Sewer System Evaluation Services
SPECIFICATIONS

_____ (OWNER)

Compliance EnviroSystems, LLC (CONSULTANT)

SECTION 1000
MOBILIZATION / DEMOBILIZATION

A. Mobilization and demobilization consists of the preparatory work and operations including, but not limited to the movement of supplies, equipment, personnel and incidentals to and from the project location.

B. Equipment includes, but is not limited to CCTV inspection units, combination vacuum trucks, fully-equipped smoke testing units, sonar inspection units, ElectroScan inspection units, acoustic pipe assessment units, fully-equipped manhole condition assessment units or any other equipment necessary to complete the project.

MEASUREMENT AND PAYMENT

1000.01 Mobilization / Demobilization of Equipment & Crews: All costs associated with the initial and subsequent mobilizations / demobilizations of equipment, as defined above.

SECTION 2000
MANHOLE SERVICES

A. The CONSULTANT shall provide all labor, material, supplies, equipment and transportation necessary to complete the 3D manhole / wet well condition assessment, structural manhole condition assessment, uncovering of buried manholes, removal of stabilized debris and cleaning of manholes.

B. The CONSULTANT shall perform each manhole / wet well assessment by determining the dimensional configuration and physical condition of the base, channel(s), barrel, corbel, connections, cone, ring and cover of the structure and locate possible sources of inflow/infiltration (I/I) and defects. The arrangement in the manhole / wet well shall be characterized with a drawing that shall indicate the invert and direction of flow.

C. The manhole / wet well interior structure shall be manually inspected using high-level illumination. High-resolution digital photographs with approved picture quality shall be taken of observed defects as well as all other relevant features. Information

gathered shall provide a full illustration of the condition of the manhole / wet well interior as well as each pipeline entering the manhole / wet well.

3D MANHOLE / WET WELL CONDITION ASSESSMENT WITH INTERNAL IMAGES AND GPS DATA COLLECTION

A. The purpose of manhole / wet well condition assessment is to determine the physical condition, location and possible sources of I/I in all manholes / wet wells designated and approved by the OWNER. Information obtained during the physical survey will be utilized in determining rehabilitation costs and methods.

B. CONSULTANT will perform 3D inspections of each manhole / wet well utilizing the Panoramo SI 3D Optical Manhole Scanner. The 3D scanner uses two high resolution digital cameras with specially designed distortion-free wide-angle lenses. The cameras optically scan the entire interior of the manhole / wet well in a few seconds in one single vertical run. The digitally transmitted image data can be viewed by the operator as if it were a live picture.

C. As a component of the inspection, CONSULTANT will collect GPS coordinates (x,y) of every manhole / wet well. This data can be imported into the OWNER's GIS mapping system.

D. 3D manhole / wet well condition assessments shall provide superior imagery and geometric data as compared to traditional methods. The CONSULTANT shall provide the OWNER with the software required to view the digital film file in the way that the CONSULTANT can view them, including full control of the virtual pan and tilt. The digital film files must include the following:

    a. An unfolded view of the manhole / wet well with a minimum of 3,000 lines of vertical resolution
    b. The capability to produce a three-dimensional representation of the manhole / wet well structure
    c. A distortion-free virtual pan and tilt allowing the review of the manhole / wet well structure from any angle at any depth. The virtual pan and tilt must consist of view from the bottom and top camera, any virtual pan and tilt that artificially creates this view from a single camera will be deemed unacceptable due to distorted images on the direct side view.
        i. The virtual pan and tilt and up/down direction of the view must be able to be controlled from a computer mouse.
        ii. The virtual pan and tilt and unfolded views must be able to be viewable by the OWNER without the need for any third party data logging software.

MANHOLE CONDITION ASSESSMENT WITH INTERNAL IMAGES

A. Manhole condition assessment with internal images shall by performed using a pole-mounted viewing camera(s) with lighting. CONSULTANT will utilize this method on manholes that cannot be accessed with 3D equipment.

B. Digital high-resolution photographs shall be taken, at a minimum, showing general surrounding view(s) to locate the manholes above ground location and other GIS map features, plan view looking down at the manhole invert. Major defects in the manhole and pipes shall be included in the photographs. Digital pictures shall have minimum resolution of 72 dpi x 72 dpi and minimum dimensions of 640 x 480 pixels.

Documentation

The following is an example of the data required during a manhole condition assessment, but is not necessarily limited to:

A. General Information:

    a. Manhole number
    b. Basin
    c. Address/ Location description
    d. Surface conditions, etc.

B. Manhole Characteristics:

    a. For each section of a manhole — Type, Shape, Materials of Construction, Depth and size
    b. Cover vents and size
    c. At/Above/Below grade
    d. Inflow dish
    e. General configuration of manhole

C. Pipe Data

    a. Size, shape, material, liner and depth of pipes, clock position
    b. Flow depth
    c. Indication if drop pipe and/or parallel line

D. Manhole Sketch showing incoming and outgoing pipes with connecting points

E. General Inspection Data

    a. Inspector, date of condition assessment, status of inspection, method of inspection, weather condition
    b. Presence of flusher valves
    c. Evidence of surcharge, groundwater, ponding and debris

F. Defects in manholes

a. Location and nature of visible defects and obstructions (i.e., indication of structural conditions or special problems in the pipe connection/manhole)
b. Root growth and type in manhole wall/base (if any)
c. Evidence of leaks and locations, along with measured or estimated sources of extraneous flows (i.e. identification and quantification of I/I)
d. Special problems and/or conditions such as overflows, bypasses, etc.
e. Type and depth of debris and deposition in the manhole

Photographic Documentation Procedures

A. High-resolution digital color photographs shall be taken for each manhole assessed and shall show the following:

a. Above ground features and conditions in the vicinity of the manhole to be assessed using pole-mounted viewing camera - photograph to be taken looking downstream with manhole in immediate foreground
b. Plan view from surface of manhole invert – photographer's feet placed on location of outgoing pipe
c. Elevation view of each incoming and outgoing sewer
d. All observed defects and obstructions

B. Groups of digital photographs for each designated manhole, orientated so that the long side of the photograph is horizontal, shall be incorporated in the hard copy of the manhole condition assessment report and supplied on a DVD(s) incorporated for each work order issued by the OWNER, unless otherwise directed.

C. Reference to location for each photograph shall be indicated on the sketches at the end of the report. Photographs taken within the manhole shall indicate the depth below the ground surface and clock reference, relative to North at 12 o'clock. Each photograph filename shall be entered into the electronic database in the appropriate corresponding record.

Deliverables

A. Electronic database with inventory and condition data and photographs shall be submitted to the OWNER.

B. All photographs shall be digital pictures in electronic format.

C. Corrections to the printed map shall be illustrated with red markings and delivered at the completion of each work task or at progress meetings. Supplemental sketches will be provided, as necessary, to clearly depict actual site conditions.

A. Once the manhole inspection data has been obtained and analyzed and professional reports compiled, a recommended protocol for repairs will be recommended by the CONSULTANT.

B. All rehabilitation recommendations must be approved by a registered licensed engineer in the state of Louisiana with a minimum of 10 years of experience analyzing manhole inspection data. Engineer must be MACP certified.

UNCOVER BURIED MANHOLES LESS THAN 12" DEEP

A. CONSULTANT shall provide all labor, materials and equipment necessary to uncover sewer manholes less than 12" deep requiring access for sewer line inspection on this project. CONSULTANT will uncover only those manholes approved by the OWNER.

B. CONSULTANT will not be required to uncover manholes covered in asphalt, concrete or any other permanent or semi-permanent material.

C. After inspection is complete, the CONSULTANT shall close the lid and re-cover the manhole only with the material removed to access the manhole. The CONSULTANT will not be required to seal manhole lid or replace any gasket material that may have been removed or damaged during the opening of the manhole.

REMOVAL OF STABILIZED DEBRIS IN MANHOLE INVERTS

A. CONSULTANT shall provide all labor, materials and equipment necessary to remove stabilized debris from manholes inverts on this project. CONSULTANT will only remove stabilized debris from manhole inverts approved by the OWNER.

INSTALLATION OF RAINSTOPPER DURING MANHOLE CONDITION ASSESSMENT

A. The CONSULTANT shall provide all labor, material, supplies, equipment and transportation necessary to complete the installation of Rainstopper manhole inserts during manhole condition assessment, in areas designated by the OWNER.

B. The Rainstopper insert and components shall be manufactured of materials resistant to corrosion from atmospheres containing hydrogen sulfide and dilute sulfuric acid.

