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February 14, 2018

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RE: 2017 ANNUAL INFLOW & INFILTRATION REPORT

This report provides an annual summary of the actions the City of Molalla has taken for the 2017 calendar year in accordance with City's Inflow and Infiltration Assessment and Reduction Plan and NPDES Permit No. 101514.

Significant strides have been made by the City since the 2015 I&I Assessment and Reduction Plan was completed. The City has updated its Sewer Capital Improvement Plan, completed a Sewer System Development Charge Methodology and Fees update, completed a Sewer Utility Fee analysis , and raised sewer rates 27.13% in 2015, 6.48% in June 2017, and again with a 6.09% increase in November of 2017 consistent with its rate study.

The City has had to make a significant investment into Wastewater Treatment Plant operations, equipment repairs, and replacements. The City is securing the revenue needed to address additional I&I issues, including, cleaning and inspection activities that will help the City make additional I&I reductions.

Please feel free to contact me (503) 759-0218 if you have any questions in regards to this letter or requirements above.

Regards,

Gerald Fisher
Public Works Director

Cc: Dan Huff, City Manager
Andy Peters, Operations Supervisor

Project/Task	Description & Information
Manhole Inspections	Public Works budgeted for repairs to 31 manholes with significant infiltration and 29 with minor infiltration (See Appendix "A" and "B"). The funds were not expended in the first half of 2017 due to existing project load and ongoing repairs needed at the treatment plant. Repairs were budgeted in the FY 2017-2018 budget and no repairs were conducted in the second half of 2017 while the City conducted a smoke test of the system (See Appendix "C"). By the end of 2017, the City had completed a wet-season inspection of manholes and also hired a new Operations Supervisor who took over the project and had selected a contractor to make the repairs in the first half of 2018, which is part of the FY 17-18 budget.
System Assessment	In 2017, a review of the work to date to identify issues was completed and I&I work was identified on Fenton Avenue and Lola Avenue. Additionally, with the completion of the smoke test as part of the Wastewater Facility and Collection System Master Plan project the City identified several projects. The City's cleaning and video inspection efforts were refocused on the upper reaches of the Toliver and Bear Creek basin to identify repair needs that would allow the City to effectively reduce the I&I within these basins. Work assessing the worst lines was coordinate with the Wastewater Facility and Collection System Master Plan and flow poking was scheduled for January 2018.
Sewer Line Cleaning	To prepare for CCTV inspection work, City crews completed approximately 22,500 lineal feet of sanitary sewer main.
CCTV Inspections	As sewer lines were cleaned, that information was relayed to Pacific Int-R-Tek to video inspect each cleaned line and report on the condition of the sanitary sewer lines. Pacific Int-R-Tek completed their contract with the conclusion of inspecting 22,500 lineal feet of sewer main. As a result of the smoke testing, the City has kept them on retainer to assist in I&I research of the sanitary and storm sewer lines on an as-needed basis.
Vactor Truck Purchase	The City made its final payment towards the purchase of its vactor truck. This piece of equipment is critical to the City's ability to clean lines and manholes for inspection as well as clearing clogged sewer lines to avoid SSO's. The City also purchased a water tanker truck for $126,000 to assist with the flushing of lines. This truck replaced the old tanker truck that was deemed unrepairable.

I&I Budget	In Fiscal Year 2017-2018, the City budgeted a total of $75,000 for infiltration and inflow repairs. The City is on track to expend all of the funds on repairs before the end of the fiscal year. City Council reviewed and approved the 2017 Rate Study prepared by Donovan Enterprises that includes an average of 6.09% increase per year for five years (See Appendix “D”).
I&I Repairs	Oct 2017 – Purchased cutting head for sewer vactor truck $2,850 to remove roots and other intrusion prior to video inspection. Nov 2017 – Created a work order system and purchase order system to track I&I repairs and costs. Replaced sewer lateral for $13,635 at 315 Kennel Ave. Dec 2017 – Purchased a sewer camera for $2,295 to inspect sewer laterals, short sections of main sewer lines, and potential storm to sewer connections. Purchased backwater valve for Shel-Mar lift station for $1,589 to keep stormwater from entering lift station from overflow pipe. Investigated possible sewer lateral leak at Glory Lane into SSMH. Investigated smoke test 2-1 from Dyer Report. Investigated smoke test report 1-25 for possible storm to sewer connection at Toliver Road.
I&I Assessment and Reduction Plan Progress Summary	The following is a status summary of the plan which is attached to the end of this report in Appendix “E”: 3.1 Administration – updates are given to City Council as information come available. 3.2 Public Relations – Smoke testing notifications was completed with door hangers, advertisement in the local newspaper, and postings to the City website and Facebook page. 3.3 I/I Quantification – An initial review was done by the City and Brown and Caldwell. It was determined that sewer line cleaning and video inspection was needed to assess system I&I and better target flow measurements. Flow poking is now underway as part of Wastewater Facility and Collection System Master Plan (WFCSMP). 3.3.1 Flow Monitoring – This will be a future project if determined to be a viable project by the master plan. Flow monitoring is available at the City’s lift stations and a determination will be made as to whether funding should be expended on permanent monitoring or used to address I&I problems.

3.3.2 Rainfall Monitoring – The WWTP has a rain gage and is monitored regularly.

3.4 Interviews – This work has been ongoing and with the review provided by the WFCSMP consultants, will be incorporated into that plan.

3.4.1 Manhole and Visual Pipe Inspections – Completed in 2015, 2016, and 2017. City staff identified 31 significant infiltrating, 29 minor infiltrating, and 13 repair recommendation manholes. Staff also cleaned 61,847 LF of sewer main.

3.4.2 Smoke Testing – This task was completed by Dyer Partnership as part of the WFCSMP.

3.4.3 CCTV – The City contracted with Pacific Int-R-Tek for video inspection of mains after cleaning. Total length of video inspection was 61,847 LF of sewer main.

3.4.4 Dyed-Water Testing – Dye testing has been completed for each project underway to address I&I issues identified in the smoke testing report and will be ongoing.

3.5 Establish Source Flows and Costs – This is also underway as part of WFCSMP.

3.6 Recommendations and Implementation Plan – A work order system was recently developed by City staff to track sewer related issues as well as I&I projects completed. Additionally, as part of WFCSMP, a list of recommended projects will be identified for each basin of the collection system.

4.1 Cost Effective Rehabilitation – Several manholes in the Shel-Mar subdivision have been sealed which reduced the pump cycle time and flows from that basin by approximately 64%. The City anticipates all of the manholes identified in the winter and summer manhole inspections completed before the end of June 2018. Anticipated costs are approximately $25,000. Other cost effective repairs and replacements will be ongoing.

4.1.1 Manhole Rehabilitation – As of the writing of this report 12 manholes on the list are done and expect balance of 60 identified MH's to be done before the end of June.

4.1.2 Pipeline Rehabilitation – One section of sewer main along Toliver Road has been identified as a candidate for slip lining. This section was an additional line reviewed as part of the City's investigations from the smoke testing reports.

4.2 Structural Rehabilitation – The completion of the sewer cleaning and video inspection will now allow the City staff to determine which sewer mains are beyond cost effective lining and spot repairs.

4.2.1 Manhole Rehabilitation – No manholes have been identified with structural defect that warrant replacement on an individual basis.

4.2.2 Pipeline Rehabilitation – The City has two projects underway for replacement of 749 LF on Fenton Avenue and 1,250 LF on Lola Avenue. Both projects are in design and staff anticipates Fenton to be constructed during the summer of 2018 and Lola during the summer of 2019. Another recent section of pipe along Toliver Drive was identified from the City's investigations from the smoke testing report.

4.3 Preventative Maintenance – The City will continue its efforts with sewer line cleaning, updates of the City's GIS mapping system, changes to our maintenance policies, changes to our design and construction standards, and inspection procedures during construction of City projects and private development projects.

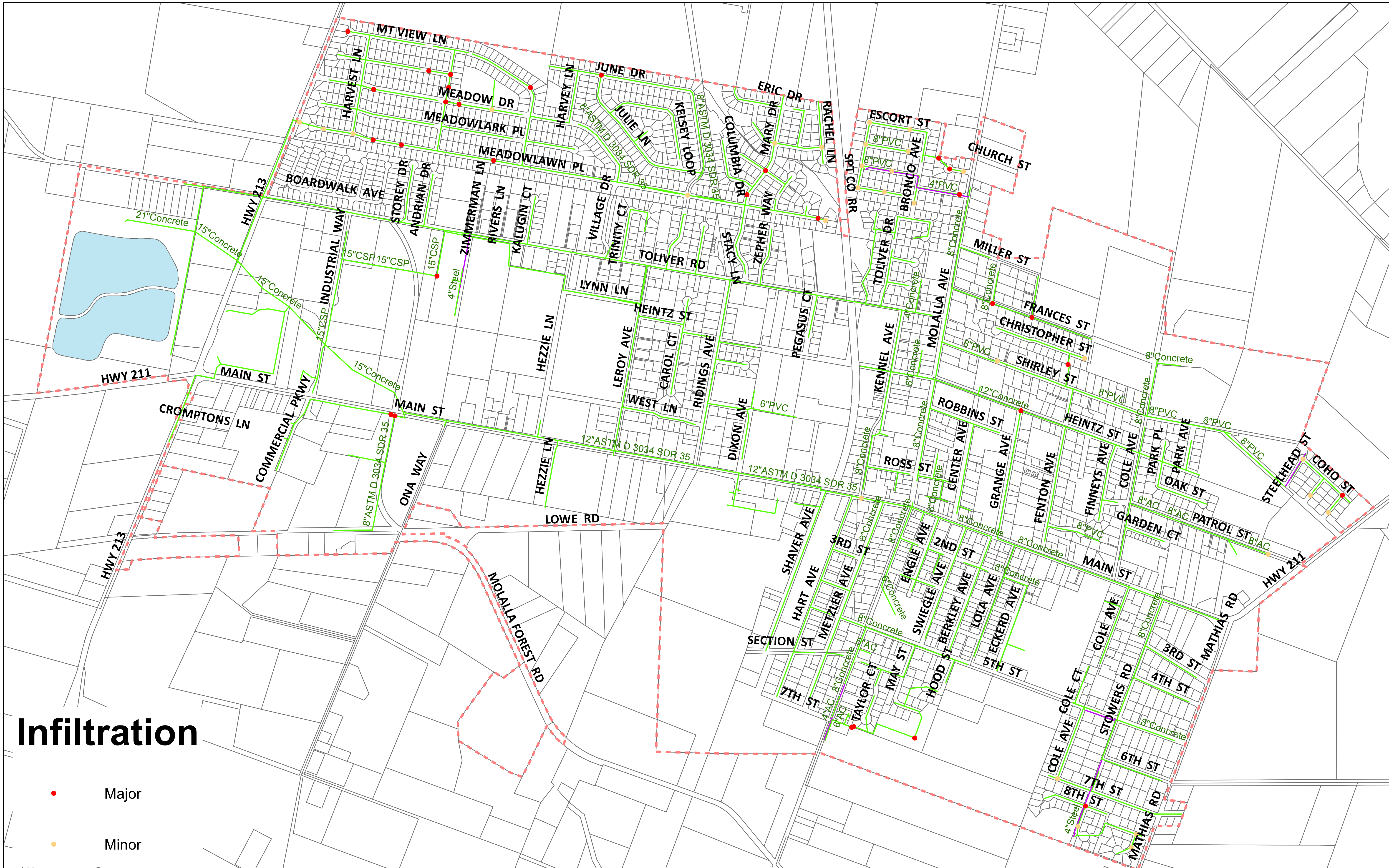
4.4 Post-Rehabilitation Flow Monitoring – In the interim, City staff intends to monitor flows at Wastewater Treatment Plant and, if determined cost effective, additional flow monitoring beyond lift station data will be identified in the WFCSMP. It will be extremely important not to expend funds that can be used to address I&I issues on expensive flow monitoring equipment and data collection. Flow monitoring of the system, however, is still a long term goal of the City of Molalla.

5 Schedule – As new information is collected and priorities in funding change, the schedule will continue to remain fluid until significant strides in I&I reduction are achieved. Until the WFCSMP is completed in the summer of 2018, staff is focusing on repairs to the system and budgeting for those repairs as a priority. From the original schedule identified in the plan, the Pre-Field Activites, Manhole Inspections, Smoke Testing, and CCTV tasks are complete. Dye Testing and I&I Removal Analysis will be ongoing and Flow Meters will be identified in the WFCSMP with a future target date for implementation.

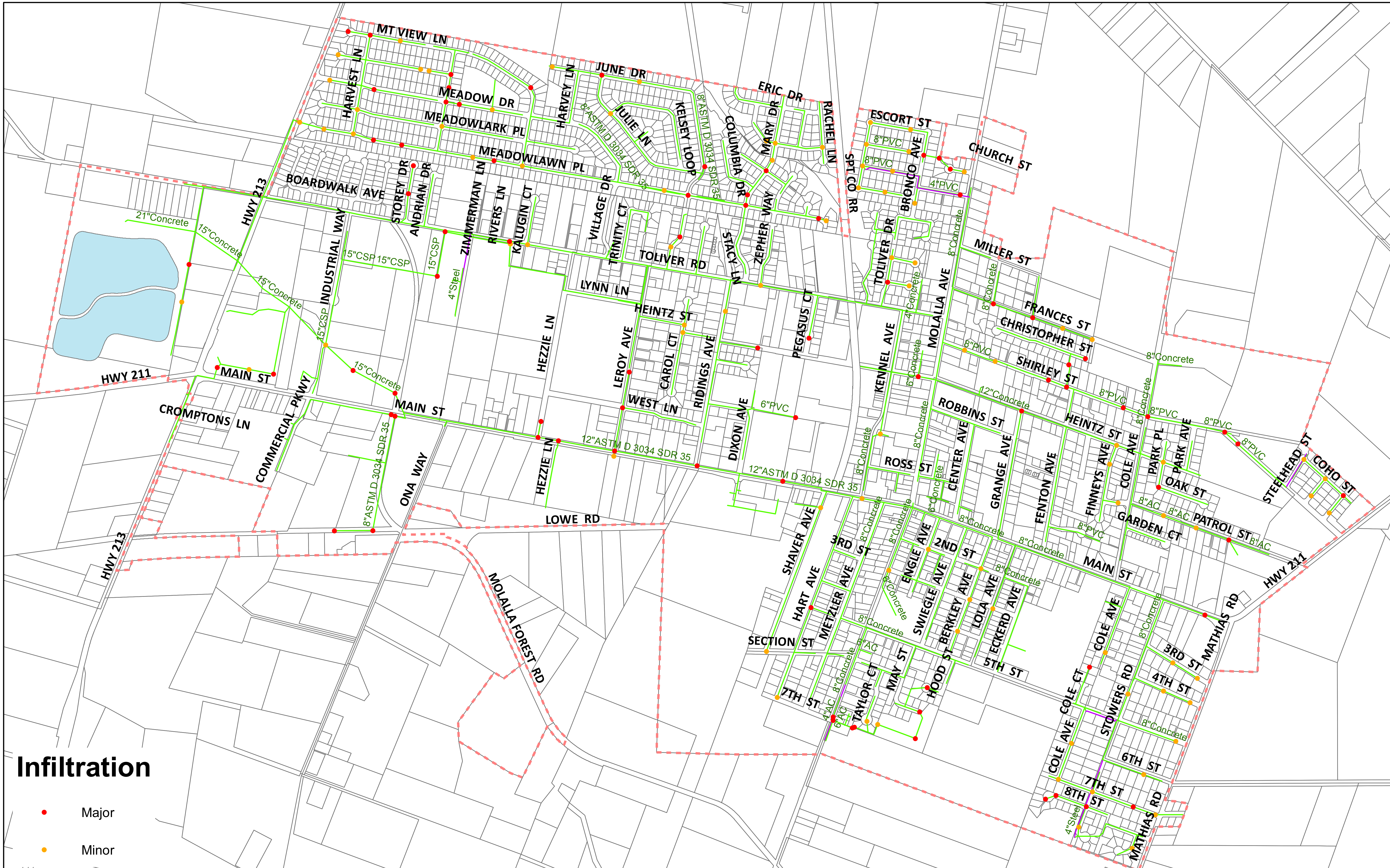
APPENDIX

APPENDIX	*TITLE*
A	SUMMER MANHOLE INFILTRATION
B	WINTER MANHOLE INFILTRATION
C	2017 SMOKE TESTING REPORT
D	2017 UTILITIES RATE STUDY
E	2015 I/I ASSESSMENT AND REDUCTION PLAN

Summer Infiltration



Winter Infiltration



Infiltration

- Major
- Minor

CITY OF MOLALLA

SMOKE TESTING REPORT

OCTOBER 2017

DRAFT

The Dyer Partnership Engineers & Planners, Inc.

Project No. 100.26

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City of Molalla

Clackamas County, Oregon

Smoke Testing Report

DRAFT

October 2017

Project No. 100.26

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SECTION 1:

INTRODUCTION

SECTION 1: **INTRODUCTION**

1.1 General

Infiltration and inflow (I/I) is a problem affecting many Oregon communities. Infiltration and inflow, which is defined as groundwater and rainwater that enters a sanitary sewer collection system, creates many wastewater-related problems. Rain-induced sewer flows can hydraulically overload a wastewater treatment plant or pump station, increase the cost of operations, potentially cause a discharge of inadequately treated effluent, and lead to regulatory compliance issues. Infiltration and inflow can also cause flows to exceed the capacity of the pipes, thereby compromising the collection system.

1.2 Background and Need

The City of Molalla (‘City’) experiences higher sanitary sewer flows in “wet” weather months. Excessive infiltration and inflow overload the wastewater treatment facility, and contributes to violations at the wastewater treatment plant.

Smoke testing was performed to identify potential deficiencies allowing I/I into the collection system. Some of the sources of I/I that smoke testing identifies includes catch basins and roof drains tied to the sewer system, leaks in main and lateral sewer lines, leaky cleanouts, and deteriorated manholes. Correction of these I/I sources is an economical way to reduce extraneous flows within the collection system, reduce the operation and maintenance costs associated with treatment, and facilitate compliance at the wastewater treatment facility. Smoke testing the City’s wastewater collection system is also a requirement of the Department of Environmental Quality.

1.3 Scope of Study

The scope of this study includes the following two main tasks: smoke testing and summary report.

Smoke Testing of the study area was completed to assist in identifying inflow sources. Detailed, individual reports were developed to document each “smoke sign”. Each report includes a photograph of the observed smoke, a hand-drawn map of the location of the smoke, a written description of the source of the smoke, and other pertinent information. The ultimate and intended purpose of the smoke report is to assist the City in focusing on problem areas. Individual reports are attached in Appendix A.

Summary and Recommendations were developed that identify the areas of that portion of the City’s sewer collection system which need further investigation. The City should determine whether the individual defects are their responsibility or the responsibility of individual property owners, and create a plan to repair or rehabilitate each problem.

1.4 Study Area

The City’s collection system is divided into two major basins; Toliver and Bear Creek. The Toliver Basin (TL) is located along Toliver Road, beginning from the WWTP, and includes the main trunk interceptor. The Bear Creek Basin (BC) originates at the WWTP, and follows Bear Creek until it intersects with Woodburn-Estacada Highway. The study area associated with the smoke testing includes all basins and sub-basins, as set forth in Table 1.4.1. Figure 1.4.1 illustrates the limits of the study area associated with the smoke testing.

TABLE 1.4.1
BASINS AND SUB BASINS SMOKE TESTED
CITY OF MOLALLA

Basin ID	
Toliver Basin	**Bear Creek Basin**
TL	BC
TL_Sub basins	BC_A
TL_A	*BC_A1*
TL_A1	*BC_A2*
TL_A2	*BC_A3*
TL_B	*BC_A4*
TL_C	*BC_A5*
TL_C1	BC_B
TL_C2	BC_C
TL_D	*BC_C1*
TL_E	
TL_F	

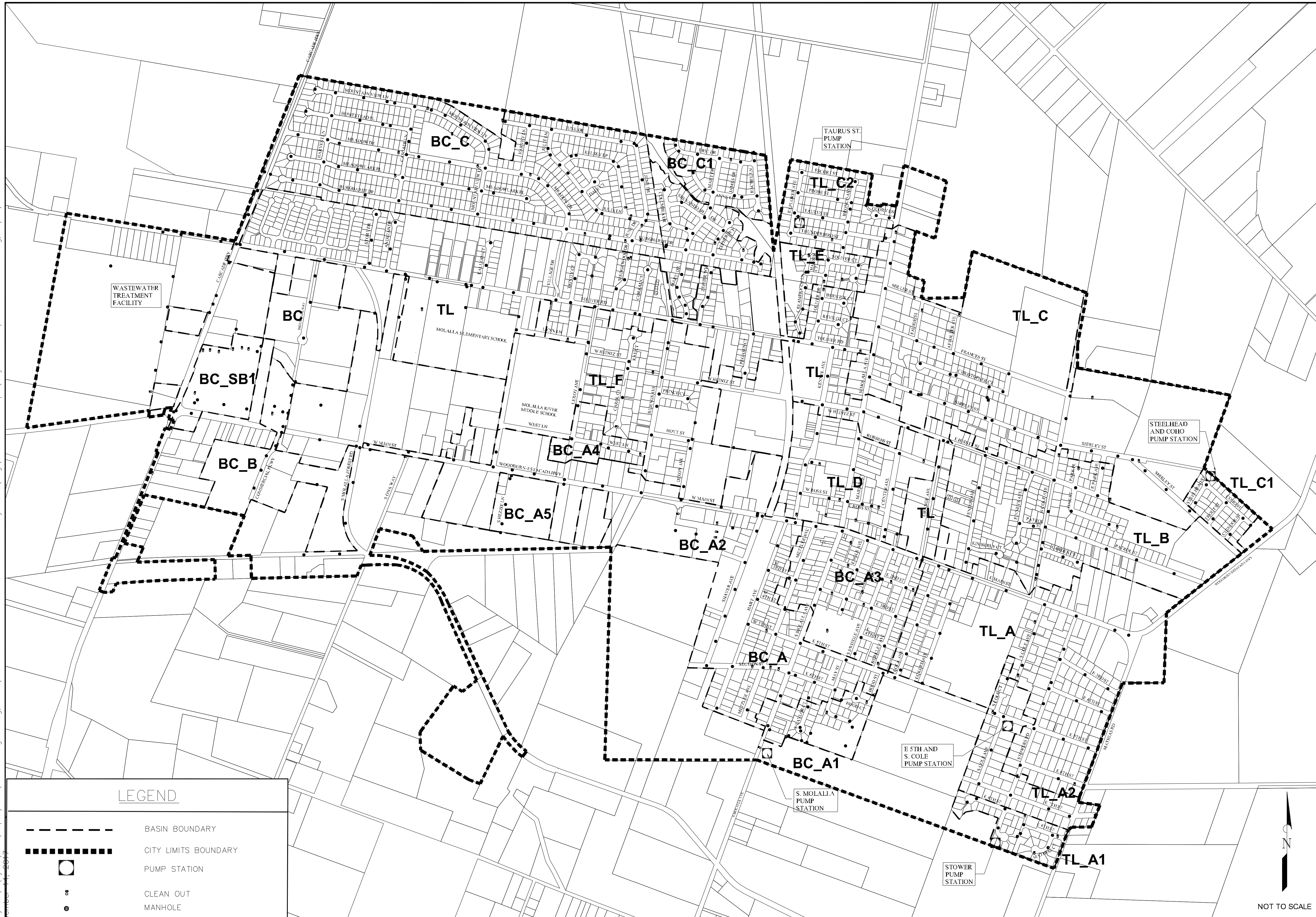

FIGURE NO. **1.4.1**

CITY OF MOLALLA
CLACKAMAS COUNTY, OREGON

SEWER BASIN MAP

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SECTION 2:

FIELD RESULTS

SECTION 2: **FIELD RESULTS**

2.1 Smoke Testing

Smoke testing was conducted from October 16 through October 18, 2017. The smoke testing was successful in identifying several possible sites of infiltration and inflow. Several catch basins are connected to the sewer system, which could introduce high flows into the collection system during wet weather conditions.

