INTERLOCAL COOPERATION CONTRACT

THE STATE OF TEXAS
COUNTY OF TARRANT

This Interlocal Cooperation Contract (this "Contract") is entered into by and between the Contracting Parties shown below pursuant to authority granted in and in compliance with the *Interlocal Cooperation Act, Chapter 791, Texas Government Code.*

I. Findings:

Each party finds that the subject of this Contract is necessary for the benefit of the public and that each has the legal authority to perform and to provide the government functions or services which are the subject matter of this Contract; and

Each party finds that the performance of this Contract is in its common interest and that the division or payment of costs fairly compensates the Performing Party for the services or functions under this Contract; and

II. Contracting Parties:

The Receiving Party: City of Coppell, TX (sometimes "Receiving Party" or "City"), a local government of the State of Texas:

Mike Garza
City of Coppell, TX
Assistant Director of Public Works – Operations
816 S. Coppell Rd.
Coppell, TX. 75019
Email: MGarza@coppelltx.gov

The Performing Party: The University of Texas at Arlington (sometimes "UTA" or "University" or "Performing Party"), a State University of Higher Education established under the laws of the State of Texas as an institution of the University of Texas System:

Programmatic Matters:

Ali Abolmaali, P.E., Ph.D.
Professor and Department Chair
Dept. of Civil Engineering
UTA Box 19308
Arlington, TX 76019
Tel. 817-272-5055 Fax. 817-272-2630
Email: abolmaali@uta.edu

Agreement terms and all other matters:

Jeremy Forsberg
Assistant Vice President for Research
The University of Texas at Arlington
701 S. Nedderman Drive
Box 19145
Arlington, TX 76019-0145

III. Statement of Research Services to be Performed

Performing Party will perform inspections of City of Coppell sewer/gravity pipelines including data analysis and determination of remaining service life, and other related projects (sometimes "Research Services") as are necessary to meet the research goals described briefly below, and enumerated more fully in Exhibit A, from and after [start date]**.**

The City staff desires to define the scope of work for a Sewer Condition Assessment Program. Dr. Abolmaali will lead the project as described in Exhibit "A".

The primary deliverables for this project will be as described in Exhibit "A". University will use reasonable efforts and its own and contracted facilities and equipment to perform Services and deliver deliverables. University does not guarantee specific results.

IV. Contract Amount

The total amount of this Contract is the fixed amount of Eight Hundred Ninety-Five Thousand, One Hundred Fifty and 00/100 Dollars ($895,150).

V. Payment of Services

Billing invoices shall be sent to Receiving Party care of the email addresses in Section I. Receiving Party will remit payments to Performing Party for Services in the fixed amount noted in III above, and as per the payment schedule in Exhibit B.

VI. Warranties

Performing Party warrants that (1) it has authority to perform the Research Services under authority granted in Section 65.31, *Texas Education Code* and Chapter 791, *Texas Government Code;* (2) it has all necessary power and has received all necessary approvals to execute and deliver this Contract; and (3) the representative signing this Contract on its behalf is authorized by its governing body to sign this Contract.

Receiving Party warrants that (1) the Research Services are necessary and authorized for activities that are properly within its statutory functions and programs; (2) it has the authority to contract for the Research Services under authority granted in Chapter 791, *Texas Government Code*; (3) it has all necessary power and has received all necessary

approvals to execute and deliver this Contract; and (4) the representative signing this Contract on its behalf is authorized by its governing body to sign this Contract.

VII. Term of the Agreement (“Term”)

This Agreement is effective as of [start date] ("Effective Date") and shall terminate on [end date].

VIII. Termination

In the event of a material failure by a Contracting Party to perform its duties and obligations in accordance with the terms of this Contract, the other party may terminate this Contract upon sixty (60) days’ advance written notice of termination setting forth the nature of the material failure; provided that, the material failure is through no fault of the terminating party. The termination will not be effective if the material failure is fully cured prior to the end of the 60 day period.

