Document 00910

ADDENDUM NO. 1

Date of Addendum: 02-03-2016

PROJECT NAME: Large Diameter Sanitary Sewer Inspection Using Robotic Technology

PROJECT NO: WBS No. R-MA2013-0048-4, File No. 4277-92

BID DATE: February 11, 2016 **(There is no change to the Bid Date.)**

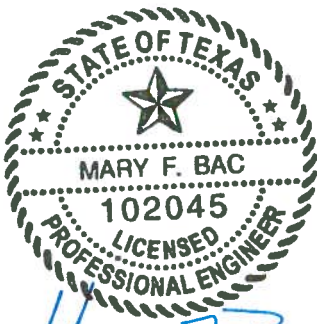
FROM: Tim Lincoln, P.E., City Engineer
City of Houston
Department of Public Works and Engineering
1002 Washington Avenue
Houston, Texas 77002

Attn: Mary Bac, P.E., Project Manager

TO: **Prospective Bidders**

This Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable. Insofar as the original Project Manual and Drawings are inconsistent, this Addendum governs.

This Addendum uses the change page method: remove and replace or add pages, or Drawing sheets, as directed in the change instructions below. Change bars (|) are provided in the outside margins of pages from the Project Manual to indicate where changes have been made; no change bars are provided in added Sections. Reissued Drawing Sheets show the Addendum number below the title block and changes in the Drawing are noted by a revision mark and enclosed in a revision cloud.



02/03/16

CHANGES TO PROJECT MANUAL

CONTRACT FORMS

1. Document 00410B – Bid Form - Part B. Replace with attached revised Document 00410B.

SPECIFICATIONS

1. Section 02558-S – Cleaning and Television Inspection. Replace with attached revised Section 02558-S.

END OF ADDENDUM NO. __1__

Dhanuka Ratnayake

Dan Ratnayake, P.E.
Managing Engineer
Department of Public Works and Engineering

02-03-2016
DATED

Document 00410B

BID FORM - PART B

B. BASE UNIT PRICE TABLE:

Item No.	Section No.	Item Description	Unit Measure	Unit Quantity	Unit Price (this column controls)	Total in Figures
1	02558	Sensor Transport Including TV and Meander & Incline , 48" and Above, All Depths	L.F.	185,000		
2	02558	Sensor Transport Using Floating Style Platform, Including TV , 48" and Above, All Depths (shall only be used when approved by Engineer)	L.F.	50,000		
3	02558	Laser Inspection, 48" and Above, All Depths	L.F.	235,000		
4	02558	Sonar Inspection, 48" and Above, All Depths	L.F.	235,000		
5	02558	H2S and Temperature Inspection, 48 " and Above, All Depths	L.F.	235,000		
6	02558	Sensor Transport Manhole Insertion	EACH	100		
7	02558	Elevations of Manhole and Sanitary Sewers at each Manhole/Location using GPS (includes x, y and z coordinates)	EACH	375		
8	02221, 06510	Removal of Manhole Grating	EACH	2		
9	02221, 06510	Replacement of Manhole Grating	EACH	2		
10	02221, 06510	Removal and Disposal or Delivery and Unloading of Gratings at a City Site	EACH	2		
11	01555	Flagmen For Traffic Control (Uniformed Peace Officer)	HOUR	80		
12	01555	Certified Flagmen For Traffic Control (Not a Peace Officer)	HOUR	160		

Base Unit Price Total (a): _____

C. EXTRA UNIT PRICE TABLE:

Item No.	Section No.	Item Description	Unit Measure	Unit Quantity	Unit Price (this column controls)	Total in Figures
13	01555	Traffic Control Plan	EACH	3		

Extra Unit Price Total (b): _____

Bidder's Initials [ ]

Document 00410B

BID FORM - PART B

D. CASH ALLOWANCE TABLE: [NA]

E. ALTERNATES TABLE: [N/A]

F. TOTAL BID PRICE: **$** _____
(Add Totals for Items A, B, C, D, and E above)

2.0 SIGNATURES: By signing this Document, I agree that I have received and reviewed all Addenda and considered all costs associated with the Addenda in calculating the Total Bid Price.

