



REQUEST FOR PROPOSALS (RFP)

Enhancing Collection Systems Integrity with Application of Emerging Assessment and Renewal Methods (5240)

Date Posted

Monday, September 11, 2023

Due Date

Proposals must be received by 3:00 pm Mountain Time on Tuesday, November 14, 2023

WRF Project Contact

Jian Zhang, PhD, PE, jzhang@waterrf.org

Project Sponsors

This project is funded by The Water Research Foundation (WRF) as part of WRF's Research Priority Program.

Project Objectives

This project will identify state-of-the-art emerging condition assessment methods and innovative renewal technologies. It will focus on advanced techniques from physics-based models and analytical techniques to Artificial Intelligence/Machine Learning (AI/ML) technologies with a specific focus on collection systems integrity.

Budget

Applicants may request up to \$150,000 in WRF funds for this project.

Background and Project Rationale

Maintaining wastewater and stormwater infrastructure is essential to a utility's mission to provide safe conveyance and treatment of wastewater for protection of public health and the environment. Much of the nation's wastewater and stormwater infrastructure has served the public for many years—even beyond its intended lifetime in many older communities—and it has the potential of continuing to do so if its defects, such as fissures and erosion, are identified and addressed well before the point of structural failure. Critical to effectively addressing problems are (a) the ability to identify and prioritize vulnerable areas in collection systems to conduct targeted, timely, low-cost reliable condition assessments and (b) the availability of affordable renewal technologies.

Advances in materials science and sensing technologies have the potential to greatly enhance infrastructure assessment and renewal through novel applications such as self-healing concrete and embedded fluorophores that can "light up" upon release from the pipe interior triggered

by pipe wall deterioration. Another example is the use of fiber optics as sensors in detecting pipe deterioration. While promising, there is presently no robust linkage between the research community and utilities to align their efforts. The development of innovative condition assessment and renewal technologies should result in the creation of new, cost-effective tools for strategic asset management. Helping utilities identify and evaluate these emerging technologies will allow them to utilize these technological advancements. Condition assessment technologies now employ advanced mechanisms and systems (e.g., digital imaging, acoustics, and fiber optics) that are pushing the inspection of sewers beyond traditional methods such as Closed-Circuit Television (CCTV). The demonstration and evaluation of these emerging assessment methods and renewal technologies would be beneficial to utilities in the long run and will lead to enhanced collection system integrity. Specifically, a summary of advancements of assessment and renewal technologies and practices over the past decade in collection systems' applications is needed.

Not all utilities are well aware of the most vulnerable areas of their collection system and therefore have no insights on where some of the promising available assessment technologies might be deployed for more cost effective and targeted results. As a result, there is a need for research into systemwide assessment methods that identify and prioritize areas in the collection system for targeted assessment. There has been innovative work that combines pipe attributes—including material types, flows, geologic setting, age, and available pipe failure records—to develop AI/ML models and provide guidance. A review of the most promising approaches in this area is another needed area of research.

Research Approach

The following approach is intended as a starting point. Proposers are encouraged to develop their own research approach with creativity and originality. Proposers should describe how they will conduct the research to meet the objectives listed above.

- Comprehensive literature review (focusing on emerging assessment and renewal methods)
- Utility surveys
- Collecting relevant case studies
- Workshops attended by utility staff and industry participants
- Synthesis document including case studies
 - Existing techniques/established technologies will be included to provide a basis for comparison to the new/emerging technologies
 - Newer techniques/technologies will be described relative to their ability to expand the understanding of and to improve collection system conditions together with a comparison of cost to more established technologies

Expected Deliverables

- Utility-facing synthesis document, including utility survey results and case studies
- Virtual webinars
- Summary of future research needs and preliminary concepts

Communication Plan

Please review WRF's *Project Deliverable Guidelines* for information on preparing a communication plan. The guidelines are available at <https://www.waterrf.org/project-report-guidelines#project-deliverable-guidelines>. Conference presentations, webcasts, peer-reviewed publication submissions, and other forms of project information dissemination are typically encouraged.

Project Duration

The anticipated period of performance for this project is 18 to 24 months from the contract start date.

References and Resources (Optional)

The following list includes examples of research reports, tools, and other resources that may be helpful to proposers. It is not intended to be comprehensive, nor is it a required list for consideration.

- Kumar, S., and D. Abraham. 2020. *Leveraging Big-Data and Deep Learning for Economical Condition Assessment of Wastewater Pipelines*. Project 4902. Denver, CO: The Water Research Foundation.
- Martel, K., M. E. Tuccillo, and C. Feeney. 2011. *Field Demonstration of Condition Assessment Technologies for Wastewater Collection Systems*. EPA/600/R-11/078. Washington, DC: US Environmental Protection Agency.
https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=236900
- T. Y. -J. Chen, and S. D. Guikema. 2020. Prediction of water main failures with the spatial clustering of breaks. *Reliability Engineering & System Safety*, 203: 107108. <https://doi.org/10.1016/j.ress.2020.107108>

Proposal Evaluation Criteria

The following criteria will be used to evaluate proposals:

- Understanding the Problem and Responsiveness to RFP (maximum 20 points)
- Technical and Scientific Merit (maximum 30 points)
- Qualifications, Capabilities, and Management (maximum 15 points)
- Communication Plan, Deliverables, and Applicability (maximum 20 points)
- Budget and Schedule (maximum 15 points)

PROPOSAL PREPARATION INSTRUCTIONS

Proposals submitted in response to this RFP must be prepared in accordance with WRF's *Guidelines for Research Priority Program Proposals*. The current version of these guidelines and the *Instructions for Budget Preparation* are available at <https://www.waterrf.org/proposal-guidelines>. The guidelines contain instructions for the technical aspects, financial statements, indirect costs, and administrative requirements that the applicant must follow when preparing a proposal.

