

**DRAFT SCOPE (10/31/18)**  
**LEE'S SUMMIT WATER TRANSMISSION, LARGE DIAMETER SEWERS,  
AND FORCE MAIN CONDITION ASSESSMENT AND MANAGEMENT  
PROGRAM – PHASE 1 SUPPORT  
CITY OF LEE'S SUMMIT**

**SCOPE OF SERVICES**

This scope of services describes the work to be performed by HDR on behalf of the City of Lee's Summit for the Water Transmission, Large Diameter Sewers, and Force Main Condition Assessment and Management Program.

The Lee's Summit Water Utilities Department has identified 45 miles of water and sewer pipelines that could cause significant impacts to the community and existing infrastructure if a failure occurred. The City desires to develop a management program for these pipelines, including assessing the condition of a portion of these pipelines. Condition assessments will focus on the highest consequence of failures lines, and establishing a representative sample of the condition of other pipelines. This program is anticipated to be executed in the following phases:

- Phase 1 (2018 – 2020)
  - Phase 1A – Program Planning and Development (December 2018 – June 2019)
  - Phase 1B – Phase 1 Pipelines Condition Assessment and Evaluation (January 2019 – June 2020)
  - Phase 1C – Phase 1 Final Report and Phase 2 Program Planning (January 2020 – December 2020)
- Phase 2 (2021 – 2022) – Phase 2 Pipelines Condition Assessment & Evaluation, to be completed in 2021 and 2022.
- Phase 3 (After 2022) – Future Pipelines Condition Assessment & Evaluations, to be completed post 2022.

This scope describes HDR's services to be provided for Phase 1A Program Planning and Development (Tasks 1-3) and Phase 1C Final Report and Phase 2 Program Planning (Task 7). This scope also includes portions of the anticipated work to be included in Phase 1B Pipelines Condition Assessment and Evaluation. This condition assessment work in this scope includes:

- Condition assessment services for the Water Transmission Main from Independence
- Condition assessment services for the Tudor Road and Scruggs Road Force Mains
- Condition assessment services for the sewers under Lakewood Lake

This scope of services does not include support for additional condition assessment activities that are anticipated to occur in Phase 1B that are not described in this scope. The scope of these activities will be determined based on the results of the work



### ***TASK 1 – System Evaluation and Pipeline Prioritization***

This task will focus on evaluation of the City’s pipelines and development of a risk-based prioritization of the pipelines. The outcome of this task will be a prioritized ranking of pipelines assets by risk based on consequence and likelihood of failure factors (COF and LOF). The results of the prioritization will be used to help determine the lines included in the upcoming condition assessment efforts and to inform other programmatic efforts. This task will also include a documentation of known problem areas within the system and operational considerations and constraints, as well as a workshop to review the City’s corrosion issues and review potential long term approaches to corrosion management.

#### **Services Provided by HDR:**

1. Compile and review City provided pipeline data including GIS mapping, as-built information, and past pipeline break and repair data. Develop inventory of pipe assets to be included in project.
  - a. Review asset data for completeness and identify any significant gaps.
  - b. Develop enhanced GIS project mapping of pipelines included in program.
2. Conduct Project Kickoff Meeting with members of HDR and City management team.
3. Develop preliminary pipeline criticality (COF and LOF) and risk prioritization criteria for City review during workshops.
4. Prepare for and conduct Pipeline Prioritization Workshops with City. The workshops topics are anticipated to include, but not be limited to:
  - a. Known history of each line segment including any past failures or performance issues, part renewal work and other improvement projects.
  - b. System wide and pipeline specific operational concerns and constraints.
  - c. Small diameter pipeline failure “hot spots” which many inform prioritization efforts.
  - d. Consequence and likelihood of failure rating system approaches.
  - e. Data on historical pipeline failure rates that may inform prioritization.
  - f. Available soil data mapping and its potential uses in identifying relative risks of corrosion.
5. Document key workshop findings.
6. Review City standard details and specifications for new pipeline construction and corrosion protection for new and existing pipelines. Document comments and recommendations.
7. Prepare for and conduct Corrosion Management Workshops with City. The workshops topics are anticipated to include, but not be limited to:
  - a. Historical City corrosion issues, and reactive and proactive efforts to address corrosion.
  - b. Corrosive potential of soils based on local soil data.
  - c. Approaches to corrosion protection and corrosion management programs.
8. Update project mapping with enhancements to document known issues, identify system corrosion hot spots, key appurtenances.
9. Finalize pipeline COF and LOF factors and risk-based prioritization.
10. Develop Draft System Evaluation and Pipeline Prioritization Technical Memorandum (TM).