UTA shall be compensated in accordance with the terms of this Contract for all work accomplished prior to the receipt of notice of such termination, and for such other Research Services (if any) provided during the notice period reasonably necessary to terminate this Contract, and any noncancellable expenses for Research Services accrued prior to termination, including all reasonable expenses incurred or committed to be expended as of the effective termination date. UTA shall invoice the City for all such items within sixty (60) of the termination notice. Upon termination, the Performing Party shall provide the Receiving Party with any and all inspection data and analysis performed for which compensation has been received by the Performing Party.

IX Notices

All notices, communications and reports required or permitted under this Contract shall be personally delivered or mailed to the respective parties by depositing same in the United States mail, postage prepaid, at the addresses shown below, unless and until either party is otherwise notified in writing by the other party, at the following addresses. Mailed notices shall be deemed communicated as of actual receipt.

If intended for City, to:

Name:	Mike Garza
Title:	Assistant Director of Public Works
Address:	816 S. Coppell Rd., Coppell Tx, 75019
Tel.:	972-304-3681
Cell:	469-964-4656
Email:	mgarza@coppelltx.gov

If intended for UTA, to:

Jeremy Forsberg
Assistant Vice President for Research
The University of Texas at Arlington
701 S. Nedderman Drive, Box 19145
Arlington, TX 76019-0145

IX. Ownership of Deliverables

Party recognizes that under University's academic policy, the results of any research project must be publishable. Accordingly, University and City agree that the individuals engaged in the Research Services or the Contract on behalf of their respective Party, shall be permitted to present at symposia, national and international, or regional professional meetings, and to publish in journals, theses or dissertations, or otherwise of their own choosing, methods and results of the Research Services or the Contract, as per usual and customary academic custom. Under University policy, University investigators such as its designated faculty for a project own copyright in their scholarly works.

City and University agree that Research Services and Contract deliverables (other than University intellectual property and UTA faculty copyrights in scholarly works) delivered to City by University in connection with this Agreement are hereby assigned to City, to use in any manner City sees fit. UTA shall have no liability for changes made to any materials or other documents by others subsequent to the completion of the Research Services or the Contract. City grants to the University a perpetual, non-exclusive, worldwide, royalty-free, fully paid up license to use, copy, modify, and create derivative works of the statement of work for the Research Services or the Contract, the results of the Research Services or the Contract, and any reports, publications or other materials or work product (excluding scholarly works, which copyright is owned by the University principal investigators) created or developed-with funding from City, for the University's educational and research purposes and missions, and any other lawful purpose. University retains all its other rights as per usual and customary academic practice, including, subject to the rights of the City herein to use deliverables as City sees fit, University commercialization of University intellectual property (if any).

X. OTHER PROVISIONS:

a. Insurance

UTA is an agency of the State of Texas and as such does not purchase certain insurance policies. Employees of UTA are provided worker's compensation insurance coverage under a self-insured, self-managed program as authorized by the Texas Labor Code, Chapter 503. UTA purchases automobile liability insurance for all UTA owned, hired, and non-owned vehicles with limits of $250,000 per person and $500,000 per accident for bodily injury and $100,000 for property damage. These damage limits are set by the Texas Tort Claims Act (the "Act"), Chapter 101 of the Texas Civil Practice and Remedies Code. UTA does not purchase general liability or employer's liability insurance for its general operations. However, the Act does provide a limited waiver of the State's

sovereign immunity. The Act may provide a remedy for claimants who make tort claims that fall under its provisions. These claims fall into two general categories: (i) injuries arising out of use of publicly owned motor vehicles and motor-driven equipment and (ii) injuries arising out of conditions or use of property. UTA's liability is limited under the Act. Liability in cases of personal injuries or death is limited to a maximum amount of $250,000 per person and $500,000 for each single occurrence. The maximum amount of liability for injury to or destruction of property is $100,000 for each single occurrence.

b. Venue; Governing Law.