Bidder: _____
(Print or type full name of your proprietorship, partnership, corporation, or joint venture.*)

**By: _____
Signature Date

Name: _____
(Print or type name) Title

Address: _____
(Mailing)

_____
(Street, if different)

Telephone and Fax Number: _____
(Print or type numbers)

* If Bid is a joint venture, add additional Bid Form signature sheets for each member of the joint venture.

****** Bidder certifies that the only person or parties interested in this offer as principals are those named above. Bidder has not directly or indirectly entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding.

Note: This document constitutes a government record, as defined by § 37.01 of the Texas Penal Code. Submission of a false government record is punishable as provided provided in § 37.10 of the Texas Penal Code.

END OF DOCUMENT

SUPPLEMENT

Section 02558-S

CLEANING AND TELEVISION INSPECTION

The following supplements modify Section 02558 – Cleaning and Television Inspection Standard Specification. Where a portion of the Specification is modified or deleted by this Supplementary Specification, the unaltered portions of the Specification shall remain in effect.

PART 1 GENERAL

1.01 SECTION INCLUDES: *Add paragraph C.*

C. Laser inspection, sonar inspection and condition assessment via robotics to locate and quantify sediment, corrosion and other pipe defects.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices: *Delete paragraphs 1, 2, 4, 5, 6, 7, 8, 10, 11, 12 and 13. Revise paragraph 9 as follows. Add paragraphs 14, 15, 16 and 17 as follows.*

9. If the Contractor is unable to complete the TV inspection of a mainline section after performing a reverse setup (i.e., obstructions are encountered from both the upstream and downstream manhole that prevents the passage of the camera), the Contractor shall be paid for television inspection of the actual footage of pipe successfully televised, if the TV inspection video and report is of acceptable quality.

14. Payment for laser inspection, sonar inspection, gas inspection and inspection sensor transporting, and condition assessment for large diameter pipe segments selected by the Engineer is on a linear-foot basis from centerline to centerline of the manholes.

15. Payment for sensor transport including television inspection and meander and incline is on a linear foot basis.

16. Payment for sensor transport using floating style platform, including television inspection is on a linear foot basis. Floating style platforms shall only be used when approved by the Engineer.

17. Payment for determining elevations of manhole rim and the sanitary sewer flow lines at each manhole/location is on a unit price basis for each elevation determination. This includes x, y and z coordinates.

1.03 DEFINITIONS: *Delete paragraph F and replace with the following paragraph.*

SUPPLEMENT

F. Television Inspection Report: A report that is submitted in pdf format for each line segment using NASSCO PACP codes.

1.05 SUBMITTALS: Delete paragraph E and replace with following paragraph. A*dd paragraphs F, G, and H as follows*.

E. The Contractor shall provide the City with the sewer video (including audio), a hard copy report and an electronic report in pdf format for the inspections for each line segment. The electronic report and video shall be named by line segment. The sewer video shall be MPEG4 format. The Contractor shall utilize the latest NASSCO PACP codes at the time of the Contract notice to proceed. Prior to commencing the work the NASSCO PACP codes to be utilized shall be submitted. All work on the contract shall follow the same codes. Inspection Software must be NASSCO PACP Certified and proof of certification of Software shall be submitted prior to commencing the work. Contractor shall be current on NASSCO training. All electronic data shall be submitted in MS Access. Any variation from the requirements shall be subject to approval by the Project Manager. Submittal of the CCTV videos and the reports for review can be submitted through a data storage device, such as a flash drive, or through Contractor's FTP site and will be available for download. An email of the information availability and phone calls to the Inspector, Senior Inspector and/or specific contact shall be made.

F. The Contractor shall provide a three-dimensional model for each of the sanitary sewers with details such as meander, incline, diameter variation, debris, etc. noted from laser & sonar inspection, H_2S values, and deficiencies as defined in NASSCO codes. The location of the value shall be reflected in the model. An option should be provided to select the type of deficiencies to be reflected on the model.

G. At the end of the contract, the Contractor shall submit a hard drive including all videos and reports for the entire contract.