C. The insert body shall be manufactured of high density ethylene hexane-1 copolymer equal to Phillips Chemical Co. Marlex HHM-5502, meeting the requirements or ASTM D1248 Class A, Category 5. The insert shall exceed 5 ½" in depth to allow penetration of the manhole lid through the clear opening in the ring. The insert shall have three or more ribs in the bottom for stiffness and lid deflection. The insert shall have a straight-side design to allow a loose fit into ring for easy removal. The insert

manufacturer must furnish a “load test verification” showing a load test failure in excess of 800 pounds.

D. The gasket shall be made of close cell neoprene, and shall have a pressure sensitive adhesive on one side. The gasket shall be installed by the manufacturer and must be compatible with the insert material to form a long lasting bond in wet or dry conditions.

E. The gas relief valve shall be designed to release at a pressure of .5-1.5 PSI and have a water leak down rate no greater than 5 gallons per 24 hours. The valve shall be installed in the insert by means of a hole tapped in the insert by the manufacturer, and secured by a special designed lip molded into the insert to prevent being knocked out by lid rotation. The valve shall be made of nitrile for prevention of corrosion from contact with hydrogen sulfide, dilute sulfuric acid and other gasses associated with sewers.

F. The handle shall be made of 1” wide nylon webbing and shall be installed on the insert body with #6 high grade stainless steel rivets and washers. The handle shall be installed on the insert in such a way that it does not interfere with the installation of the manhole lid. The handle shall be able to withstand a pull of 500 pounds of force before it fails or separates from the insert.

G. The manhole frame rim shall be free of dirt and debris prior to the installation of the Rainstopper insert. The Rainstopper insert should be fully seated around the manhole frame rim to insure against water seepage between the insert and manhole frame rim. A generous coating of grease on the gasket will be applied by CONSULTANT to assist in seating and prevention of rust.

MEASUREMENT AND PAYMENT

2000.01 3D Manhole Condition Assessment: All costs associated with inspecting all designated manholes and documentation including but not limited to labor, equipment, transportation, tools, GPS data collection and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the manhole condition assessment section. CONSULTANT will be paid per each manhole inspected.

2000.02 Structural Manhole Condition Assessment: All costs associated with inspecting all designated manholes and documentation including but not limited to labor, equipment, transportation, tools and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the manhole condition assessment section. CONSULTANT will be paid per each manhole inspected.

2000.03 3D Wet Well Condition Assessment (Less Than or Equal to 8-Ft Diameter): All costs associated with inspecting all designated wet wells that are less than or equal to 8-ft. diameter and documentation including but not limited to labor, equipment, transportation, tools, GPS data collection and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the manhole / wet well condition assessment section. CONSULTANT will be paid per each wet well inspected.

2000.04 3D Wet Well Condition Assessment (Greater Than 8-Ft Diameter): All costs associated with inspecting all designated wet wells that are greater than 8-ft. diameter and documentation including but not limited to labor, equipment, transportation, tools, GPS data collection and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the manhole / wet well condition assessment section. CONSULTANT will be paid per each wet well inspected.

2000.05 Uncover Buried Manholes Less than 12" Deep: Payment will be made for the uncovering of buried manholes in less than 12" of soil. Uncovering of manholes in concrete, asphalt, or any other material besides soil will not be performed.

2000.06 Removal of Stabilized Debris in Manhole Inverts: All costs associated with confined space entry into manhole and removal of stabilized debris from manhole inverts. CONSULTANT will be paid for each manhole that stabilized debris is removed from.

2000.07 Installation of Rainstopper During Manhole Condition Assessment:

2000.08 Manhole Inspection Data Management: All costs associated with the preparation and delivery of manhole inspection data, reports in the form, format and quality specified in the manhole inspection section. Payment will be made per each manhole inspected.

2000.09 Manhole / Wet Well Rehabilitation Recommendations: All costs associated with the preparation and delivery of manhole / wet well rehabilitation recommendations. Payment will be made per each manhole / wet well inspected.

SECTION 3000
FLOW MONITORING SERVICES

TEMPORARY FLOW MONITORING

A. The objective of temporary flow monitoring is to quantify high groundwater, dry weather base flows, rainfall dependent inflow/infiltration and wet weather peak flows to support extraneous flow quantification and decision making and hydraulic modeling.

B. The Work includes:
    a. Investigating proposed monitoring sites and confirming suitability.
    b. Installing, calibrating, and monitoring temporary flow monitors for a minimum of 60 days (up to a maximum of 120 days) at each site.
    c. Visiting each meter location once a week to enter the confined space to perform depth and velocity sensor calibrations, collect data and verify monitor operation.
    d. Installing, calibrating and maintaining temporary rain gauges, for a minimum of 60 days (up to a maximum of 120 days) at each site.
    e. Visiting each rain gauge once per week collect data and ensure synchronization with the temporary flow meters.
    f. Evaluating the collected data, performing the required QA/QC of the data and providing electronic data delivery and written reports and analysis of the temporary flow monitoring results/rain gauge data.

C. The temporary flow monitor, as manufactured by MGD, Sigma, ISCO or equal, shall be equipped with a pressure and area velocity sensors. Accuracy shall be demonstrated from the manufacturer of the meter to be +/- 5 percent of actual flow, recorded in time intervals as short as 5 minutes or other specified interval. The vendor shall submit certification results for each meter proposed to be used in the project of the date of the most recent manufacturer or field calibration and results.

D. Rainfall data shall be collected by the contractor by means of tipping bucket rain gauges. Each unit shall be approved by the OWNER, shall provide real time synchronized to computer type memory bank, and shall be of the solid-state type. Whenever 0.01 inches of rain is collected, the tipping bucket shall empty, triggering an electronic counter. At the agreed upon time interval, the timer shall activate the computer and the number of counts shall be recorded on the memory bank.

E. The flow meter and rain gauge data storage and clocks shall be compatible so each time interval of data shall be recorded synchronously with respect to each other meter and rain gauge deployed during the project.

F. OWNER will select and propose initial locations for the flow meters and rain gauges. OWNER will provide maps of the initial meter site selections to the Contractor. The Contractor will perform field investigations and evaluate the proposed sites for the meters (those manholes with the best hydraulic characteristics) and rain gauges (clear, open and secure areas that are protected from vandalism).

G. Laminar flow is desired with little evidence of backwater and/or surcharging conditions. Meter locations upstream of pumping stations shall get particular attention

to ensure a minimum of impact from the wet well operating levels. Should a proposed meter or rain gauge site not be suitable, the contractor shall propose and document alternate sites that still meet the general criteria of the collection system area identified for metering.

H. The Contractor will develop and submit detailed site reports, including upstream pipe photos, for the proposed meter or rain gauge locations. The manhole meter and rain gauge site reports will be submitted to the OWNER for review and confirmation of the site before the meters are installed.

I. Following OWNER's approval of the site, the Contractor will install the flow meters and rain gauges in the selected locations. Contractor will initially calibrate the meters at each installation. The meters will be set up to record flow data (depth, velocity and flow) at 15-minute intervals unless otherwise requested and the sensor calibrations confirmed in the pipe. The tipping bucket rain gauges, recording rainfall in depths of 0.01 inch increments, will also be set up to record every 15 minutes synchronously with the flow monitors.

J. The Contractor will maintain the flow meters throughout minimum 60-day metering period. Contractor will visit each meter a minimum of one time per week to download the data, to perform any necessary meter maintenance (e.g. scrubbing sensors, removing debris) and to field calibrate and confirm the meter sensor firings. Manual depth and velocity confirming measurements will be made weekly during each visit. Data collection routes, time of data collection and calibrations should be staggered, as practical, to ensure a reasonable calibration across the full range of diurnal flows for each meter site. One calibration point each, generally at the dry-weather peak diurnal flow and the minimum diurnal flow, is required over the minimum 60 day metering and data collection period.

K. Data will be reviewed on-site for overall data quality and any problems will be immediately addressed by the Contractor. A documentation log will be maintained by the Contractor of each meter visit and calibration and a copy of the entries provided to the OWNER on a bi-weekly basis. The manhole number (meter location), date, time on meter, and the time of manual depth verification will be indicated on the log. A written record will be maintained by field personnel for each monitoring point for each site inspection. The data will also be reviewed in the Contractor's office by engineering staff. Field crews will return to the site as necessary if the engineering staff identifies any additional issues.

L. The Contractor shall maintain spare meters, parts and testing equipment to permit replacement of defective meters to ensure a reasonably continuous metering period.

M. After the 60 day minimum monitoring period, the OWNER has the option to direct the additional data collection and field calibration on a weekly basis for up to an additional 60 days. The OWNER will determine when to pull the meters and rain gauges and advise the Contractor of that decision at least 7 days in advance of the

meter data collection termination date. The Contractor can then begin removing meters subsequent to the meter termination data.

