements and rights-of way that are off-road.
   a. Including but not limited to portable CCTV equipment, vehicles capable of transporting TV equipment and accessing remote easements, and adequate cleaning equipment rights of way or easement applications.

B. PACP Compliant Software & Data logger Requirements

1. Data logger
   a. Internal inspection logs created and captured electronically during the television inspection through the use of commercially available electronic data loggers in the truck are required. NASSCO PACP protocols Version 6.0.1 shall be used for capturing and recording the observations. Audio commentary made during the inspection and captured on the digital video shall correspond with the PACP observations on the log.
   b. The data logger equipment and software shall allow the Program Manager access directly to the captured electronic data and provide for a non-proprietary export of the data into MS ACCESS databases in accordance with PACP standards for standalone database review.
2. Software must be compliant with the NASSCO PACP V.6.0.1 standards. Follow PACP protocol for recording of observations and defects for sewer mains.
   a. All software shall be capable of providing complete survey reports in compliance with PACP, and the software shall be the V.6.0.1 of the PACP compliant software.
   b. The Program Manager has no intent to specify which software the Contractor shall use, but requires the software and the submitted database to be fully compliant with PACP V.6.0.1 and capable of being exported to ACCESS databases. No payment will be rendered for improperly formatted data.
   c. Software and data logger must be capable of capturing sewer main and sewer lateral observations by PACP descriptions, record travel footage along pipeline, and video time stamp the recorded observations to support hyper linking from the digital record to the event point or location within the digital inspection record. The

same requirements apply to still photo images (if provided) which shall follow PACP guidelines and be hyperlinked to the inspection log.

C. Sewer Main CCTV

1. Sewer Main Digital Color Video Camera
   a. All cameras used shall be digital format color CCTV units specifically designed and constructed for use in sewer pipe inspection work. The cameras shall be operable in 100 percent humidity conditions. The camera shall have a high-resolution, 360-degree pan and tilt or rotating head with a wide viewing angle lens and either automatic or remote focus and iris controls. Camera lighting shall be sufficient for use with digital color inspection cameras and for the manhole and pipe diameters identified in the contract.
      i. Camera, Television Monitor, and Other Components shall be capable of producing a high resolution color digital inspection record.
      ii. Video file to be in MP-4 (Web optimized) format
   b. In all cases, the complete digital inspection system (camera, lens, lighting, cables, monitors, and recorders) shall be capable of providing a digital picture and digital video quality acceptable to the Program Manager. Inadequate lighting, image distortions, blurry or murky images, and dirty lenses will be a cause for rejection. No payment will be made for unsatisfactory inspections and the Contractor shall perform work until deliverable is of acceptable quality. Digital video cameras/digital recorders not specifically intended for use for internal television inspection of manholes and sewer lines shall not be permitted.
   c. Pan and tilt type camera, capable of turning at right angles to pipe's axis over an entire pipe wall perimeter shall be used.
      i. The camera lens shall be capable of self-righting itself after a lateral view or connection view with a return view down the pipe with a "home" capability for the lens.
   d. Lighting shall be suitable to allow clear picture of entire inner pipe wall extending at least 10 feet in front, including black High Density Polyethylene (HDPE) pipe.
   e. Document header and observations shall be in accordance with PACP V.6.0.1 protocols.