Table 2.1.1 lists the type and number of deficiencies that were indicated by the presence of smoke. Figure 2.1.1 illustrates the number and percentage of type of deficiency. Figures 2.1.2 and 2.1.3, located at the end of this section, are maps of the City's collection system, which show the sewer lines that were tested, the location of each deficiency discovered, and which manholes were smoked. Table 2.1.2 provides a reference to each of these individual deficiency reports according to the type of deficiency. A table of the smoke testing report number and its associated deficiency is included in Appendix A.

TABLE 2.1.1
NUMBER AND TYPE OF DEFICIENCIES

Type of Deficiency	Deficiency Code	Number of Issues
Leaking Service Lateral	LSL	19
Leaking Main Line	LML	2
Catch Basin	CB	26
Leaking Manhole	LMH	44
Open Cleanout	OCO	107
Plugged House Vent	PHV	1
Roof Drain	RD	9
	TOTAL DEFICIENCIES	**208**

FIGURE 2.1.1
SMOKE TESTING RESULTS SUMMARY
NUMBER OF VIOLATIONS BY TYPE

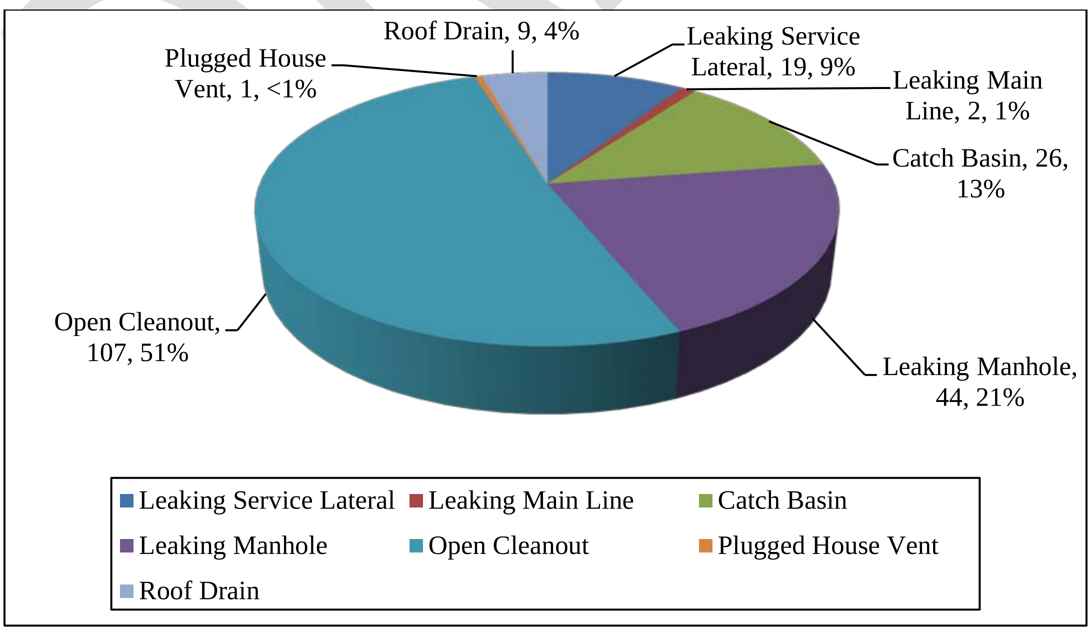


TABLE 2.1.2
REPORT NUMBERS ACCORDING TO DEFICIENCY TYPE[1]

Deficiency Type	Deficiency Code	Smoke Test Report Number			
Plugged House Vent	PHV	3-20			
Catch Basin	CB	1-14	1-33	2-1	2-17
		2-19	2-31	2-42	2-45
		2-57	2-59	2-61	3-16
		4-17	4-33	4-35	
Leaking Main Line	LML	1-25	2-47		
Roof Drain	RD	1-23	1-40	1-55	2-18
		2-36	3-40	4-12	4-22
		4-29			
Leaking Manhole	LMH	1-1	1-2	1-4	1-5
		1-16	1-19	1-20	1-21
		1-22	1-26	1-29	1-30
		1-39	2-3	2-6	2-14
		2-16	2-21	2-24	2-29
		2-34	2-35	3-1	3-2
		3-3	3-8	3-15	3-18
		3-23	3-26	3-32	3-34
		3-35	4-1	4-2	4-3
		4-4	4-5	4-9	4-13
		4-18	4-19	4-23	4-24
Leaking Service Lateral	LSL	1-11	1-28	1-32	1-38
		1-42	1-48	1-50	1-52
		2-2	2-13	2-15	2-39
		3-7	3-39	3-42	4-14
		4-26	4-31	4-34	
Open Clean Out	OCO	1-3	1-6	1-7	1-8
		1-9	1-10	1-12	1-13
		1-15	1-17	1-24	1-27
		1-31	1-32	1-34	1-35
		1-36	1-37	1-38	1-41
		1-43	1-44	1-45	1-46
		1-47	1-49	1-50	1-51
		1-53	1-54	2-4	2-5
		2-7	2-8	2-9	2-10
		2-11	2-12	2-20	2-22
		2-23	2-25	2-26	2-27
		2-28	2-30	2-32	2-33
		2-37	2-38	2-40	2-41
		2-43	2-44	2-46	2-48
		2-49	2-50	2-51	2-52
		2-53	2-54	2-55	2-56
		2-58	2-60	2-62	2-63

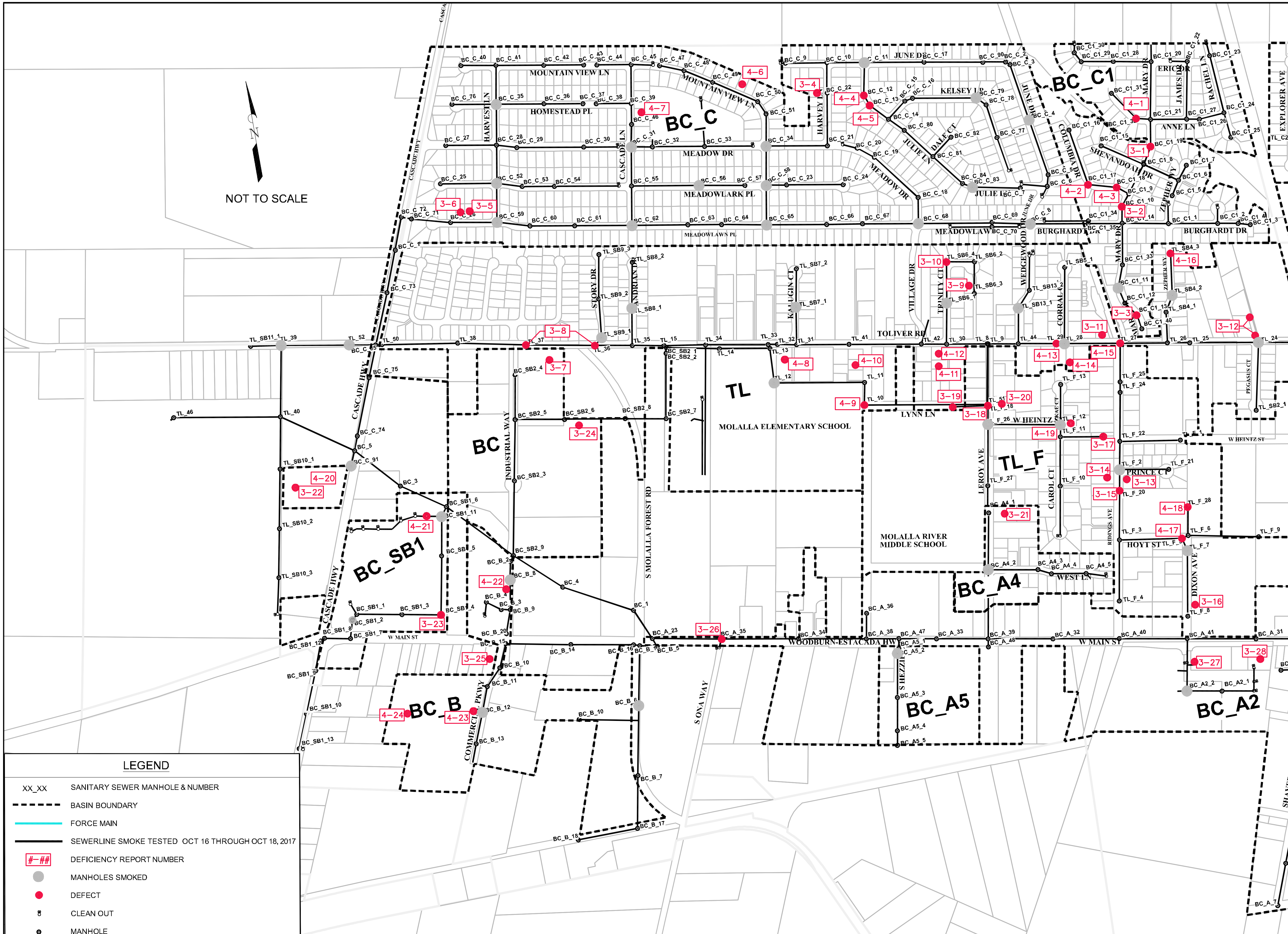
TABLE 2.1.2 (CONTINUED)
REPORT NUMBERS ACCORDING TO DEFICIENCY TYPE[1]

Deficiency Type	Deficiency Code	Smoke Test Report Number			
Open Clean Out	OCO	3-4	3-5	3-6	3-9
		3-10	3-11	3-12	3-13
		3-14	3-17	3-19	3-20
		3-21	3-22	3-24	3-25
		3-27	3-29	3-30	3-31
		3-33	3-36	3-37	3-38
		3-41	4-6	4-7	4-8
		4-10	4-11	4-15	4-16
		4-21	4-25	4-27	4-28
		4-30	4-32	4-36	

1. Some smoke reports included multiple deficiencies.

Other deficiencies, outside of the above categories, are summarized below:

- 1-18. Smoke was exiting from a communication box located in front of telephone pedestal #127.
- 3-28. Smoke was exiting from a vault in the parking lot west of car wash.
- 4-20. Floor drains at Les Schwab Tire Center were connected to the gravity sewer.



CITY OF MOLALLA
CLACKAMAS COUNTY, OREGON
SMOKE TESTING MAP

FIGURE NO. **2.1.2**

THE DYER PARTNERSHIP
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DATE: OCTOBER, 2017
PROJECT NO.: 100.26

\\dyer2\H\dyer-part\AAprojects\100.00 Engineering, Misc\100.26 PDG - Molalla WW Fac & Coll Syst MP\dwg\Smoke Test Maps\100.26 Smoke Test Results.dwg, 11/10/2017 1:58:01 PM PLOT DATE November 10, 2017

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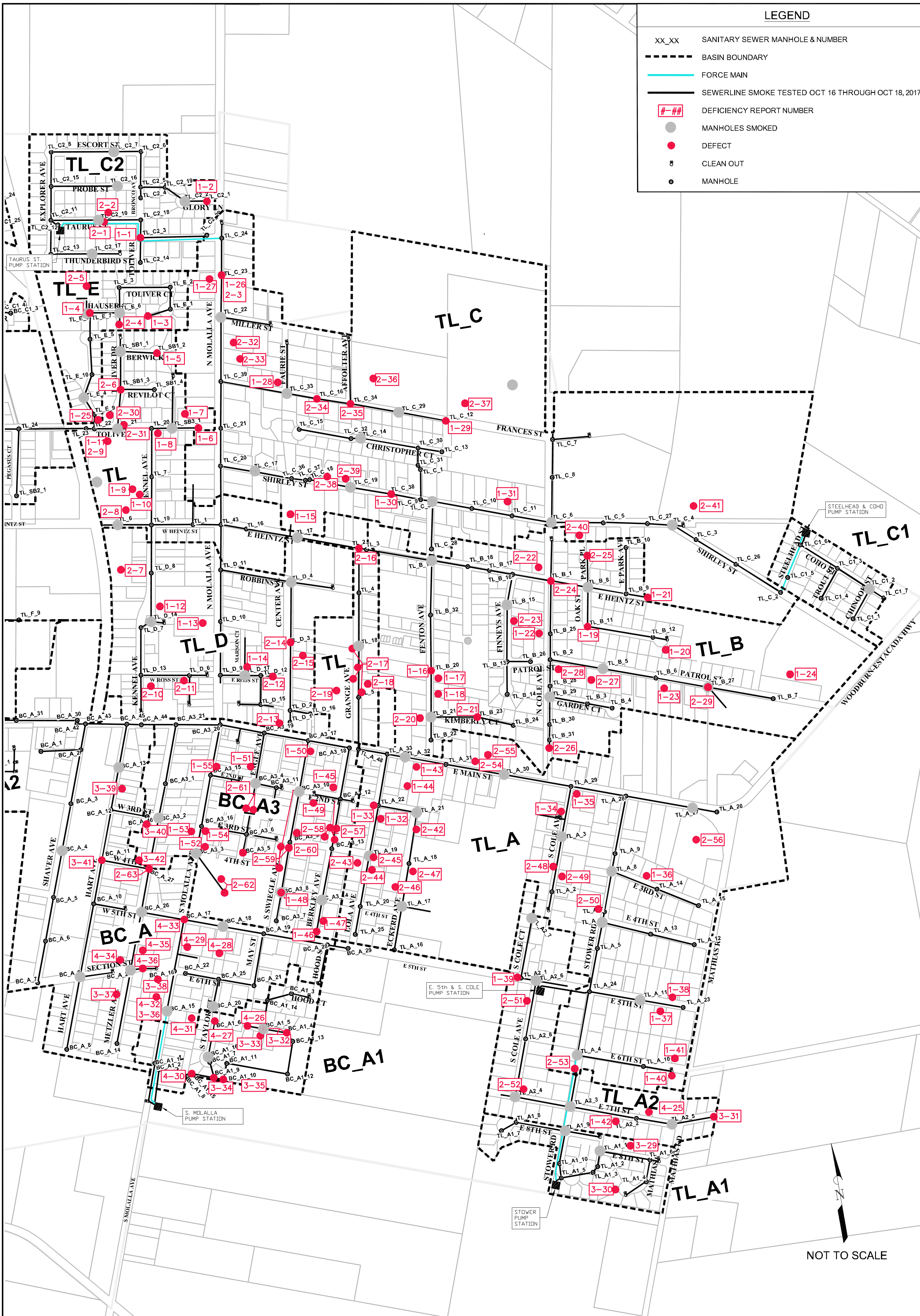

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ENGINEERS & PLANNERS

DATE: OCTOBER, 2017

PROJECT NO.: 100.26

CITY OF MOLALLA
CLACKAMAS COUNTY, OREGON

SMOKE TESTING MAP

FIGURE NO.
2.1.3

SECTION 3:

POTENTIAL DEFICIENCIES

SECTION 3: **POTENTIAL DEFICIENCIES**

3.1 Major Line Failures

Failed lines can be described as having any of the following problems, many of which may be identified during television inspection.

- Blockages, collapses, or corroded pipes.
- Material degradation due to hydrogen sulfide gas.
- Joint gaskets exposed or missing.
- Large or multiple areas with earth exposure.
- Cross connections to storm drain infrastructure.
- Major joint or crack infiltration.
- Excessive settlement or sags such that the crown of the pipe deflects below the invert of upper and lower pipeline sections (submerged flow conditions).

3.2 Spot Failures

Spot failures can typically be characterized as a localized break, crack, or failure in a pipe section. The failures can come in the form of circumferential cracks, holes in the pipe walls, areas of minor root intrusion, chipped and broken pipe joints, and displaced or gapped joints. Many of these types of failures can be identified during television inspection of the main lines.

3.3 Leaky Service Laterals

As is the case with aging collection systems, many service laterals within the collection system contribute to the I/I problem. More often, utilities and regulatory agencies recognize the need to combat I/I in a holistic approach that addresses both public collection system components and private sources. The privately owned portions of the sewer system have the potential to contribute significantly to I/I flows. In some cities, it is estimated that as much as 60% of the I/I flows originate from service laterals (US Environmental Protection Agency, 1996). According to a 2015 Water Environment Federation (WEF) I/I survey, 31% of the respondents noted private I/I sources contributing 50 to 75% of the I/I, and 36% of the respondents contributing 20 to 50%. As a relatively local example, the City of McMinnville, Oregon estimates that approximately 60% of the City's I/I originates from their private sewer laterals.

Many communities throughout Oregon have recognized the need to address private sewer lateral I/I. The cities of Lebanon, McMinnville, Albany, and Mt. Angel, many of which were faced with similar sewer and WWTP capacity issues, all developed programs geared towards identifying and repairing defective private sewer laterals.

If the time of television inspection is correctly chosen, leaking laterals can clearly be identified. In order for this to occur, the collection system must not be surcharged, but high groundwater levels must be present. For Molalla, 9% of deficiencies were leaking service laterals.

Service laterals with leakage can, and should be, replaced from the connection to the main line, to the edge of the right-of-way during pipe reconstruction and rehabilitation. The City should work with private property owners to provide technical and other assistance to repair or replace private laterals. In many cases, the lateral connection can be deteriorating or failed. Improperly installed lateral connections include protruding lateral taps that extend far into the pipe cross section. In many cases, the protruding tap acts like a dam, trapping solids behind it. The protruding taps also make it troublesome or impossible to get an inspection camera or cleaning head through a sewer line.

Associated with service laterals are cleanouts that may be installed between the dwelling or structure and the main sewer line. Cleanouts can act as area drains if the caps are not properly installed. For Molalla, 51% of deficiencies noted were due to open cleanouts.

3.4 Leaky Manholes

Although not a part of this task, all manholes should be inspected to determine if leaks are present in incoming pipes, manhole bases, or other locations. Significant leaks can occur at pipe entrances if not properly grouted. As with service laterals, whenever a major improvement is proposed for a sewer line, the manholes on either side should be replaced or rehabilitated as necessary. In some cases, it is possible to effectively repair manholes using grouting or lining techniques. Leaky manholes can be rehabilitated for a fraction of the cost of a new manhole. In Molalla, forty-four manholes were found to be leaking.

3.5 Storm and Roof Drain Connections

As with any gravity sewer system, potential exists for interconnection of catch basins, ditching and storm drain piping with the sewer system. These storm drain connections can cause significant flows into the sewer system and can easily exceed capacities of the gravity sewer system. Depending on location and topography, the removal of the storm drain connection may entail placement of new storm drain lines to maintain drainages. Twenty-six catch basins and nine roof drains did show some type of interconnection with the gravity sewer system in the study area.

3.6 Deficient House Plumbing

Smoke from rooftop vents is normal and allows harmful sewer gasses to release outside rather than within structures. Occasionally a vent will be plugged or blocked allowing sewer gasses to escape within a structure. Smoke should not enter structures unless:

- Vents connected to the building's sewer pipe are inadequate, defective, or improperly installed.
- Traps under sinks, tubs, basins, showers, and other drains are dry, defective, improperly installed, or missing.
- Pipes, connections, and seals of the wastewater drain system in and under building are damaged, defective, or are improperly installed.

The most common defects allowing smoke into buildings are dry traps for wash basins, showers, or tubs that are used infrequently. Smoke was discovered inside some structures, and one structure was noted as having a plugged house vent where smoke did not exit the rooftop vent.

SECTION 4:

ALTERNATIVES

SECTION 4: **ALTERNATIVES**

4.1 General

Until recently, infiltration in sewer collection systems was either ignored or the piping systems were completely replaced in order to correct infiltration problems. Today, new “trenchless technologies” allow collection systems to be rehabilitated without excavating to replace the old pipe. Expenses associated with new asphalt, sidewalks, landscaping, and other costs resulting from trenching can be almost completely avoided. If applicable, trenchless technology can almost always reduce project costs when rehabilitating sewer collection systems. A summary of different repair and rehabilitation techniques is provided below.

4.2 Collection System Repair and Rehabilitation Methods

Repair and rehabilitation methods to correct pipe deficiencies and minimize I/I intrusion are discussed below.

Complete Pipe Replacement

Pipeline replacement by conventional excavation and backfill is normally required when the existing pipeline is deteriorated so badly that other methods of rehabilitation are not feasible. However, complete replacement provides the opportunity to correct any misalignments or low areas, increase the hydraulic capacity of the line, repair service connections, or eliminate storm water entry points such as catch basins. Replacing pipelines can also remove any “incidental” I/I (i.e. minor leaks that would not individually be cost-effective to remove). A rehabilitation alternative that is similar to complete pipe replacement is point repairs, which involve excavation, pipe replacement, backfill and resurfacing for selected sections only.

The obvious advantage of pipe replacement is that the service life gained with modern materials and methods is generally considered to be more than 50 years. The cost of pipe replacement is generally high, and the associated inconveniences and restoration required are expensive.

Another advantage associated with complete pipe replacement is the fact that the I/I along a replaced pipe segment should be significantly reduced; however, it is important to note that a large percentage of I/I will continue to originate from service laterals or other aboveground sources. It is therefore recommended that wherever feasible, complete service replacement to the property line be included in a replacement project.

There are a number of techniques for installing new sewer pipe, including the traditional open cut construction, and trenchless techniques (e.g. horizontal directional drilling (HDD)) and pipe bursting). Some of the key criteria for selecting a method for new pipe installation are given in Table 4.2.1.

TABLE 4.2.1
KEY CRITERIA FOR NEW PIPE INSTALLATION

Criteria	Potential Factors
Surface Conditions	Type (paved/unpaved), traffic use, land use (urban/rural), type (forest, water, etc.).
Cost	Pipe installation, surface restoration, subsurface difficulties
Environmental Considerations	Wetlands, critical habitat, migratory route
Subsurface Conditions	Installation depth, groundwater level, soil type, existing utilities
Hydraulics	Gravity vs. pressure flow, needed flow capacity, existing grades

Typically, the decision process will involve weighing the advantages of avoiding surface disruption against the costs. Surface conditions, depth of installation, subsurface conditions and environmental considerations also will affect the cost analysis. The evaluation and weighing criteria for choosing a particular construction technique will depend on specific site conditions. Brief descriptions of open cut, pipe bursting and HDD construction techniques are given below.

Open Trench Construction
Open trench construction consists of excavating an open trench in the ground for pipe installation. Typically, the width of the trench is at least 12 inches greater than the pipe diameter. While the trench depth will depend upon the specific application (e.g. force main versus gravity sewer), the cover depth over the pipe is generally at least three feet.

Open trench construction is traditionally used in most new sewer pipe installations because of cost considerations and availability of local contractors and crews to perform the work. The disadvantages of open trench construction include trench shoring requirements for trenches over five feet in depth or where soils are unstable, dewatering of the trench when high groundwater is present, and increased cost and complexity with deep excavations.

Horizontal Directional Drilling (HDD)
In horizontal directional drilling methods, a pilot bore is first made using a controllable drilling head. Once a hole is drilled from the entry point to the terminus, a new pipe is "towed" back through the bore hole behind the drill head on the return trip from the terminus to the entry point. While drift control within a few inches is available using electromagnetic tracking systems, this method cannot be used for minimum grade gravity sewer lines. Most projects utilize high-density polyethylene (HDPE) or fusible PVC for new line installations. The advantages of this construction technique include minimal impact to the surface conditions and ability to install pipe under adverse subsurface conditions (e.g. high groundwater). The disadvantages of horizontal directional drilling include cost (typically from 3 to 5 times greater than open trench construction), inability to construct minimum grade sewers, and difficulty in dealing with subsurface conditions containing boulders and cobbles. Environmental issues might potentially exist as well in that pressurized drilling fluids can fracture the soil surrounding the bore and migrate to the surface at undesirable locations.

Pipe Bursting
Pipe bursting is a trenchless replacement method that is used in certain circumstances to replace failed pipe or when upsizing of a pipe section is required. Pipe bursting consists of a hydraulically activated cutting head that is pushed or pulled through the inside of the old pipe to be replaced, breaking it up, and forcing the broken fragments into the surrounding ground. The cutting head tows a new pipeline behind it that is simultaneously installed in place as the head bursts the old line. The cutting head has a slightly larger outside diameter than the new pipe and is bigger than the inside diameter of the old pipe. Depending upon the size of the cutting head, new pipes of the same size or up to almost twice the original size can be installed. For example, an existing 8-inch diameter concrete sewer pipe can be replaced with a 15-inch diameter HDPE pipe utilizing pipe bursting technology.