11. Conduct review meeting with City to gather comments and input on Draft TM.
12. Submit Final System Evaluation and Pipeline Prioritization TM.

**Deliverables:**

System Evaluation and Pipeline Prioritization TM  
Prioritization of Pipelines

**Meetings:**

Project Kickoff Meeting  
Pipeline Prioritization Workshops  
Corrosion Management Workshops  
TM Review Meeting

***TASK 2 – Condition Assessment and Management Program Planning***

This task will focus on development of the condition assessment and management program plan. A detailed evaluation of the high priority pipelines that may be included in Phase 1 and Phase 2 of the program will be completed. This will include establishing recommended technology platforms for condition assessment, evaluating access needs and operational constraints, construction needs, and development of planning level costs to complete the condition assessments.

The results of this evaluation will be used to define the pipelines that will be included in Phase 1 of the program. Pipelines anticipated to be included in Phase 2 and Phase 3 will also be determined. A Pipeline Condition Assessment and Management Program Plan will be developed; this plan will be a flexible document that will be updated in Task 4, based on the findings of the Phase 1 condition assessments.

**Services Provided by HDR:**

1. Provide recommendations to City on pipelines to assess for inclusion in Phase 1 and Phase 2 of the program. After City concurrence, define pipelines to be included in detailed condition assessment planning. Up to 12 pipelines are assumed to be evaluated.
2. Complete detailed evaluation of each Phase 1 and Phase 2 pipeline candidate, including the following:
  - a. Evaluate potential technologies, define advantages/disadvantages and establish preferred technology platform(s).
  - b. Evaluate access constraints and define construction necessary to complete condition assessments.
  - c. Evaluate operational constraints including allowable outage periods, seasonal constraints, and applicable flow and run time data.
  - d. Coordinate with the City to evaluate valve accessibility and condition as necessary.
  - e. Compile available original pipeline specification and laying schedules available from manufacturers.
  - f. Establish recommended and alternate assessment approaches and cost benefit evaluations when warranted.

- g. Develop planning level costs for condition assessments.
  - h. Complete hydraulic modeling as needed using the City's water system model to investigate system hydraulics as needed to prepare for condition assessment activities.
3. Facilitate up to three (3) meetings or site visits with City operations and/or engineering staff to discuss pipeline specific details.
  4. Prepare for and Facilitate Condition Assessment Plan Development workshops to review findings and recommendations with City. Review advantages/disadvantages of different assessment approaches including cost effectiveness and data collected.
  5. Based on evaluation results and City input, develop condition assessment program plan and preliminary project budgets for Phase 1, 2, and 3 pipelines.
  6. Determine any pipeline management and protection recommendations to be included in initial program plan. These may include operational or pipeline protection improvements identified during program efforts. Recommendations may be programmatic or pipeline specific.
  7. Develop Draft Pipeline Condition Assessment and Management Program Plan TM.
  8. Conduct review meeting with City to gather comments and input on Draft Plan.
  9. Submit Final Pipeline Condition Assessment and Management Program Plan Prioritization TM.

**Deliverables:**

Pipeline Condition Assessment and Management Program Plan TM  
 Program Schedule and Preliminary Budgets

**Meetings:**

Meetings/Site Visits to review specific pipeline details (3)  
 Condition Assessment Plan Development Workshop  
 Corrosion Management Plan Development Workshops  
 Review Meeting on Condition Assessment and Management Plan

***TASK 3 – Phase 1 Pipelines Condition Assessment Work Plan Development***

This task will focus on development of Condition Assessment Work Plans for Phase 1 pipelines. The information developed during Task 2 will be expanded on and a Work Plan written for each pipeline. Each Work Plan will include the following:

- General schedules for pre-inspection activities – e.g. access construction, valve testing or replacement
- Recommended approach to assessment for each segment of pipeline to be inspected
- Access recommendations and construction requirements, staging areas, easement requirements
- O&M coordination for flow control and shutdowns, and required valve inspections and/or repairs
- Identification of confined space entry requirements, traffic control, and other safety issues

- Schedule of field activities for inspection week

While the exact line segments included in the condition assessment will be determined over the course of the project, it is anticipated that from 3 to 6 line segments may be included in the Phase 1 condition assessment efforts (with the Lakewood gravity sewers considered as only one). These are likely to include some combination of the following:

- A portion of the PCCP water transmission main from Independence (Work Plan 1)
- Expanded assessment of the gravity sewer mains under Lakewood Lake (Work Plan 2)
- Assessment of a representative sample of metallic sewer force mains (Work Plan 3)
- Assessment of a representative sample of metallic water transmission and distribution mains (Work Plan 3)

For planning purposes, the scope of services for Task 3 assumes four (4) individual condition assessment work plans will be required. It is assumed that similar work plans will be combined into one work plan (i.e. inspection of three segments of the Tudor Road Forcemain will be documented in one Work Plan). The level of effort may vary significantly between Work Plans depending on the technology platforms used and the complexity of preparation activities.

