INFLOW / INFILTRATION PROGRAM MANAGEMENT

ANNUAL REPORT FY 2022-2023

June 2023

WE #OC21-II

wallis engineering

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SECTION 1: INTRODUCTION

Purpose of Report

This report was prepared by Wallis Engineering to provide an overview of Oregon City's Inflow / Infiltration Program Management, which began in May 2022. As outlined in the project scope of work, this report will cover program management and project expenditures, work accomplished in FY 2022-2023, work anticipated to be completed in FY 2023-2024, data on success indicators of the program and a general summary of the results of flow monitoring at the completion of the projects.

The program in coordination with the City has subdivided and redefined basins within the reimbursement areas. The revised basins are in accordance with Figure 1.

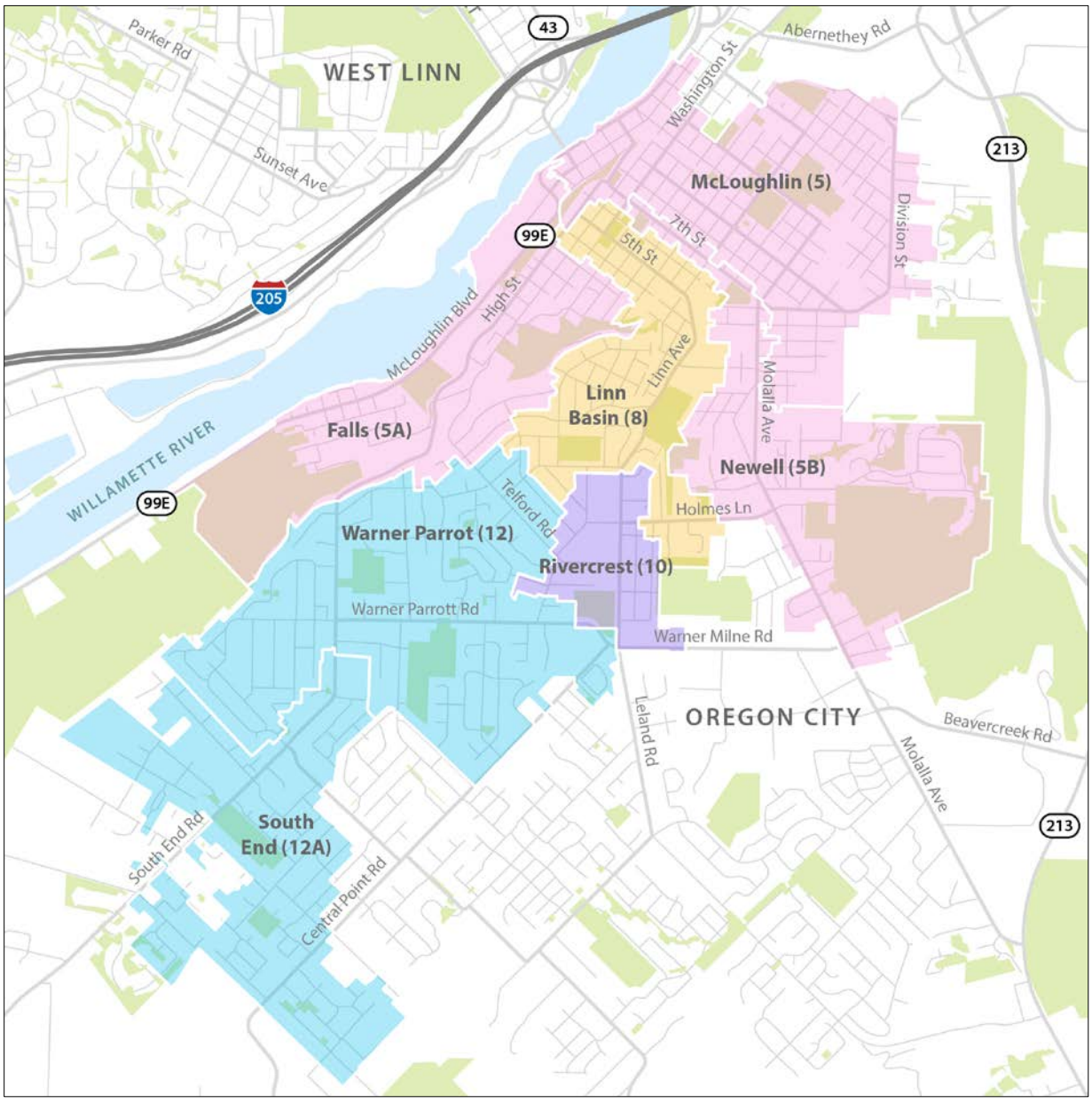


Figure 1: OC Basin Map

SECTION 2: BUDGET EXPENDITURES

A breakdown of budget by task for May 2022 through May 2023 is shown below in Table 1: YTD Budget Accounting. On the following page, Table 2: Program Delivery by % reports the breakdown of consultant expenses between Wallis Engineering and subconsultants.

Table 1: YTD Budget Accounting

Task	Contract Amount	Billed From 5/2022 to 5/2023
Task 1: Program Administration	$106,572.95	$100,074
Task 2: Program Management	$118,126.92	$184,260
Task 3: Flow Monitoring & Analysis	$67,188.48	$24,217.02
Task 4: Condition Assessment for Sewer Basin 8	$100,000.00	$166,505.59
Task 5: Work Order Development	$10,000.00	$15,955.50
Task 6: Pre-Design Investigations	$100,000.00	$78,848.58
Task 7: Design Services	$450,000.00	
Package 1	$211,670.00	$201,252.04
Package 2	$141,051.52	$128,061.33
Task 8: Utility Coordination	$50,000.00	
Package 1	$7,531.00	$6,924.63
Package 2	$1,092.60	$615.94
Task 9: Right-of-Way and Easement Acquisition Services	$50,000.00	