The advantage of pipe bursting is the minimization of trenching and surface restoration. Pipe bursting, however, is generally not used if congestion underground is a question or if the existing pipeline is not of a brittle nature (e.g. clay, concrete, asbestos-cement pipe). In addition, this technique has major noise and vibration problems and is somewhat uneconomical if a number of laterals must be reconnected. Pipe bursting of AC pipe is also a concern as this process converts "non-friable" asbestos material in an intact AC sewer main to a friable one. While pipe bursting is performed underground with limited construction exposure, the shattered pipe material may be exposed during the installation of new sewer laterals or connections.

Summary
Among the complete pipe replacement techniques listed above, open trench construction is considered the preferred method for the replacement of existing sewer pipes. This construction technique is the most common means of constructing new sewers and is familiar to local contractors. Horizontal directional drilling and pipe bursting may be warranted and would be considered if pipe replacement was needed in an area with a deep sewer line and/or in areas where surface disturbance should be minimized.

Trenchless Pipe Rehabilitation Methods

Cured in Place Pipe
Cured in place pipe (CIPP) is best described as "manufacturing a new pipe within an existing pipe". A CIPP installation uses a plastic-lined felt bag that has been impregnated with resins. The impregnated bag is inverted (turned inside out) allowing the plastic exterior to be turned inward. Two methods are commonly used to cure the liner. The inner space is either filled with pressurized water or with air as the inverted bag is oriented into the existing pipe. The pressurized water or air drives the bag's inversion until the entire section of liner has been turned inside out and the end has been retrieved at the downstream manhole. The water or air pressure forces the resin material against the existing sewer pipe. Then heated water or steam is continuously pumped through the tube, causing the resins in the bag to cure and harden.

The use of CIPP lining is appropriate for pipelines requiring minor structural repair, sealing holes, leaky joints, leaky misalignments, and for correcting corrosion problems. Because this method of rehabilitation does not require excavations, it may be used under highways, railroads, and buildings. Service lateral connections are typically made with special cutters and sealers from inside the pipe. Laterals are sometimes physically reconnected in a manner similar to a spot repair. This is done with specific types of lateral saddles. If properly completed, the life of an inversion-lined pipe has been claimed by several lining manufacturers to be more than 50 years. Due to frictional factors of the lining, the hydraulic capacity of the pipe is increased.

Chemical Grouting
Chemical grouting is commonly used to seal leaking joints in structurally sound pipe, laterals, and manholes experiencing infiltration. Typical applications consist of two separate chemicals that are pumped through separate hoses to the joint, crack or manhole being sealed. Once the two chemicals are mixed together they form a gel or foam that expands out through the defect and into the surrounding earth.

The equipment used for chemical grouting of pipelines includes a joint or lateral packer and television (TV) camera. The entire assembly is pulled inside the sewer pipe with cables and winches. Chemical feed lines are extended from the supply tanks to the packer unit. Chemical injection is performed internally, using robotic equipment without requiring man entry or excavations unless unique problems develop.

Since manholes are a major component of the collection system, it is often desirable to enhance the grout rehabilitation method by applying an interior coating. This coating increases the effectiveness of a grout repair by providing an interior seal that will last beyond the expected grout life. Successful manhole coatings include cementitious linings, polyethylene linings, epoxy coatings, and cured-in-place fiberglass lining systems.

Chemical grouting does not improve the structural strength of a pipeline; therefore this method of rehabilitation should not be used on pipes that are badly broken or deteriorated. If the groundwater table drops below the level of the pipe, the chemical grout may become dehydrated and its useful life will be shortened. Also, many chemical grouts do not have shear strength and will tear or fracture if a load is applied to the surrounding earth. When used appropriately, rehabilitation by chemical grouting should serve a useful life of at least ten years.

Internal Spot Repairs

There are a number of highly effective methods for performing internal spot repairs without requiring excavations. Two methods commonly utilized are Link-Pipe (stainless sleeve) and ambient cured soft liners. Each method has unique advantages.

Link-Pipe is a stainless steel grouting sleeve that is used to accomplish small spot repairs within a sewer line; these sleeves come in a variety of lengths—12, 18, 24 and 36 inches—and diameters ranging between 4 and 36 inches. Link-Pipe can be used to restore partially collapsed pipes, close holes created by material loss in pipe walls, and seal infiltrating cracked pipes and pipe joints. This method of rehabilitation requires no trenching and can be performed without bypassing water.

A Link-Pipe installation involves the placement of a grouting sleeve inside the damaged portion of a sewer line. This grouting sleeve is of stainless steel construction and is surrounded by a grout-absorbing gasket. The sleeve is moved into position on a wheeled flow-through plug; a video camera is used to monitor the positioning of the grout sleeve. Once in place, compressed air is used to inflate the plug, which in turn compresses the gasket against the walls of the sewer line. The repair is completed when the flow-through plug is fully inflated, the gasket has adhered to the wall, and the Link-Pipe's internal locks have engaged.

This method of rehabilitation creates a smooth stainless steel channel that supports damaged pipe and may actually improve the hydraulic properties of the existing line. Manufacturers of the stainless steel sleeve indicate a substantially long service life and guarantee 100 percent infiltration reduction. This guarantee, however, does not account for other sources or leaks associated with service laterals.

The second method of performing an internal spot repair commonly utilized is to install an ambient cure soft-liner. This type of liner is very similar to CIPP except that the liner does not require an inversion system and the resin does not require an external heat source to harden. Spot repair liners are especially applicable when a section of pipe requires a repair over a few feet in length. Another advantage of an ambient cure liner is that it can be used to repair laterals with or without having to excavate at the mainline connection.

Summary

Among the trenchless pipe rehabilitation methods described above, cured in place pipe (CIPP) is considered the preferred method for the rehabilitation of existing sewer pipes that have various defects throughout the entire length of pipe. Chemical grouting and internal spot repairs may be warranted and would be considered if the defects were isolated to a particular area within a pipe segment. Trenchless pipe rehabilitation method construction techniques are specialized and require the use of special equipment.

SECTION 5:
SUMMARY

SECTION 5: **SUMMARY**

5.1 Smoke Testing Summary

The smoke testing identified a number of deficiencies that need to be addressed. The City of Molalla's collection system and wastewater treatment facility is hydraulically overloaded. Eliminating infiltration and inflow is necessary to release capacity, within the collection system and at the wastewater treatment facility, trapped by infiltration and inflow.

The City of Molalla should return to each site using the reports to determine what measures must be taken to repair or rehabilitate each problem that is allowing smoke to escape the collection system. Some of the repairs can be fairly easy to correct, such as leaky cleanouts, while others such as catch basins, may require more extensive efforts to reroute flows to nearby drainages. Some of the deficiencies may also require additional television inspection to see the extent of deterioration of sewer main lines, sewer laterals, and lateral connections.

In some cases, the problem is located within the public right-of-way and should be repaired or rehabilitated by the City. In other cases, the deficiency is located on private property and the private property owner should be required to address and repair the problem. It is recommended that letters be sent to all private property owners where deficiencies were noted. A sample letter is provided in Appendix B.

APPENDICES

APPENDIX A: SMOKE TEST REPORTS

City of Molalla
Smoke Testing Report Summary
Project 100.26

Smoke Test Report Number	Deficiency Type
1-1	LMH
1-2	LMH
1-3	OCO
1-4	LMH
1-5	LMH
1-6	OCO
1-7	OCO
1-8	OCO
1-9	OCO
1-10	OCO
1-11	LSL
1-12	OCO
1-13	OCO
1-14	CB
1-15	OCO
1-16	LMH
1-17	OCO
1-18	Communication Box
1-19	LMH
1-20	LMH
1-21	LMH
1-22	LMH
1-23	RD
1-24	OCO
1-25	LML
1-26	LMH
1-27	OCO
1-28	LSL
1-29	LMH
1-30	LMH
1-31	OCO
1-32	OCO / LSL
1-33	CB
1-34	OCO
1-35	OCO
1-36	OCO
1-37	OCO
1-38	OCO / LSL
1-39	LMH
1-40	RD
1-41	OCO
1-42	LSL
1-43	OCO
1-44	OCO
1-45	OCO
1-46	OCO
1-47	OCO
1-48	LSL
1-49	OCO
1-50	OCO / LSL
1-51	OCO
1-52	LSL
1-53	OCO
1-54	OCO
1-55	RD

Smoke Test Report Number	Deficiency Type
2-1	CB
2-2	LSL
2-3	LMH
2-4	OCO
2-5	OCO
2-6	LMH
2-7	OCO
2-8	OCO
2-9	OCO
2-10	OCO
2-11	OCO
2-12	OCO
2-13	LSL
2-14	LMH
2-15	LSL
2-16	LMH
2-17	CB
2-18	RD
2-19	CB
2-20	OCO
2-21	LMH
2-22	OCO
2-23	OCO
2-24	LMH
2-25	OCO
2-26	OCO
2-27	OCO
2-28	OCO
2-29	LMH
2-30	OCO
2-31	CB
2-32	OCO
2-33	OCO
2-34	LMH
2-35	LMH
2-36	RD
2-37	OCO
2-38	OCO
2-39	LSL
2-40	OCO
2-41	OCO
2-42	CB
2-43	OCO
2-44	OCO
2-45	CB
2-46	OCO
2-47	LML
2-48	OCO
2-49	OCO
2-50	OCO
2-51	OCO
2-52	OCO
2-53	OCO
2-54	OCO
2-55	OCO
2-56	OCO
2-57	CB
2-58	OCO
2-59	CB
2-60	OCO
2-61	CB
2-62	OCO
2-63	OCO

Smoke Test Report Number	Deficiency Type
3-1	LMH
3-2	LMH
3-3	LMH
3-4	OCO
3-5	OCO
3-6	OCO
3-7	LSL
3-8	LMH
3-9	OCO
3-10	OCO
3-11	OCO
3-12	OCO
3-13	OCO
3-14	OCO
3-15	LMH
3-16	CB
3-17	OCO
3-18	LMH
3-19	OCO
3-20	OCO
3-21	OCO
3-22	OCO
3-23	LMH
3-24	OCO
3-25	OCO
3-26	LMH
3-27	OCO
3-28	Leaking Vault
3-29	OCO
3-30	OCO
3-31	OCO
3-32	LMH
3-33	OCO
3-34	LMH
3-35	LMH
3-36	OCO
3-37	OCO
3-38	OCO
3-39	LSL
3-40	RD
3-41	OCO
3-42	LSL

Smoke Test Report Number	Deficiency Type
4-1	LMH
4-2	LMH
4-3	LMH
4-4	LMH
4-5	LMH
4-6	OCO
4-7	OCO
4-8	OCO
4-9	LMH
4-10	OCO
4-11	OCO
4-12	RD
4-13	LMH
4-14	LSL
4-15	OCO
4-16	OCO
4-17	CB
4-18	LMH
4-19	LMH
4-20	Floor Drains
4-21	OCO
4-22	RD
4-23	LMH
4-24	LMH
4-25	OCO
4-26	LSL
4-27	OCO
4-28	OCO
4-29	RD
4-30	OCO
4-31	LSL
4-32	OCO
4-33	CB
4-34	LSL
4-35	CB
4-36	OCO

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		Intersection of Thunderbird St & Bronco Ave.	
Project Name :		Location / Address:	
100.26	1-1	TL_C2	MH TL_C2_3
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	LMH
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from around the ring and the cracks in the road next to the manhole.
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla I/I Study	Location / Address: Glory Lane
Project No.: 100.26	Report No.: 1-2
Basin: TL_C2	MH No. / Main: MH TL_C2_1
Tested By: Chilton Peck	Date: 10.16.17

TESTING CODE	
LSL	= Leaking Service Lateral
LML	= Leaking Main Line
CB	= Catch Basin
LMH	= Leaking Manhole
OCO	= Open Cleanout
PHV	= Plugged House Vent
RD	= Roof Drain

PHOTOGRAPHS

No.	Description
1	LMH

Comments

- Smoke coming from around the ring and the cracks in the road next to the manhole.

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		Toliver Court	
Project Name :		Location / Address:	
100.26	1-3	TL_E	C/O – TL_E_1
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Located in concrete driveway for 120 Toliver Ct.
- Smoke coming from cleanout cap, Did not open to verify actual issue
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla I/I Study		Location / Address: Hauser Court	
Project No. 100.26	Report No. 1-4	Basin: TL_E	MH No. / Main: TL_E_7
Tested By: Chilton Peck			Date: 10.16.17

TESTING CODE	**PHOTOGRAPHS**	
	No.	**Description**
LSL = Leaking Service Lateral	1	LMH
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from crack in road next to the manhole
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		Berwick Court	
Project Name :		Location / Address:	
100.26	1-5	TL	TL_SB1_2
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

Testing Code	Photographs	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	LMH
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from around the rim of the manhole
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study
Project Name :

Toliver Rd.
Location / Address:

100.26
Project No.

1-6
Report No.

TL
Basin:

C/O - TL_SB3_1
MH No. / Main:

Chilton Peck
Tested By:

10.16.17
Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	OCO
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from around the rim of the cleanout
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		103 Toliver Rd.	
Project Name :		Location / Address:	
100.26	1-7	TL	C/O - TL_SB3_1
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	OCO
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from behind wooden fence, could not gain access to verify issue
- There was an exposed section of PVC pipe at the fence.
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study		Location / Address: Intersection of Toliver Rd & Kennel Ave	
Project No.: 100.26	Report No.: 1-8	Basin: TL	MH No. / Main: TL_20 - TL_SB3_1
Tested By: Chilton Peck			Date: 10.16.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	CB
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from catch basin.
- Looking east on Toliver Rd from Kennel Ave.
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

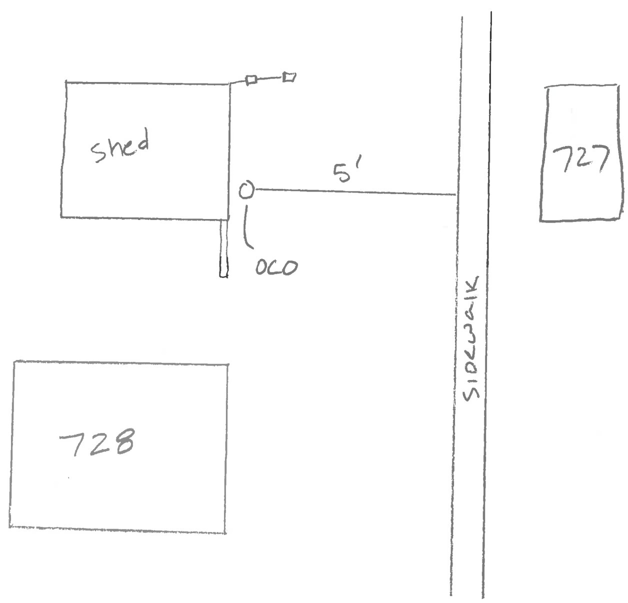
Project Name: Molalla I/I Study		Location / Address: 205 W. Heintz St Unit #728	
Project No.: 100.26	Report No.: 1-9	Basin: TL	MH No. / Main: TL_21 - TL_22
Tested By: Chilton Peck			Date: 10.16.17

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Located at Unit #728 of Twin Firs Mobile Home Park
- Smoke coming from open cleanout, located behind the shed

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: 205 W. Heintz St Unit #723
Project No.: 100.26	Report No.: 1-10
Basin: TL	MH No. / Main: TL_21 - TL_22
Tested By: Chilton Peck	Date: 10.16.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO - overall
LML = Leaking Main Line	2	OCO – open c/o behind the shed
CB = Catch Basin	3	OCO – broken cap on c/o next to shed
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Located at Unit #723 of Twin Firs Mobile Home Park
- Smoke coming from open cleanout, located behind the shed
- Smoke coming out of broken cleanout cap on the side of the shed

SKETCH

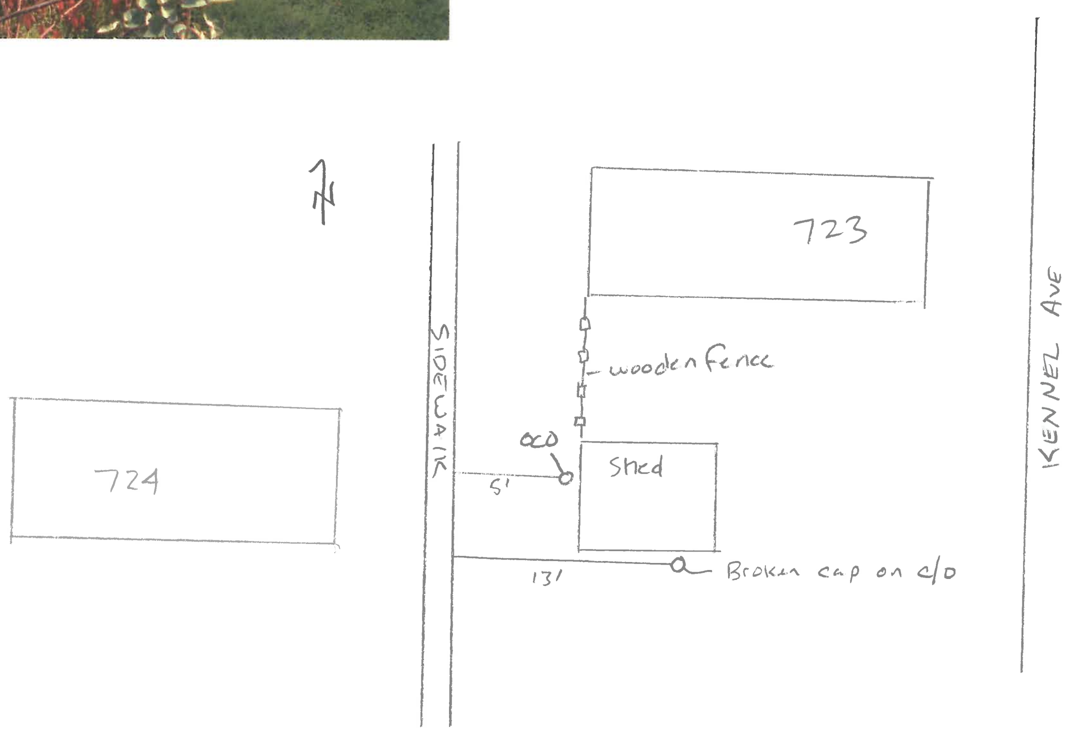
1.


723
10 16 2017 11:41

2.


723
10 16 2017 11:41

3.


N
723
SIDEWALK
wooden fence
OCO
Shed
5'
724
13'
Broken cap on c/o
KENNEL Ave

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

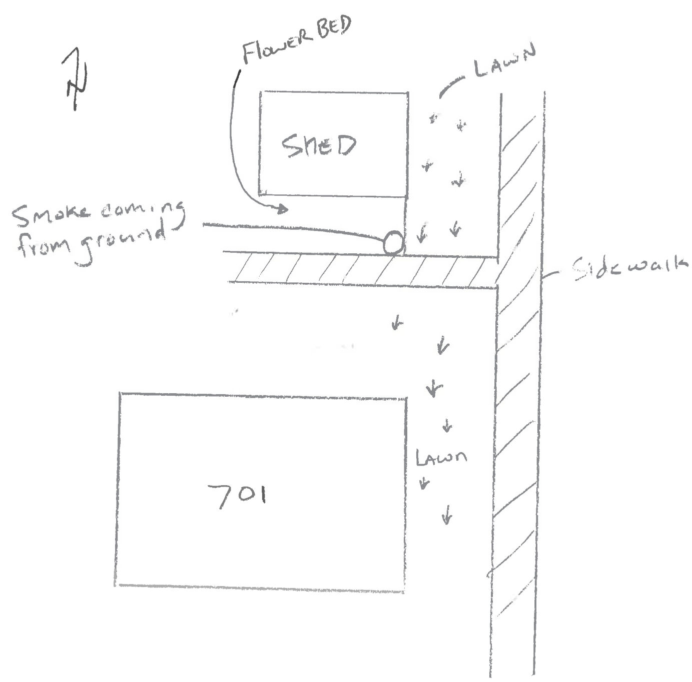
Project Name : Molalla I/I Study		Location / Address: 205 W. Heintz St Unit #701	
Project No. 100.26	Report No. 1-11	Basin: TL	MH No. / Main: TL_21 - TL_22
Tested By: Chilton Peck			Date: 10.16.17

TESTING CODE	PHOTOGRAPHS No.	Description
LSL = Leaking Service Lateral	1	LSL
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Located at Unit #701 of Twin Firs Mobile Home Park
- Smoke coming from ground in the flower bed, next the shed.
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

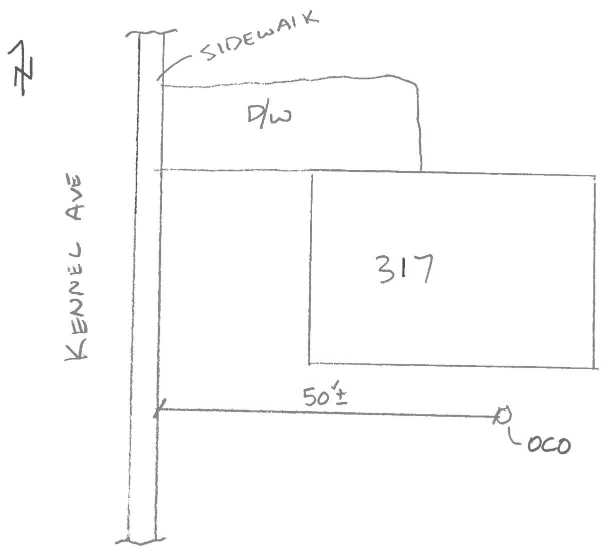
Project Name: Molalla I/I Study		Location / Address: 317 Kennel Ave	
Project No.: 100.26	Report No.: 1-12	Basin: TL_D	MH No. / Main: TL_D_8 - TL_D_14
Tested By: Chilton Peck			Date: 10.16.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from open cleanout
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

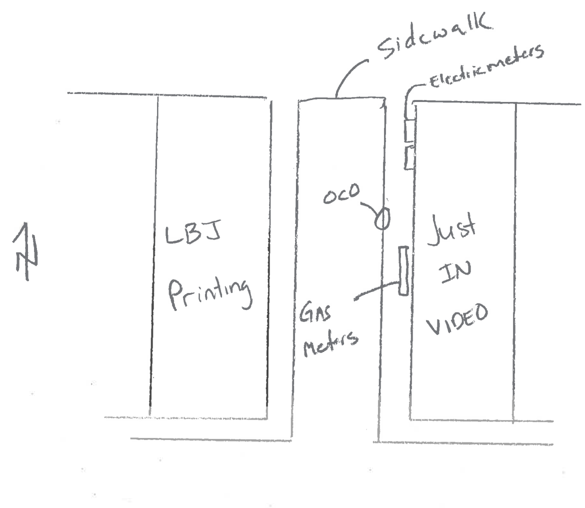
Molalla I/I Study		270 N. Molalla Ave	
Project Name :		Location / Address:	
100.26	1-13	TL_D	TL_D_8 - TL_D_14
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from cleanout cap,
- Located in the sidewalk along the west wall of building 270 N. Molalla (Just In video)
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