[UTA also offers an OPTION FOR SILENCE ON VENUE: Tarrant County, Texas shall be the proper place of venue for suit on or in respect of this Contract]. This Contract and all of the rights and obligations of the parties hereto and all of the terms and conditions hereof shall be construed, interpreted and applied in accordance with and governed by and enforced under the laws of the State of Texas.

c. Entire Agreement; Modifications.

This Contract supersedes all prior agreements, written or oral, between City and UTA and shall constitute the entire agreement and understanding between the parties with respect to the subject matter hereof. This Contract and each of its provisions shall be binding upon the parties and may not be waived, modified, amended or altered except by a writing signed by UTA and City.

d. Loss of Funding.

Performance by a Contracting Party of its duties and obligations under this Contract may be dependent upon the appropriation and allotment of funds by the Texas State Legislature (the "Legislature") and/or allocation of funds by that Contracting Party's governing board. If the Legislature fails to appropriate or allot the necessary funds to a Contracting Party, or a Contracting Party's governing board fails to allocate the necessary funds, then the Contracting Party that loses funding may terminate this Contract without further duty or obligation under this Contract.

e. Assignment.

UTA has or will have commitments from multiple third parties such as vendors and contractors or consultants, or subcontractors, to assist UTA to accomplish the Research Services, and UTA may use or contract with these third parties under UTA direction and at UTA's sole and reasonably exercised discretion.

f. Severability.

If any one or more of the provisions contained in this Contract shall for any reason be held to be invalid, illegal, or unenforceable in any respect, such invalidity, illegality or unenforceability shall not affect any other provision thereof, and this Contract shall be construed as if such invalid, illegal, or unenforceable provision had never been contained therein.

Executed effective as of the Effective Date by the following duly authorized representatives of the Contracting Parties:

Receiving Party City of Coppell	Performing Party The University of Texas at Arlington
By: _____	By: _____
Name: _____	Name: _____
Title: _____	Title: _____
Date: _____	Date: _____
ATTEST:	APPROVED AS TO FORM:
_____	BY:_____

EXHIBIT A

MULTI-SENSOR INSPECTION AND REMAINING SERVICE LIFE DETERMINATION OF SEWER PIPE SYSTEM

For the City of Coppell

Submitted to:

Mike Garza
City of Coppell, TX
Assistant Director of Public Works – Operations
816 S. Coppell Rd.
Coppell, TX. 75019
Email: MGarza@coppelltx.gov

Principal Investigators:
Ali Abolmaali, Ph.D., P.E.

Co- Principal Investigators:
Arash Emami Saleh, Ph.D.
Faculty Research Associate, Center for Structural Engineering Research/Simulation and Pipeline Inspection

Maziar Mahdavi, Ph.D.
Faculty Research Associate, Center for Structural Engineering Research/Simulation and Pipeline Inspection

Center for Structural Engineering Research/Simulation and Pipeline Inspection at the University of Texas Arlington

April 6, 2020

SCOPE OF WORK

This proposal defines the scope of work to perform the inspection for 149,000 ft. and determine the remaining service life for 20,000 ft. of sewer Pipe system for the City of Coppell. The inspection will be performed for the total length of project including 36,000 ft. of maximum 12 in. diameter, 20,000 ft. of maximum 18 in. diameter and 93,000 ft. of maximum 48 in. diameter which will be inspected based on proposal ,submitted by RedZone Robotics as an appendix to this proposal.

For the current task order (number 1), The remaining service life analysis will be performed for 20,000 ft. of the total inspected sewer pipe system. This length will be part of the 93,000 ft. of maximum 48in. diameter, which will be inspected by RedZone using CCTV/Sonar/Laser MSI.

1. **RedZone Robotics** will perform the inspection. which will allow for an accurate assessment and dimensional information that can be used on the evaluation of the general condition, defects, debris amounts and quantity, dimensional information, and conditions as a baseline for any current or future program. Details of the inspection and equipment are mentioned in RedZone Robotics proposal.