**Services Provided by HDR:**

1. Develop up to four (4) Draft Condition Assessment Work Plans.
2. Facilitate up to four (4) Work Plan review meetings with the City. Two individual work plans will be reviewed at each meeting.
3. Complete and submit Final Condition Assessment Work Plans.

**Deliverables:**

Draft and Final Condition Assessment Work Plans

**Meetings:**

Two Work Plan Review Meetings

***TASK 4 – Condition Assessment of Water Transmission Main from Independence***

This task includes the in-pipe condition assessment of the section of the PCCP water transmission main that provides City water from Independence, and evaluation of the inspection data. The transmission main is approximately 30,000 linear feet and 30-inches in diameter. An electromagnetic inspection will be completed using the Pipe Diver platform. Additional follow-up inspections may be completed using the LDS 1500 or other in-pipe CCTV/multi-use inspection platform.

Initial planning activities are included in Task 2 and 3, while pre-inspection onsite planning, coordination, and walkthrough activities are included in the scope for Task 4.

An allowance has been included in Task 4 to provide support for design and construction phase of improvements needed to perform the condition assessment. A similar allowance is included in Task 5. It is anticipated that these allowances may be reallocated between tasks if needed.

Evaluation of condition assessments results and recommendations are included in Task 4. Development of renewal alternatives and corresponding cost estimates for this pipeline are included in Task 7 Final Phase 1 Report.

**Services Provided by HDR:**

1. Provide design and construction support services for any necessary pipe access or tracking installation that will need to be constructed to facilitate the onsite inspection, and valve replacement or modifications needed for Phase 1 inspections. This may include design of access structure and connections, tracking sensor attachments, design of details, traffic control planning, valve replacements, coordination activities with the City’s contractor, shop drawing, resident project representative services, and permit acquisition.
2. Conduct site planning and coordination meetings with City staff and inspection Contractor, including review of Draft and Final Work Planning document and schedule.
3. Conduct pre-condition assessment meeting with City to finalize action plan for inspection. Support the city in any pre-assessment walkthrough activities needed. Finalize inspection day plans and schedules.
4. Contractor Mobilization and Demobilization.
5. Perform internal Pipe Diver inspection to identify wire breaks and provide onsite assistance and coordination during condition assessment activities.
6. Contractor condition assessment findings and reporting.
7. Review and analyze inspection data provided by Contractor. Complete structural evaluation of identified structural defects in comparison to operating conditions of pipe. Develop assessment findings and recommendations.
8. Perform in-pipe CCTV or leak detection follow up inspections at select locations to be determined based on condition assessment findings.
9. Facilitate a workshop to present assessment results, discuss risk tolerance and the City’s threshold for initiating rehabilitation or repairs, and other topics to be determined based on the assessment findings.
10. Develop rehabilitation, repair, pipe modification, and operating recommendations based on workshop and assessment data.
11. Prepare Draft Condition Assessment Report summarizing inspection and analysis methods and results, and recommendations to extend the service life of the pipeline.
12. Facilitate a review meeting with City to discuss draft report.
13. Incorporate City comments and finalize the Condition Assessment Report.

**Deliverables:**

Design and construction phase services, TBD  
Field services for condition assessments

## Condition Assessment Report

### **Meetings:**

Condition Assessment Planning Meetings and Walkthrough  
Condition Assessment Findings Workshop  
Report Review Meeting

### ***TASK 5 – Initial Condition Assessment of Tudor Road and Scruggs Road Force mains***

This task will focus on an initial evaluation of the City's high consequence of failure metallic force mains. Condition assessment work will focus on identifying the most likely locations where the pipelines may be experiencing internal and/or external corrosion, thus increasing the likelihood of failure. This will be completed through a combination of the following:

- Desktop analysis of soil mapping records and historical break locations that may indicate areas where corrosion potential is elevated (developed during Task 1 and 2).
- Identification of inoperable or closed air release valves (ARVs), assessed during Task 2.
- Internal gas pocket and leak detection of the Tudor Road and Scruggs Road forcemains.
- External Corrosion Direct Assessment (ECDA) activities, which may include soil sampling, testing using broadband electromagnetic (BEM) ultrasonic (UT) technologies, and/or visual inspections at pipe excavations.