D. Cleaning Equipment

1. Hydraulic sewer pipe cleaners or combination hydraulic/vacuum cleaners shall be specifically designed and constructed for such cleaning.
2. Mechanical sewer pipe cleaners shall be specifically designed and constructed for such cleaning.
3. The Contractor shall possess equipment capable of cleaning hydraulically or mechanically a minimum of 1,000 linear feet of pipe from one direction and have a minimum 1,000 linear feet of hose or cable on-site during the cleaning execution.
4. Hydraulic sewer pipe cleaners shall be specifically designed and constructed for such cleaning. The sewer cleaner shall have a minimum usable water capacity of 600 gallons and a pump capable of delivering at least 30 gallons per minute at 1,500 psi at the nozzle.
   a. The hydraulic cleaning equipment shall have multiple hydraulic cleaner hose nozzles for a variety of sewer cleaning conditions, including grease, roots, debris and granular materials.
   b. Vacuum equipment shall be capable of lifting debris removed from the segment from the downstream manhole.
5. Mechanical sewer pipe cleaners (cable machines with buckets, brushes, swabs, root cutters, and power rodders with similar capability) shall be capable of controlled forward and reverse travel through the sewers without inflicting damage to the existing pipe in removing rocks, grit and other heavy debris and roots.

PART 3 – CONSTRUCTION REQUIREMENTS

3.01 CCTV Inspection of Sewer Mains

A. Cleaning

Sewer pipe cleaners or combination hydraulic-vacuum cleaners must accompany CCTV units at all times. Ideally, sewers lines are to be cleaned and then followed immediately by CCTV inspection. All sewers must be cleaned in advance of CCTV during the same calendar day they are inspected.

1. Light Cleaning
   a. Before CCTV work, the Contractor shall light clean the sewer line from manhole to manhole, from upstream to downstream direction unless an obstruction is encountered, one sewer section at a time and performed as efficiently as possible at the Contractor's discretion.
   b. Materials shall not be passed from one sewer segment to another but must be trapped and removed from each sewer segment prior to CCTV inspection.
2. Heavy Cleaning
   a. If a camera is inserted and additional debris or impediments to inspection are observed following the required light cleaning, heavy cleaning shall be approved by the Program Manager. Sections of pipe containing significant roots, large areas of debris, and/or several inches of depth of sands and gravels that will require the use of additional hydraulic nozzles, cable/bucket machine, power rodders and root cutters is considered heavy cleaning.
   b. Heavy cleaning will be proposed by the Contractor and approved by the Program Manager. The Contractor must obtain prior approval for heavy cleaning in each sewer segment in order to receive payment for heavy cleaning.
3. Cleaning Execution
   a. No roots, grease or debris from light or heavy cleaning shall be passed from sewer segment to sewer segment during the cleaning operation. All debris flushed from the sewer must be collected, captured, and removed from the sewer at the downstream manhole.
   b. Roots shall be removed in the sections where root intrusion is a problem. Special precautions shall be exercised during the cleaning operation to assure complete removal of visible roots from the joint area and so as not to incur further damage to the pipe. Any visible roots that may impact rehabilitation efforts shall be removed. Fine roots are allowed if the Contractor made a heavy cleaning attempt to remove roots with proper root removal means. Procedures may include the use of mechanical devices such as rodding machines, expanding root cutters and porcupines, and hydraulic procedures such as high-pressure jet cleaners.
   c. The Contractor is responsible for safe, responsible and legal handling and disposal of all material and debris removed from the sewers. The Contractor is responsible for all permits and landfill fees associated with the disposal of debris collected and removed from the sewer.

d. The Contractor shall provide a dated manifest of the volume or weight of the dewatered sewer cleaning loads taken and dumped at the permitted dump site selected by the Contractor. Each waste load manifest shall be associated with a list of corresponding sewer segments from where the waste originated.