Package 1	$0.00	$0
Package 2	$13,775.00	$1,838.26
Task 10: Bidding Services	$50,000.00	
Package 1	$2,961.00	$0
Package 2	$1,739.72	$0
Task 11: Construction Management Services	$300,000.00	
Package 1	$0	$0
Package 2	$0	$0

Table 2: Program Delivery by %

Task	% Wallis	% Non-Wallis
Task 1: Program Administration	92%	8%
Task 2: Program Management	86%	14%
Task 3: Flow Monitoring & Analysis	14%	86%
Task 4: Condition Assessment for Sewer Basin 8	100%	0%
Task 5: Work Order Development	100%	0%
Task 6: Pre-Design Investigations	0%	100%
Task 7: Design Services	25%	75%
Task 8: Utility Coordination	8%	92%
Task 9: Right-of-Way and Easement Acquisition Services	100%	0%
Task 10: Bidding Services	0%	0%
Task 11: Construction Management Services	0%	0%

SECTION 3: WORK ACCOMPLISHED IN FY 22-23

Wallis Engineering began management of the City of Oregon City's I/I Reduction Program in May 2022. The following services have been or are in process of being completed by FY 22-23.

Administration

As program administrator, Wallis coordinated and led program meetings, managed the program schedule, tracked budgets and expenditures, ensured quality assurance and control, maintained records, contracted with subconsultants, and oversaw all work within the program to date. As the program advanced, we expanded our design team to include Century West to accommodate future design packages of the added Basin work requested by the City.

The subconsultants and their respective disciplines are shown in the table below:

Table 3: Design Team

Subconsultant	Discipline
Brown & Caldwell	Engineering Design
Century West Engineering	Engineering Design
JLA	Public Involvement
Keller Associates	Engineering Design
Leeway Engineering	Engineering Design
Pacific Int-R-Tek	CCTV Inspection
CESNW	Surveying
Epic Land Solutions	Right-of-Way
GRI	Geotechnical Eng