Analysis & Deliverables

Preliminary Data Review and Submittal:

A. Preliminary data (site logs, initial raw meter and rain gauge data) will be delivered for the OWNER's review following the initial 30 days of data collection. This data will be submitted no later than 45 days after the start of the data collection period. This data and any contemporary rain and flow data collected in the remaining period will be the basis for extending the meters on a weekly basis beyond the minimum 60-day flow-metering period.

Final Data Submission:

A. The Contractor will submit a letter report summarizing the data collected (statistical wastewater flow summaries, rainfall data, hydrographs and tabularized formats); and will perform analyses associated with the data including an estimate of base sanitary flow and an assessment of I/I quantities tributary to each meter. Contractor will also submit meter data to OWNER in electronic Excel file format. Final calibrated data and letter report will be delivered no later than 30 calendar days following the termination of the flow-monitoring period.

A. The report shall include, but not be limited to, the following:
    a. Executive Summary
    b. Field procedures used for data collection and calibration
    c. Site location information and reports
    d. Hydrographs of depth, velocity, flow, and rain.
    e. Graphs of dry and wet weather analysis.
    f. Results of the dry and wet weather analysis. Prioritized areas shall be ranked by the amount of extraneous (I/I) flow tributary to each meter

Electronic data (rain, depth, velocity & flow ASCII or CSV format)

LONG TERM FLOW MONITORING

A. The objectives of establishing a long term flow network are to track the effectiveness of the sewer system rehabilitation and evaluate system performance throughout the OWNER over time and establish an event notification network.

B. CONSULTANT will install wireless wastewater flow monitors within the collection system. Each of the flow monitors will be networked into a system and provide the OWNER with vital information (including alarming) on the hydraulic performance of the wastewater. CONSULTANT will deliver, install and maintain flow monitors for the aforementioned flow monitoring program. CONSULTANT shall supply all hardware for each monitoring location as specified.

    a. Data Analysis

i. The OWNER understands that flow data collected from a wastewater environment requires review for accuracy, issuing of work orders to maintain equipment, and identification and editing of data irregularities.

b. Software

i. CONSULTANT shall deliver a means to interrogate the flow monitoring data, including generating graphs and accessing reports prepared by CONSULTANT.

Site Selection, Investigation and Installation

A. CONSULTANT shall work with the OWNER to select sites for the installation of all equipment.

B. Each site shall be inspected to determine hydraulic suitability. This shall require a full manhole descent to ensure an adequate inspection. A topside inspection alone shall not be satisfactory.

C. CONSULTANT shall install equipment in optimum locations for best accuracy and reliability. A Site Report for each installed location shall be provided for approval by the OWNER.

D. The Site Report should include, but not be limited to the following:
   a. The initials of the person who performed the inspection
   b. The city and project name
   c. The model of flow monitor recommended
   d. A placeholder for the serial number of flow monitor
   e. The OWNER's numerical designation for the manhole
   f. The type of collection system - Sanitary/Storm/Combined
   g. House address or a short description of the site location indicating the map page number and grid number, if available
   h. The measured height and width of the pipe to be monitored
   i. A copy of an electronic, small-scale, detailed map with street names and house numbers (if possible) of the immediate area where you will locate the monitor
   j. A road or landmark from the access map and upstream and downstream manholes with the sewer line and flow direction
   k. The date and time the site inspection was performed
   l. A topside inspection of each up and downstream manhole location with any hydraulic inconsistencies recorded on the inspection form
   m. Recorded depth of flow, velocity and silt at time of inspection
   n. The depth from the manhole rim to the invert
   o. The type of manhole material indicating whether loose bricks, broken rungs, cracked rim or cover, or slippery walls exist on the invert or apron

p. The presence of all drop or side connections
q. The type of pipe material
r. Digital photos shall be taken of each selected site and alternate sites. One photo shall be taken of the area where the manhole is located. One photo shall be a planar view of the manhole invert showing the flow through the manhole from a north orientation. In addition, in-line photos shall be taken of all contiguous lines.

E. CONSULTANT may recommend that a designated monitoring location be changed to take advantage of more favorable hydraulics at upstream or downstream locations.

F. Site inspections shall include the accurate measurement of the pipe or channel geometry, silt, and the recommended location for the installed equipment for use in flow calculations. The CONSULTANT shall not rely on as-built drawings for the determination of pipe geometry.

G. CONSULTANT shall submit one (1) copy of Site Reports to OWNER for review and comment. If requested, CONSULTANT shall provide comments to the initial submittal.

Wireless Access

A. CONSULTANT shall provide a method for wireless access to the flow monitors and install all wireless equipment and ensure it is operational.

B. CONSULTANT shall pay all charges for wireless service.

C. CONSULTANT shall provide software to communicate with the equipment as specified.

Confirmation of Data Accuracy

A. The OWNER will require the CONSULTANT to perform a minimum of three (3) manual depth and velocity measurements (Confirmations) at each site in order to confirm that the sensors are accurately recording depths and velocities.

B. A valid confirmation is where the field accuracy of a given depth measurement and average velocity is within two standard deviations of the final data set.

C. CONSULTANT shall maintain three (3) valid confirmations at all times at each site during the term of the contract.

D. As a minimum requirement, confirmation of sensor accuracy shall be measured in the OWNER's sewers at every site on a yearly basis.

E. The OWNER will not accept any options or proposals from the CONSULTANT to waive confirmations.

F. Method of confirmation:

   a. Initial confirmation of the flow monitors shall involve a minimum of three (3) manhole measurements taken on different days. These initial confirmations shall be obtained within three (3) months of monitor installation and will compare manual readings to sensor readings for all depth and velocity sensors. Attempts shall be made to have these measurements done at flow levels that span typical dry daily flows.

   b. The instantaneous depth of flow measurement shall be taken from the bottom of the pipe to the top of the flow as well as from the crown of the pipe to the top of the flow and both results shall be recorded.

   c. There will be a manual depth reading for silt which will be recorded on the confirmation report.

Operation and Maintenance Services

A. CONSULTANT will notify the OWNER upon completion of the initial installations. The OWNER will then have 5 days to notify the CONSULTANT in writing of acceptance of installations which will provide a start date of the annual maintenance section of the contract.

B. CONSULTANT shall provide all spare parts at the CONSULTANT's expense to maintain the equipment. Those spare parts shall be maintained at the CONSULTANT's closest office to the project site. A minimum of 10% of major hardware component spare parts must be available for ready use.

Monitoring System Uptime

A. CONSULTANT shall provide a system-wide uptime of 90% or greater. Uptime is defined as number of valid 15-minute flow data points divided by total number of 15-minute intervals in the month.

Data Analysis

A. Backup copies of raw data shall be maintained and delivered to the OWNER by the CONSULTANT for the duration of the contract.

B. Twice-weekly Data Review shall be performed by the CONSULTANT to ensure that the equipment is operational and properly logging data. CONSULTANT shall be responsible for issuing maintenance work orders based on this review.

C. Finalization of data shall be completed according to the specification for Information Deliverables.

Web-Based Data Management

A. CONSULTANT shall be responsible for purchasing any computers, third-party software licenses, hosting the application, maintaining the physical system, ensuring network security and providing reliable access to the system.

B. The web-based software system supplied by CONSULTANT shall meet the following minimum specifications:

    a. CONSULTANT shall supply a software system that is accessible using Microsoft® Internet Explorer version 6.0 or greater and available to any personnel requiring access.

    b. CONSULTANT shall host all data in a central database to ensure that any modifications to the central data are available to all other users of the system.

User Security

A. The software system shall have unique password security for each user. Each user shall be permitted to perform only authorized functions.

Data Viewing

A. The software system shall have the ability, at a minimum, to display data for each site in the following formats:

    a. Hydrograph – a time series graph of multiple data types with the ability to segment data based on intervals (e.g. "weekly") over the user specified time period

    b. Scattergraph – a depth to velocity graph for the specified time period with the ability to select a data point to see the actual value for that data point

    c. Tabular – both tables for viewing and a CSV format for download shall be available.

Telecommunications

A. The software system shall allow an authorized user to collect data directly from wireless monitors via the Internet. The software system shall automatically collect data from all telemetered sites at a minimum each day and whenever an alarm occurs.

Multiple Data Type Support

A. Final and Original Data: The software system shall allow for the upload of final edited data and shall maintain a copy of both the final and the original data after upload.