B. Sewer Flow Levels During Inspection Operations

1. Maintain low sewer flow during inspection by using sandbags or flow-through plugs or by inspecting during low flow times of day, evening, or early morning hours while camera is moving and recording observations in the sewer segment. Any items used to restrict flow shall be removed immediately after intended use.
   a. Flow-through Plugs: If used, secure the plugs so as to remain in place during inspection. Use a fail-safe device at the downstream pipe connection to ensure the plug is not lost in the downstream sewer segment if it becomes dislodged from the upstream pipe connection.
   b. Conduct all cleaning and CCTV operations to prevent building backups and sewer overflows.
   c. Contractor shall be responsible for cleanup, repair, fines, property damage costs, and claims for any sewage backup, spillage or sanitary sewer overflow during or as a result of the cleaning and inspection operations.
2. Allowable Depth of Flow For Inspection Operations
   a. For effective inspection, all flow shall be minimized in the segment being inspected. However, the depth of flow at the upstream manhole of the interceptor section being worked shall be within the specified limits provided herein.
3. Maximum Allowable Depth of Flow for CCTV Inspection
   a. 6 - 10 inch diameter Pipe - 20% of pipe diameter
   b. 12 - 18 inch diameter Pipe - 25% of pipe diameter
   c. 24-inch diameter and Larger Pipe - 30% of pipe diameter
   d. Exceptions to these guidelines shall result in rejection, and non-payment, of the CCTV inspection unless approved in advance by the Program Manager.

C. Camera Operations

1. Using the pan/tilt feature, pan the interior of the manhole for record purposes in accordance with V.6.0.1 PACP protocols and begin and terminate the inspection in the starting and ending manholes.
   a. Capture the inside of manhole walls, manhole channel, and pipe connection to wall at both upstream and downstream manhole and

lateral connections using the digital mainline sewer camera and the pan/tilt feature.

2. Place the camera at center of manhole and commence video before entering pipe.
   a. Start footage counter at manhole wall/pipe connection or at a short pre-measured distance down the pipe for the sewer segment inspection.
3. Connections: The digital camera shall be used to look at connections and up laterals from the connection in the main sewer pipe being inspected. The camera shall pause, pan, and record all connections. Conditions noted in these sidelines and laterals shall be noted on the inspection logs.
4. Mainline camera operations:
   a. Move through line at speed no greater than 30 feet per minute stopping for minimum 10 seconds to record lateral connections, mainline connections, defects, and features and points of interest.
   b. Do not float camera.
   c. Maintain technical quality, sharp focus, and distortion free picture with the camera lens centered in the pipe for the different diameters inspected.
      i. Eliminate steam in line for duration of inspection.
      ii. Utilize blower as needed to defog sewer line.
   d. Digitally record a complete sewer segment in its entirety with no breaks, “blink-outs,” or interruptions from manhole to manhole according to PACP V.6.0.1 formats.
   e. Pan, tilt, and rotate as necessary to best view and evaluate lateral connections, pipe defects, features, obstructions, and points of interest.
   f. Use power winches, powered rewinds, self-propelled tractors, or other devices that do not obstruct camera view or interfere with proper documentation of sewer conditions to move camera through sewer.
   i. Whenever non-remote powered and controlled winches are used, set up telephones or other suitable means of communication between manholes to insure good communication.
   g. Use hydraulic jet nozzle pressure and flow to remove standing water from depressions or sags in the sewer, if necessary, for complete inspection of the sag portion of the sewer segment.

h. Measurement for location of defects and service laterals:
    i. At ground level by means of Program Manager-approved footage counter or metering device.
    ii. Electronic display measurement meters: Accurate to PACP standards over length of section being televised.
    iii. Do not pull unnecessary length of slack camera cable if it impacts the footage counter.
i. Stop camera at service connections and inspect lateral with pan and tilt camera.
    i. Identify building connection in PACP compliant terms as active, capped, or abandoned.
    ii. If no wastewater flows are being discharged from building, consider steady, clear observed flow as infiltration/inflow.
j. Identification of defects
    i. If roots, sludge, or sediment material impedes inspection after the light cleaning, withdraw camera and perform heavy cleaning at the direction of the Program Manager.
    ii. Upon completion of heavy cleaning operation, resume internal inspection.
    iii. Furnish media confirmation for heavy cleaning (more than three passes with jet cleaner) to Program Manager.
    iv. If protruding tap impedes inspection trim protruding tap to 1/2 inch.
k. If obstructions are not passable and cannot be removed by sewer cleaning, withdraw CCTV equipment and perform a reverse inspection from opposite end of the sewer segment in accordance with PACP protocols.
    i. Contractor shall be responsible for costs associated for reverse set-ups when an obstruction is encountered that cannot be passed.
    ii. Contractor shall be responsible for all judgments and impacts as to whether an obstruction in the sewer main can be passed. Costs involved in extracting a stuck camera in the sewer main will be borne by the Contractor and at no additional cost to the Program Manager.
    i. When additional obstructions are encountered after reversal of equipment and no means are available for passing a second obstruction in order to complete the sewer main inspection, remand the segment inspection to the Program Manager for resolution. The portion of the main inspected will be paid for as prescribed.
l. Undocumented facilities
    i. If undocumented manholes or sewer mains (facilities not on the field updated GIS sewer maps) are encountered during the inspection, the Contractor needs to complete the