Proposals that include the production of web- or software-based tools, such as websites, Excel spreadsheets, Access databases, etc., must follow the criteria outlined for web tools presented in the *Web Tool Criteria and Feasibility Study for The Water Research Foundation Project Deliverables* at <https://www.waterrf.org/project-report-guidelines#webtool-criteria>.

Eligibility to Submit Proposals

Proposals will be accepted from both U.S.-based and non-U.S.-based entities, including educational institutions, research organizations, governmental agencies, and consultants or other for-profit entities. WRF's Board of Directors has established a Timeliness Policy that addresses researcher adherence to the project schedule. The policy can be reviewed at <https://www.waterrf.org/policies>. Researchers who are late on any ongoing WRF-sponsored studies without approved no-cost extensions are not eligible to be named participants in any proposals. Direct any questions about eligibility to the WRF project contact listed at the top of this RFP.

Administrative, Cost, and Audit Standards

WRF's research program standards for administrative, cost, and audit compliance are based upon, and comply with, Office of Management and Budget (OMB) Uniform Grants Guidance (UGG), 2 CFR Part 200 Uniform Administrative Requirements, Cost Principles, and Audit Requirements for Federal Awards, and 48 CFR 31.2 Contracts with Commercial Organizations. These standards are referenced in WRF's *Guidelines for Research Priority Program Proposals*, and include specific guidelines outlining the requirements for indirect cost negotiation agreements, financial statements, and the Statement of Direct Labor, Fringe Benefits, and General Overhead. Inclusion of indirect costs must be substantiated by a negotiated agreement or appropriate Statement of Direct Labor, Fringe Benefits, and General Overhead. Well in advance of preparing the proposal, your research and financial staff should review the detailed instructions included in WRF's *Guidelines for Research Priority Program Proposals* and consult the *Instructions for Budget Preparation*, both available at <https://www.waterrf.org/proposal-guidelines>.

Budget and Funding Information

The maximum funding available from WRF for this project is \$150,000. The applicant must contribute additional resources equivalent to at least 33% of the project award. For example, if an applicant requests \$100,000 from WRF, an additional \$33,000 or more must be contributed by the applicant. Acceptable forms of applicant contribution include cost share, applicant in-

kind, or third-party in-kind that comply with 2 CFR Part 200.306 cost sharing or matching. The applicant may elect to contribute more than 33% to the project, but the maximum WRF funding available remains fixed at \$150,000. Proposals that do not meet the minimum 33% of the project award will not be accepted. Consult the *Instructions for Budget Preparation* available at <https://www.waterrf.org/proposal-guidelines#RPP-instr-budget-prep> for more information and definitions of terms.

Period of Performance

It is WRF's policy to negotiate a reasonable schedule for each research project. Once this schedule is established, WRF and its sub-recipients have a contractual obligation to adhere to the agreed-upon schedule. Under WRF's No-Cost Extension Policy, a project schedule cannot be extended more than nine months beyond the original contracted schedule, regardless of the number of extensions granted. The policy can be reviewed at <https://www.waterrf.org/policies>.

Utility and Organization Participation

WRF encourages participation from water utilities and other organizations in WRF research. Participation can occur in a variety of ways, including direct participation, in-kind contributions, or in-kind services. To facilitate their participation, WRF has provided contact information, on the last page of this RFP, of utilities and other organizations that have indicated an interest in this research. Proposers are responsible for negotiating utility and organization participation in their particular proposals. The listed utilities and organizations are under no obligation to participate, and the proposer is not obligated to include them in their particular proposal.

Application Procedure and Deadline

Proposals are accepted exclusively online in PDF format, and they must be fully submitted before 3:00 pm Mountain Time on Tuesday, November 14, 2023.

The online proposal system allows submission of your documents until the date and time stated in this RFP. To avoid the risk of the system closing before you press the submit button, do not wait until the last minute to complete your submission. Submit your proposal at <https://forms.waterrf.org/cbruck/rfp-5240>.

Questions to clarify the intent of this RFP and WRF's administrative, cost, and financial requirements may be addressed to the WRF project contact, Dr. Jian Zhang at 303.347.6114 or jzhang@waterrf.org. Questions related to proposal submittal through the online system may be addressed to Caroline Bruck at 303.347.6118 or cbruck@waterrf.org.

5240 Utility and Organization Participants

The following utilities have indicated interest in possible participation in this research. This information is updated within 24 business hours after a utility or an interested organization submits a volunteer form, and this RFP will be re-posted with the new information. **(Depending on your settings, you may need to click refresh on your browser to load the latest file.**

Brian Jo

Engineer
City of Toronto
55 John St.
Toronto, ON M5V 3C6
647.272.2496
brian.jo@toronto.ca
Canada

Keisha Thorpe

Chief Operations Officer
Clayton County Water Authority
1600 Battle Creek Road
Morrow, GA 30260
(770) 960-5217
keisha.thorpe@ccwa.us
USA

Xiongfei Xie

Senior Engineer
Hillsborough County Water Resources Dept.
925 East Twiggs St.
Tampa, FL 33602
813.635.7392
xiex@hillsboroughcounty.org
USA

John Norton

Director of Energy, Research, and
Innovation
Great Lakes Water Authority
735 Randolph St., Suite 1101
Detroit, MI 48226
313.400.2553
john.norton@glwater.org
USA

Benjamin Yoakum

Project Manager, Research & Innovation
Orange County Utilities
9150 Curry Ford Rd
Orlando, FL 32825
689.258.2361
benjamin.yoakum@ocfl.net
USA