2. **RedZone Robotics** will document Condition Rating of all length of the project (149,000 ft.) based on WEF/ASCE (2009) and [NASSCO, 2015] according to their proposal.

3. **RedZone Robotics** Will deliver CCTV and Condition Rating assessments using ICOM Asset Management Software Program.

4. **UTA** will conduct **S**canning **E**lectron **M**icroscope (SEM) laboratory testing for service life prediction which involves relating the chemistry of the cored samples to their strength. 10 core samples will be taken for each mile of the project, with maximum 40 cored samples for total 20,000 ft.

5. **UTA** will develop an **A**rtificial **I**ntelligence **D**egradation Model for service lifetime prediction of sewer pipelines through a performance function that describes the failure state of a pipeline overtime, which will be formed by considering the residual capacity or resistance of the pipeline and the loading effect as a function of time.

I. Introduction

The City of Coppell has identified 149,000 ft. including three different diameter range segments of sanitary sewer (36,000 ft. of maximum 12 in. diameter, 20,000 ft. of maximum 18 in. diameter and 93,000 ft. of maximum 48 in. diameter) that require inspection, condition assessment, and service life prediction. RedZone Robotics will perform the inspection based on their proposal, Attached as an appendix.

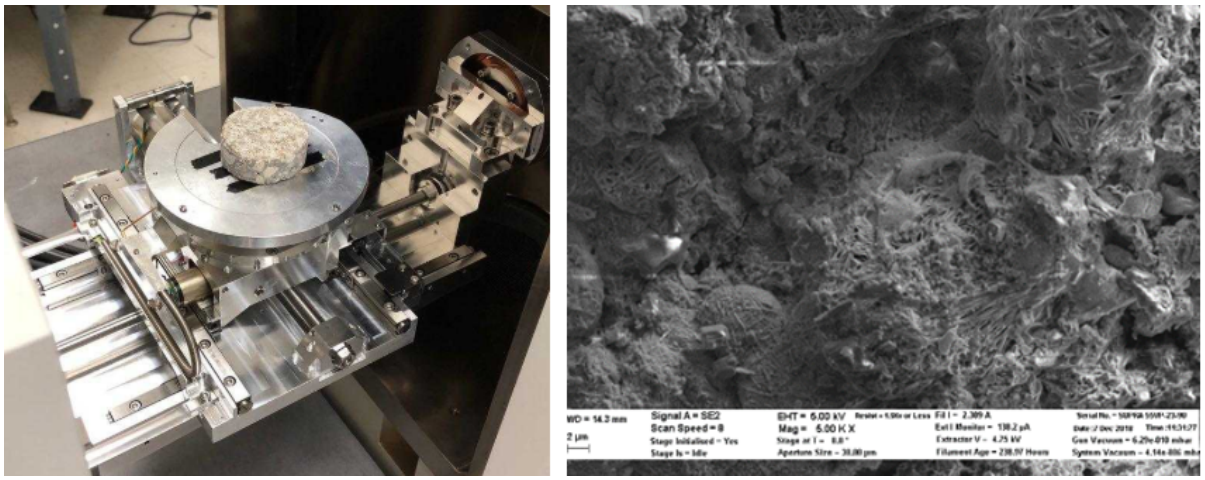
The remaining service life analysis will be performed for 20,000 ft. of the total inspected sewer pipe system. This length will be part of the 93,000 ft. of maximum 48in. diameter, which will be inspected using CCTV/Sonar/Laser MSI.