Data Exports

A. The software system shall allow the user to export data to an Excel/CSV format.

Report Types

A. The system shall support the following types of configurable reports:

    a. Alarm report providing information about all alarms generated by the monitoring system including alarm type, alarm status and users who have acknowledged the alarms

    b. Data Collect Summary report providing the number of successful and failed attempts and the percentage of successful attempts to collect the data from selected monitoring locations

Alarming and Alarm Types

A. At a minimum, the system shall provide alarming for the following types of common flow conditions:

    a. High depth
    b. High-High depth
    c. Loss of Flow
    d. Rain Exceeding Threshold

Alarm Configuration

A. CONSULTANT shall submit with their proposal their approach to minimize false alarms, including both software approaches and procedures for resolution of alarm related issues.

B. CONSULTANT shall ensure that each site is configured and verified individually to minimize false alarms.

C. The system shall allow authorized users to acknowledge an alarm condition.

D. The acknowledgement time shall be recorded along with the user who acknowledged the alarm and any comments by the user.

E. Acknowledged alarms shall be distinguished from normal conditions as well as from active alarms.

Training and Support

A. CONSULTANT shall provide necessary and sufficient training on the use of the software to the OWNER.

B. CONSULTANT shall provide telephone support to the OWNER using personnel experienced in troubleshooting problems with the specified software.

Flow Information Deliverables

A. Semi-annual Dry and Wet Weather Performance Report

   a. The provider shall deliver a report that characterizes the dry weather and wet weather performance of each sewer shed being monitored. The report will include key operating parameters the OWNER uses to guide maintenance, rehabilitation programs and post-rehabilitation evaluation.

B. Dry Day Analysis

   a. Dry days used for this analysis will be days that are not affected by recent rainfall. Selected dry days shall be grouped into Weekdays and Weekend and analyzed separately.

C. Rainfall Analysis

   a. Rainfall data shall be reported in tabular form with the depth of rain for each storm. A storm will consist of any event in which half the rain gauges in the network record at least 0.5 inches of rainfall.

   b. A Depth Duration Frequency (DDF) analysis shall be conducted for each storm and each rain gauge to report the maximum return frequency and duration for each storm and rain gauge.

D. Wet Weather Analysis

   a. Rainfall Dependent Infiltration and Inflow (RDII) shall be calculated for each monitor and every qualifying storm for the period. The objective is to quantify both the peak rate and volume of RDII. If there are upstream monitors, the peak and volume of Net RDII is also to be determined.

   b. RDII shall be determined after the dry day hydrograph is adjusted either higher or lower to match the actual flow rate immediately prior to the storm.

It is intended to compensate for periods of high ground water causing the dry weather flow to be temporarily higher that the average dry weather flow.

c. RDII values are to be normalized by dividing the net RDII by both the area (acres) of the basin and/or the LF of sewers in the basin. A ranking of the basins will be based on normalized values of RDII. As rehabilitation projects are completed, each report shall RDII to show it has been reduced.

E. Hydraulic Capacity Analysis

a. Depth and velocity data will be plotted in a scattergraph format.

b. The report shall include an evaluation of silt or blockages present at each site.

c. The report shall include a statistical evaluation of hydraulic performance indicators for each monitoring point; to include evaluations of depth capacity, flow capacity, backwater, surcharge, velocity and silt.

NIGHT FLOW ISOLATION

A. The purpose of flow isolation is to identify localized areas of likely sources of infiltration to specific reaches of sewer where flow monitors have indicated specifically high levels of flow relative to base flow. Measurements are typically taken between 12:00 a.m. and 5:00 a.m. when base flows are minimal.

B. Graduated V-notch weirs or depth/velocity measurements shall be used to determine flow rate during flow isolation. Floating objects are not acceptable to estimate mean flow velocity. Computation of mean velocity using sewer slope and measured depth of flow is not acceptable.

C. All flow isolation field measurements shall be conducted between 12:00 A.M. and 5:00 A.M. local time on a micro-system of sewers with a total length of approximately 1,000 linear feet. CONSULTANT will plug all pipes upstream of the test segment or differentially isolate the segments.

D. The CONSULTANT shall document all observations regarding each flow isolation test in a report. The report shall include the following information at a minimum:

a. Date and time
b. Location, including reference to the OWNER manhole numbering system and
street address
c. Testing personnel
d. Schematic layout of the manholes and sewer lines under testing, showing location of the weir.
e. Pipe Sizes and lengths

E. Prior to measuring flows, CONSULTANT will perform an area survey to identify and document businesses and/or institutions that typically have high discharge rates to the sewer, such as hospitals, laundries/cleaners, food establishments, bars, etc.

F. Public notification is critical and compliance with the public notification criteria is a prerequisite for conducting flow isolation, when conducting flow isolation tests on sewers in easements which pass through private property. At a minimum, the following steps shall be taken:

   a. Residential/commercial: Distribute advance notice flyers between 24 and 72 hours before flow isolation commences for each section of pipe.
   b. Emergency response agency (fire/police): Set up contact person and notify daily as to area, start time, and ending time.
   c. Schools, hospitals, and nursing homes: Distribute advance notice flyers between 24 and 72 hours before flow isolation.
   d. The CONSULTANT shall keep a daily log of his/her contact with all affected agencies and institutions.

G. Electronic database of flow isolation data and digital photographs of results shall be submitted to the OWNER. The electronic database using the required file format in Microsoft Access®.

H. A binder with hard copies of the flow isolation reports including photos shall be submitted to the OWNER.

MEASUREMENT AND PAYMENT

3000.01-.08 Temporary Flow Monitoring: All costs for temporary flow monitoring, documentation and preparation and delivery of data including but not limited to labor, equipment, transportation, tools and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the flow monitoring section. Payment will be made based on the number of meters installed and the number of days each meter is installed for (meter days).

3000.09-.10 Long Term Flow Monitoring: All costs for long term flow monitoring, documentation and preparation and delivery of data including but not limited to labor, equipment, transportation, tools and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the flow monitoring section. Payment will be made based on the number of meters installed and the number of months each meter is installed for (meter months).

3000.11 Temporary Rain Gauges: All costs for rain gauges, documentation and preparation and delivery of data including but not limited to labor,

equipment, transportation, tools and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the flow monitoring section. Payment will be made based on the number of rain gauges installed and the number of days each gauge is installed for (gauge days).

3000.12 Long Term Rain Gauges: All costs for rain gauges, documentation and preparation and delivery of data including but not limited to labor, equipment, transportation, tools and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the flow monitoring section. Payment will be made based on the number of rain gauges installed and the number of months each gauge is installed for (gauge months).

3000.13 Night Flow Isolation: All costs for night flow isolation, documentation and preparation and delivery of data including but not limited to labor, equipment, transportation, tools and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the flow monitoring section. Payment will be made per each night flow isolation setup utilized.

SECTION 4000
SMOKE TESTING

A. The CONSULTANT shall provide all labor, material, supplies, equipment and transportation necessary to complete the smoke testing work.

B. The objective of smoke testing sewer pipes is to locate specific sources of direct inflow to the sewers, such as storm sewer cross-connections, roof drains, yard and basement drains, fountain drains and abandoned building sewers. Additionally, smoke testing assists in locating system defects that contribute I/I to the sewers, including broken sewer pipes and service laterals and areas subject to ponding.

C. Smoke testing work shall be conducted on pipes in areas of the system as selected and approved by the OWNER.

D. Smoke testing may affect residences and/or businesses in the area being tested. Therefore, public and emergency response notification is an important aspect of this testing procedure. Such notification shall be conducted by the CONSULTANT as specified herein and is a prerequisite for initiating smoke testing.

E. High-grade mineral oil will be used to generate the smoke required for smoke testing. Smoke shall be dense, non-toxic, odorless and non-staining.

F. Blowers shall be used to force smoke into the sewer and shall be portable, custom-mounted to be installed over an open manhole casting, and shall have a maximum capacity of 4,500 CFM and a minimum capacity of 2,000 CFM.

G. Intensified smoke testing techniques shall be employed in all cases. Intensified techniques shall include at least one blower capable of a free air delivery of at least 2,000 CFM and smoke generation for a minimum of six minutes. Up to three line segments, but no more than 1,000 feet of sewer main may be tested at one time. However, a separate Smoke Test Form must be filled out for each line segment even if no defect is found. Line segments shall be adequately isolated by using sandbags, baffles, or other methods. Smoke emanating from vents on buildings or adjacent manholes will determine the extent of successful smoke testing. Only clearly visible, dense smoke will qualify the sewer main tested for acceptance up to 1,000 feet of sewer main.

H. Restrictions: Smoke testing shall not be conducted on rainy days or when saturated soil conditions exist. Rainy days are defined as days where greater than 0.5 inches of rain falls in any consecutive twelve-hour period. 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 and/or photo documentation, testing shall cease until such time that weather conditions permit an accurate record of smoke testing results.