documentation requirements per PACP requirements and capture on the video the following:

1. Approximate horizontal distance from the upstream or reference manhole.
2. Approximate depth of the undocumented manhole by turning the pan/tilt camera vertically and estimating the height of the cover from the invert.
3. A provisional manhole asset ID number shall be used by the Contractor by adding a dash and two-character number to the closest upstream manhole ID.

m. Retrieval of Stuck Equipment

The Contractor is responsible for hiring a licensed sub-contractor to retrieve any equipment/foreign objects that get stuck in the sewer system through the execution of the scope of work (fallen cameras, jet nozzles, inflatable plugs, sandbags etc.) at the Contractor's own cost. Such retrieval by an appropriately licensed sub-contractor shall be made within 72 hours to avoid interfering with the City of Memphis sewer system operations. Any and all impacts and related costs due to the Contractor's equipment in the line shall be the responsibility of the Contractor.

D. Quality Assurance

1.

With each monthly invoice the Contractor shall provide a QA/QC memo documenting that 10% of the previous month's CCTV data has undergone a random, independent review by a PACP certified reviewer using NASSCO standards for Television Inspection of Main Sewer and PACP Quality control as the basis for the QA/QC procedures. The independent reviewer shall be a Tennessee P.E. or is a P.E. in another state and has a Tennessee P.E. license pending. Each line segment which has been randomly reviewed shall be identified in the QA/QC memo as well as any subsequent findings or recommendations. Internal independent QA/QC is acceptable, as long as the person is a Tennessee P.E. or is a P.E. in another state and has a Tennessee P.E. license pending. Failure to submit the QA/QC memo shall delay payment of the current month's invoice.

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2. For all new Contractors and Operators who begin PACP coding, an initial review of CCTV data will consist of reviewing, at a minimum, 20 of the first 100 PACP inspection records submitted. Subsequent reviews will be based on the results of the initial reviews as explained below.
3. Auditing Procedures:
   a. Header information: As explained in the NASSCO PACP Quality Control Standards each audited inspection record is given an accuracy level for the header information and the detailed observation records. It is expected that the accuracy of the header record exceed 90% because the majority of the contents are based upon facts and not subject to operator judgment. To assess the accuracy level of the header, record the number of errors as compared to the total number of header fields using the following formula:

      100% - (error count/total header fields)*100% = Header Accuracy

   b. Detailed Observations: Determining the accuracy level for the detailed observation records is similar to the method for assessing the header record. The main difference being that a defect observation has multiple data entries that must also be counted towards the total number of entry fields. In the event that a defect is not coded all of the required entries for coding the missed defect are counted towards the total error count. The following formula is used to calculate the accuracy level of the detailed observation records:

      100% - (error count/total entries) * 100% = Detail Accuracy

   c. Review Scoring and Results
      i. Satisfactory Review, No changes required. Accuracy Level of 90% or above for both the Header Record and Observation Detail with no major errors or omissions found.
      ii. Unsatisfactory Review (below levels of acceptance) will not be accepted by the Program Manager and will not be considered payable items in the Contractor's Request for Payment.