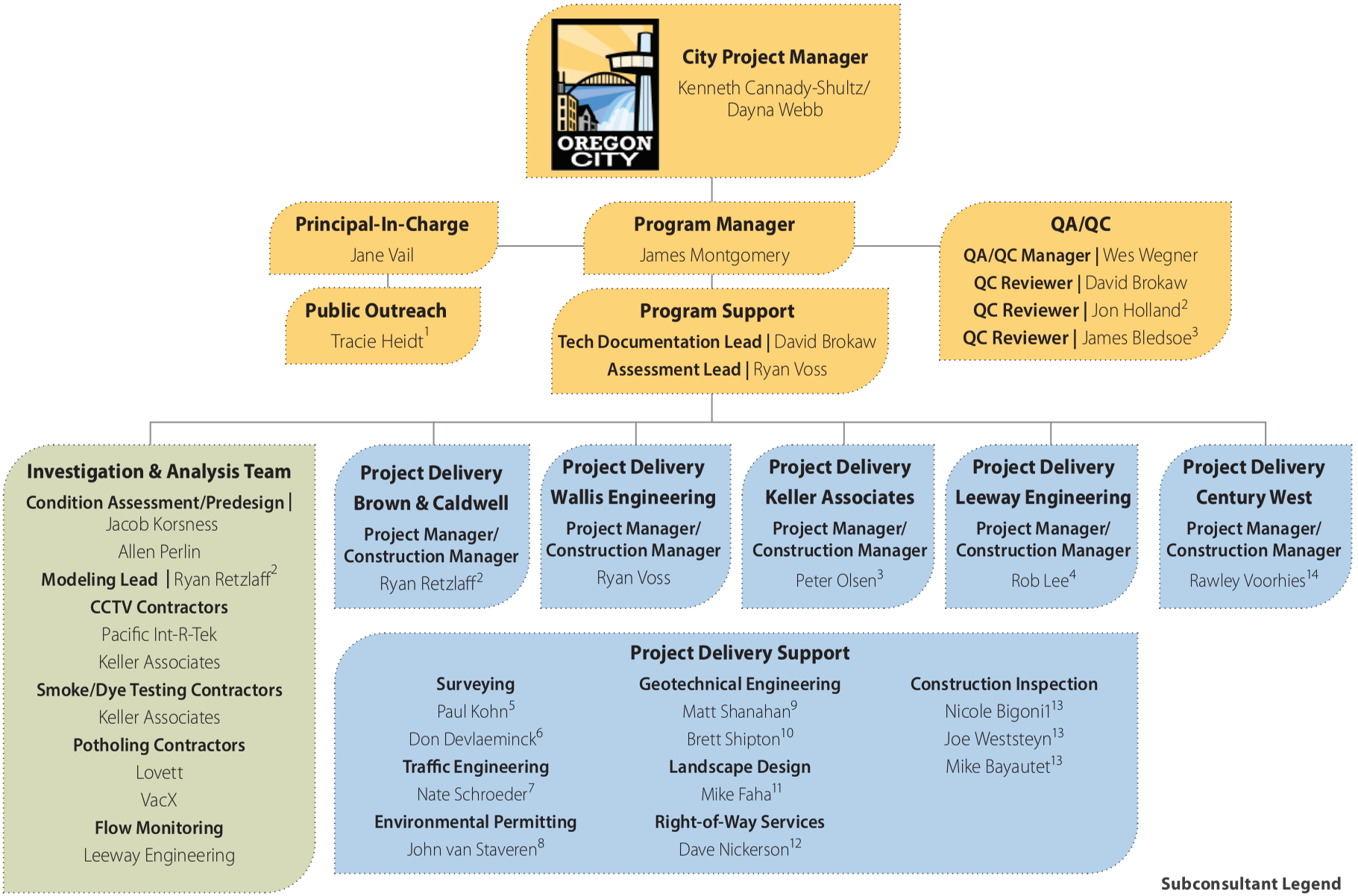
Table 4: Key Personnel

Oregon City I/I Pilot Program Key Team Members Contact List			
Organization / Role	**Name**	**Phone**	**E-mail**
City of Oregon City			
City Project Manager	Kenny Cannady-Shultz	971-204-4622 503-260-0059	kshultz@orcity.org
City Engineer	Dayna Webb	971-204-4633 503-312-5648	dwebb@orcity.org
City Public Works Director	John Lewis	971-204-4626 503-793-2255	jmlewis@orcity.org
City Maintenance	Eric Hand	971-204-4661	ehand@orcity.org
Wallis Engineering PLLC			
Principal in Charge	Jane Vail	360-852-9158	Jane.vail@walliseng.net
Program Manager	Jim Montgomery	360-852-9189 503-997-3315	Jim.montgomery@walliseng.net
Project Manager / Technical Documentation Lead	Dave Brokaw	360-852-9153 503-504-1553	David.brokaw@walliseng.net
Project Assistant	Erin Kingsley	360-852-9168	Erin.kingsley@walliseng.net
Assessment Lead / Project Manager	Ryan Voss	360-852-9164	Ryan.voss@walliseng.net
Condition Assessment	Allen Perlin	360-852-9150	Allen.perlin@walliseng.net
QA/QC Manager	Wes Wegner	360-852-9160 503-860-0536	Wes.wegner@walliseng.net
Brown & Caldwell			
Project Delivery PM	Ryan Retzlaff	503.977.6628 503.893.0410	rretzlaff@BrwnCald.com
QA/QC Reviewer	Jon Holland	503-977-6609	JRHolland@brwncald.com
CES|NW			
Survey	Paul Kohn	503-968-6655 503-586-8311	pkohn@cesnw.com
Century West			
Project Delivery PM	Rawley Voorhies	503.419.2132	rvoorhies@centurywest.com
Compass			
Survey	Don Devlaeminck	503 653-9093 503 939-519	dond@compass-landsurveyors.com

Oregon City I/I Pilot Program Key Team Members Contact List			
Organization / Role	**Name**	**Phone**	**E-mail**
Epic Land Solutions			
Right-of-Way	Dave Nickerson	503-213-3974	dnickerson@epicland.com
GRI			
Geotechnical Engineering	Matthew Shanahan	360-213-1690 360-601-6719	mshanahan@gri.com
JLA Public Involvement			