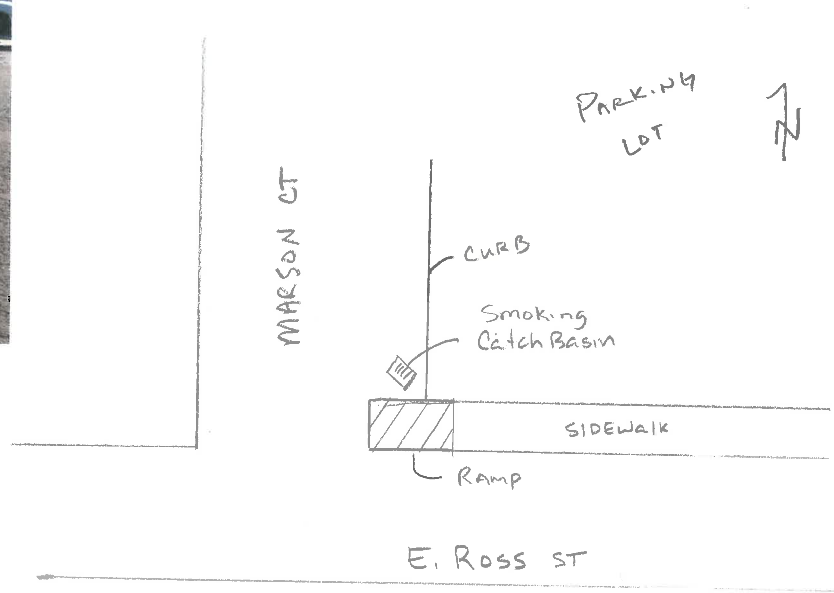
Molalla I/I Study		Intersection of Marson Ct. & East Ross Street	
Project Name :		Location / Address:	
100.26	1-14	TL_D	TL_D_17
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	CB
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from catch basin
- Located in the northeast corner of intersection of E. Ross Street & Marson Court, on the north side of the asphalt ramp.
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: 138 Shirley St, Unit #16
Project No.: 100.26	Report No.: 1-15
Basin: TL_C	MH No. / Main: TL_16 - TL_17
Tested By: Chilton Peck	Date: 10.16.17

TESTING CODE	
LSL = Leaking Service Lateral	
LML = Leaking Main Line	
CB = Catch Basin	
LMH = Leaking Manhole	
OCO = Open Cleanout	
PHV = Plugged House Vent	
RD = Roof Drain	

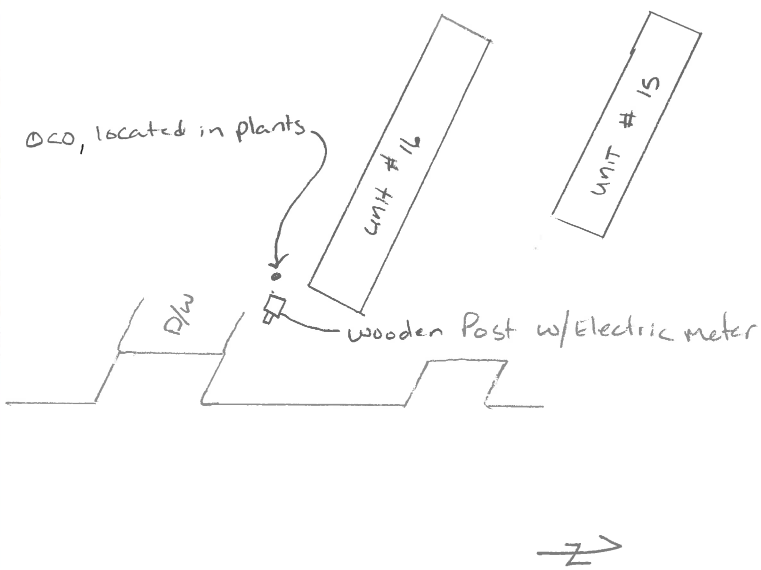
PHOTOGRAPHS

No.	Description
1	OCO

Comments

- Smoke coming from open cleanout with no cap
- Located in Molalla Mobile Manor
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		137 Fenton Avenue	
Project Name :		Location / Address:	
100.26	1-16	TL_B	TL_B_20
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	LMH
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Little bit of smoke leaking around the rim

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

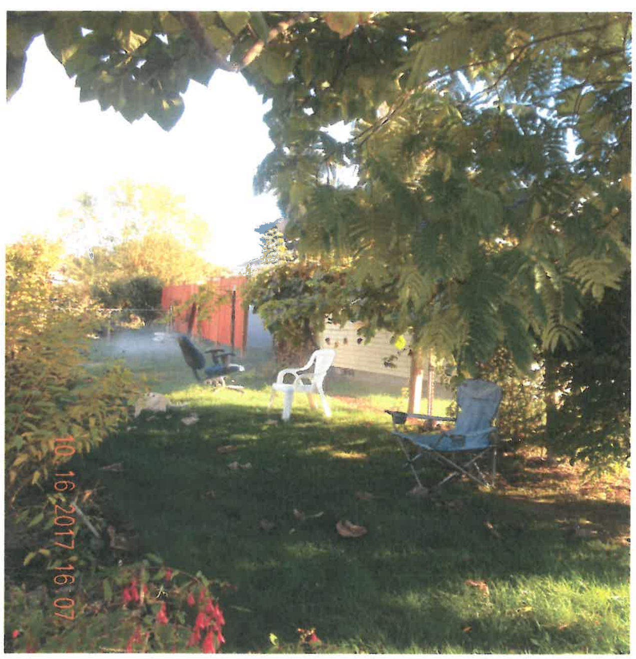
Molalla I/I Study		135 Fenton Avenue	
Project Name :		Location / Address:	
100.26	1-17	TL_B	TL_B_20 - TL_B_21
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

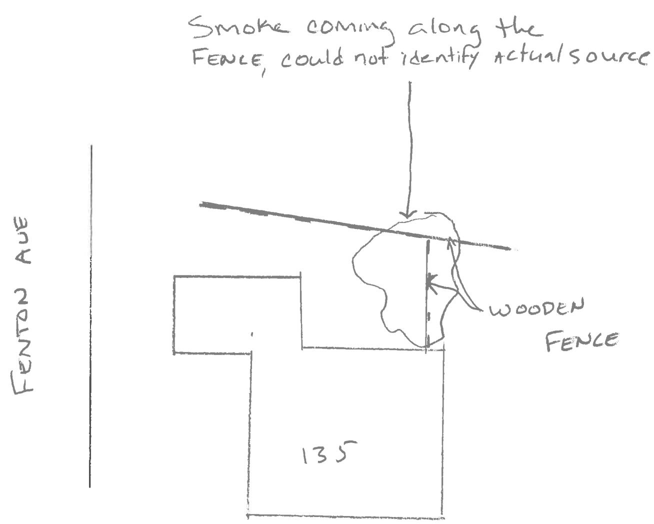
TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming behind the fence, could not identify the source.
-
-
-
-

SKETCH





SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

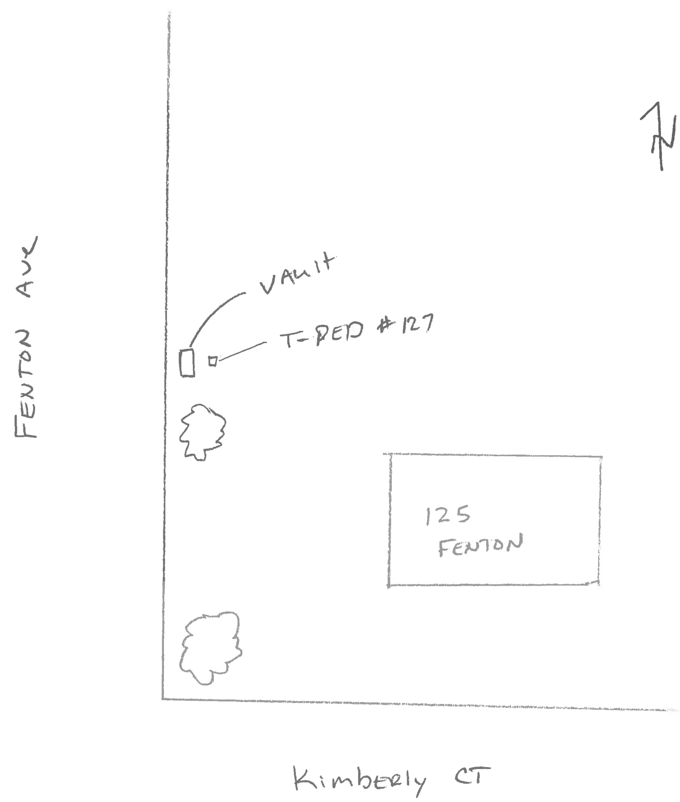
Project Name: Molalla I/I Study	Location / Address: 131 Fenton Avenue
Project No.: 100.26	Report No.: 1-18
Basin: TL_B	MH No. / Main: TL_B_20 - TL_B_21
Tested By: Chilton Peck	Date: 10.16.17

TESTING CODE	PHOTOGRAPHS No.	Description
LSL = Leaking Service Lateral	1	
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of communication box located in front of telephone pedestal #127

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: 200 Oak St.
Project No.: 100.26	Report No.: 1-19
Basin: TL_B	MH No. / Main: TL_B_11
Tested By: Chilton Peck	Date: 10.16.17

TESTING CODE		
LSL	=	Leaking Service Lateral
LML	=	Leaking Main Line
CB	=	Catch Basin
LMH	=	Leaking Manhole
OCO	=	Open Cleanout
PHV	=	Plugged House Vent
RD	=	Roof Drain

PHOTOGRAPHS

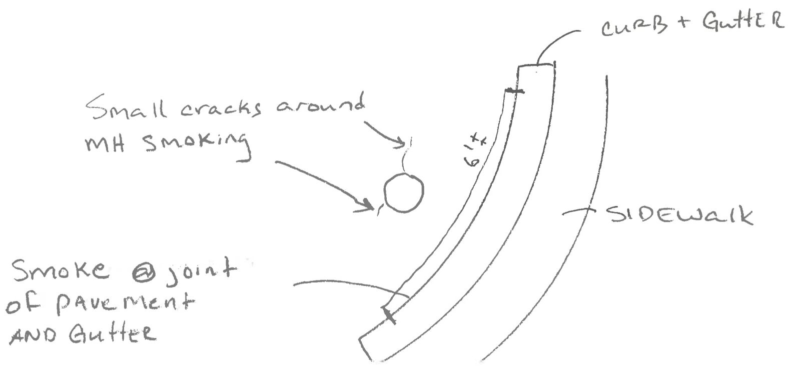
No.	Description
1	LMH

Comments

- Smoke leaky out around the rim of the manhole, the cracks in the road around the manhole and along the joint between the ac pavement and concrete gutter
-
-
-
-

SKETCH

1.



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

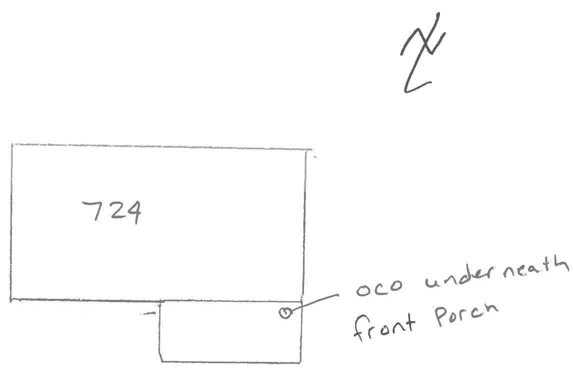
Project Name : Molalla I/I Study	Location / Address: 724 Oak St.
Project No. 100.26 — Report No. 1-20	Basin: TL_B — MH No. / Main: TL_B_12 - C/O
Tested By: Chilton Peck	Date: 10.16.17

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	LMH
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of open clean located under the front deck.

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		Intersection E. Heintz St. & E. Park Ave.	
Project Name :		Location / Address:	
100.26	1-21	TL_B	TL_B_9
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

TESTING CODE

LSL = Leaking Service Lateral
LML = Leaking Main Line
CB = Catch Basin
LMH = Leaking Manhole
OCO = Open Cleanout
PHV = Plugged House Vent
RD = Roof Drain

PHOTOGRAPHS

No.	Description
1	LMH

Comments

- Smoke leaking slightly around the rim of the manhole
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study		Location / Address: 200 N. Cole Ave	
Project No.: 100.26	Report No.: 1-22	Basin: TL_B	MH No. / Main: TL_B_25
Tested By: Chilton Peck			Date: 10.16.17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	LMH
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke leaking slightly around the rim of the manhole
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		716 Patrol St.	
Project Name :		Location / Address:	
100.26	1-23	TL_B	TL_B_6 - TL_B_27
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.16.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	RD
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of gutter by front porch.
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla I/I Study

Location / Address: 920 Shirley St

Project No.: 100.26

Report No.: 1-24

Basin: TL_B

MH No. / Main: TL_B_27 - TL_B_7

Tested By: Chilton Peck

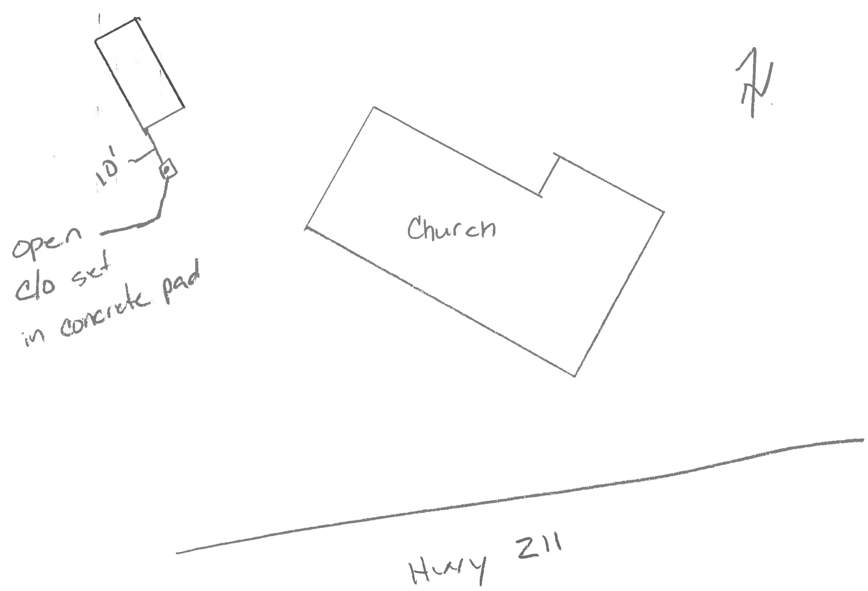
Date: 10.16.17

TESTING CODE	**PHOTOGRAPHS**	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of open cleanout next to shop T@ Church of the Nazarene
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

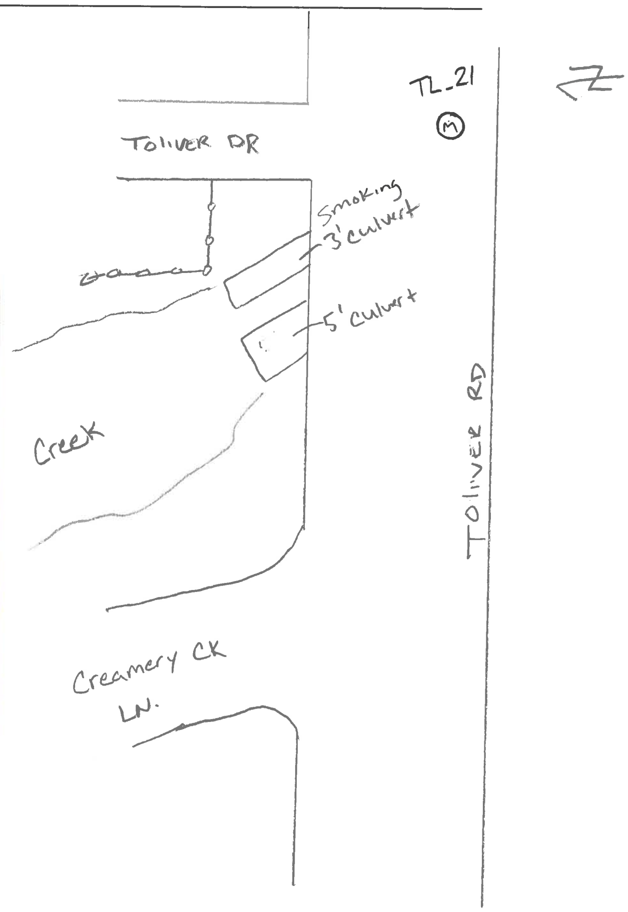
Molalla I/I Study		Toliver Rd & Creamery Cr. Lane	
Project Name :		Location / Address:	
100.26	1-25	TL	TL_21 - TL_22
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.17.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	LML
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of the 36" diameter culvert. Smoke machine was set up on MH TL_21
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: 718 N. Molalla Ave
Project No.: 100.26	Report No.: 1-26
Basin: TL_C	MH No. / Main: TL_C_23
Tested By: Chilton Peck	Date: 10.17.17

TESTING CODE	
LSL	= Leaking Service Lateral
LML	= Leaking Main Line
CB	= Catch Basin
LMH	= Leaking Manhole
OCO	= Open Cleanout
PHV	= Plugged House Vent
RD	= Roof Drain

PHOTOGRAPHS

No.	Description
1	LMH

Comments

- Smoke leaking around rim of manhole
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

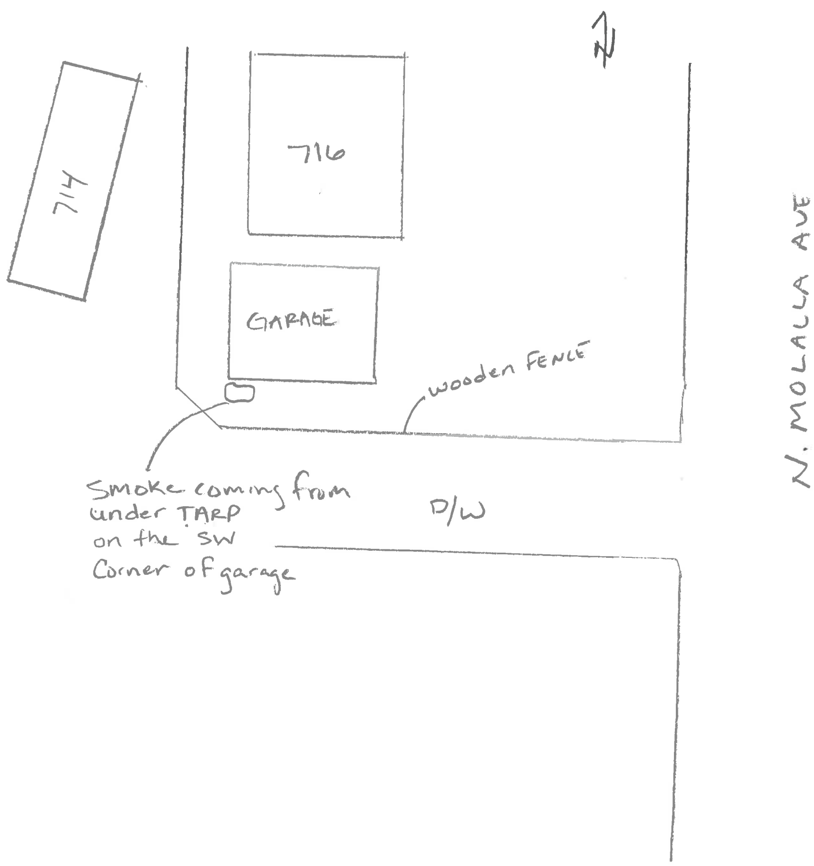
Project Name: Molalla I/I Study	Location / Address: 716 N. Molalla Ave
Project No.: 100.26	Report No.: 1-27
Basin: TL_C	MH No. / Main: TL_C_22 - TL_C_23
Tested By: Chilton Peck	Date: 10.17.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out from under the tarp on the southwest corner of the garage

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

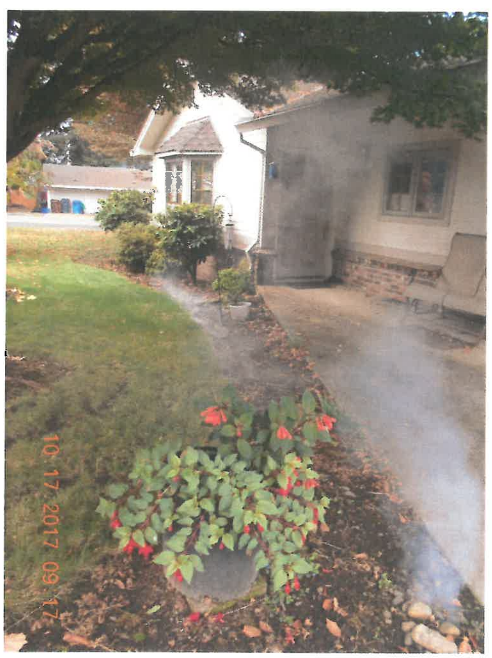
Molalla I/I Study		702 Faurie Ave	
Project Name :		Location / Address:	
100.26	1-28	TL_C	TL_C_33 - C/O
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.17.17
Tested By:			Date:

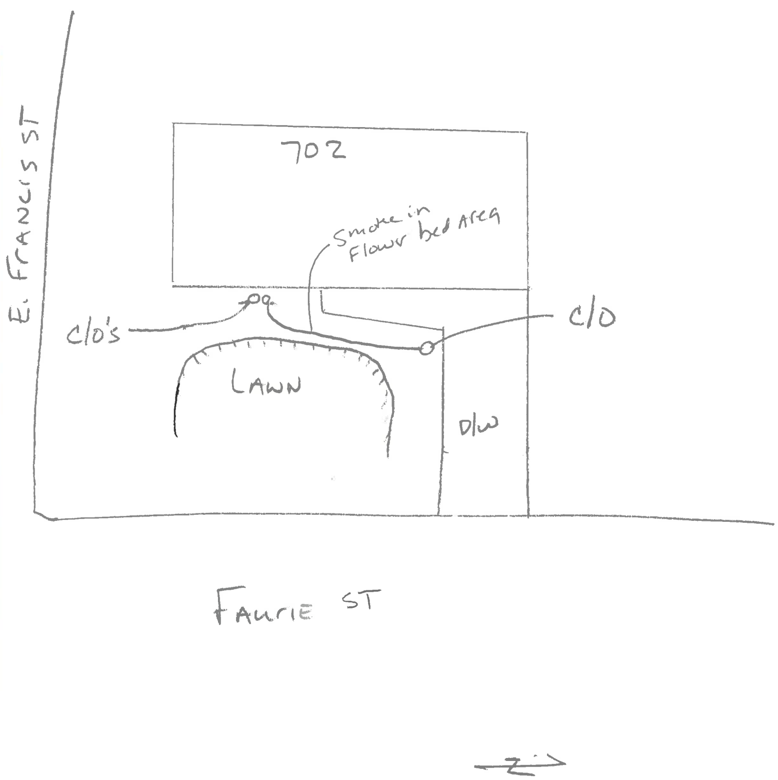
TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO, LSL
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out from cleanout with rocks over it and along the lateral to another cleanout located close to the house. The lateral follows the edge of the grass.
-
-
-
-

SKETCH





SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: Intersection of Frances St. & Christopher St.
Project No.: 100.26	Report No.: 1-29
Basin: TL_C	MH No. / Main: TL_C_12
Tested By: Chilton Peck	Date: 10.17.17

TESTING CODE		PHOTOGRAPHS	
LSL = Leaking Service Lateral		No.	Description
LML = Leaking Main Line		1	LMH
CB = Catch Basin			
LMH = Leaking Manhole			
OCO = Open Cleanout			
PHV = Plugged House Vent			
RD = Roof Drain			

Comments

- Smoke coming out from around rim of manhole
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		193 Shirley St	
Project Name :		Location / Address:	
100.26	1-30	TL_C	TL_C_38
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.17.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	LMH
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out from around rim of manhole
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study