II. RedZone Robotics Sewer Condition Assessment

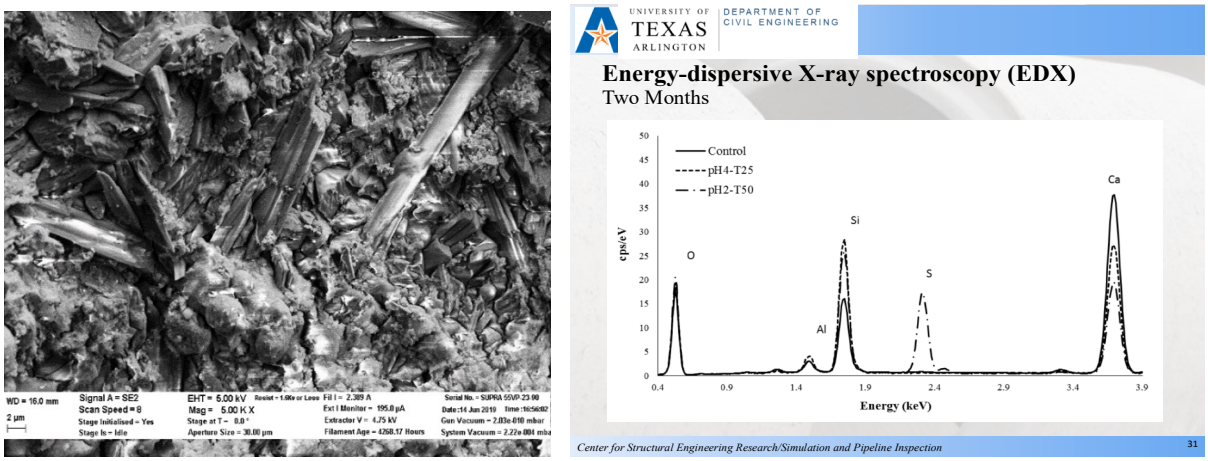
RedZone Robotics will perform the inspection and report the results cased on their proposal, Attached as an appendix.

III. Determination of Service Life by Scanning Electron Microscope (UTA)

10 cored samples for each mile will be obtained for SEM analyses. The total length for service life prediction is 20,000 ft. for this task order (number 1) so the maximum number of the cores will be 40. The SEM can identify the material chemistry of aged samples. The chemistry of cored samples will be compared with chemistry of new pipe martials and the level of degradation will be determined by relating the chemistry to the strength. Figure 1 shows typical microscopic view and chemical properties of a cored sample analyzed by SEM. The City of Coppell will be responsible for all excavation, site restoration and patching of the sewer pipes system required for core sampling.



(a)



(b)

Figure 1. (a) Sample preparation and SEM performance. (b) Sample results of SEM chemical analysis

IV. Determination of Service Life by Artificial Intelligence Degradation Model (UTA)

Deterioration models, based upon artificial intelligence and data-driven category approach, will also be used for the remaining service life determination of sewer pipes in the City of Coppell. In other words, the construction of the model is based upon the available data (procured from inspections) as opposed to model-driven approaches (i.e. deterministic and statistical models). This is because artificial intelligence approach is essentially designed to operate based on learning through improving and generalization, similar to learning pertaining to human brain.

Due to the inherent learning and improving feature of artificial intelligence technique, numerous applications of this approach within various engineering areas have been observed, wherein the patterns between the inputs and the outputs (in other words, independent variables and the outcomes) are identified through this characteristic of artificial intelligence and eventually the classifications are allocated based on the observed patterns.

The case-based reasoning (CBR) is an artificial intelligence method which will be used to model the deterioration of sewer pipes in the City of Coppell. We will employ case-based reasoning, which is essentially a modeling technique based on the field data.

Initial data acquisition will be provided by RedZone through application of robotic inspection of sewer pipes. The selected sewer pipes based on this inspection have a total length of approximately 20,000 ft. Once the initial data is recorded using the aforementioned inspection equipment, through

post-processing at UTA, the previously stated quantities such as loss of thickness, loss of strength, aged material chemistry, wall thickness, and other related parameters will be determined. Other observations such as root intrusions, visually visible cracks, holes, fractures, etc. will be inspected and reported.