Public Outreach	Tracie Heidt	503-235-5881x116 503-708-1485	tracie@jla.us.com
Keller Associate			
Design & Construction Management	Peter Olsen	503-364-2002 503-910-2421	polsen@Kellerassociates.com
QA/QC	James Bledsoe	503-364-2002	jbledsoe@kellerassociates.com
Leeway Engineering			
Design & Construction Management	Rob Lee	(503) 828-7542	rob.lee@leewayengineeringsolutions.com
Pacific Habitat Services			
Environmental Permitting	John van Staveren	503-570-0800 503-708-8320	jvs@pacifichabitat.com
Pacific Int-R-Tek			
CCTV	Adam Scott	503-522-5515	adam.scott@tvmypipe.com
AIMS Companies			
CCTV	Nick Curcio	503-747-6410 503-545-9640	ncurcio@aimscompanies.com

ORGANIZATION CHART

FY 23-24



Subconsultant Legend

1 JLA	6 Compass	11 Greenworks
2 Brown & Caldwell	7 DKS	12 Epic Land Solutions
3 Keller Associates	8 Pacific Habitat Services	13 MacKay Sposito
4 Leeway Engineering	9 GRI	14 Century West
5 CES|NW	10 GeoDesign/NV5	

Program Management

Wallis Engineering managed the program schedule, budget, and quality for all project elements comprising the overall program to date. The following milestones were achieved:

- Continued management of public outreach program.
- Assisted with adoption of the consolidated private lateral and downspout disconnection program
- Managed and facilitated the work of the subconsultants to complete each project.
- The Program Manager reviewed and approved project plans for conformance to program strategy, plan, schedule, and all other applicable specifications, codes, and standards.
- The Program Manager functioned as a liaison for transfer of information between project management teams, and City leadership, and conducted periodic briefings/status updates.
- Reviewed background information provided by the city on work completed under other investigation efforts and design projects.