E. Deliverable Documentation

1. Mainline Sewer.

a. Submit V.6.0.1 PACP compliant records, logs, and electronic inspection data for sewer line inspection to Program Manager by the close of business on the Monday following a week after data acquisition
b. Monthly QA/QC memo submittal listing which segments have been randomly reviewed, as well as any subsequent findings or recommendations.
c. Digital videos, data, and photos shall be delivered to the Program Manager on external hard drives which will become property of the Program Manager.
d. Data files shall be formatted to facilitate upload into a PACP Exchange Database with the approval of the Program Manager.
e. Inspections displaying poor digital video/audio quality will be rejected. Quality refers to, but is not limited to, grease or debris on lens, camera under water, image too dark or light, image washed-out, distorted image, out of focus images, lines improperly cleaned, and poor/no audio.
    i. Contractor will re-televise rejected inspections and resubmit inspections at no additional cost to the Program Manager.

2. Map changes/undocumented manholes:
    a. For map changes identifying undocumented manholes and network changes which were found as a result of field inspections or observations, a Map Edit Form shall also be prepared and supplied by the Contractor with a drawing or sketch and shall indicate special details, field measurement or distances, or locations about an observed undocumented manhole or a change to the sewer network. The Map Edit Form should also identify buried manholes and siphons that have been encountered.
    b. Contractor shall indicate all buried manholes identified in the field via CCTV using the provided Buried Manhole Form. Any additional manholes that have not been located or verified via CCTV but are impeding the completion of required CCTV work should be designated as unable to locate (UTL) and be included on the form.

F. Easement or Turf Operation

1. The Contractor will restore the work area to its original condition as quickly as possible after the inspection is complete. The Contractor will not be allowed to postpone restoration of the site until the end of the project.

PART 4 –DELIVERABLES

4.01 RECORDS

A. Pipe Cleaning Record

The Contractor shall provide a dated manifest of the volume or weight of the dewatered sewer cleaning loads taken and dumped at the permitted dump site selected by the Contractor. Each waste load manifest shall be associated with a list of corresponding sewer segments from where the waste originated.

B. Digital Inspection Record

In the digital PACP V.6.0.1 compliant format, the Contractor shall provide the following information:

1. Digital CCTV survey inspection which shall be recorded and shall be continuous as the inspection proceeds through the manholes and sewer pipes. Inspection videos should be delivered in an MP-4(Web optimized) format.
2. Digital Recordings: The digital recording shall document the visual and audio record of the manhole and sewer pipe inspection and shall be the basis of measurement and payment. Digital recording playback shall be at the same speed that it was recorded. Original digital recordings for the Project shall be forwarded to the Program Manager on clearly labeled external hard drive(s) in PACP ACCESS format with final report submittals and shall become the property of the Program Manager. Data for a single facility asset will not be split across multiple hard drives. Digital recordings shall be available to the Program Manager by the close of business on the Monday following a week after data acquisition. File naming must be consistent. Additional instructions, naming conventions, file structures, etc. will be provided after contract award.
    a. Picture Quality: The sewer inspection digital record shall be free of steam, fog, vapor, or other headspace distortion that degrades the quality of the picture from the intended purpose of evaluating the sewer for structural and watertight integrity. If necessary, the Contractor shall provide positive ventilation or other means through the sewer pipe to draw out steam, fog, and vapor that will degrade the recorded image of the pipe.

C. Inspection Documentation Logs

Observations made during television inspection shall be documented in an unmodified PACP compliant manner within an electronic inspection log form, supported by accompanying audio, digital photographs and MP-4 (Web optimized) format recording written to an external hard drive and

submitted to the Program Manager. Hard copies of completed inspection log photographs shall be furnished to the Program Manager with invoicing.

D. Electronic & Hard Copy Records

1. Reports:
The Contractor shall prepare printed inspection log reports for each associated sewer pipes inspected during the actual field inspection activities. These field logs shall then be reviewed by the Contractor's technical staff, along with reviewing the associated digital video record, as a means of ensuring that no defects or entries are omitted or incorrect. Edited field logs shall then be used in the final project reports and submitted in pdf format.