H. The digital information shall contain files which store each line segment as a unique digital record.

1.06 QUALITY ASSURANCE: *Revise paragraph B and add paragraph D as follows*.

B. Acceptance of work is subject to successful completion of the inspection and survey.

D. The work shall comply with current NASSCO standards.

PART 2 PRODUCTS: Revise section 2.03 as follows and *add sections 2.04, 2.05, 2.06, 2.07, 2.08 and 2.09.*

2.03 VIDEO EQUIPMENT: Delete paragraphs C and D.

2.04 SENSOR TRANSPORT VEHICLE

A. The Contractor must use a stable/tracked platform to dramatically improve the accuracy of the collected data.

B. The transport system shall be capable of operating within pipes of 36-inches in diameter or greater.

C. The transport shall be capable of inspecting upstream and downstream of the deployment location in flow conditions of 10/ft/sec in partially and/or fully submerged conditions. This allows the inspection to continue while the pipe is in service.

D. A CCTV / Sensor transport vehicle shall be used to provide a stable platform for all of the sensors and cameras specified. A stable platform is required to provide the most accurate data from the data sensors. Floating style platforms may only be used when directed by the Engineer. The transport vehicle shall be capable of pulling up to 3,000 feet of cable and maneuvering over sediment normally associated with large diameter sewer lines.

E. The transport vehicle shall be capable of being deployed through a 24-inch access hole.

F. The transport vehicle shall have recovery fail safe in the event that the vehicle is flipped.

G. The condition assessment inspection speed shall be determined by the lowest rate specified for any individual sensor.

H. The transport vehicle shall have an onboard-integrated inertial measurement unit (IMU) to enable real-time monitoring of vehicle position and orientation. The IMU shall measure three axis of rotation and three axis of acceleration with real time vehicle orientation and display of pitch and roll measurement with respect to gravity and relative heading good to ±1°.

I. The transport vehicle shall be capable of sweeping a sonar sensor through a range of -90° to 90° degrees in its lateral axis to inspect maintenance holes and structures.

J. The Contractor shall have a large diameter pipe transport vehicle available that is capable of traversing accumulated grit, grease, slime and sediment in order to televise without cleaning the sewer. This shall include specialized wheeled, tracked and or articulating equipment with superior accessing capabilities. It shall include the ability to raise and lower the camera on the tractor as required for clearing sediment or varying water levels caused by sediment.

2.05 LASER SCANNING EQUIPMENT

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A. Laser scanning equipment shall be capable of measuring the distances to objects and surfaces in pipes and shall be capable of imaging pipes 48 inches and larger with a minimum of 24 inches of not submerged portion of pipe. The laser shall support 35Hz scan rates or higher and be Class 1 or Class 2, for operator safety.

B. The laser sensor resolution must be 1mm and measurements shall be accurate to 1cm at 3 meters in pipelines 48 inches and larger. Overlapping high resolution dwell scans shall be taken by stopping, not less than, every ten feet for a minimum of thirty seconds. If laser is capable of real time data viewing then stopping is not required.

2.06 SONAR SENSOR EQUIPMENT

A. Sonar equipment must be specifically adapted for use in sewers using high frequency sound waves to locate and map irregularities within the pipes creating a continuous sonar images recorded in “real time” mode. Sonar equipment shall be digital, multi-frequency profiling sonar that supports a range of frequencies from 600 kHz to 2.25 MHz and be equipped with operating/monitoring computer and associated hardware.

B. Sonar sensors shall function in pipelines with a minimum of 18 inches of water. If pipes are surcharged, overlapping high resolution dwell scans shall be taken by stopping, not less than, every fifty feet for a minimum of thirty seconds. If sonar is capable of real time data viewing then stopping is not required.

2.07 H_2S GAS SENSOR

A. The H_2S sensor shall sample continuously during the inspection and be capable of detecting H_2S limits of 1 – 100 ppm.

2.08 TEMPERATURE SENSOR

A. The Temperature sensor shall sample continuously during the inspection.

2.09 GLOBAL POSITIONING SYSTEM (GPS) OR SURVEYING EQUIPMENT

A. The equipment shall be capable of obtaining x, y & z coordinates with the accuracy specified in paragraph 3.15 of this Section. The values shall be reported in Access Database.