I. The roofs of each building shall be visually inspected for evidence of roof drains connected to sanitary sewers.

Documentation

A. The following data will be recorded on a paper form and entered into a database by the CONSULTANT, using the required file format in Microsoft ACCESS®. Data will be recorded using the approved smoke test form. A bound hard copy and DVD shall be submitted to the OWNER. The smoke test database shall include the following information at a minimum:

    a. Description of the smoke return (“leak”), including intensity;
    b. Date and time;
    c. Location, including reference to the relevant manhole segment (upstream and downstream manhole incorporating the OWNER’s manhole numbering system) and the nearest street address;
    d. Area and type of surface drained by the smoke return (“leak”);
    e. Testing personnel; and
    f. Digital color photographs and filenames of the results of each smoke test
    g. GPS X & Y location of the leak location

B. The location of smoke defects shall be marked with a flag using blue for light smoke, yellow for medium smoke and red for heavy smoke and each leak's location will be collected with a GPS collection device.

C. Sketch must be provided of the manholes and sewer lines under testing including address, location, photo number, dimensional ties and offsets to the documented smoke returns (leaks). Note geographical orientation relative to north.

Photographic Documentation Procedures

A. The CONSULTANT shall document each smoke leak or series of leaks by high-resolution digital photograph. Digital photographs shall be provided in .jpg format. The resolution of the photographs shall be a minimum of 72 dpi x 72 dpi and minimum dimensions of 640 X 480 pixels. The photographs shall be referenced in the database by filename using UPSMH#_DNSMH#_LEAK#.

B. Photographs will be taken in such a way that the smoke leak is clearly visible in the foreground and a distinct fixed reference is visible in the background. This method of referencing something fixed will support QA/QC to ensure that smoke leaks and their associated data can be confirmed by someone other than the original smoke test crew.

C. Groups of digital photographs will be orientated so that the long side of the photograph is horizontal and printed copies can be incorporated in the hard copy of the smoke testing report. The report shall be supplied on a USB 2.0 flash drive(s) to the OWNER.

D. The digital photographs shall incorporate annotation references below the image to upstream manhole number and date when the photograph was taken. The annotation shall be clearly visible and shall have a l2 pt (uppercase) font size.

Public Notification

A. Public notification is critical. Compliance with the public notification criteria is a prerequisite for conducting smoke testing, especially when conducting smoke tests on sewer lines that pass through private property. At a minimum, the following steps shall be taken:

    a. Residential/Commercial: The CONSULTANT shall distribute pre-approved advance notice flyers 48 before smoke testing commences for each section of pipe.

    b. Emergency Response Agency Fire & Sheriff's Office: The CONSULTANT shall notify the appropriate local authorities daily to report the start time and end time for smoke testing and the exact locations where the tests will be performed. Fire stations within the smoke testing work area must be notified daily before field work commences each day.

c. Schools, Hospitals & Nursing Homes: The CONSULTANT shall distribute advanced notice flyers 48 hours before smoke testing, and make personal contact with responsible persons no more than 60 minutes prior to testing.

d. Advance notice flyers to all property owners/occupiers likely to be affected by smoke testing shall be customized by the CONSULTANT to suit this project and must be submitted for approval by the OWNER prior to project commencement. The warning flyer shall include, at a minimum, the following information:

   i. The reason for the smoke testing
   ii. The location and area affected by smoke testing
   iii. The timing of smoke testing
   iv. The CONSULTANT's name
   v. Contact person(s) and telephone number(s) of pertinent people involved in the project

B. The CONSULTANT shall note his contact with all affected agencies and institutions and incorporate these contacts into his daily-submitted log.

Deliverables

A. The standard electronic deliverable (all inspection images, database containing line segment information and leak details, coding information, Shapefiles containing GPS points of leaks and manholes and a GPS map created from the collection of manholes and leaks points) will be submitted on an external USB 2.0 flash drive for each basin as it is completed. The smoke testing report will consist of a report for each segment smoked (imagery from Arcmap) leak detail with one digital photograph of each leak and one aerial imagery shot (collected from Arcmap). A final report will be provided for all basins upon completion of the entire project.

MEASUREMENT AND PAYMENT

4000.01 Smoke Testing: All costs for smoke testing, documentation and public notification including but not limited to labor, equipment, transportation, tools and all other related procedures and materials necessary to produce the results in the form, format and of the quality specified in the smoke testing section. CONSULTANT will be paid for the actual footage of pipe smoke tested.

4000.02 Smoke Testing Data Management: All costs associated with the preparation and delivery of smoke testing data and reports in the form, format and quality specified in the smoke testing section. CONSULTANT will be paid for the actual footage of pipe smoke tested.

SECTION 5000
SANITARY SEWER LINE CLEANING

A. Standard line cleaning shall be performed to remove foreign material and restore pipe capacity to 95%. Standard cleaning shall be defined as two (2) complete passes of the sewer line with the cleaning equipment. The term "complete passes" shall mean cleaning from the upstream manhole all the way to the downstream manhole.

B. Heavy line cleaning shall be performed to remove foreign material and restore pipe capacity to 95%. Heavy line cleaning shall be defined as three (3) or more complete passes of the cleaning equipment. The term "complete passes" shall mean cleaning from the upstream manhole all the way to the downstream manhole.

C. The location of manholes and line segments which require additional equipment and manpower to access and perform cleaning operations are considered to be in the easement. Additional equipment includes, but is not limited to an easement machine, additional vacuum hose, additional manpower, etc.

D. Conditions such as broken pipe and major blockages may prevent cleaning from being accomplished, especially where additional damage would result if cleaning were attempted or continued. Should such conditions be encountered, the CONSULTANT shall not be required to clean those specific pipe sections unless the OWNER removes the apparent obstruction.

E. During sewer cleaning operations, satisfactory precautions shall be taken by the CONSULTANT in the use of cleaning equipment. Precautions shall be taken to ensure that damage to, or flooding of public or private property does not occur during the cleaning procedure.

F. Selection of the equipment shall be the sole discretion of the CONSULTANT and based on the conditions of lines at the time the work commences. The equipment shall be capable of removing dirt, grease, rocks, sand, and other materials and obstructions from the sewer lines and manholes.

G. If cleaning of an entire section cannot be successfully performed from one manhole, the equipment shall be set up at the other manhole and cleaning again attempted. If successful cleaning still cannot be performed or the equipment fails to traverse the entire manhole-to-manhole pipe segment it will be assumed that a major blockage exists and the cleaning operation will be abandoned. The cleaning operator will note these occurrences in his daily cleaning log. The CONSULTANT will be compensated for cleaning the entire length of sewer should this occur.

H. All sludge, dirt, sand, rocks, grease, and other solid or semi-solid materials resulting from the cleaning operation shall be removed at the downstream manhole of the

section being cleaned. Passing materials from pipe segment to pipe segment, which could cause line stoppages, accumulations of debris in wet wells, interference with in-line long term flow monitoring equipment or damage to pumping equipment will not be permitted. Under no circumstances shall sewage or solids removed during the cleaning operation be dumped onto the streets or in ditches, catch basins or storm drains.

I. If the CCTV inspection shows the cleaning to be unsatisfactory, the CONSULTANT shall re-clean and re-inspect the sewer line at his sole expense until the cleaning is shown to be satisfactory.

J. All sludge, dirt, sand, rocks, grease, and other solid or semisolid materials removed from the sewers and manholes during the cleaning operation shall be drained of water and transported to the local dumpsite to be provided by the OWNER. No tipping fee will be charged to the CONSULTANT by the OWNER.

K. The OWNER will provide water for cleaning operations from any fire hydrant at no cost to CONSULTANT.

MEASUREMENT AND PAYMENT

5000.01-.16 Standard and Heavy Pipe Cleaning: Standard and heavy pipe cleaning will be billed per linear foot with measurement being made between centerlines of consecutive manholes for the line segments being cleaned. Payment for standard and heavy sanitary pipe cleaning shall be made at the unit price per linear foot based on the pipe size being cleaned and whether or not the line is in the easement. Heavy pipe cleaning will be charged in addition to the standard cleaning rate when applicable.

SECTION 6000
ROOT / GREASE / TAP CUTTING

A. The CONSULTANT shall furnish all labor, equipment, supplies, and supervision and shall perform all work required in accordance with these specifications.

B. Roots, grease and/or taps that can be removed by conventional means, such as cutting, shall be removed by the CONSULTANT at the rate specified for that line item.

C. The cutting of roots, grease and or taps will occur during CCTV inspection.

D. Roots, grease and/or taps will only be removed if they do not allow the passage of the CCTV inspection camera, are obscuring the view of potential defects or could cause a potential blockage and overflow.