In addition, the rating condition of the sewer pipes will be documented and submitted to the City of Coppell. Pipeline Assessment and Certification Program (PACP) assists with condition rating of sewer pipes through categorization of defects in details. Once the sewer pipe defects are identified, the grading will be assigned. Depending upon the severity of defects, etc., the gradings can vary from 1 to 5. For each of these condition gradings, the following descriptions will be applied [NASSCO, 2015]:

- *Grade 1*: A defect with condition rating of 1 demonstrates a minor defect present in the pipe
- *Grade 2*: A defect with condition rating of 2 demonstrates a minor to moderate defect
- *Grade 3*: A defect with condition rating of 3 demonstrates a moderate defect
- *Grade 4*: A defect with condition rating of 4 demonstrates a significant defect
- *Grade 5*: A defect with condition rating of 5 demonstrates a highly significant defect within the pipe

Furthermore, the defects are categorized in two major groups; these categories are as follows:

- Structural defects
- O&M defects

For example, fractures are categorized as structural defects [NASSCO, 2015]:

- Longitudinal fractures (structural score of 3)
- Circumferential fractures (structural score of 2)
- Multiple fractures (structural score of 4)
- Spiral fractures (structural score of 3)

And examples of O&M defects [NASSCO, 2015] are:

- Roots medium barrel (O&M score of 4)
- Roots medium connection (O&M score of 3)

- Roots medium joint (O&M score of 3)
- Roots large barrel (O&M score of 5)
- Roots large connection (O&M score of 4)
- Roots large joint (O&M score of 4)

V. Schedule

The final report including inspection results and determination of service life for the phase scoped is anticipated to be completed and submitted on or before August 31, 2020, figuring around one hundred twenty (120) days from the effective date of a fully executed agreement between UTA and the City of Coppell, with full execution of an agreement anticipated on or about April 14, 2020. UTA will have independently retained RedZone to assist UTA to accomplish the Research Services as more fully noted in Section X, titled Assignment, of a UTA- City Interlocal Cooperation Contract, also anticipated on or about April 14, 2020. Remaining analysis phases as projected and if any TBD within the next year, and beginning after August 31, 2020.

VI. Budget

The budget for this project through August 31, 2020 is shown in Table 1.

Table 1. Budget information

	Item	Price
1.	Inspection and Data Report by RedZone	$765,150
2	UTA Service Life Determination and Report (UTA)	$130,000
	Estimated Total Budget	**$895,150**

Note: The cost excavation, site restoration and patching of the sewer pipes system required for core sampling is not included in the budget. UTA invoicing and payment terms are on the next page. All other terms of the proposed Interlocal Cooperation Contract between UTA and the City (effective

date TBD, anticipated on or about April 14, 2020) ("Contract") are incorporated by reference as if fully set out.

VII. List of Deliverables:

1. NASSCO PACP CCTV report and videos (Deliverable by RedZone to UTA)
2. Corrosion and ovality/ deflection measurements from the laser
3. Debris volumes and measurements from the sonar
4. Water levels from the inspection
5. MSI color graph of corrosion/debris
6. Comprehensive report on remaining service life estimation and condition assessment
7. Recommendations concerning rehabilitation of the lines

PAYMENT TERMS

UTA will bill Receiving Party for Research Services an amount of Eight Hundred Thousand, One Hundred Fifty and 00/100 Dollars ($895,150), in two lump sum payments. The City will pay 50% of the total cost upon receiving the preliminary MIS reports from the initial line inspection. The City will pay the remaining 50% upon receiving the final deliverables identified from UTA. **Please note that while all components of this project are budgeted as a fixed rate amount, they are subject to change should additional deliverables or services be requested other than those mentioned within the scope of the Research Services, such as cost of coring the samples not included in the budget noted above.**

Within thirty (30) days of receipt of an invoice, City shall make payment in the amount shown by University's invoice. Checks must be made payable to The University of Texas at Arlington, referencing the Principal Investigator and Project Services title. The payments shall be submitted to: The University of Texas at Arlington, 219 West Main Street, Box 19136, Arlington, TX 76019-0136 (Attn: Grant and Contract Accounting).