PART 3 EXECUTION: Revise sections 3.02, 3.04 and 3.07 as follows and *add sections 3.10, 3.11, 3.12, 3.13, 3.14 and 3.15.*

3.02 PREPARATION: *Delete paragraph B.*

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3.04 TELEVISION INSPECTION: *Delete paragraph C and replace with the following paragraph. Add paragraph D as follows.*

C. Survey television inspection videos shall be continuous for pipe segments between manholes. Do not leave gaps in the video of a segment between manholes and do not show a single segment in more than one video, unless specifically allowed by the Engineer.

D. Videos shall include audio.

3.07 TELEVISION INSPECTION REPORT: *Delete paragraphs A thru C and replace with the following paragraph A.*

A. Provide a television inspection report in pdf format for each line segment using NASSCO PACP codes. The electronic report shall be named by line segment.

3.10 LASER SCANNING REPORT

A. The Laser Scanning Report shall include the following:

1. Table of contents;
2. Results summary page;
3. Deployment summary and project site photo images;
4. Color coded graphic integrated overview pipe view of corrosion and buildup full inspection length with a 250 linear foot scale;
5. Color coded graphic integrated detailed pipe view of corrosion and buildup length with a 25 linear foot scale;
6. Scaled graph of average pipe diameter corrosion and buildup vs. footage full length;
7. Scaled graph of average pipe diameter corrosion and buildup vs. footage full length by 9:00 position;
8. Scaled graph of average pipe diameter corrosion and buildup vs. footage full length by 10:30 position;
9. Scaled graph of average pipe diameter corrosion and buildup vs. footage full length by 12:00 position;
10. Scaled graph of average pipe diameter corrosion and buildup vs. footage full length by 1:30 position;

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11. Scaled graph of average pipe diameter corrosion and buildup vs. footage full length by 3:00 position;

12. Precision scan view approximately 5 linear foot section color-coded crown view;

13. Precision scan view approximately 5 linear foot section graphical cross section view;

14. Table including measured height, width, calculated ovality and eccentricity; and

15. Signed certification by a PHD of review of data on final report.

3.11 SONAR SENSOR REPORT

A. The Sonar Report shall include the following:

1. Table of contents;

2. Results summary page;

3. Deployment summary & project site photo images;

4. Table of minimum, maximum and average sediment depth in feet;

5. Graph of sediment depth 1,000 linear foot scale depth in feet;

6. Table of minimum, maximum and average sediment depth in percentage of pipe blockage;

7. Graph of average sediment depth 1,000 linear foot scale depth in percentage of pipe blockage;

8. Table of average cleaning concentrations by percentage. Categories none, light, moderate, and heavy cleaning;

9. Table of cleaning concentrations by footage for entire section. Categories none, light, moderate, and heavy cleaning;

10. Graph of cumulative sediment volume over total length of assessment in cubic feet;

11. Color coded graph to show available system capacity, ideal and actual, over the length of the project;

12. Color image of actual high-resolution dwell scan and a processed picture of the sonar image with an overlay of a one-foot grid, actual pipe size and shape, and a

mark of the location of the sonar sensor. For easy evaluation both images shall be on a single page;

13. Table of each dwell scan including scan number, distance, amount of corrosion in inches, ideal thickness of existing pipe, and percentage of corrosion;

14. Table of pipe eccentricity including scan number, distance in feet, major axis ideal inches, minor axis ideal inches, major axis actual inches, minor axis actual inches, eccentricity, and collapse percentage;

15. Virtual 3D modeling fly-through of complete length of pipeline accessed. Software shall be included to allow the Engineer to evaluate the data on a PC computer. Shall have the ability to fly through the inside or outside of the pipe;

16. Where combined TV and sonar imagery is required, the processed output shall display combined TV and sonar images of the sewer being surveyed. The sonar image shall be superimposed on the real TV image, and continuously recorded, as a combined operation;