E. When root, grease and/or tap cutting occurs, roots, grease and/or taps shall be cut to clear the pipe for flow and to allow for the proper viewing of defects.

CHEMICAL ROOT CONTROL

A. CONSULTANT will apply EPA registered root-control agents to various main line sanitary sewers, as selected by OWNER in order to kill the root growth present in the lines and to control root re-growth.

B. CONSULTANT will apply the chemical, as a foam, directly to the roots via a hose that extends throughout the entire length of each sewer section. The material will be applied evenly and uniformly, so as to completely fill the sewer pipe. CONSULTANT will not use "pour down" products or utilize high pressure application equipment. CONSULTANT will pump the chemical foam under low pressure to assure that the sewer section is completely filled with foam, and to ensure that foam penetrates "wye" connections. The chemical agent will contain a herbicide to destroy root tissue and a foaming surfactant to deliver the herbicide to the targeted roots.

C. The root control materials will be EPA registered, labeled for the intended use in sewer lines, and registered with the Louisiana Department of Agriculture & Forestry.

D. CONSULTANT will comply with all applicable federal, state and local requirements and ordinances relative to this type of material and usage thereof (OSHA, EPA, DOT and the Louisiana Department of Agriculture & Forestry). Chemical handling and treatments will be applied by trained, professional applicators that are certified by the Louisiana Department of Agriculture & Forestry, as required by law.

E. CONSULTANT will keep complete and accurate records of each day's operation. Records shall show the date of treatment, the sections of line treated, pipe size and distance, and other pertinent information.

F. The OWNER will provide water for root control operations from any fire hydrant at no cost to CONSULTANT.

G. CONSULTANT guarantees to kill all the roots in every sewer it treats in order to eliminate main line sewer stoppages caused by live tree roots. CONSULTANT will apply this guarantee for a period of two (2) years, beginning on the date of treatment and ending 2 (two) years after the date of treatment. If a treated sewer plugs up due to live tree roots during the guarantee period, CONSULTANT will re-treat the sewer line at his sole expense. CONSULTANT will provide a three (3) year guarantee on any paid repeat applications that are performed within six (6) months of the expiration date of the previous guarantee period. Re-treatments performed at no charge in honor of the guarantee do not extend the expiration date of the guarantee. This guarantee applies only to main line sewer stoppages caused by live tree roots. The guarantee does not apply to stoppages caused by grease or other foreign matter;

flat, collapsed or deformed pipe or flooding caused by a surcharged or plugged sewer section downstream from a guaranteed sewer section.

MEASUREMENT AND PAYMENT

6000.01-.03 Root / Grease Cutting: Payment will be made per linear foot requiring root and/or grease cutting.

6000.04-.07 Chemical Root Control: All costs for the application of chemical root control. CONSULTANT will be paid at the unit price per linear foot based on the pipe size that chemical root control is applied to.

6000.08 Removal or Protruding Taps By Internal Cutting: Payment will be made per tap cutting performed.

SECTION 7000
CCTV INSPECTION

A. The CONSULTANT shall furnish all labor, equipment, supplies, and supervision and shall perform all work required in accordance with these specifications. CCTV inspection shall be performed in the areas selected and approved by the OWNER.

B. It shall be the responsibility of the CONSULTANT to schedule and perform investigations to prevent system overflows. If flows are such that they interfere with the CONSULTANT's ability to collect accurate data, then the CONSULTANT shall be responsible to schedule his work during low flow periods or to request written permission to perform by-pass pumping around the site. The CONSULTANT may provide by-pass pumping only with specific approval from the OWNER. OWNER will reimburse CONSULTANT for all costs associated with bypass pumping.

C. Inspection of sewer infrastructure by means of CCTV equipment shall be performed to determine the location and extent of any obstructions and defects such as offset joints, protruding tees, broken pipe, and other pipe defects that may permit groundwater infiltration. Logs shall note the existence of any significant defects. Cleaning by the CONSULTANT shall be performed prior to each CCTV inspection on each pipeline to be inspected.

D. CCTV inspections shall be performed on one manhole-to-manhole pipe segment at a time. The inspection shall be performed by moving the CCTV camera through the line along the axis of the pipe at a rate not to exceed 30 feet per minute. Any means of propelling the camera through the sewer that would exceed this rate of speed or produce non-uniform or jerky movements shall not be acceptable. The camera shall be stopped for a minimum of 5 seconds at each identifiable defect to ensure proper documentation of the lines condition. In addition, the camera shall be stopped at each service connection, and the camera shall pan the service connection to video inside

the service line. CCTV inspection is performed from the upstream manhole to the downstream manhole when the conditions allow. If conditions do not allow an upstream to downstream inspection, the inspection will be performed in reverse (from the downstream to the upstream manhole).

E. A log shall be made by the CONSULTANT when each manhole-to-manhole pipe segment is televised. The log shall include at a minimum:

   a. Location of each point of leakage
   b. Location of each service connection or other pipe entering the televised line
   c. Location and degree of offsets
   d. Location of any damaged sections, and nature of damage
   e. Location of buried structures or blind junctions
   f. Location and amount of any deflection in alignment or grade of pipe; also the total length of pipe sag
   g. Pipe materials, diameter, and distance between pipe joints
   h. Date, city, manhole-to-manhole segment, reference manhole number, name of operator, and inspector
   i. Video Filename

F. The pipe segment length, with respect to the referenced manhole, shall be determined with a meter device, accurate to within ±2%. Markings on the cable, instruments requiring observation inside a manhole, or correction of each reading for the depth of the reference manhole shall not be allowed. Accuracy of the measurement meters shall be checked daily by use of a walking meter, roll-a-tape, or other suitable device.

G. A header screen showing tape number, segment number, and manhole number shall be taped for 10 seconds at the beginning of each televised line segment. All header information shall be recorded on the log forms.

H. At the CONSULTANT's discretion the camera shall be stopped or backed up to view and analyze conditions that appear to be unusual or uncommon for a sound sewer line. At all times, the operating technician shall be able to move the camera through the line in either direction without loss of quality in the video presentation on the monitor. The picture shall be free of electrical interference and provide a clear, stable image of the specified resolutions at all times. The camera lens shall be cleaned, as required, to provide a clear image within the sewer lines.

I. In the event that equipment becomes lodged in the sewer line, the CONSULTANT shall notify the OWNER immediately. If equipment becomes lodged through no fault of CONSULTANT, the OWNER will remove the camera at no cost to the CONSULTANT. Timely excavation is necessary to maintain project schedules and to eliminate the possibility of overflows resulting from the lodged equipment creating a blockage.

J. If during the inspection the camera cannot pass through the entire pipe segment, the CONSULTANT shall set up his equipment so that the inspection can be performed from the opposite manhole. Should this occur, CONSULTANT will be paid for an additional set-up. If the camera again fails to pass through the entire pipe segment, the inspection shall be abandoned and considered complete. The CONSULTANT will be paid for the actual footage inspected, and no additional inspection work shall be required in that pipe segment until the pipe has been rehabilitated. CONSULTANT will be paid for the actual footage inspected during each subsequent attempt.

CCTV INSPECTION OF SERVICE LATERALS

A. CONSULTANT will use a lateral launch inspection system, consisting of a robotic tractor and a lateral launch CCTV camera, to remotely deploy a pan & rotate camera into lateral pipes connected to a mainline sewer pipe. Should CONSULTANT encounter multiple laterals converging in a single tap, CONSULTANT shall utilize a steerable lateral camera with guide pin to inspect the adjoining laterals separately. Each pipe shall be identified as an independent inspection for data submittal and invoicing purposes.

B. A main sewer television camera is used to position the lateral camera launcher. The lateral sewer camera is used to inspect each lateral from the mainline towards the cleanout.

C. The television inspection of the lateral will be attempted from inside the mainline sewer up into the lateral or attempted from the cleanout towards the sewer main. Lateral sewers inspected from the cleanout towards the mainline will be attempted by using a mini push camera if necessary.

D. In the event a lateral pipe segment cannot be fully-inspected after reasonable attempts, CONSULTANT shall provide all the information to the OWNER and the OWNER will determine alternate possible solutions.

Submittals

A. Copy of completed CCTV log

B. Schedule for cleaning and inspecting each sewer reach

C. Daily report form

D. Confined space entry form

Data Submittals

C. All line pictures will be digital .mpeg video, clear, legible and free of "snow" or haze.

D. Electronic copies (data files) shall be submitted in a PACP Exchange Database.

E. The CONSULTANT shall prepare and submit a list of defects, which appear to require immediate corrective action, based on their size and/or type, on a daily and weekly basis. This submittal is not a final deliverable.