Location / Address: 237 Shirley St

Project No.: 100.26

Report No.: 1-31

Basin: TL_C

MH No. / Main: TL_C_38

Tested By: Chilton Peck

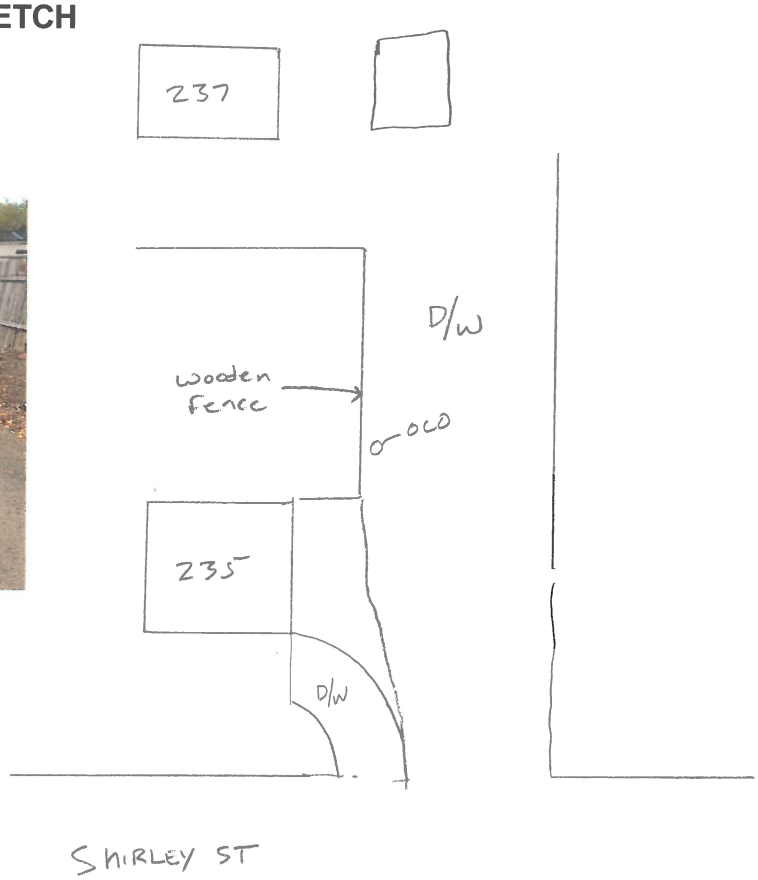
Date: 10.17.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of cleanout with no cap
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		207 Lola Ave	
Project Name :		Location / Address:	
100.26	1-32	TL_A	TL_A_19 - TL_A_22
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.17.17
Tested By:			Date:

Testing Code	Photographs No.	Description
LSL = Leaking Service Lateral		
LML = Leaking Main Line	1	OCO
CB = Catch Basin	2	LSL – smoke coming from ground
LMH = Leaking Manhole	3	Smoke coming from ground
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

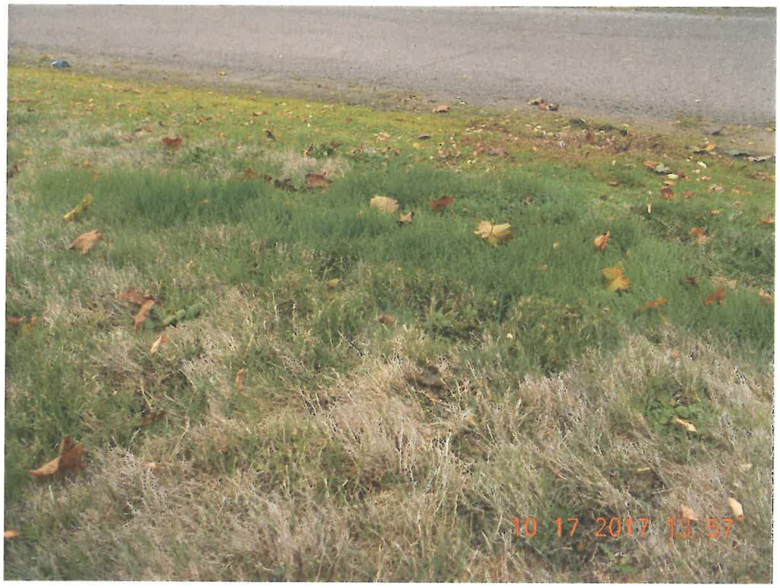
Comments

- Resident has a plastic plate fastened down over the cleanout, smoke coming out of the ground near the road and the gas meter
-
-
-
-

SKETCH

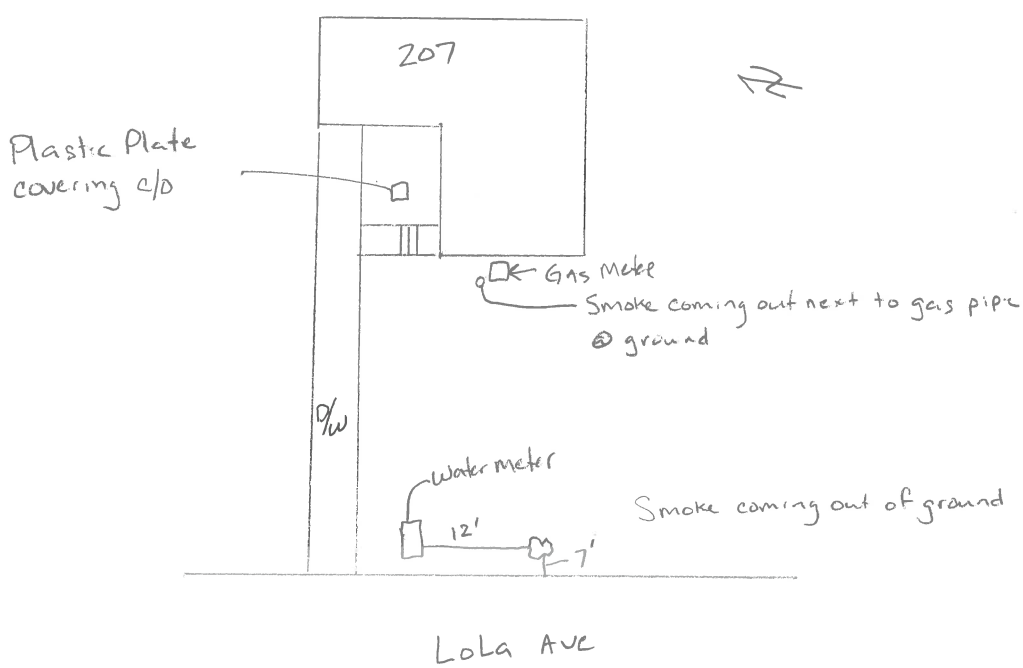
1.

2.


10 17 2017 13:57

3.


10 17 2017 13:57


207
Plastic Plate
covering c/o
Gas Meter
Smoke coming out next to gas pipe
@ ground
S/W
water meter
12'
7'
Smoke coming out of ground
Lola Ave

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study		Location / Address: 410 E. 2nd St	
Project No.: 100.26	Report No.: 1-33	Basin: TL_A	MH No. / Main: TL_A_19 - TL_A_22
Tested By: Chilton Peck			Date: 10.17.17

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	CB
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of catch basin on the southwest corner of Lola Ave and E. 2nd St.

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla I/I Study		Location / Address: 104 S. Cole Ave	
Project No.: 100.26	Report No.: 1-34	Basin: TL_A	MH No. / Main: TL_A_3 - TL_A_29
Tested By: Chilton Peck			Date: 10.17.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	CB
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke leaking around the cleanout cap
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study	813 E. 3rd St.
Project Name :	Location / Address:

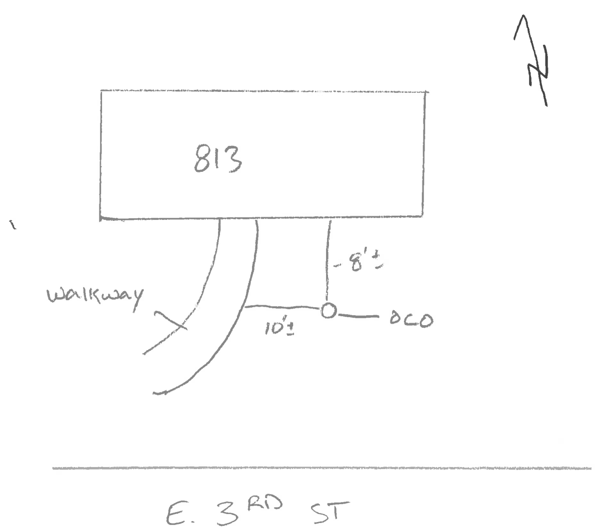
100.26	1-36	TL_A	TL_A_14 - TL_A_8
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.17.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	**No.**	**Description**
LML = Leaking Main Line	1	OCO
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of cleanout
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

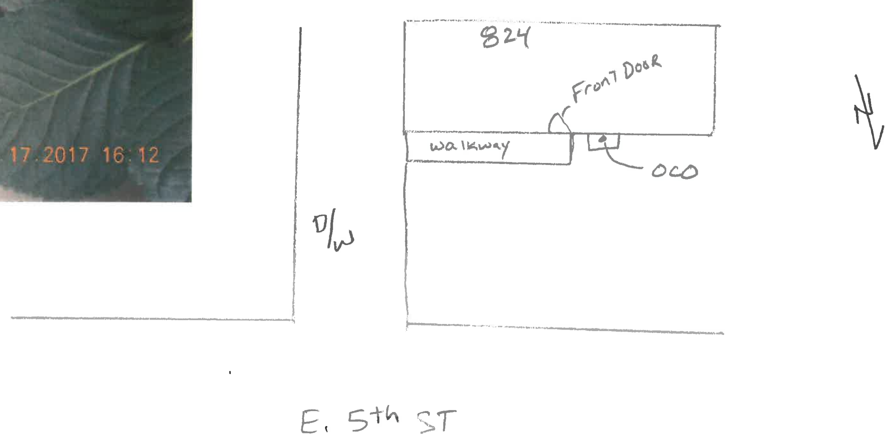
Molalla I/I Study		824 E. 5th St.	
Project Name :		Location / Address:	
100.26	1-37	TL_A	TL_A_11 - TL_A_23
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.17.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of cleanout, located in recessed house vent
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla I/I Study	Location / Address: 827 E. 5th St.
Project No.: 100.26	Report No.: 1-38
Basin: TL_A	MH No. / Main: TL_A_11 - TL_A_23
Tested By: Chilton Peck	Date: 10.17.17

TESTING CODE	
LSL	= Leaking Service Lateral
LML	= Leaking Main Line
CB	= Catch Basin
LMH	= Leaking Manhole
OCO	= Open Cleanout
PHV	= Plugged House Vent
RD	= Roof Drain

PHOTOGRAPHS

No.	Description
1	OCO
2	LSL
3	OCO

Comments

- 1. Smoke leaking around cleanout cap
- 2. Smoke coming out of irrigation valve box
- 3. Smoke coming out of cleanout with no cap
-
-

SKETCH

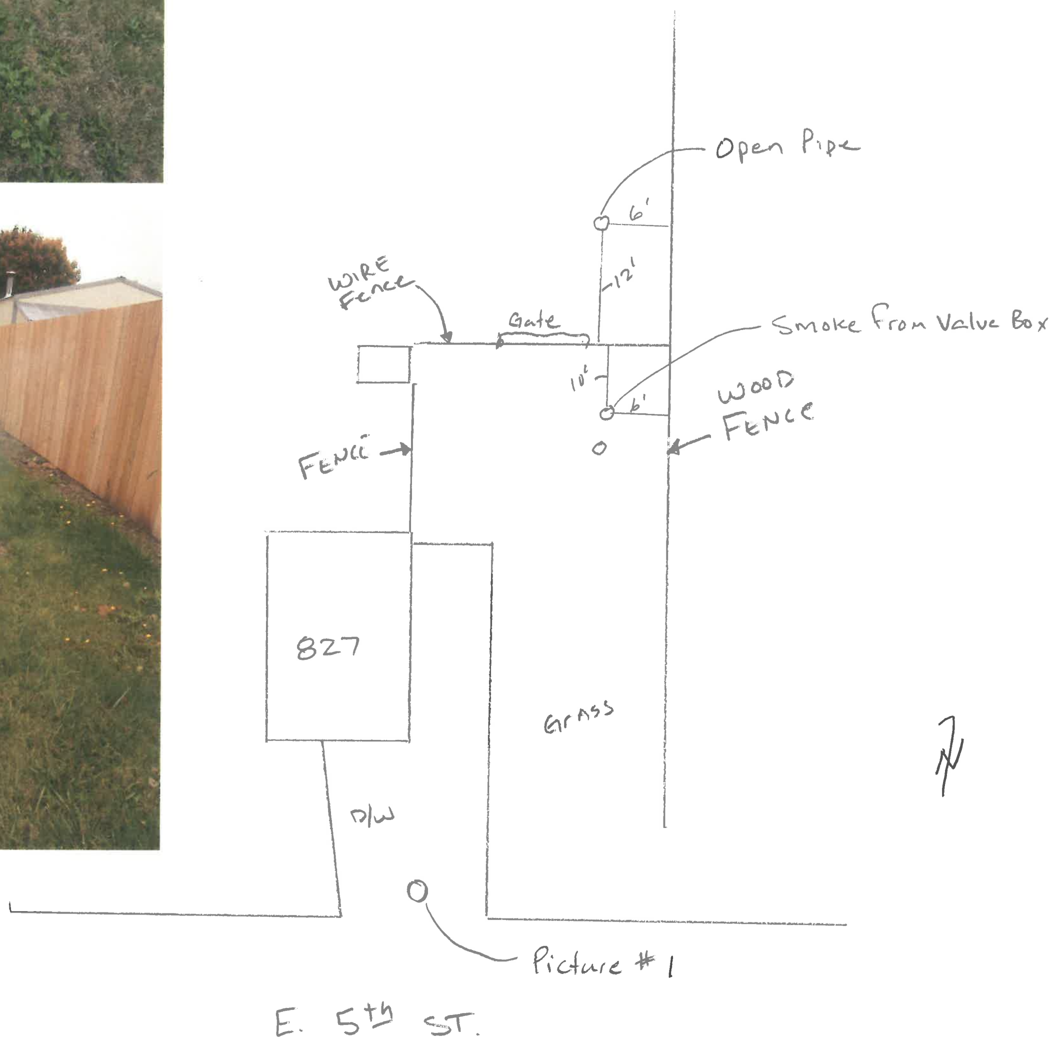
1. 

2.


10 17 2017 16:18

3.


10 17 2017 16:18


Open Pipe
6'
12'
WIRE Fence
Gate
Smoke from Valve Box
10'
6'
WOOD FENCE
FENCE
827
GRASS
D/W
Picture #1
E. 5th ST.

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study		Location / Address: Intersection of E. 5^{th} St. & S. Cole Ave	
Project No.: 100.26	Report No.: 1-39	Basin: TL_A2	MH No. / Main: TL_A2_1
Tested By: Chilton Peck			Date: 10.17.17

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	LMH
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke leaking around rim of manhole

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: 602 S. Mathias Rd.
Project No.: 100.26	Report No.: 1-40
Basin: TL_A	MH No. / Main: TL_A_10 - C/O
Tested By: Chilton Peck	Date: 10.17.17

TESTING CODE

- LSL = Leaking Service Lateral
- LML = Leaking Main Line
- CB = Catch Basin
- LMH = Leaking Manhole
- OCO = Open Cleanout
- PHV = Plugged House Vent
- RD = Roof Drain

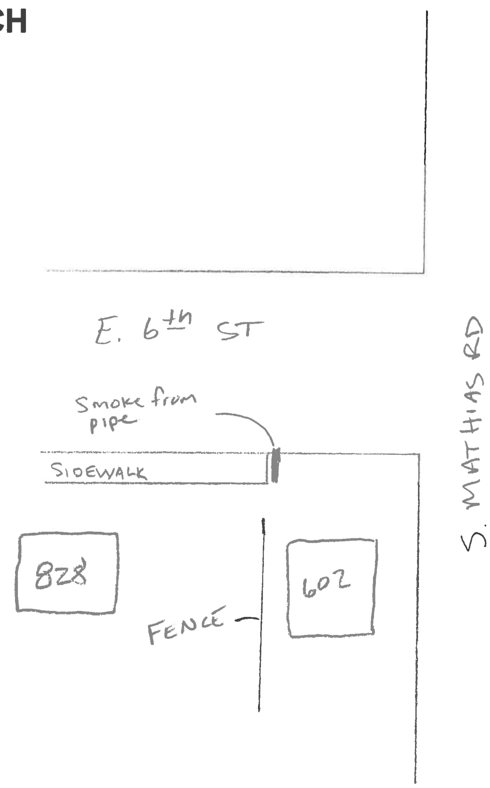
PHOTOGRAPHS

No.	Description
1	RD

Comments

- Smoke coming out of drain located in the sidewalk
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

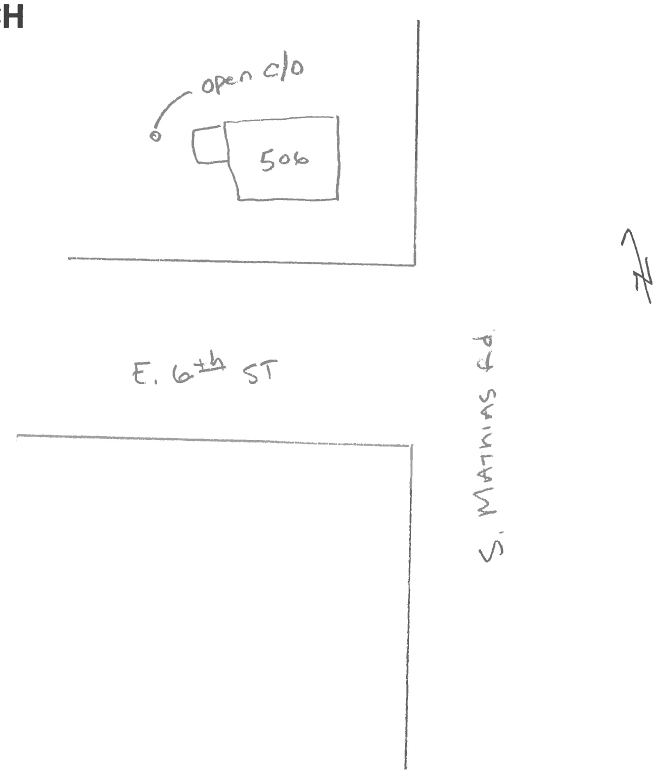
Molalla I/I Study		506 S. Mathias Rd.	
Project Name :		Location / Address:	
100.26	1-41	TL_A	TL_A_10 - C/O
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.17.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of cleanout with no cap
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

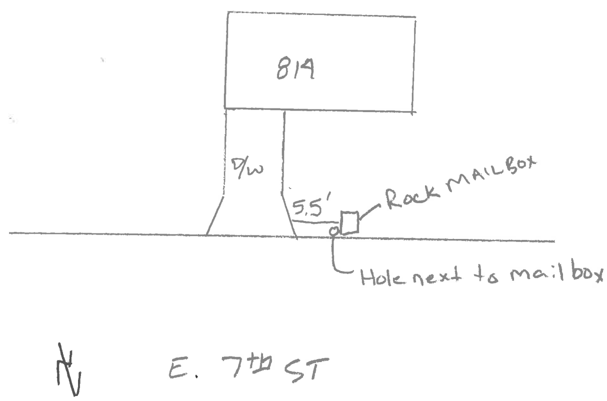
Project Name: Molalla I/I Study	Location / Address: 814 E. 7^{th} St.
Project No.: 100.26 — Report No.: 1-42	Basin: TL_A2 — MH No. / Main: TL_A2_2 - TL_A2_3
Tested By: Chilton Peck	Date: 10.17.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	LSL
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of hole in the ground next to the mailbox

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

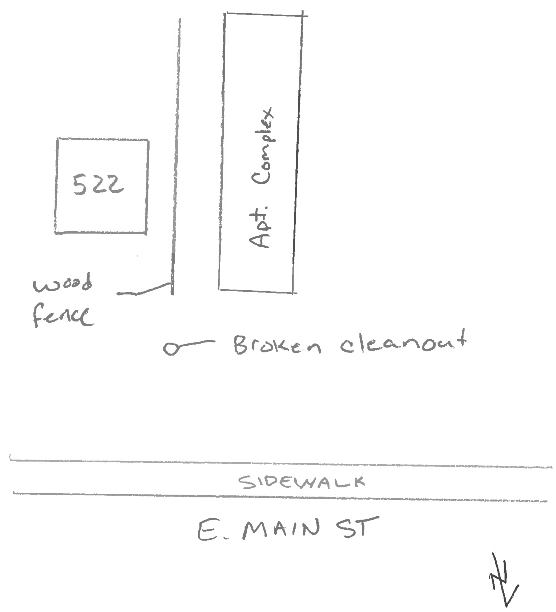
Project Name: Molalla I/I Study	Location / Address: 522 E. Main St
Project No.: 100.26	Report No.: 1-43
Basin: TL_A	MH No. / Main: TL_A_31 - TL_A_32
Tested By: Chilton Peck	Date: 10.18.17

TESTING CODE	PHOTOGRAPHS No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of broken cleanout

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: 514 & 518 E. Main St
Project No.: 100.26	Report No.: 1-44
Basin: TL_A	MH No. / Main: TL_A_31 - TL_A_32
Tested By: Chilton Peck	Date: 10.18.17

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	OCO for Unit #514
LML = Leaking Main Line	2	OCO for Unit #518
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

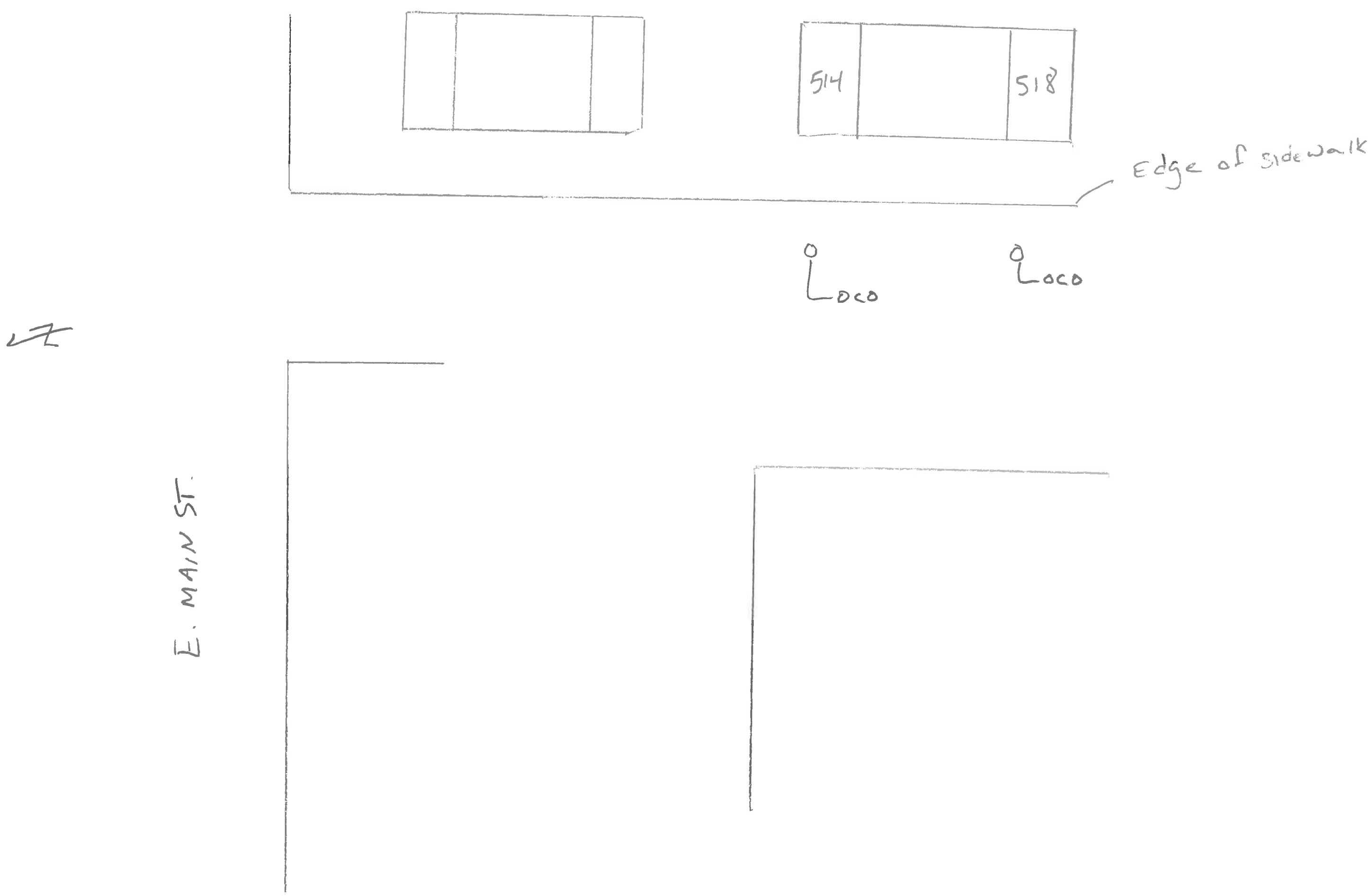
Comments

- Smoke coming out of cleanout cap for both units
-
-
-
-

SKETCH

1. 