17. If this is a first inspection of the line, the data shall be provided in a format that will provide a baseline for reference for future inspections. The data shall be complied in a format that will be used for calculating changes in sediment depth, sediment volume, sediment accumulation, changes in build up corrosion rates, and deformation rates when compared to future condition assessments;

18. If this is a follow up inspection, the previously collected baseline data shall be used to compare changes in sediment depth, sediment volume, sediment accumulation, changes in build up corrosion rates, and deformation rates;

19. Sonar reporting detailed description and discussion to include a general overview of the use of sonar in pipeline condition assessment, technical details including frequency, transducer type, beam width, range resolution, minimum detectable range, and sources of error; and

20. Signed certification by a PHD of review of data on final report.

3.12 MEANDER AND INCLINE REPORT

A. The Meander and Incline report shall include the following:

1. Table of contents;

2. Deployment summary and project site photo images;

3. Meander and incline explanation;

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4. Graph of calculated 3D pipe model including relative position in feet, relative meander in feet, and relative incline in feet. The equipment entry point shall be clearly marked on the graph;

5. Graph overhead meander with relative position in feet and relative meander in feet. The equipment entry point shall be clearly marked on the graph;

6. Graph of relative incline vs. relative position. Relative position and relative incline shall both be marked in feet. The equipment entry point shall be clearly marked on the graph;

7. Graph of relative incline vs. payout. Payout and relative incline shall both be marked in feet. The equipment entry point shall be clearly marked on the graph;

8. Graph of relative meander vs. payout. Payout and relative meander shall both be marked in feet. The equipment entry point shall be clearly marked on the graph; and

9. Meander and incline reporting detailed description and discussion to include a general overview of the use of meander and incline in pipeline condition assessment for both the incline and fiber optic gyroscope. The report shall include the technical details including sensor range, resolution, accuracy, transducer type, beam width, range resolution, minimum detectable range, and possible sources of error.

3.13 H_2S GAS SENSOR REPORT

A. The H_2S Gas report shall include the following:

1. Table of contents;

2. Deployment summary and project site photo images;

3. Hydrogen sulfide gas explanation;

4. Graph of average H_2S gas vs. footage;

5. Table including average concentration of H_2S gas in ppm and percentage of pipeline condition assessment with averages over 2.0 ppm;

6. Graph of range of H_2S readings vs. footage;

7. Table to include maximum observed concentration of H_2S gas and percentage of inspected area with maximum H_2S concentrations over 2.0 ppm;

8. If this is a first inspection of the line, the data shall be provided in a format that

will provide a baseline for reference for future inspections. The data shall be complied in a format that will be used for calculating changes in H_2S concentrations when compared to future condition assessments;

9. If this is a follow up inspection, the previously collected baseline data shall be used to compare changes in H_2S concentrations; and

10. Hydrogen sulfide reporting detailed description and discussion to include a general overview of the use of H_2S sensors in pipeline condition assessment, technical details including sensor dynamic range, measurement resolution, measurement accuracy, and sources of error.

3.14 TEMPERATURE SENSOR REPORT

A. The Temperature report shall include the following:

1. Table of temperature in ½ degree increments over footage;

2. If this is a first inspection of the line, the data shall be provided in a format that will provide a baseline for reference for future inspections. The data shall be complied in a format that will be used for calculating changes in temperature when compared to future condition assessments; and

3. If this is a follow up inspection, the previously collected baseline data shall be used to compare changes in temperature.

3.15 MEASUREMENT & REPORTING OF ELEVATIONS & DEPTH

A. The measurement of x, y & z coordinates at manhole rim and sanitary sewer flow line elevations at the manholes shall be performed to the following accuracy:

1. X/Y Coordinates: +/- 1 ft.

2. Elevation: +/- 2 in.

B. The coordinates shall be submitted in the following formats:

1. Appropriate ESRI approved file structure which can be uploaded to City of Houston GIS to create plans & cross-views.

2. Tabular form in the access database for sanitary sewer segments from upstream to downstream including each manhole with the City of Houston alphanumeric name and the measured x, y, z coordinates at manhole rim, depth of the manhole and sanitary sewers tied to the manhole.

END OF SUPPLEMENT

SUPPLEMENT

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