As part of the program management task, our program team led a series of program meetings in FY 2022-2023 with City staff and key team members:

- Program Kickoff Meeting
- Rivercrest Lessons Learned Meeting
- Public Outreach Meeting
- City Operations Coordination Meeting
- Public Works Meeting
- New Project Manager Meetings
- Lateral Policy Workshop
- Monthly and Weekly Check-in Meetings
- Programmatic Geohazard Assessment Meeting
- Piezometer Meeting
- Annual check in and performance assessment

Program Management Plan

Wallis Engineering developed a program management plan (PMP). The plan included the following:

- Program Objectives
- Team Structure and Responsibilities
- Financial Management Protocols
- Decision Making Protocols
- Communication and Coordination Protocols
- Overall Schedule and Task Schedules
- Project Development and Scoping
- Quality Assurance Plan

Public Outreach

A draft Public Outreach Program Plan (POPP) was prepared. The POPP focused on the work needed to share information with the community, and described the outreach methods, messaging, and implementation for investigation work, downspout disconnection policy, and construction.

JLA, with support from Wallis Engineering, created general flyers to be shared with the project areas during each project and placed on the City website. In addition, JLA created an e-newsletter and social media content, edited the existing webpage and created a graphic basin delineation map for outreach purposes. JLA drafted letters and mailers to support CCTV surveys, smoke testing, and private lateral ROE acquisition efforts.

Lateral Policy Development

The project team worked with the city to develop and refine a private lateral policy to enable the program to address infiltration and inflow deficiencies within private property. A presentation was prepared for City staff to deliver to City Commission for approval of the policy. Once approval was obtained, the project team developed an approach to incorporate the policy into project design and delivery, including the drafting of a right of entry form and special provisions modeled after the Clean Water Services (CWS) approach. Rehabilitation of private laterals was incorporated into every design package initiated this fiscal year and will continue being incorporated gong forward.

Rehabilitation Guidelines and Specifications

Wallis Engineering created rehabilitation guidelines and draft boilerplate specifications for use in the program. The draft guidelines were developed in coordination with the City and technical engineering staff. Wallis led the development of boilerplate special provisions for anticipated types of rehabilitation to be used during the program. Special provisions were based upon 2021 Oregon Standard Specifications and Oregon City boilerplates special provisions.

Flow Monitoring and Analysis

Flow monitors were installed in the fall as part of a previous contract with the City to collect post construction data for the Basin 10 (Rivercrest Basin) project area and baseline data in other areas. The City modified all of the sanitary sewer basins throughout the system, focused on cleaning up incorrect basin boundaries and dividing oversized basins. As a result, the monitoring results for all basins are no longer considered up to date, and Basins 5 and 12 were divided into five separate basins (Basins 5, 5A, 5B, 12, and 12A). The basins were also given new names, which were adopted into the monitoring program. New baseline flows were obtained for the basins 5/5A/5B, and the baselines were refreshed for basins 8 and 12 (12A was not monitored separately).

Flow meters were installed by ADS Environmental, the same firm that performs flow monitoring for Clackamas WES. ADS monitored flows at 4 sites (5B, 8, 10 and 12) for the period March 20, 2023 to May 8, 2023. The meters captured flows during a significant storm even on April 10th with a 1.16 inch 24-hour rainfall depth and Leeway Engineering (Leeway) has reviewed and accepted the data. To supplement the data collected by ADS, Leeway is using data from 3 permanent monitors in the WES system (5, 5A, and a West Linn location).

Leeway is utilizing the flow data to recalibrate the hydraulic model (last updated over 10 years ago). Leeway has obtained the model files and is currently in the process of updating dry weather flow calibrations. A major improvement in this model will be an application of a diurnal flow pattern that matches observed patterns throughout the model. Leeway is also making big adjustments to direct

constant groundwater rates that are causing very large errors during the dry period. The model will be calibrated with the unit hydrograph parameters to the April 10th storm event, and the model will be run with the design storm event for a new prediction of 5-year flows and distribution of I/I throughout the 4 priority basins. This work is still in process at this time.

Basin Condition Assessment

City staff provided unanalyzed CCTV video footage for approximately 41,000 linear feet of sewer mainline. Wallis Engineering prepared a condition assessment database for management and analysis of the segments provided. The database will be utilized to categorize repair methodologies, prepare a preliminary cost for rehabilitation, and create a prioritized list of segments for multiple design packages. Condition assessment sheets for each mainline section with defects labeled using PACP standard notation and recommended corrective actions were prepared for the full 41,000 LF of mainline segments with CCTV footage provided by the City. Recommended rehabilitation methodologies were established for the analyzed segments.