2. Draft Report and Final Report:
The Draft Final Report will contain electronic and hard copies of each of the PACP CCTV log pipe segment inspection logs. Digital recordings of the inspections written to an external hard drive and the PACP compliant database of the inspections in ACCESS format shall also be submitted in electronic and pdf format.

Draft Report shall be delivered to the Program Manager within fifteen working days the last or final inspection. The Program Manager will have two workweeks to review and comment. Contractor shall address all comments provided and submit a Final Report within one workweek upon receipt of comments. At the Program Manager's discretion a meeting will be held so the Contractor can explain the processes used to address the comments.

E. Meetings

The Program Team will arrange bi-weekly meetings (every other week) with the contractor to discuss data management and field issues.

F. Quality

Rejection of deliverables will be submitted to the Contractor via the Program Team in a written communication discussing issues that must be addressed. The Contractor will be required to follow up with a response within three business days upon receipt of the written communication. Contractors will have seven (7) calendar days from the rejection notice date to make the necessary corrections and resubmit the data deliverable in its entirety.

PART 5 – MEASUREMENT

5.01 LIGHT CLEANING & CCTV INSPECTION

Light cleaning and mainline CCTV inspection shall be measured by linear foot by each diameter of mainline sewer inspected and documented in accordance with the specification.

5.02 HEAVY CLEANING

Heavy cleaning shall be measured by linear foot of each diameter of heavy cleaning approved by the Program Manager and documented.

PART 6 – PAYMENT

6.01 MAINLINE CCTV INSPECTION

Light cleaning and mainline CCTV inspection shall be paid for at the unit price for each linear foot of each diameter inspected and documented in accordance with the specification.

The unit price for Light Cleaning and Mainline CCTV inspection shall cover the entire cost of the required light cleaning and CCTV inspection and reporting in accordance with PACP V 6.0.1 format, including but not limited to labor, mobilization and access, CCTV equipment, recording media, traffic control, light cleaning of mainline sewer, documenting results in PACP records and logs, digital format recordings, photo equipment, power supply for equipment, interim and final reports and all other appurtenant work.

No additional payment will be made for:
1. Re-inspection due to rejected inspection and/or records for any reason.
2. Reversals.
3. Performing excavation and associated sewer point repair to retrieve a stuck CCTV camera or hydraulic cleaning hose/nozzle.
4. Incomplete electronic logs.

6.02 HEAVY CLEANING

Heavy Cleaning shall be paid for at the unit price for each linear foot of each diameter of heavy cleaned sewers at the direction of the Program Manager and in accordance with the specification.

The unit price for Heavy Cleaning shall include the entire cost including but not limited to labor, mobilization and access, traffic control, appropriate disposal of sewer debris removed from sewer at permitted site and all

other appurtenant work. Payment includes non-hydraulic jet efforts such as porcupines, cutters, power rodding, clam buckets, and other mechanical means, traffic control, and re-cleaning with hydraulic jet, labor, materials, and equipment necessary to clean mainline sufficiently to allow video reviewers a clear picture of pipe conditions.