An allowance has been included in Task 6 to provide support for design and construction of improvements needed to perform the condition assessment. A similar allowance is included in Task 4. It is anticipated that these allowances may be reallocated between tasks if needed.

Evaluation of condition assessments results and recommendations are included in Task 5. Development of renewal alternatives and corresponding cost estimates for this pipeline are included in Task 7 Final Phase 1 Report.

### **Services Provided by HDR:**

1. Provide design and construction support services for any necessary pipe access or tracking installation that will need to be constructed to facilitate the onsite inspection, and valve replacement or modifications needed for Phase 1 inspections. This may include design of access structure and connections, tracking sensor attachments, design of details, traffic control planning, valve replacements, coordination activities with the City's contractor, shop drawing, resident project representative services, and permit acquisition.
2. Conduct site planning and coordination meetings with City staff and inspection Contractor for internal Smart Ball assessment.
3. Conduct pre-condition assessment meeting with City to finalize action plan for inspection. Support the city in any pre-assessment walkthrough activities needed. Finalize inspection day plans and schedules.



4. Contractor Mobilization and Demobilization.
5. Perform internal assessment of the forcemain using Smart to identify leaks and gas pockets. Provide onsite assistance and coordination during condition assessment activities.
6. Contractor condition assessment findings and reporting of gas pocket and leak detection survey.
7. Review and analyze inspection data provided by Contractor. Complete evaluation of internal conditions identified during inspection in comparison to operating conditions of pipe and ARVs. Develop assessment findings and recommendations.
8. Facilitate a workshop to present assessment results, identification of areas at increased risk of failure due to internal corrosion, and other topics to be determined based on the assessment findings.
9. Coordinate with City and identify recommended locations for External Direct Corrosion Assessments prior to mobilization of assessment staff.
10. Perform External Direct Corrosion Assessments field activities
11. Analyze the results of the external assessment activities.
12. Prepare Draft Condition Assessment Report summarizing inspection and analysis methods and results, and recommendations to extend the service life of the pipeline.
13. Facilitate a review meeting with City to discuss draft report.
14. Incorporate City comments and finalize the Condition Assessment Report.

**Deliverables:**

Design and construction phase services, TBD  
 Field services for condition assessments  
 Condition Assessment Report

**Meetings:**

Condition Assessment Planning Meetings and Walkthrough  
 Condition Assessment Findings Workshop  
 Report Review Meeting

***TASK 6 – Condition Assessment of Lakewood Sewers***

This task will include an expanded condition assessment of the gravity lines under Lakewood, using a Multi-Sensor Inspection Platform (MSI) that can utilize laser profiling, HDCCCTV, and sonar technologies concurrently in one inspection. These inspections may utilize all three technologies if warranted; however sonar technologies may not be necessary for all segments inspected. There are approximately seven miles of gravity lines that will be evaluated when planning the condition assessment – it is anticipated that the MIS inspection will be completed on only a portion of those lines. The scope of line segments to be assessed will be developed by the project team in coordination with the City.

Initial planning activities are included in Task 2 and 3. Note that since this is an inspection of gravity mains that are anticipated to be accessed through existing manholes

remain in service during the inspection, the pre-inspection coordination will not be as extensive as other inspection activities included in this scope.

Evaluation of condition assessments results and recommendations are included in Task 6. Development of renewal alternatives and corresponding cost estimates for this pipeline are included in Task 7 Final Phase 1 Report.

**Services Provided by HDR:**

1. Conduct task kickoff meeting prior to initiating condition assessment work.
2. Perform MSI platform inspection of Lakewood Sewers.
3. Compile Contractor HDCCTV findings and evaluate inspection findings.
4. Process Laser profiling inspection findings in locations where it is warranted based on the inspection findings.
5. Process Sonar inspection findings.
6. Review and analyze Sonar and Laser profiling data provided by Contractor.
7. Complete structural evaluation of identified structural defects in comparison to operating conditions of pipe. Develop initial assessment findings and recommendations.
8. Facilitate a workshop to present assessment results, discuss risk tolerance and the City's threshold for initiating rehabilitation or repairs, and other topics to be determined based on the assessment findings.
9. Prepare Draft Condition Assessment Report summarizing inspection and analysis methods and results, and recommendations to extend the service life of the pipelines.
10. Facilitate a review meeting with City to discuss draft report.
11. Incorporate City comments and finalize the Condition Assessment Report