Additionally, Wallis Engineering subcontracted an additional 38,000 linear feet of sewer mainline CCTV. These contracts were focused on Basins 5, 5B, and 8. PACP standard notation was provided alongside this additional footage. Wallis Engineering completed review of this additional footage and prepared recommended corrective actions. The additional condition assessment sheets were entered into the database and used for prioritization in the development of additional design packages.

An additional 55,000 linear feet of CCTV is contracted and currently in progress. This contract is focused on Basins 5, 5A, and 5B. Completion is expected in early FY 2023-2024.

Develop Project Design Criteria

A scope of services template was developed for use in contracting on design projects allocated by the program. A methodology for prioritizing rehabilitation work was prepared and refined. From this, the program management team analyzed condition assessment data to prioritize rehabilitation packages on a generally worst first basis. The project team developed work orders for the following contracted efforts:

- Two design contracts
- Five preliminary design contracts
- Three CCTV contracts
- Center Street Catch Basin Disconnect preliminary design
- Manhole Sealing Pilot Program

Design Services

Design Package 1 - A solicitation for the first package to act as a pilot project was provided to Leeway Engineering. Package 1 consists of 11,000 LF of mainline sewer pipe and associated public side laterals within Basin 8 (Linn). These sections of mainline pipe are intended for CIPP rehabilitation with some spot repair and open excavation lateral replacement. As of June 2023, the package was at 90% completion status and is scheduled to be constructed in Fall 2023.

Design Package 2 - A second design package within Basin 8 (Linn)was developed in coordination with City staff to address some high priority maintenance concerns that will require full replacement with open trench or pipe bursting methods. The second design package is being designed by Wallis Engineering and consists of 1,800 LF of mainline sewer pipe, manhole replacement and associated public

side laterals. As of June 2023, the package was in the process of completing 90% design and is scheduled to be constructed in Summer/Fall 2023.

Design Package 4 – Rivercrest Lateral Rehabilitation (Century West assigned scope)

SECTION 4: WORK ANTICIPATED IN 2023-2024

We anticipate the following work to be completed in 2023. Tasks are organized according to the project's scope of work:

Table 5: FY 2023-2024 Estimated Costs

Task	Estimated Costs
Task 1: Program Administration	$235,000
Task 2: Program Management (includes Manhole Sealing Pilot Program)	$1,000,000
Task 3: Flow Monitoring & Analysis	$135,00
Task 4: Linn Basin SS #1 (Construction Management)	$135,000
Task 5: Linn Basin SS #2 (Design & Construction Management)	$235,000
Task 6: Molalla Design Package (Design)	$465,000
Task 7: Rivercrest Lateral Rehabilitation (Design & Construction Management)	$190,000
Task 8: Applegate Design Package (Design)	$285,000
Task 9: Linn Basin SS #3 (Design & Construction Management)	$285,000
Task10: Singer Hill	TBD
Task 11: Center Street Catch Basin Disconnect	$175,000

Program Management and Administration

Wallis will schedule and lead program meetings, manage the schedule, track budget and expenditures, ensure quality assurance and control, maintain accurate records, contract with subconsultants, and oversee all work within the program. Monthly and annual reports will be prepared for the program. The Program Management Plan and Public Outreach Program Plan will be implemented throughout the year and regularly reviewed for effectiveness and refined as required.

Rehabilitation Guidelines and Specifications

Rehabilitation guidelines and specification will be refined as necessary to incorporate lessons learned, additional rehabilitation methodologies as needed, and updated design or construction best practices. A detailed review of the boilerplate specifications and design guidelines is planned for November 2023, and program wide plan preparation guidelines will be developed.

Lateral and Downspout Disconnection Policies

The program management team assisted City staff in finalizing and presenting to City Commission the private property I/I source removal policy and downspout disconnection policy for adoption. The City Commission adopted a fully funded lateral rehabilitation policy.

CCTV Mainline Inspection

In addition to the CCTV footage provided by the City, three additional contracts were completed in FY 2023, capturing sewer mainline conditions across portions of Basins 5, 5A, 5B, 8 and 10. Two additional CCTV contracts totaling 120,000 linear feet are anticipated to be completed in FY 2024.