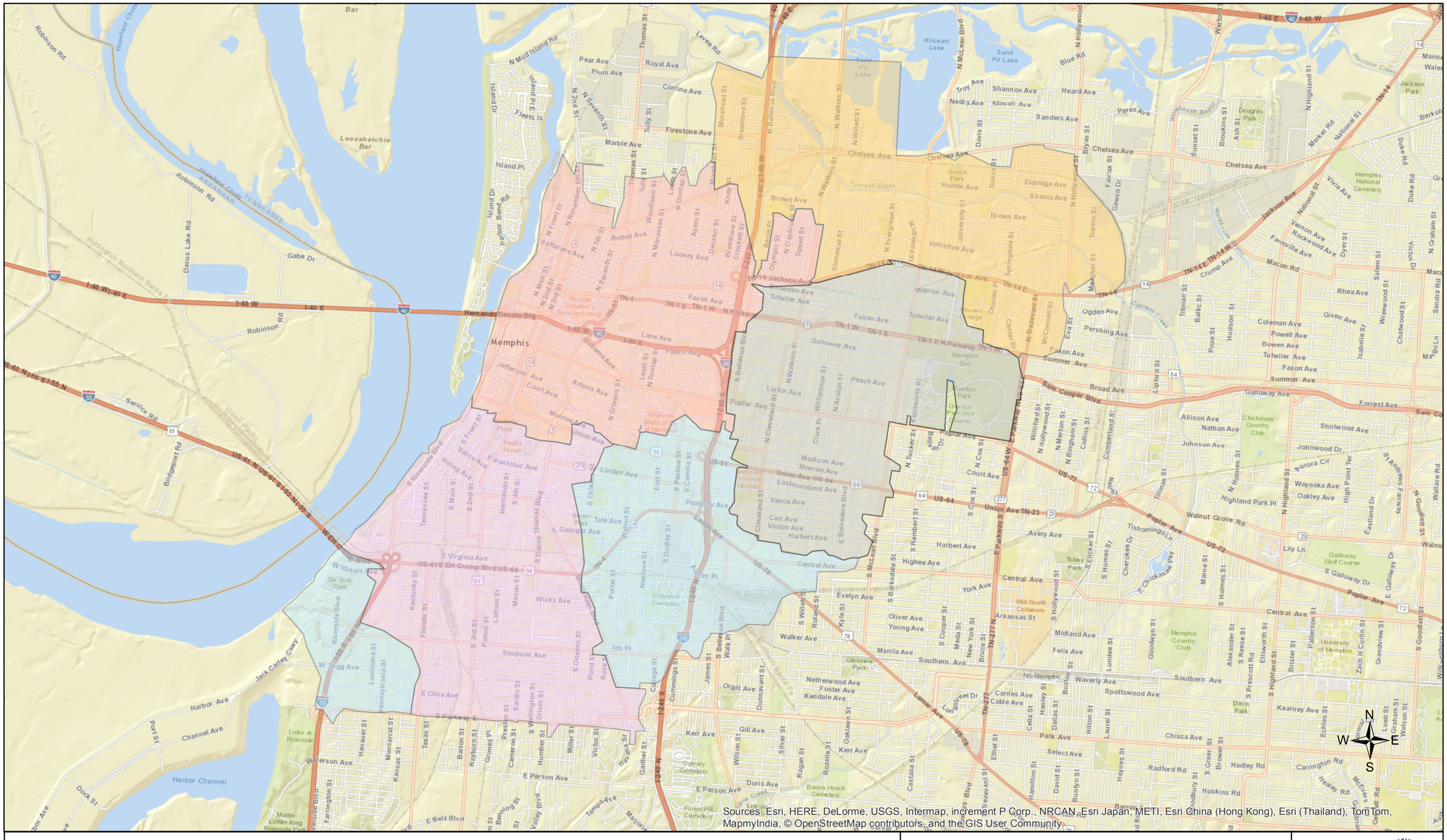
No additional payment will be made for:

1. Additional passes of heavy cleaning if the inspection observation reveals roots, grease or other debris remaining in the sewer after the heavy cleaning passes.

6.03 PAYMENT WILL BE MADE UNDER:

Item No.	Pay Item	Pay Unit
00003-6.01	LIGHT CLEANING & MAINLINE CCTV INSPECTION FOR EACH DIAMETER	LF
00003-6.02	HEAVY CLEANING FOR EACH DIAMETER	LF

END OF SECTION 00003



WS-01 Cypress Creek Area

FS03 02 PI-01 Beale & President Island Area

WS-01 Lick Creek Area

FS-02 Gayoso Area

FS-03 Huling and Beale Area

Phase 2

City of Memphis, TN WWCTS Study

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