F. To establish the working criteria for video picture quality which must be maintained throughout the project, the CONSULTANT shall furnish a DVD with .mpeg video footage of an actual sewer line inspection that is satisfactory to the OWNER, and meets the job specifications for CCTV inspection. This DVD shall become the property of the OWNER and shall be used throughout the project as a standard that the CONSULTANT's video picture quality must meet.

G. The CONSULTANT shall furnish the OWNER a hard drive or DVD that contains both data files and video files. The data files shall be able to upload into a PACP Exchange Database. Once downloaded by the OWNER, the hard drive will be returned to the CONSULTANT. OWNER shall provide labeling and file naming standards at the pre-construction meeting.

H. All inspections shall be made by PACP certified operators and data shall be documented using NASSCO's Pipeline Assessment and Condition Program.

I. Once the CCTV inspection data has been obtained and analyzed and professional reports compiled, a recommended protocol for repairs will be recommended by the CONSULTANT.

J. All rehabilitation recommendations must be approved by a registered licensed engineer in the state of Louisiana with a minimum of 10 years of experience analyzing sanitary sewer line inspection data. Engineer must be PACP certified.

MEASUREMENT AND PAYMENT

7000.01-.02 CCTV Inspection: All costs associated with the CCTV inspection of sanitary sewer lines. CONSULTANT will be paid for the actual linear footage of pipe inspected at the unit rates specified based on pipe size.

7000.03 Additional Setup of CCTV Inspection Equipment: All costs associated with the additional setup performed during CCTV. This will occur when the CCTV camera is unable to traverse the line segment from one manhole and must be setup again at the opposite or connecting manhole to attempt the inspection. CONSULTANT will be paid for each additional setup performed.

7000.04 CCTV Inspection of Service Laterals (Lateral Launching From Mainline): All costs associated with the CCTV inspection of sanitary sewer service

laterals from the mainline towards the cleanout. CONSULTANT will be paid for each service lateral inspected.

7000.05 CCTV Inspection of Service Laterals (Push Camera From Cleanout): All costs associated with the CCTV inspection of sanitary sewer service laterals from the cleanout towards the mainline. CONSULTANT will be paid for each service lateral inspected.

7000.06 CCTV Inspection Data Management: All costs associated with the preparation and delivery of CCTV inspection data, videos, reports and rehabilitation recommendations in the form, format and quality specified in the CCTV inspection section. Payment will be for the actual footage of pipe CCTV inspected.

7000.07 Sewer Pipe Rehabilitation Recommendations: All costs associated with the preparation and delivery of sewer pipe rehabilitation recommendations. Payment will be made per linear foot of sewer pipe inspected.

SECTION 8000
BYPASS PUMPING

A. CONSULTANT shall be responsible for furnishing all equipment, labor and materials necessary to setup, operate and maintain by-pass pumping. The OWNER and CONSULTANT shall determine and agree upon the quantities and disposition of water to be pumped and the CONSULTANT shall provide the necessary equipment to meet these requirements.

B. When by-pass pumping is required, the CONSULTANT shall furnish, install and operate pumps, plugs, conduits and other equipment to divert the flow of sanitary sewer around the pipeline reach around the pipe being inspected. The pumping system shall be of sufficient capacity to handle peak flow plus additional flow that may occur during a rainstorm.

C. Pumping shall be done by the CONSULTANT in such a manner as to not damage public or private property or create a nuisance or health menace. The pumped sewage shall be in an enclosed hose or pipe and shall be reinserted into the sanitary sewer system. Sewage shall not be allowed to flow in gutters, streets or over sidewalks, nor shall any sewage be allowed to flow into storm inlets or conduits. After the work has been completed, flow shall be restored to normal.

D. When flow in a sewer line is plugged, blocked or by-passed, the CONSULTANT shall protect the sewer lines from damage that might result from sewer surcharging.

MEASUREMENT AND PAYMENT

8000.01 - .03 Setup of Bypass Pump: All costs associated with the setup and subsequent teardown of bypass pumps, up to 600' of discharge hose and 50' of suction hose. Payment will be made based on the size of the pump needed to accommodate the amount of flow.

8000.04-.06 Operation of Bypass Pump: All costs associated with the operation of bypass pumps. Payment will be made based on the size of the pump needed to accommodate the amount of flow.

SECTION 9000
MISCELLANEOUS SERVICES

TRAFFIC CONTROL

A. CONSULTANT will provide standard traffic control including cones, signs, etc. at no cost to the OWNER

B. CONSULTANT will provide additional traffic control such as a flagman or policeman, as needed and as approved by the OWNER.

C. The CONSULTANT shall notify the local fire department, police department, engineering department, and all other necessary authorities to carry out the requirements of the scope of work. All investigation work shall be coordinated with these authorities on a daily basis to avoid any conflict.

CLEANING WET WELLS

A. The CONSULTANT shall scour debris or grease-laden wet well walls with a high-velocity water gun. If the impact of the high-velocity water appears to be weakening the structural integrity of the wet well wall or any internal components of the wet well, the CONSULTANT shall discontinue the scouring on the wet well and notify the OWNER.

B. Wet well cleaning shall be conducted on wet wells in areas of the system as selected and approved by the OWNER.

C. Upon request from CONSULTANT, OWNER shall provide CONSULTANT with adequate access to the wet wells requiring cleaning.

D. All debris removed during the cleaning process shall be properly disposed of by the CONSULTANT at a site provided by the OWNER at no cost to CONSULTANT.

E. Upon request from CONSULTANT, OWNER shall draw down the water level in the wet well within a reasonable time and to a reasonable water level to facilitate the cleaning.

DYE TESTING

A. The objective of dye water testing, when used in conjunction with CCTV, is to pinpoint specific points of entry of inflow into the sanitary sewer system, such as direct and indirect connections of storm drains, yard drain inlets and pipes, sinkholes, leaking manholes in unpaved areas and leaking manhole covers and rings. Dye water testing without CCTV shall also be used to trace line segments during sewer map updating, locate cross connections, and co-relationship of individual properties to sewer lines.

B. At a minimum, CONSULTANT should flood the area over the suspected leak with dyed water and check for dye at 5-minute intervals for up to 30 minutes, noting positive or negative each time checked at the downstream manhole. Two photographs will be taken: one when dyed water is applied and a second when positive results are noted, or at the 30 minute check if results are negative.

C. The following data shall be recorded by the CONSULTANT using the required file format in Microsoft ACCESS. Data, where specified, will be recorded using codes provided by the OWNER. A hard copy and electronic diskette shall be submitted to the OWNER. The dye test database shall include the following information at a minimum:

a. Date and time
b. Location, including reference to the relevant manhole segment (upstream and downstream manhole incorporating the OWNER's manhole numbering system) and the nearest street address
c. Testing personnel
d. Schematic layout of the manholes and sewer lines under test — noting location of sandbags and/or plugs
e. Precise location of the site of confirmed source of inflow or leak, as determined by the dye testing, keyed to the relationship to appropriate manhole and pipe numbers from the OWNER's GIS mapping system and street address, and confirmation of any negative results of dye testing
f. Digital color photographs filenames of the results of each dye test

D. Digital photographs shall be provided in jpeg (.jpg) format. Resolution of photographs shall be a minimum of 72 dpi x 72 dpi and minimum dimensions of 640 X 480 pixels. The CONSULTANT shall document each dye leak or series of dye tests by high-resolution digital photograph. The photographs shall be included in the database along with the location of the dye test defect.

E. Groups of digital photographs orientated so that the long side of the photograph is horizontal and that 3”x 5” printed copies shall be incorporated in the hard copy of the dye testing report and supplied on a CD-ROM(s) incorporated for each work order issued by the OWNER, unless otherwise directed.

F. The digital photographs shall incorporate annotated references superimposed on the image to upstream manhole number and date when the photograph was taken. The annotation shall be clearly visible and shall have a 12pt (uppercase) font size. Each photograph shall have a clearly labeled filename incorporating the upstream manhole ID followed by the letter “D” and the three-character sequence number assigned by the digital camera. Reference to location of each photograph shall be indicated on the sketches at the end of the report.

Deliverables

A. Electronic database of dye test data and digital photographs of results shall be submitted to the OWNER. The electronic database using the required file format in Microsoft Access® version 2002, shall be tied to the OWNER’s GIS sewer maps through the manhole numbers. If no GIS sewer maps are available, the CONSULTANT will be responsible for providing an applicable numbering system for manholes.

B. A binder with hard copies of the dye test reports, location sketches, and digital photographs shall be submitted to the OWNER.