2.

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

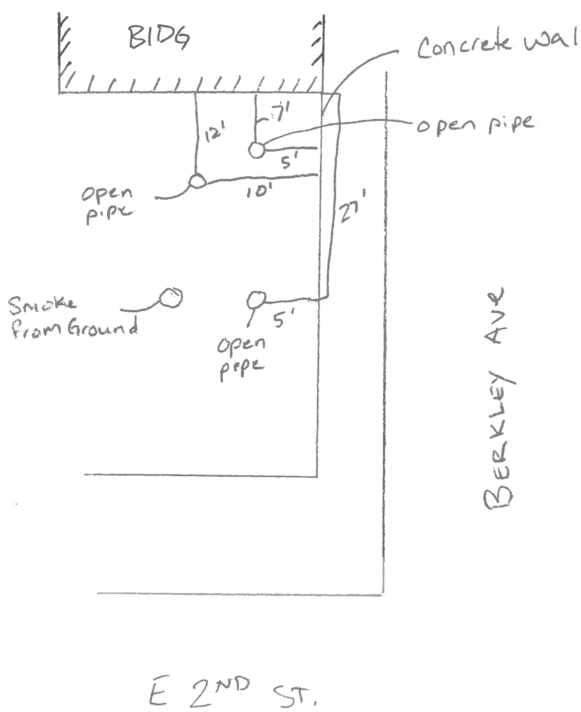
Project Name:	Molalla I/I Study	Location / Address:	124 Berkley Ave
Project No.	100.26	Report No.	1-45
Basin:	BC_A3	MH No. / Main:	BC_A3_12 - BC_A3_18
Tested By:	Chilton Peck	Date:	10.18.17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Vacant lot - has multiple open pipes and multiple area where smoke was coming from the ground.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		415 Berkley Ave	
Project Name :		Location / Address:	
100.26	1-46	BC_A3	BC_A3_14 - C/O
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.18.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoking coming out of cleanout
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		411 Berkley Ave	
Project Name :		Location / Address:	
100.26	1-47	BC_A3	BC_A3_14 - C/O
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.18.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoking coming out of cleanout with no cap
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study		Location / Address: 304 E. 4th St.	
Project No.: 100.26	Report No.: 1-48	Basin: BC_A3	MH No. / Main: BC_A3_7 - BC_A3_8
Tested By: Chilton Peck			Date: 10.18.17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	LSL
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoking coming out of communications vault
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		312 E. 2nd St.	
Project Name :		Location / Address:	
100.26	1-49	BC_A3	BC_A3_10 - BC_A3_12
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.18.17
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	OCO
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoking coming out around the cleanout, located in the street.
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SKETCH

Cleanout location

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla I/I Study	Location / Address: 111 Swiegle Ave
Project No. 100.26	Report No. 1-50
Basin: BC_A3	MH No. / Main: BC_A3_18 - BC_A3_12
Tested By: Chilton Peck	Date: 10.18.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO & LSL
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of open cleanout with chunks of concrete covering it up. Smoke coming out at the joint of the AC pavement and the curb.
-
-
-
-

SKETCH

1. smoke from open cleanout

2. smoke from joint between road and curb,

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		120 Engle Ave - Pregnancy Care Center	
Project Name :		Location / Address:	
100.26	1-51	BC_A3	BC_A3_4 - BC_A3_19
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.18.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out next the building, could not identify the source
-
-
-
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla I/I Study		311 S. Molalla Ave	
Project Name :		Location / Address:	
100.26	1-52	BC_A3	BC_A3_3 - BC_A3_16
Project No.	Report No.	Basin:	MH No. / Main:
Chilton Peck			10.18.17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	LSL
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of the joint in the concrete sidewalk
-
-
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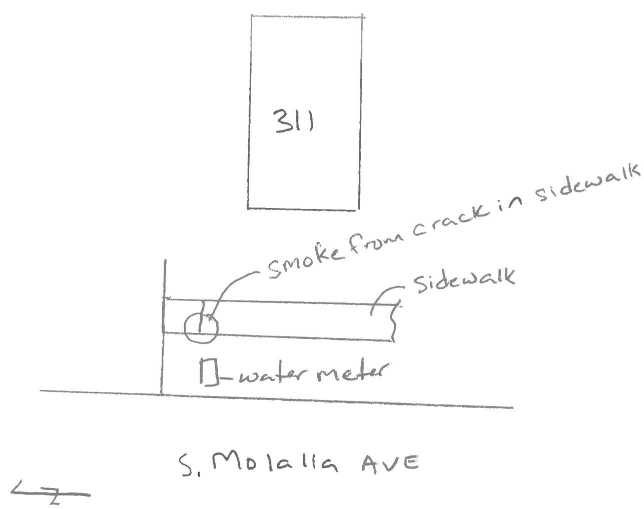
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study		Location / Address: 314 S. Molalla Ave	
Project No.: 100.26	Report No.: 1-53	Basin: BC_A3	MH No. / Main: BC_A3_3 - BC_A3_16
Tested By: Chilton Peck			Date: 10.18.17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of open cleanout, no cap
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-
-
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: Intersection of S. Molalla Ave & E. 3rd St.
Project No.: 100.26	Report No.: 1-54
Basin: BC_A3	MH No. / Main: BC_A3_3 - BC_A3_16
Tested By: Chilton Peck	Date: 10.18.17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	OCO
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming out of catch basin, located on the southeast corner of the intersection
-
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-
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla I/I Study	Location / Address: 123 S. Molalla Ave
Project No.: 100.26	Report No.: 1-55
Basin: BC_A3	MH No. / Main: BC_A3_15 - BC_A3_20
Tested By: Chilton Peck	Date: 10.18.17

TESTING CODE	
LSL	= Leaking Service Lateral
LML	= Leaking Main Line
CB	= Catch Basin
LMH	= Leaking Manhole
OCO	= Open Cleanout
PHV	= Plugged House Vent
RD	= Roof Drain

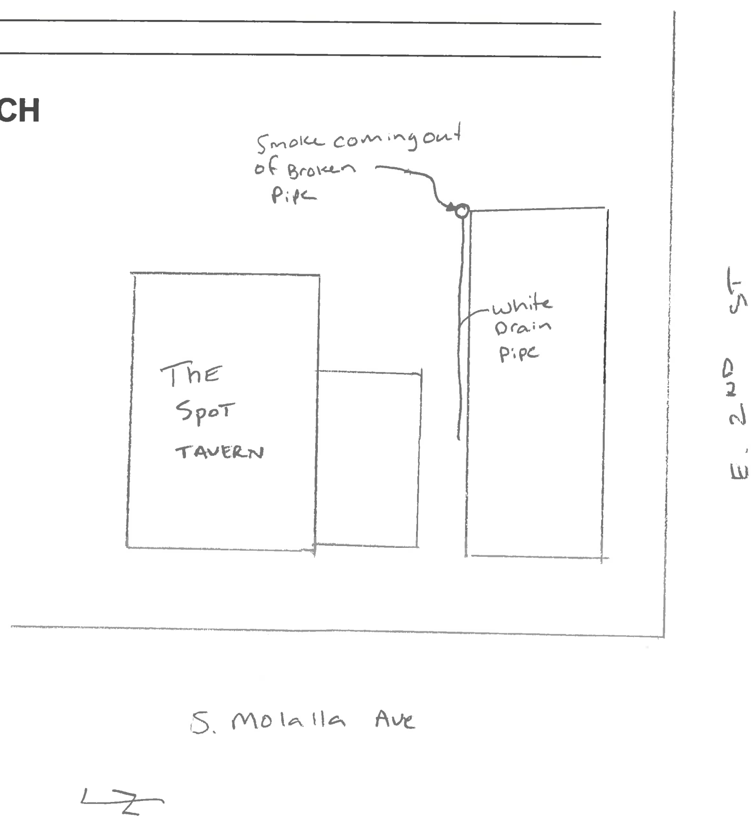
PHOTOGRAPHS

No.	Description
1	RD

Comments

- 4" white drain pipe located on the north side of the building. Smoke coming out of the pipe at the northeast corner of the building. Hole in the pipe.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

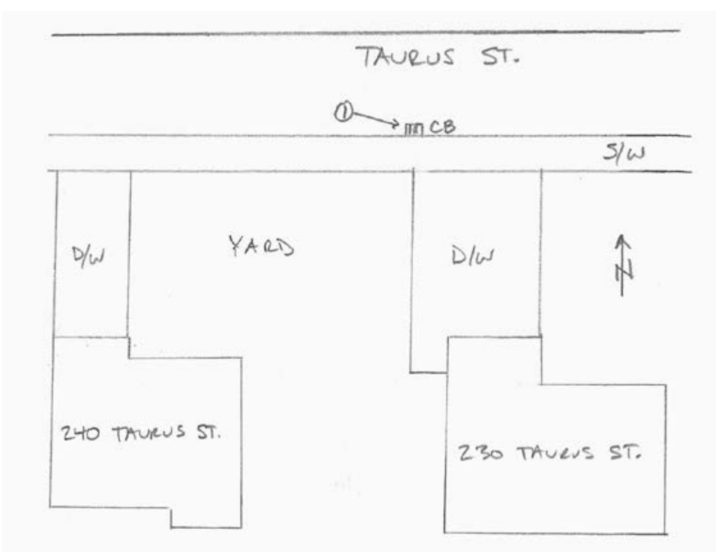
Molalla Smoke Testing		230 Taurus St.	
Project Name :		Location / Address:	
100.26	2-1	TL_C2	TL_C2_10 and TL_C2_18
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from Catch Basin
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Catch Basin on the south side of Taurus St., in front of 230 & 240 Taurus St.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

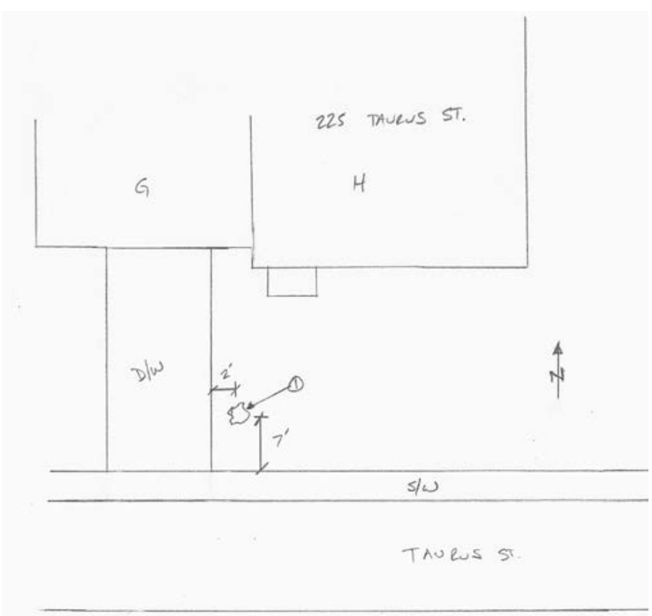
Project Name : Molalla Smoke Testing		Location / Address: 225 Taurus St.	
Project No. 100.26	Report No. 2-2	Basin: TL_C2	MH No. / Main: TL_C2_10 and TL_C22_18
Tested By: Ryan Quigley			Date: Monday, October 16, 2017

Testing Code	Photographs	
	No.	**Description**
LSL = Leaking Service Lateral	1	Smoke from front yard
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke in front yard, just east of driveway edge. No cleanout found in area of smoke.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Toliver Rd & Creamery Creek Ln	
Project Name :		Location / Address:	
100.26	2-3	TL	TL_23
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke between MH rim and asphalt
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- No picture available. Smoke was coming up from exterior of manhole TL_23 rim.
-
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-
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	Toliver Dr.
Project No.	100.26
Report No.	2-4
Basin:	TL_E
MH No. / Main:	TL_E_6
Tested By:	Ryan Quigley
Date:	Monday, October 16, 2017

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from mainline cleanout lid
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Mainline cleanout on Toliver Dr., +/-65' south of manhole TL_E_6.
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-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Hauser Ct.	
Project Name :		Location / Address:	
100.26	2-5	TL_E	TL_E_3
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from mainline cleanout lid
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Mainline cleanout on Hauser Ct., +/-185' north of manhole TL_E_3.
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SKETCH

SMOKE TEST REPORT
The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: Toliver Dr. & Revilot Ct.	
Project No.: 100.26	Report No.: 2-6	Basin: TL	MH No. / Main: TL_SB1_3
Tested By: Ryan Quigley			Date: Monday, October 16, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Smoke between MH rim and asphalt
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke was coming up from exterior of manhole TL_SB1_3 rim.
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-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing	Heintz St. – Lot #7 Twin Fir Mobile Home Park
Project Name :	Location / Address:

100.26	2-7	TL_D	TL_D_6
Project No.	Report No.	Basin:	MH No. / Main:

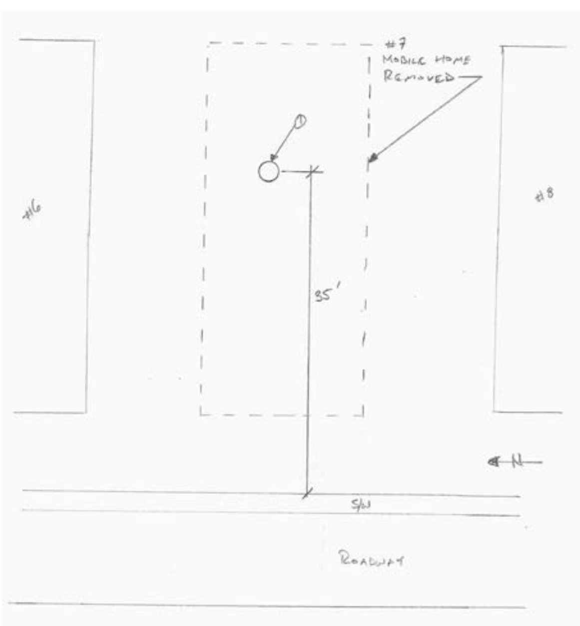
Ryan Quigley	Monday, October 16, 2017
Tested By:	Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from open cleanout/connection
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Mobile home has been removed from Lot #7. Sewer connection wasn't capped and covered with plywood.

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla Smoke Testing	Location / Address: 721 Heintz St. (Twin Fir Mobile Home Park)
Project No.: 100.26	Report No.: 2-8
Basin: TL	MH No. / Main: TL_21
Tested By: Ryan Quigley	Date: Monday, October 16, 2017

TESTING CODE		
LSL	=	Leaking Service Lateral
LML	=	Leaking Main Line
CB	=	Catch Basin
LMH	=	Leaking Manhole
OCO	**=**	**Open Cleanout**
PHV	=	Plugged House Vent
RD	=	Roof Drain

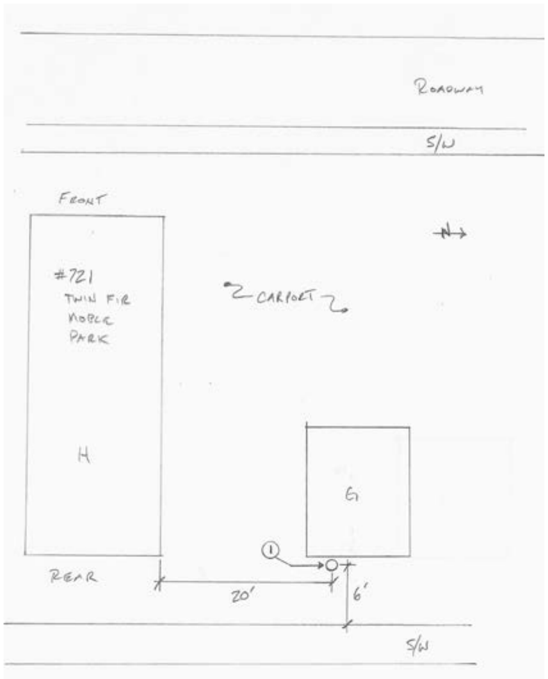
PHOTOGRAPHS

No.	Description
1	Smoke from open cleanout/connection

Comments

- Open sewer connection/cleanout behind garage.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		744 Heintz St. (Twin Fir Mobile Home Park)	
Project Name :		Location / Address:	
100.26	2-9	TL	TL_21
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from broken cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Broken sewer cleanout cap behind garage.
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-
-
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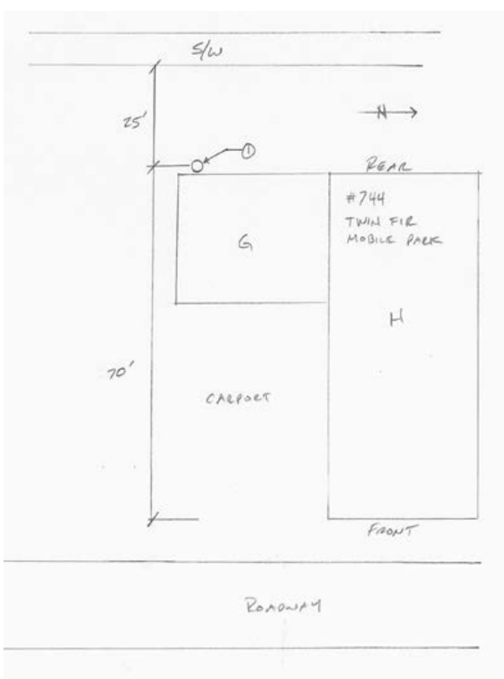
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

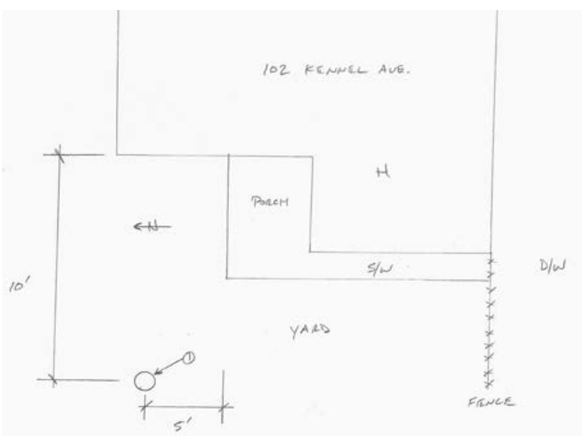
Molalla Smoke Testing		102 Kennel Ave.	
Project Name :		Location / Address:	
100.26	2-10	TL_D	TL_D_13
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from broken cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Broken sewer cleanout cap in front yard.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		102 W. Ross St.	
Project Name :		Location / Address:	
100.26	2-11	TL_D	TL_D_13 and TL_D_6
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from broken cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout without cap. Covered with cinder block.
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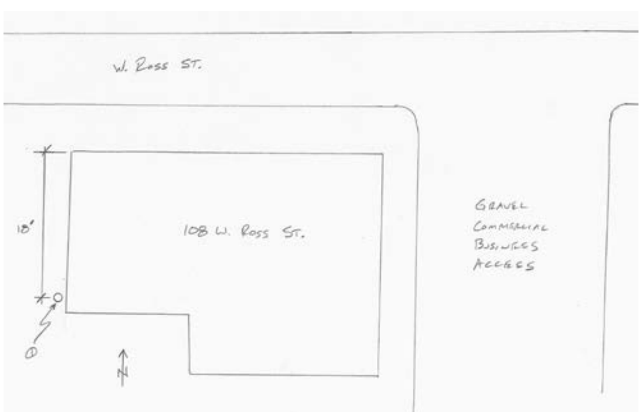
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: E. Ross St.	
Project No. 100.26	Report No. 2-12	Basin: TL_D	MH No. / Main: TL_D_12
Tested By: Ryan Quigley			Date: Monday, October 16, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Smoke from mainline cleanout lid
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from cleanout located 80’ east of manhole TL_D_12.
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-
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

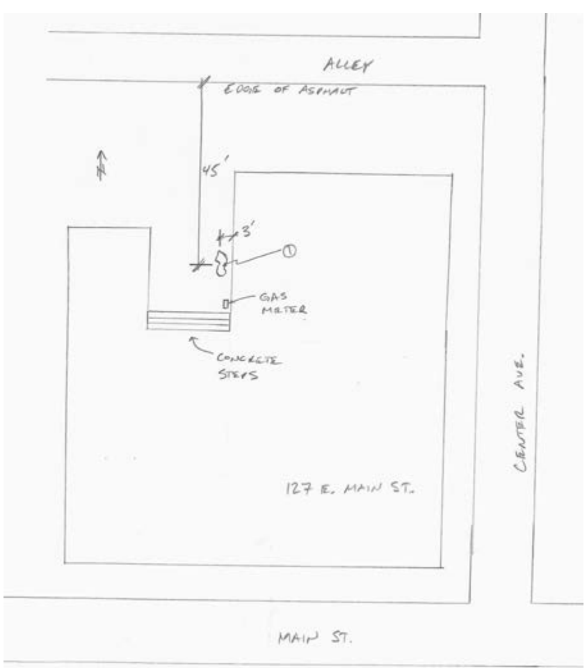
Project Name : Molalla Smoke Testing	Location / Address: 127 E. Main St.
Project No.: 100.26	Report No.: 2-13
Basin: TL_D	MH No. / Main: TL_D_15
Tested By: Ryan Quigley	Date: Monday, October 16, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from gravel area behind building
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoking through the gravel. No sign of a cleanout in the area but possibly buried.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		211 Center Ave.	
Project Name :		Location / Address:	
100.26	2-14	TL_D	TL_D_3
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke between MH rim and asphalt
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming up from exterior of manhole TL_D_3.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		205 Center Ave.	
Project Name :		Location / Address:	
100.26	2-15	TL_D	TL_D_2 and TL_D_3
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from under concrete walkway
CB = Catch Basin	2	Smoke from under concrete walkway
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- A 10' section of concrete walkway on the north side of the residence had smoke coming up on both sides of the walk.
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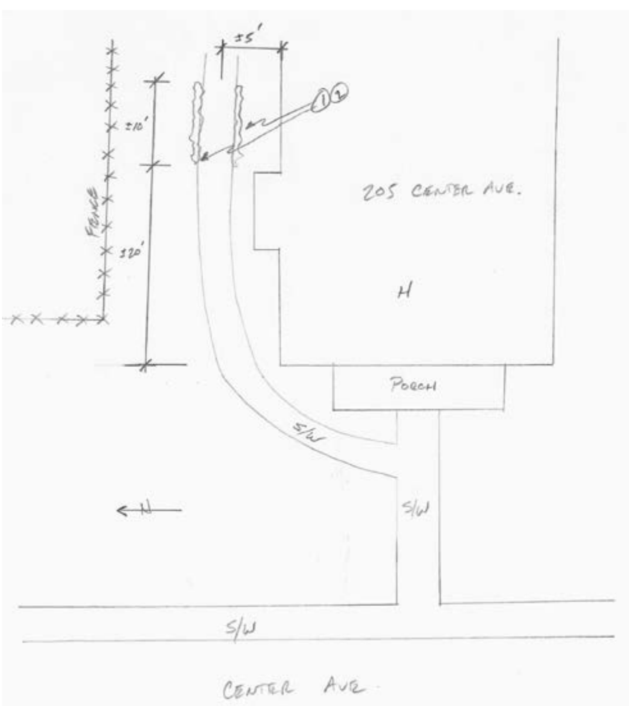
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		E. Heintz St. & Grange Ave.	
Project Name :		Location / Address:	
100.26	2-16	TL	TL_2
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke between MH rim and asphalt
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming up from exterior of manhole TL _2.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Grange Ave.	
Project Name :		Location / Address:	
100.26	2-17	TL	TL_2 and TL_5
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Near 150 Grange Ave. – west side of road
LML = Leaking Main Line	2	Near 139 Grange Ave. – east side of road
CB = Catch Basin	3	Near 122 Grange Ave. – west side of road
LMH = Leaking Manhole	4	Near 127 Grange Ave. – east side of road
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