**Deliverables:**

Field services for condition assessments  
Condition Assessment Report

**Meetings:**

Condition Assessment Planning Meeting  
Condition Assessment Findings Workshop  
Report Review Meeting

### ***TASK 7 – Phase 1 Final Report and Phase 2 Program Planning***

This task will focus on a programmatic assessment of the results of Phase 1 of the program, and refinement of the plan for Phase 2. This will include documenting the overall condition assessment findings and rehab/rehabilitation and management strategy recommendations for those line segments that were assessed during Phase 1. Rehabilitation alternatives will be evaluated, and implementation recommendations and estimated costs will be developed for any improvements identified during Phase 1 so these can be added to the City's CIP.

The long term program strategies documented in the Pipeline Condition Assessment and Management Program Plan will be updated based on the findings of Phase 1. An updated schedule for Phase 2 and Phase 3 will be developed.

Note that evaluations such as structural analysis of pipelines are assumed to be included in the scopes of work for the individual condition assessments included in Phase 1B.

#### **Services Provided by HDR:**

1. Develop GIS mapping of relevant condition assessment findings from Phase 1 inspections. Attribute layers and format will be developed in coordination with City staff to ensure mapping data can be integrated into City's GIS and CityWorks applications.
2. Develop pipeline renewal recommendations and identify pipelines where multiple improvement alternatives should be evaluated. Identify any emergency or immediate repair needs that should be immediately implemented.
3. Prepare for and Facilitate Phase 1 Condition Assessment Findings and Renewal Alternative Development Workshop. Review findings and potential renewal alternatives with City staff and obtain initial input on renewal strategies. Review any emergency repair recommendations.
4. Provide support for the City to complete any emergency repairs. This may include location and survey staking of pipeline defects, developing repair details, evaluating and recommending manufacturer products, and resident project representative services.
5. Complete renewal alternatives evaluation for capital improvement projects on pressure pipelines:
  - a. Identify recommended extents of pipeline improvements.
  - b. Develop site exhibits, identify utility conflicts, easement acquisition requirements, and restoration requirements.
  - c. Evaluate renewal alternatives including trenchless vs. open cut repair/replacement/realignment.
  - d. Develop preliminary plan and profile sheets when warranted, using the existing ground contours in the City's GIs.
6. Develop planning level cost estimates for evaluated alternatives and recommended projects.
7. Identify any recommended operational improvements and pipeline protection recommendations.
8. Develop programmatic recommendations for proactive corrosion protection of new pipelines, and management of corrosion issues for existing pipelines.

9. Develop implementation plan schedule and budgets for recommended capital improvement projects.
10. Develop rehabilitation alternatives for gravity sewer lines under Lakewood Lake.
11. Prepare for and Conduct Phase 1 Recommendations Workshop. Review recommended improvements and alternative evaluation results with City.
12. Finalize recommendations and implementation plan.
13. Update recommended Phase 2 and Phase 3 inspection plan based on Phase 1 findings. Update Phase 2 schedule and budget. Update recommended management strategies.
14. Develop Draft Phase 1 Pipeline Condition Assessment and Management Program Final Report.
15. Update Pipeline Condition Assessment and Management Program Plan.
16. Conduct review meeting with City to review updated Phase 2 and Phase 3 plan, and review City comments on Phase 1 Final Report.
17. Finalize updated Program Plan based on City comments.
18. Finalize Final Report based on City comments.

**Deliverables:**

GIS Mapping of Condition Assessment Findings  
Support for Emergency Repair Work (if needed)  
Phase 1 Pipeline Condition Assessment and Management Program – Final Report  
Implementation Plan and CIP Budget for Capital Improvement Projects  
Updated Pipeline Condition Assessment and Management Program Plan

**Meetings:**

Phase 1 Condition Assessment Findings and Renewal Alternatives Workshop  
Phase 1 Recommendations Workshop  
Review Meeting on Final Report, Implementation Plan, and Updated Program Plan

***TASK 8 – Project Management***

**Services Provided by HDR:**

1. Project management and administration (project setup)
2. Budget and invoice management
3. Quality Control and Project Approach and Resource Review

**Deliverables:**

Project invoices

**Meetings:**

None