C. The photographs shall be digital pictures in both hard copy and electronic format.

SONAR INSPECTION

A. The CONSULTANT shall determine the inspection technology method or combination of methods to be utilized in each pipeline segment. Generally, sonar alone will be used where the depth of fluid in the pipeline is greater than 75% of the full diameter of the pipe. CCTV and sonar will be used together when the fluid levels are between 25% and 75% of the full pipe diameter. Sonar will not be used where the fluid depth is generally less than 25% of the pipe diameter or more specifically where there is insufficient depth to pass the sonar gear on the float or crawler.

B. The speed of the crawler or float shall not be greater than 20 feet per minute when the scanning sonar is in use either alone or in combination with the CCTV camera.

C. The sonar equipment shall be purpose built for use in the inspection of sewer system pipelines and shall be operative in totally submerged conditions. It shall be capable of being traversed by crawler tractor, float or other suitable means through the pipeline on a stable vehicle constructed to situate the sonar inspection equipment below the water level.

D. The maximum beam width of the sonar energy pulse will be no greater than 2 degrees from the center of the transducer. The transducer will be of the continuous scanning type. The sonar image will be in full color during the inspection.

E. The sonar survey will include complete structural and service assessment of the equivalent PACP standard as that obtained through the CCTV survey. The sonar survey will include measurement of fluid depth and silt depth.

F. The sonar survey will be continuously recorded and saved on CDs, DVDs or external hard drives in MPEG-1 format, supported by complete defect inspection logs and summary reports.

G. A color high resolution sonar still image of cross-sections of the pipeline must be taken and recorded every 50 feet or more frequently should the internal profile of the pipeline change and at every defect. These images are to be cross referenced to the reports and databases for ease of reference.

ELECTRO SCAN INSPECTION

Field Operation

A. For each sewer main, the Electro Scan procedure begins with a light flushing of the sewer line and then uses the hydraulic jet hose and reel to pull the Electro Scan probe through the pipe from the downstream manhole to the upstream manhole where the combo CCTV/Electro Scan unit is positioned.

B. The sewer line will be flushed from the downstream manhole, the nozzle removed at the upstream manhole, a Sliding Funnel Plug will be attached to the hose, and the Electro Scan probe will be attached to the Sliding Funnel Plug. The hydraulically powered jet truck would then pull the probe through the pipe while simultaneously providing the water necessary for the probe to electrically examine the pipe walls.

C. While water is used to surround the Electro Scan probe, only a small portion of the probe must technically be surrounded in 360° of water to allow electrical current to conduct or reach the wall of the pipe. While only a portion of water is required, maintaining a 6-10 foot column or reservoir of water behind the full cone to allow sufficient water to surcharge 24-36 inches up each sewer lateral is recommended. By allowing water to surround the entire service connection, Electro Scan will be able to successfully test all elements of the connection for defects.

D. Should a pipe segment be surcharged to the point where flushing isn’t appropriate, other techniques and equipment will be used, including, but not limited to, float lines, parachutes, and immediate-area flow restriction.

E. If through no fault of CONSULTANT’s operators, inspection equipment, cleaning nozzles or root cutters become lodged in the collection system, the OWNER will

provide excavation services to retrieve the equipment at no cost to CONSULTANT. Excavation of lodged items will be completed by the OWNER within a 48 hour period.

F. All data will be fed back to the combo Electro Scan/CCTV unit via the standard CCTV coaxial cable. Once the data is collected on the unit's laptop computer, it will all be uploaded to *CONSULTANT's Critical Sewers Cloud-Based Portal* where it will be instantly processed and easily accessible for review by the OWNER.

Data

A. A temporary software user license will be provided to allow one person to access the Electro Scan Critical Sewers™ cloud application, where data from the field will either be uploaded directly from the combo CCTV / Electro Scan unit using a remote Wi-Fi connection or uploaded when a stable connection to the Internet can be established at the end of each day.

B. The Scan Detail page shows each defect identified by Electro Scan including location, severity, and leakage rate. A visual graph of the Electro Scan readings is also displayed, along with any header information entered by the OWNER.

C. Electro Scan's custom and proprietary algorithms are used to grade the size and type of each leak, and structural defects, and graphically display the defect grade size, corrosion, type and frequency for each manhole-to-manhole pipe section. In addition, Electro Scan's software will provide an estimated gallons per minute (GPM) infiltration rate per defect and for the entire pipe segment. The Electro Scan traces have a resolution of less than 0.1ft. This information can be readily used to qualitatively identify corrosion problems, highest potential infiltration sections and assist with the selection of the most cost effective repair method.

Data Evaluation and Analysis

A. Data will be presented in both tabular and graphics formats to facilitate a comparative condition assessment of line segments.

B. Data collected in the field will include:

    a. Length of sewer line
    b. Pipe defect locations
    c. Classification of all defects as large, medium or small
    d. Classification of all defects as minor, moderate or severe peak estimated flow.
    e. A total estimated peak gallons per minute (GPM) will be provided for each defect and pipe segment, as a whole
    f. If CCTV inspection reports or videotapes are available, CONSULTANT will compare a select number of sewer mains.

Deliverables

A. Three (3) copies of the draft report will be prepared for submittal to the OWNER for review

B. Three (3) copies of the Final Report incorporating the comments from the review of the draft report will be furnished. Final Report in Microsoft Office 2010 and in PDF format will be included.

ACOUSTIC PIPE ASSESSMENT

A. The CONSULTANT shall furnish all labor, equipment, supplies, and supervision and shall perform all work required in accordance with these specifications. Acoustic pipe assessment shall be performed in the areas selected and approved by the OWNER.

B. The purpose of the acoustic pipe assessment is to identify blockages in sewer lines.

C. The acoustic pipe assessment system shall be capable of inspecting 6”-12” lines using active acoustic transmission (transmit on one end of the pipe, receive on the other end of the pipe). Active transmission of sound for an individual inspection should be limited to no more than four (4) minutes of transmission time.

D. The system shall be capable of inspecting an individual pipe length up to 800 linear feet.

E. The device shall contain a USB connection or similar to allow for downloading of inspection data to a computer.

F. Acoustic inspection results shall be provided on the device within three (3) minutes of completion of each individual inspection.

G. The device(s) shall not need to come into contact with the waste flow and shall not require penetration of more than two (2) feet into the manhole or access point.

H. The device(s) shall be battery-powered with the capability of performing at least 35 measurements on a fully charged battery.

MEASUREMENT AND PAYMENT

9000.01 Traffic Control: Payment shall be made when a flagger or uniformed police officer is required to control traffic during any inspection or cleaning activity.

9000.02 Cleaning Wet Wells: All costs associated with the cleaning of wet wells to include operators, combination truck, hoses, pipe, and confined space

entry equipment shall be billed at the proposed unit rate. A 4 hour minimum will be charged anytime this item is utilized.

9000.03-.04 Dye Testing In Conjunction with CCTV Inspection: All costs associated with the dye testing of sewer lines in conjunction with CCTV inspection and preparation and delivery of data. CONSULTANT will be paid per each dye testing setup performed.

9000.05 Dye Testing NOT In Conjunction with CCTV Inspection: All costs associated with the dye testing of sewer lines NOT in conjunction with CCTV inspection and preparation and delivery of data. CONSULTANT will be paid per each dye testing setup performed.

9000.06 Sonar Inspection of > 12” Diameter Sewer Pipe: All costs associated with the sonar inspection of sewer lines and preparation and delivery of data. CONSULTANT will be paid for the actual linear footage of pipe sonar inspected at the unit rates specified.

9000.07 ElectroScan Inspection 8”-21” Diameter: All costs associated with the ElectroScan inspection of sewer lines and preparation and delivery of data. CONSULTANT will be paid for the actual linear footage of pipe inspected at the unit rates specified.

9000.08 Acoustic Pipe Assessment: All costs associated with the acoustic pipe assessment of sewer lines and preparation and delivery of data. Contractor will be paid for the actual linear footage of pipe assessed with measurement being made between centerlines of consecutive manholes for the line segments being assessed at the unit rates specified.

9000.09 Emergency Combination Cleaning Truck with Operator and Helper (Min. 8 Hours) < 10,000 LF: All costs associated with the emergency port-to-port mobilization/demobilization of one (1) combination cleaning truck with operator and helper. This item is to be used for projects of less than 10,000 LF.

9000.10 Emergency CCTV Inspection Unit with Operator and Helper (Min. 8 Hours) < 10,000 LF: All costs associated with the emergency port-to-port mobilization/demobilization of one (1) CCTV inspection unit with operator and helper. This item is to be used for projects of less than 10,000 LF.