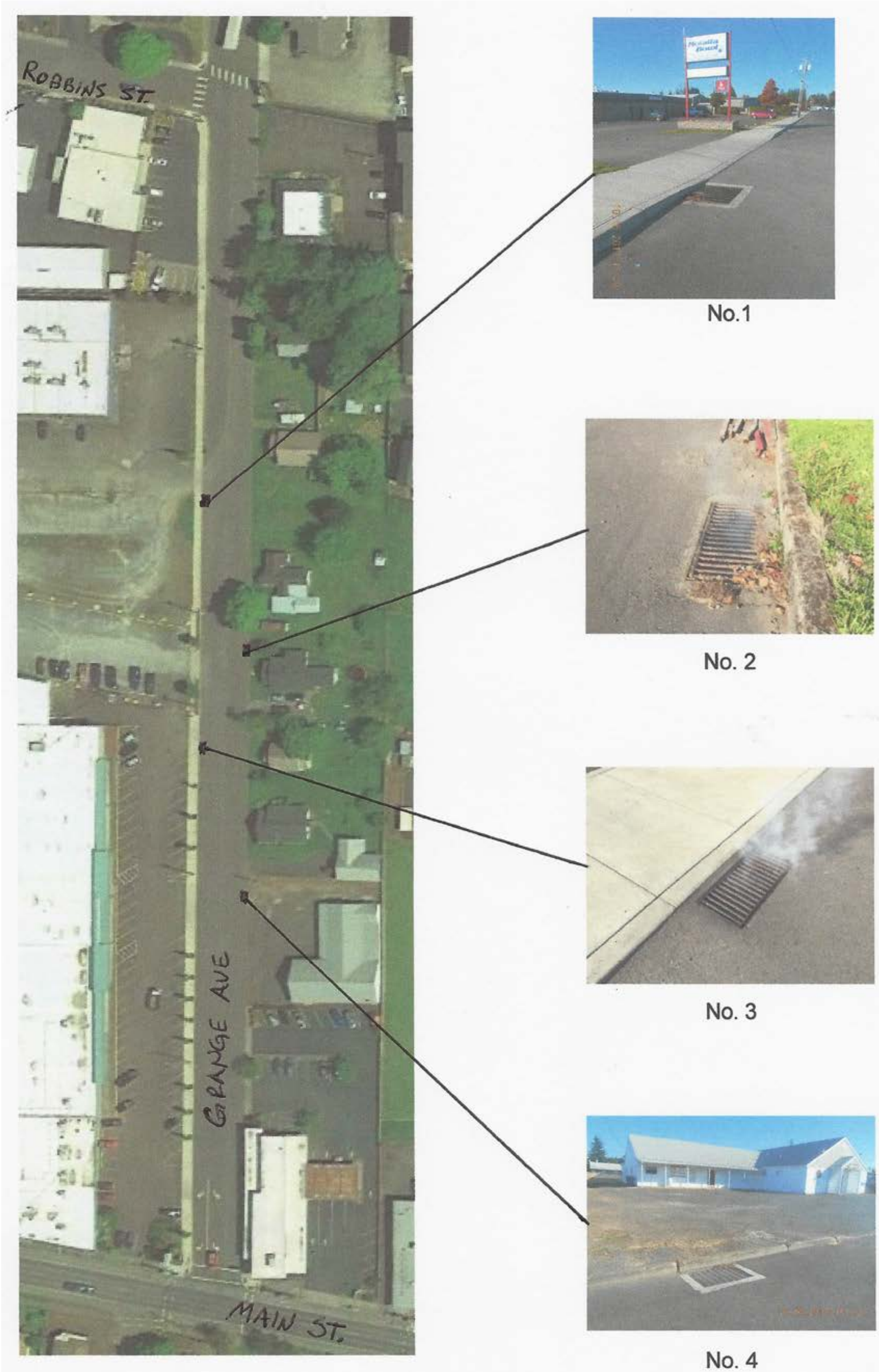
Comments

- Smoke was coming from the city storm system catch basins on Grange Ave.
- See attached aerial for catch basin locations and pictures.

SKETCH

See Attached

Molalla Smoke Testing
Report No. 2-17
Grange Ave.



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		131 Grange Ave.	
Project Name :		Location / Address:	
100.26	2-18	TL	TL_5 – TL_18
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from house gutter
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from gutter/downspout on northwest corner of house.
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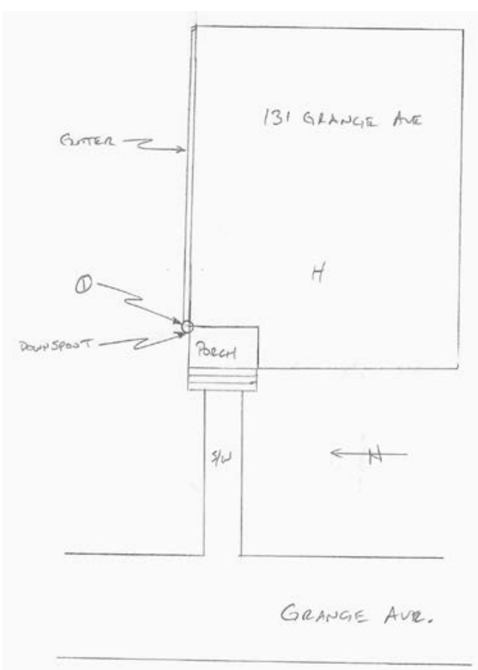
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 122 Grange Ave.
Project No.: 100.26	Report No.: 2-19
Basin: TL	MH No. / Main: TL_5 and TL_18
Tested By: Ryan Quigley	Date: Monday, October 16, 2017

Testing Code	**Photographs**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from parking lot catch basin
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Small amount of smoke coming from the parking lot catch basin.
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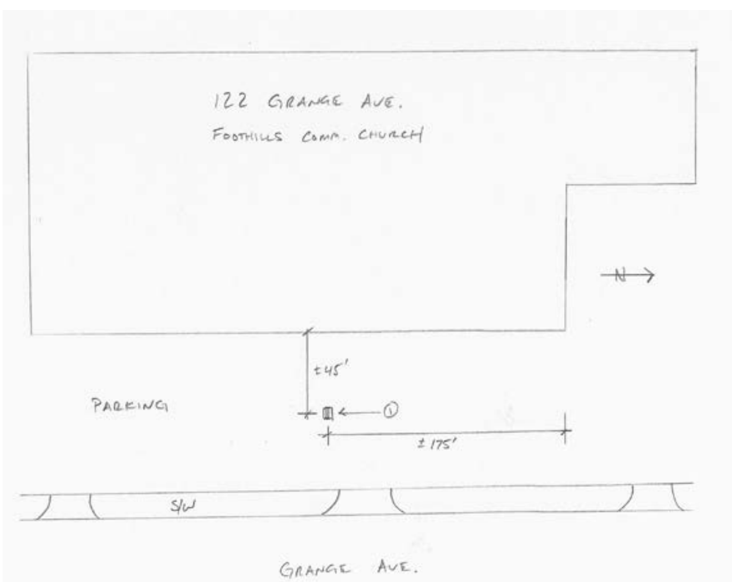
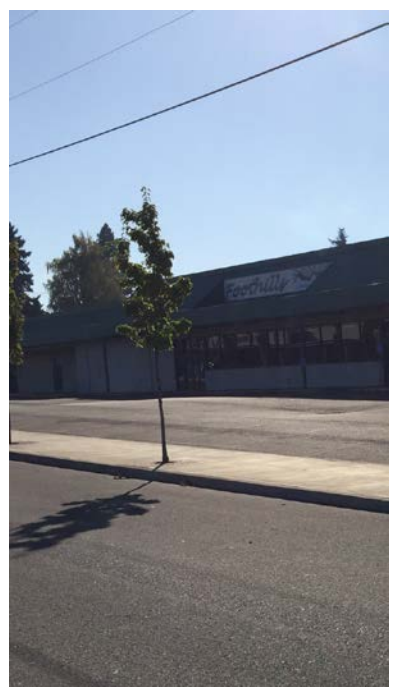
SKETCH





SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 120 Fenton Ave.
Project No. 100.26	Report No. 2-20
Basin: TL_B	MH No. / Main: TL_B_21 and TL_B_22
Tested By: Ryan Quigley	Date: Monday, October 16, 2017

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	**No.**	**Description**
LML = Leaking Main Line	1	Smoke from cleanout
CB = Catch Basin	2	Smoke from cleanout
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from cleanout area. It appears the area is currently under repair/construction.
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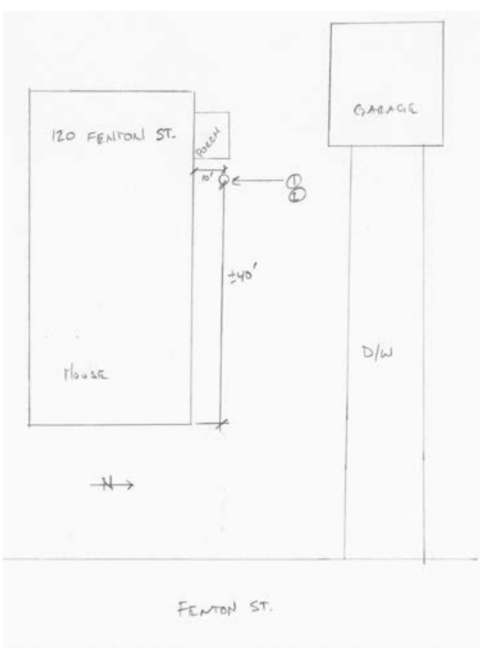
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	Kimberly Ct.
Project No.	100.26
Report No.	2-21
Basin:	TL_B
MH No. / Main:	TL_B_23
Tested By:	Ryan Quigley
Date:	Monday, October 16, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke between MH rim and asphalt
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming up from the exterior of manhole TL_B_23.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		302 N. Cole Ave.	
Project Name :		Location / Address:	
100.26	2-22	TL_B	TL_B_1 and TL_B_16
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	**No.**	**Description**
LML = Leaking Main Line	1	Smoke from broken cleanout cap
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

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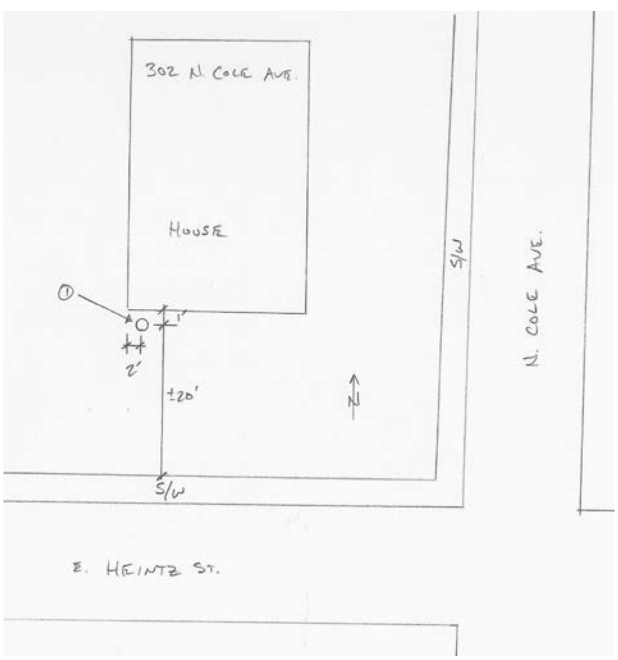
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		207 Finneys Ave.	
Project Name :		Location / Address:	
100.26	2-23	TL_B	TL_B_1 and TL_B_16
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from broken cleanout cap
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

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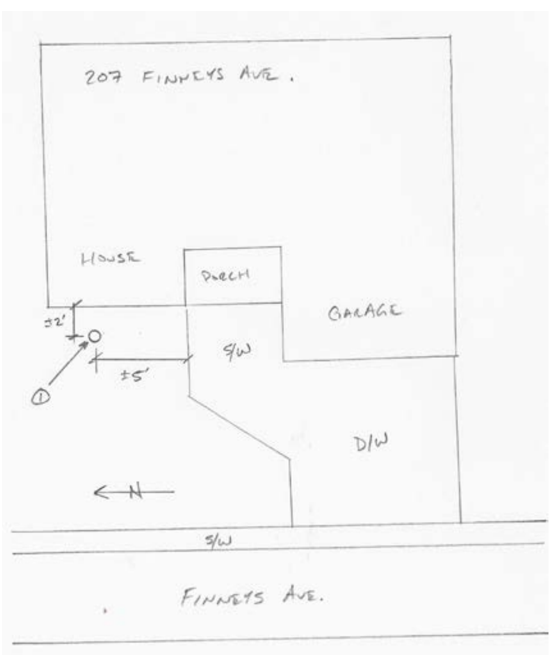
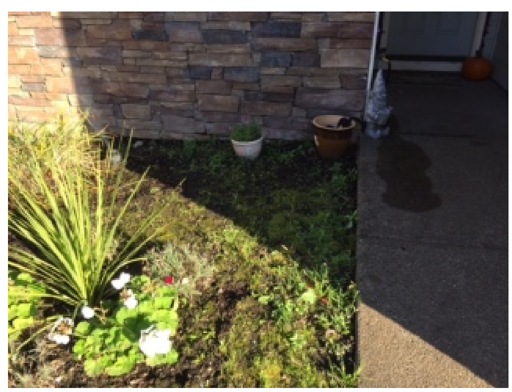
SKETCH





SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: Heintz St. & N. Cole Ave.	
Project No.: 100.26	Report No.: 2-24	Basin: TL_B	MH No. / Main: TL_B_1
Tested By: Ryan Quigley			Date: Monday, October 16, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke between MH rim and asphalt
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from exterior of manhole TL_B_1.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	Park Pl.
Project No.	100.26
Report No.	2-25
Basin:	TL_B
MH No. / Main:	TL_B_8
Tested By:	Ryan Quigley
Date:	Monday, October 16, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from mainline cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from mainline cleanout in Park Pl. cul-de-sac.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	N. Cole Ave.
Project No.	100.26
Report No.	2-26
Basin:	TL_B
MH No. / Main:	TL_B_31
Tested By:	Ryan Quigley
Date:	Monday, October 16, 2017

Testing Code	Photographs	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from mainline cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from mainline cleanout 15' south of manhole TL_B_31.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Location / Address:
Molalla Smoke Testing	704 Patrol St.

Project No.	Report No.	Basin:	MH No. / Main:
100.26	2-27	TL_B	TL_B_2 and TL_B_5

Tested By:	Date:
Ryan Quigley	Monday, October 16, 2017

TESTING CODE

LSL	=	Leaking Service Lateral
LML	=	Leaking Main Line
CB	=	Catch Basin
LMH	=	Leaking Manhole
OCO	**=**	**Open Cleanout**
PHV	=	Plugged House Vent
RD	=	Roof Drain

PHOTOGRAPHS

No.	Description
1	Smoke from cleanout with no cap
2	Smoke from cleanout with no cap

Comments

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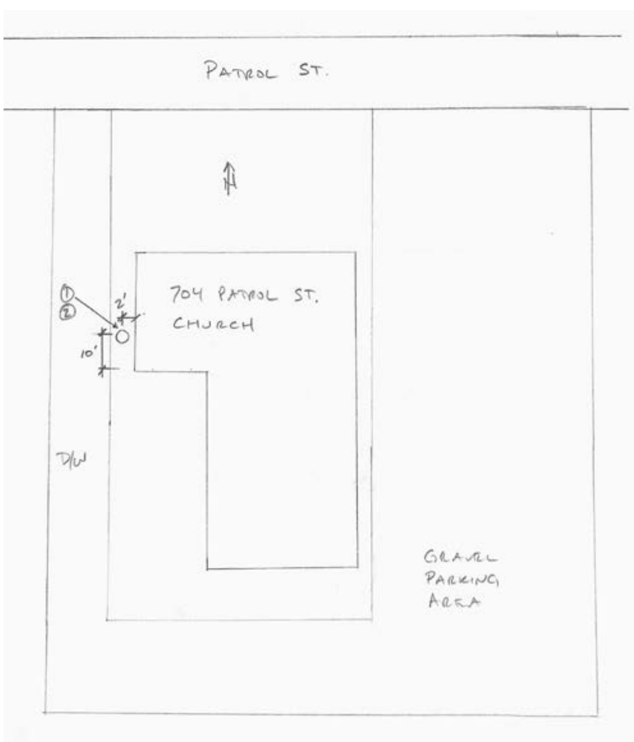
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		151 N. Cole Ave.	
Project Name :		Location / Address:	
100.26	2-28	TL_B	TL_B_2 and TL_B_28
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from cleanout located adjacent to the northeast corner of the garage, behind fence.
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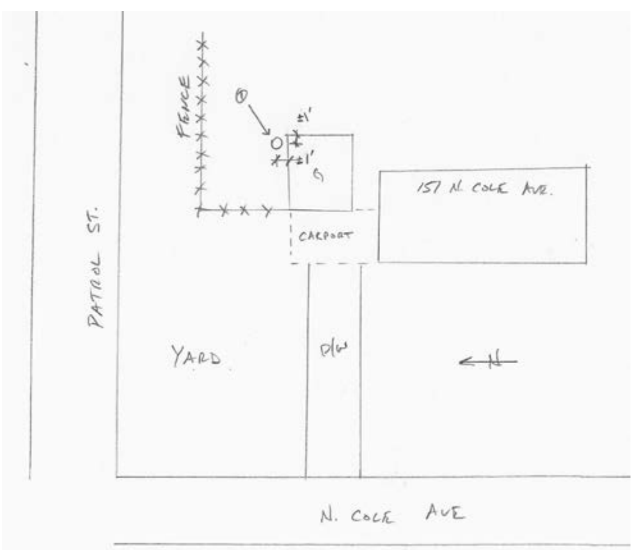
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Patrol St.	
Project Name :		Location / Address:	
100.26	2-29	TL_B	TL_B_27
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Monday, October 16, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from side of manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from manhole rim and concrete above grade.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		602 Toliver Dr.	
Project Name :		Location / Address:	
100.26	2-30	TL	TL_21 and TL_SB1_3
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from broken cleanout cap
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

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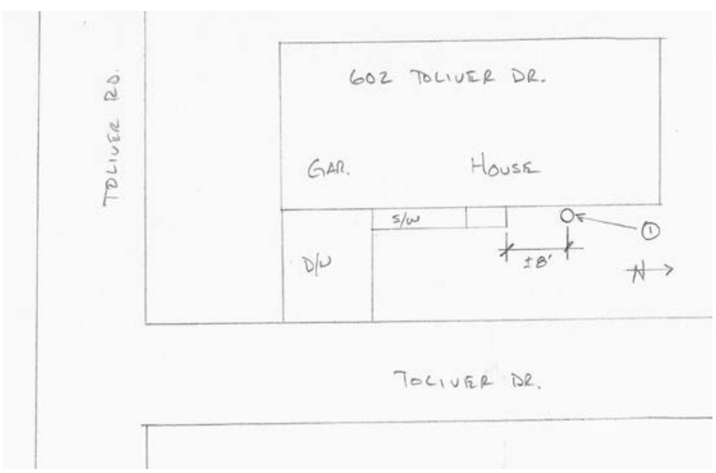
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: Toliver Rd. & Toliver Dr.
Project No.: 100.26	Report No.: 2-31
Basin: TL	MH No. / Main: TL_21 and TL_SB1_3
Tested By: Ryan Quigley	Date: Tuesday, October 17, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral		
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke was seen from the catch basin on the corner of Toliver Rd. & Toliver Dr. when the smoke testing machine was setup on MH TL_24 on day one (10/16/17). The catch basin did not produce any smoke when the testing machine was setup on MH TL_21 on day two (10/17/17), however, there was visible smoke from the culvert west of the Toliver Rd./Toliver Dr. intersection (see report 1-25).
- A TV inspection should be conducted in this area to further investigate the cross connection between the sewer and storm systems.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		709 N. Molalla Ave.	
Project Name :		Location / Address:	
100.26	2-32	TL_C	TL_C_22 and TL_C_39
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from broken cleanout cap
LML = Leaking Main Line	2	Smoke from broken cleanout cap
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Broken cleanout cap on north side of garage, adjacent to concrete sidewalk.
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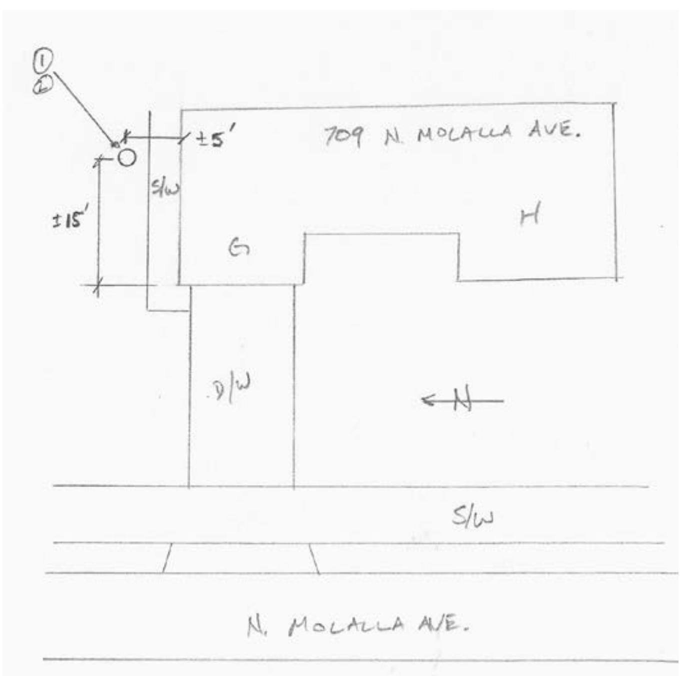
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		705 N. Molalla Ave.	
Project Name :		Location / Address:	
100.26	2-33	TL_C	TL_C_22 and TL_C_39
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE

LSL	=	Leaking Service Lateral
LML	=	Leaking Main Line
CB	=	Catch Basin
LMH	=	Leaking Manhole
OCO	**=**	**Open Cleanout**
PHV	=	Plugged House Vent
RD	=	Roof Drain

PHOTOGRAPHS

No.	Description
1	Smoke from broken cleanout cap
2	Smoke from broken cleanout cap
3	Smoke from landscape pond

Comments

- Broken cleanout cap on south side of house, between house and driveway.
- Smoke from landscape pond overflow pipe. Pond is southeast of house.
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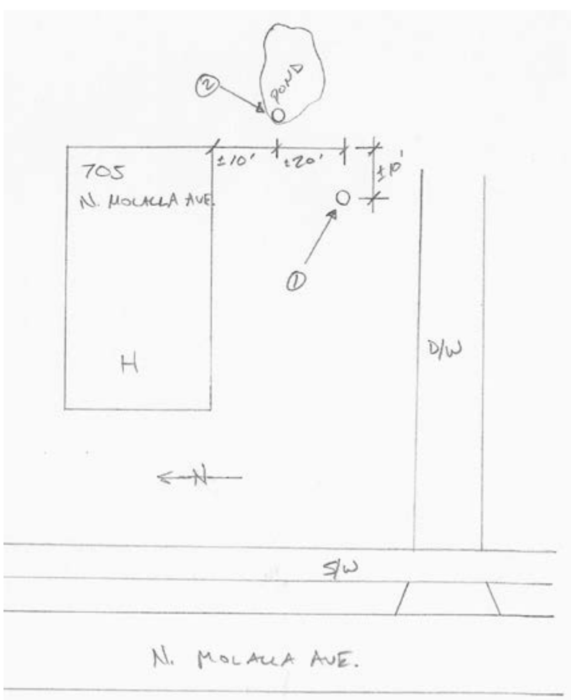
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Frances St.	
Project Name :		Location / Address:	
100.26	2-34	TL_C	TL_C_16
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke between MH rim and asphalt
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming up from exterior of manhole TL_C_16.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: Frances St.	
Project No. 100.26	Report No. 2-35	Basin: TL_C	MH No. / Main: TL_C_34
Tested By: Ryan Quigley			Date: Tuesday, October 17, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Smoke between MH rim and asphalt
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming up from exterior of manhole TL_C_34.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		St. James Church	
Project Name :		Location / Address:	
100.26	2-36	TL_C	TL_C_34 and TL_C_29
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from gutter/downspout
CB = Catch Basin	2	Smoke from gutter/downspout
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from gutter on the south side of the main church building.
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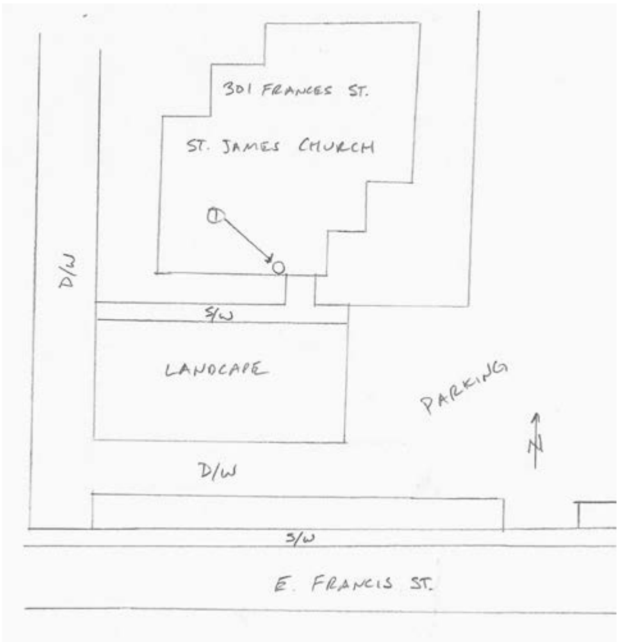
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: Molalla High School	
Project No.: 100.26	Report No.: 2-37	Basin: TL_C	MH No. / Main: TL_C_34 and TL_C_29
Tested By: Ryan Quigley			Date: Tuesday, October 17, 2017