Smoke Testing

One smoke test package, totaling approximately 130 thousand lineal feet of sewer main, will be created this year. Draft smoke testing maps will be prepared for City project manager review and approval. During smoke testing, Wallis staff will be on site to address public comments and validate the quality of the smoke testing performed.

Flow Monitoring and Analysis

As a continuation of flow monitoring work done to date, Leeway will continue to monitor flows to establish post-construction data for the Basin 10 project area and pre- and post-construction flows for the pending Basin 8 design projects. The data from these established monitoring locations will be used in the H/H model recalibration to be delivered to the City as an update of their 2014 master plan. Additionally, Leeway will establish an anticipated additional three flow monitoring stations: one will be installed downstream of current project areas to gauge successful I&I reduction and two will be installed at locations downstream of anticipated future rehabilitation areas, particularly basins 12 and 12A, to establish baseline flow conditions.

Basin Model Recalibration

Leeway Engineering will utilize the flow monitoring data to recalibrate the collection system model and reforecast peak wet-weather flows at each basin. This method will help demonstrate collection system rehabilitation effectiveness and reproject the updated basins' response to the 10-year design storm. A brief Technical Memorandum will be provided to document the results of the updated H/H model.

Condition Assessment

Condition assessment will be completed for all mainline segments with CCTV footage. The condition assessment database will be separated into revised I/I program subbasins and refined to include CCTV information, mainline condition ratings, rehabilitation recommendations and City coordination elements for use in prioritization. Methodology will be developed to incorporate lateral condition data from various sources into the rehabilitation prioritization process.

Work Order Development

Wallis Engineering will coordinate with City staff on the development of additional work order contracts for 2023. Contracts are anticipated to include at least two additional CCTV contracts, up to 5 additional design contracts (with associated pre-design investigations, utility coordination and right of way services as required) and up to 3 construction management and inspection contracts.

Design Services

The program management team will complete design services for up to 6 design contracts (Molalla, Rivercrest Lateral Rehabilitation, Applegate, LB #3, Center Street Catch Basin Disconnect, Manhole Sealing Pilot Program, previously initiated in the FY 22-23 contract. Design services for packages 1 & 2 to be finalized for bidding in the first quarter of the FY23-24. The design contracts will include predesign investigations, utility coordination, right of way and bidding services as required.

Construction Management Services

The program management team will provide construction management services necessary to support the delivery of design contracts. It is anticipated that 5 design contracts will go to construction in FY 2023-2024.

SECTION 5: DATA ON SUCCESS INDICATORS OF THE PROGRAM

The success indicators of this program are anticipated to be I/I reduction related to the rehabilitation of sewer systems through construction. The program has not yet completed the analysis of the post-construction flow data necessary to define program success for the Rivercrest projects. Flow monitoring will be conducted following construction of additional design projects under the program and analyzed to determine I/I reduction and associated costs.

SECTION 6: FLOW MONITORING GENERAL SUMMARY

Flow monitoring was conducted on Basins 5, 8 and 10 in Winter-Spring of 2022. The data was high quality and included the larger storms in April 2022.

General results of the basins in 2022 were as follows:

Basin 5 (flow monitoring includes basins 8 and 10) – Mostly inflow during bursts of rainfall. Flows rise and fall very quickly, so not consistent with an infiltration-type signature.

Basin 10 – Mostly infiltration, but some inflow with a fairly fast response to larger storms.

Basin 8 (flow monitoring includes basin 10) – High infiltration and biggest peaking factor. High flows take about 10 days to recover to base flow rates, so there is likely a lot of groundwater infiltration.

Additional flow data was collected at four locations from March 22nd to May 9th, 2023. These sites were close to those previously used for Basin 5 (Mollala Avenue at Willamette Street), Basin 8 (on Center between 6th and 7th), Basin10 (Linn Ave and Park Drive), and Basin 12 (easement near Barker Avenue and Hazelwood Drive). Rainfall was collected with a single rain gauge at the Oregon City maintenance yard. This is the same location used previously.

Model calibration for the data collected from March 22nd to May 9th, 2023, should be completed by August 2023, and preliminary results will be presented shortly after.