Testing Code	**Photographs**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from parking lot cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from cleanout in the southwest parking lot of Molalla High School.
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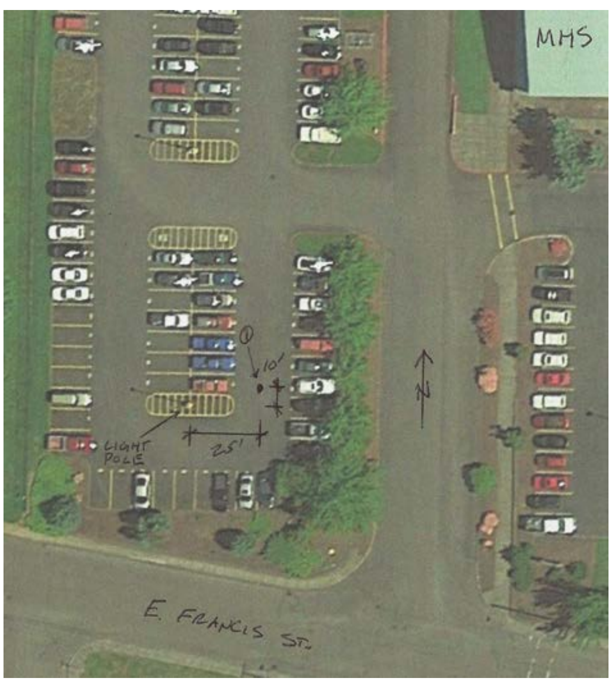
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		165 Shirley St.	
Project Name :		Location / Address:	
100.26	2-38	TL_C	TL_C_18 and TL_C_19
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from driveway cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from cleanout in the driveway serving flag lots at 165 Shirley St.
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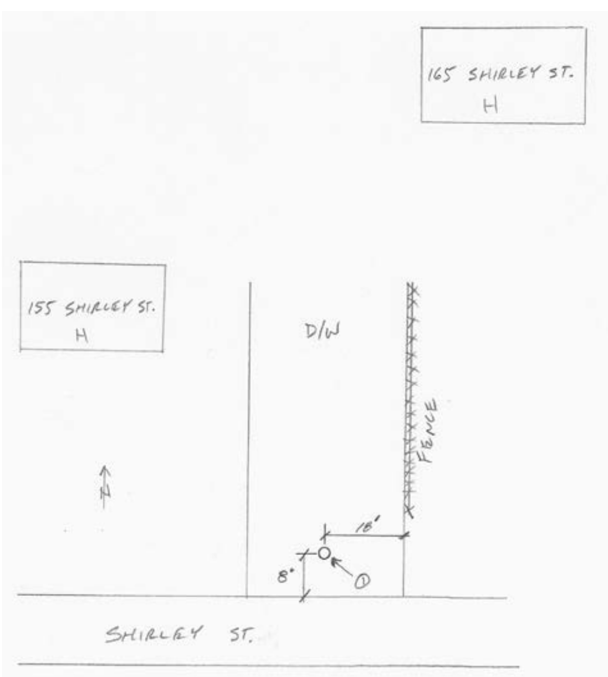
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing Project Name :		169 Shirley St. Location / Address:	
100.26 Project No.	2-39 Report No.	TL_C Basin:	TL_C_18 and TL_C_19 MH No. / Main:
Ryan Quigley Tested By:			Tuesday, October 17, 2017 Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from west edge of driveway
LML = Leaking Main Line	2	Smoke from west edge of driveway
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- .Smoke coming up from a 13' section of the driveway edge.
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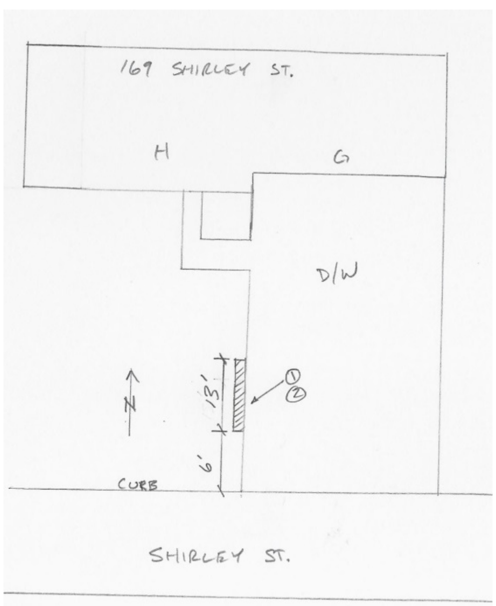
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		704 Shirley St.	
Project Name :		Location / Address:	
100.26	2-40	TL_C	TL_C_5 and TL_C_6
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from broken cleanout cap
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- .Smoke from broken cleanout cap, located next to concrete walkway, under planter.
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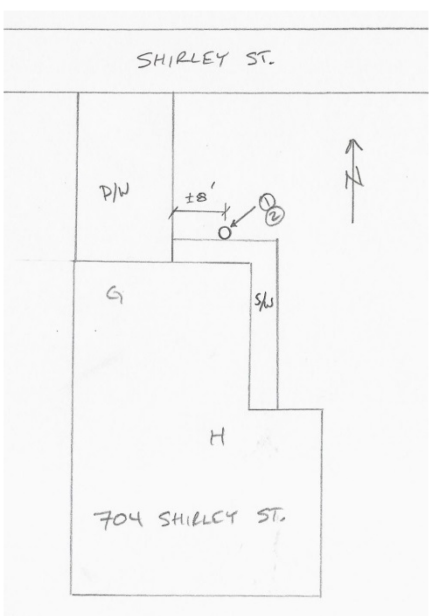
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Molalla Buckaroo Grounds	
Project Name :		Location / Address:	
100.26	2-41	TL_C	TL_C_3 and TL_C_27
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

Testing Code	**Photographs**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from broken cleanout cap
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from broken cleanout cap inside a water meter box. Cleanout is located on the north east side of the gravel parking area.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Eckerd Ave.	
Project Name :		Location / Address:	
100.26	2-42	TL_A	TL_A_18 and TL_A_21
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from catch basin/curb
LML = Leaking Main Line	2	Smoke from catch basin/curb
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from catch basin and crack in the concrete curb behind the catch basin on the east side of Eckerd Ave, approximately 75' south of manhole TL_A_21.
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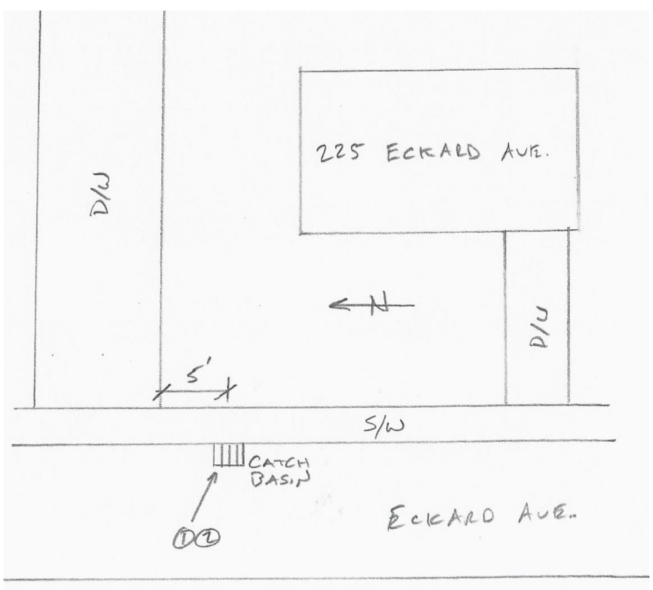
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		302 Lola Ave.	
Project Name :		Location / Address:	
100.26	2-43	TL_A	TL_A_22 and TL_A_19
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from cleanout area
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from cleanout area. Could not confirm if the cap was broken or missing.
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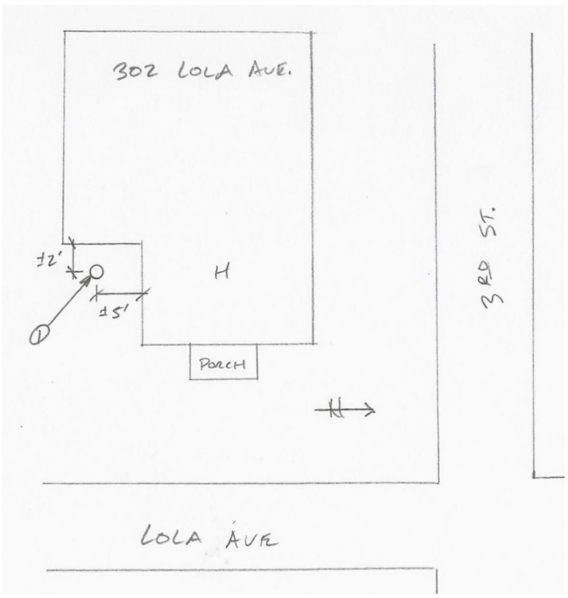
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing	307 Lola Ave.
Project Name :	Location / Address:

100.26	2-44	TL_A	TL_A_22 and TL_A_19
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from broken cleanout cap
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

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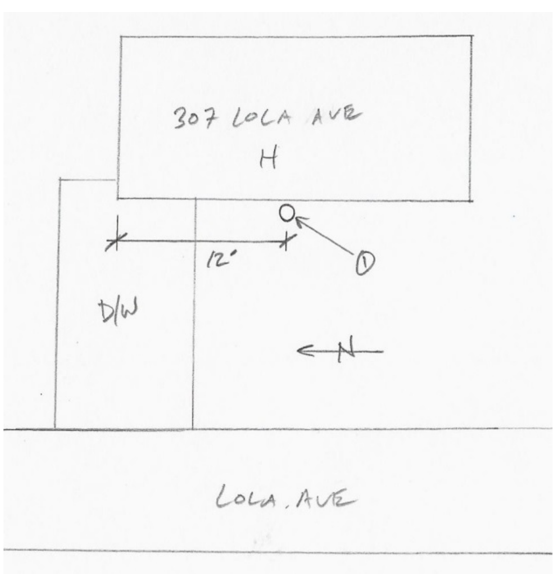
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		3rd & Lola Ave.	
Project Name :		Location / Address:	
100.26	2-45	TL_A	TL_A_19
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from catch basin
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from CB at the south east corner of Lola Ave. and 3rd St. intersection, with smoke machine setup on manhole TL_A_19.
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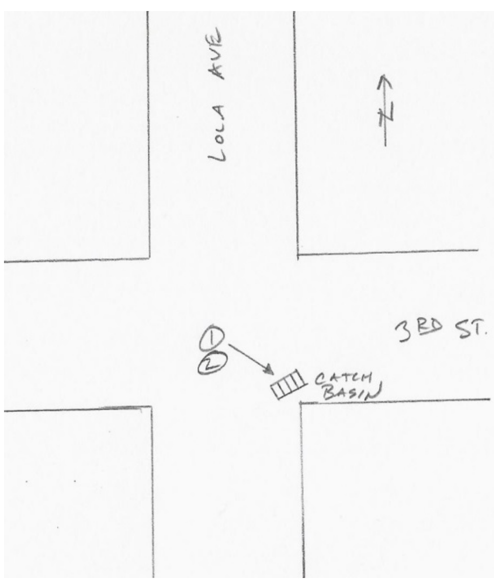
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		310 Eckerd Ave.	
Project Name :		Location / Address:	
100.26	2-46	TL_A	TL_A_17 and TL_A_18
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from cleanout area
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from cleanout area. Could not confirm if the cap was broken or missing.
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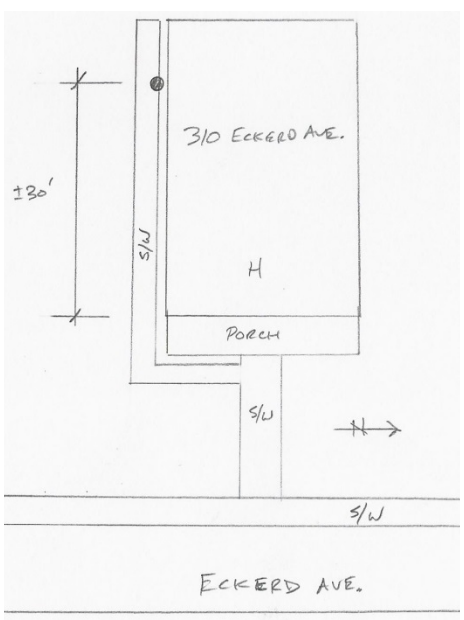
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

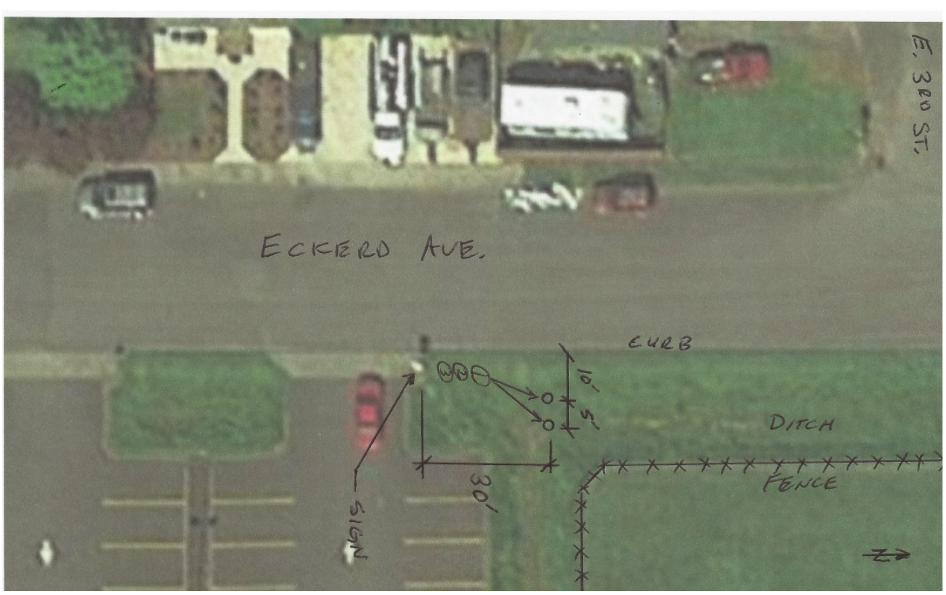
Molalla Smoke Testing		Eckerd Ave. – MHS Football Field	
Project Name :		Location / Address:	
100.26	2-47	TL_A	TL_A_17 and TL_A_18
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from bottom/west side of ditch
LML = Leaking Main Line	2	Smoke from bottom/west side of ditch
CB = Catch Basin	3	Smoke from bottom/west side of ditch
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from ditch running north/south on east side of Eckerd Ave. Smoke was near the northwest corner of the football field parking lot.
- See attached for pictures.

SKETCH



Molalla Smoke Testing
Report No. 2-47
MHS Football Field

No. 1

No. 2

No. 3

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		224 S. Cole Ave.	
Project Name :		Location / Address:	
100.26	2-48	TL_A	TL_A_2 and TL_A_3
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from driveway cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from cleanout in flag lot driveway.
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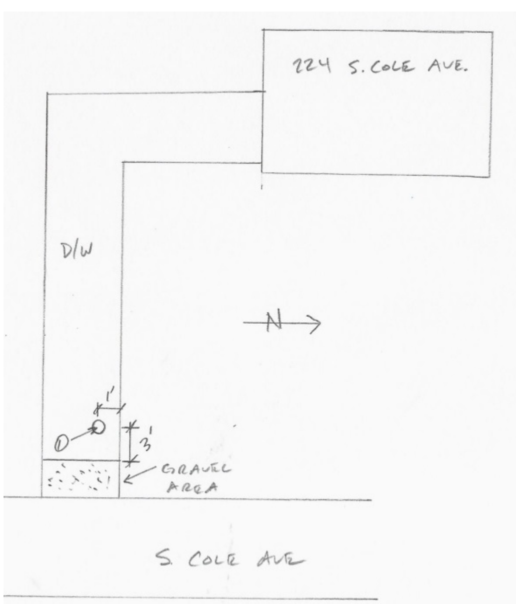
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		219 S. Cole Ave.	
Project Name :		Location / Address:	
100.26	2-49	TL_A	TL_A_2 and TL_A_3
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE			PHOTOGRAPHS	
LSL	=	Leaking Service Lateral	No.	Description
LML	=	Leaking Main Line	1	Smoke from cleanout area
CB	=	Catch Basin		
LMH	=	Leaking Manhole		
OCO	**=**	**Open Cleanout**		
PHV	=	Plugged House Vent		
RD	=	Roof Drain		

Comments

- Smoke from cleanout area. Could not confirm broken or missing cleanout cap.
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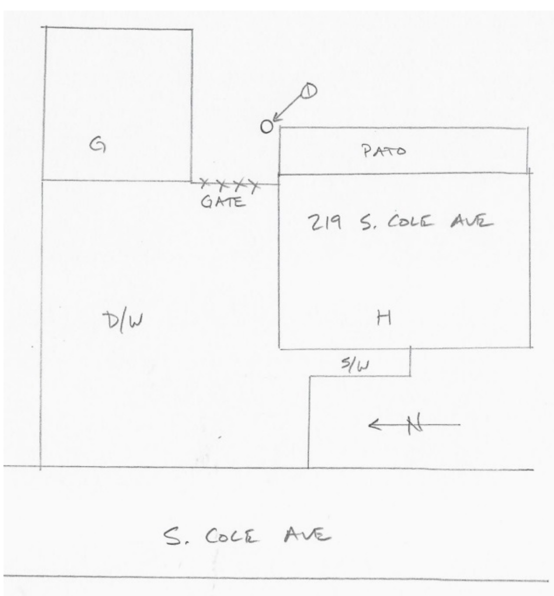
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 228 Stower Rd.
Project No.: 100.26	Report No.: 2-50
Basin: TL_A	MH No. / Main: TL_A_7 and TL_A_8
Tested By: Ryan Quigley	Date: Tuesday, October 17, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Smoke from cleanout/sewer connection
LML = Leaking Main Line	2	Smoke from cleanout/sewer connection
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- House has been removed. Smoke from uncovered sewer connection in foundation.
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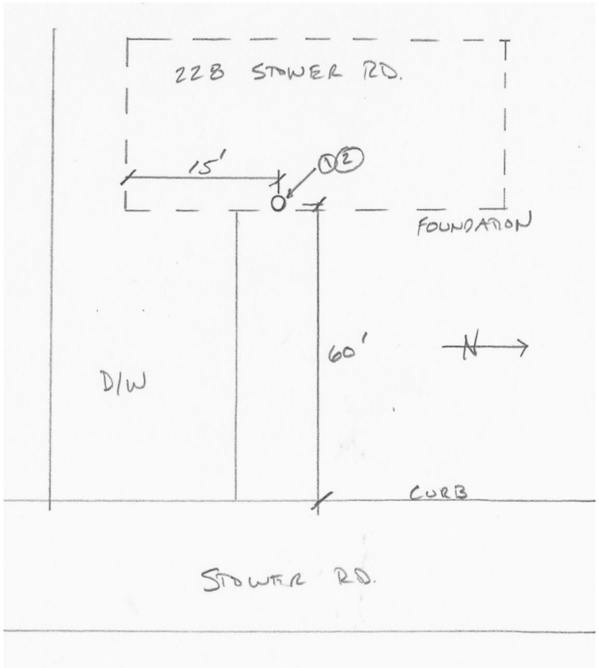
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing	402A S. Cole Rd.
Project Name :	Location / Address:

100.26	2-51	TL_A	TL_A_6 and TL_A_8
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Smoke from driveway cleanout
LML = Leaking Main Line	2	Smoke from driveway cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from driveway cleanout cover on south side of driveway.
- Smoke is also coming up from edge of asphalt, adjacent to the cleanout cover.
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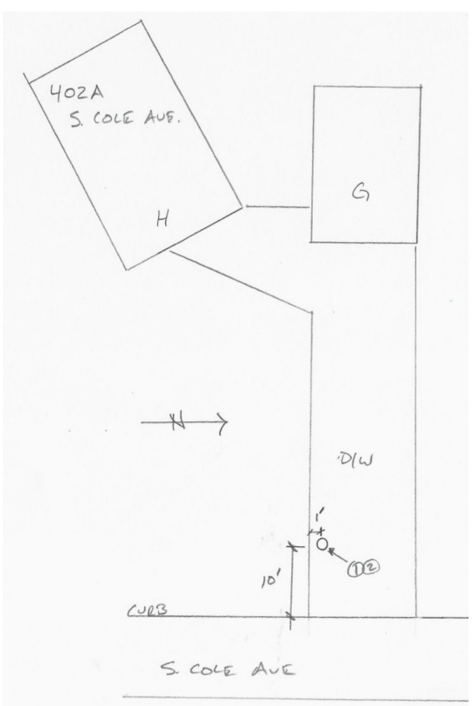
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		507 S. Cole Rd.	
Project Name :		Location / Address:	
100.26	2-52	TL_A	TL_A_4 and TL_A_8
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

Testing Code	Photographs	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from open cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from open cleanout, south of front porch, adjacent to front of house.
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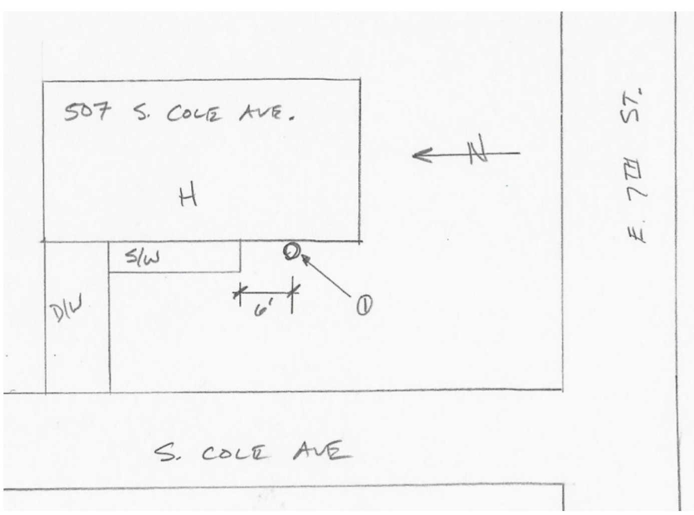
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		503 Stower Rd.	
Project Name :		Location / Address:	
100.26	2-53	TL_A	TL_A_3 and TL_A_4
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Tuesday, October 17, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from mainline cleanout cover
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from mainline cleanout cover on Stower Rd., in front of 503 Stower Rd.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		621 Main St.	
Project Name :		Location / Address:	
100.26	2-54	TL_A	TL_A_30 and TL_A_31
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Wednesday, October 18, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from two broken cleanout covers
CB = Catch Basin	2	Smoke from two broken cleanout covers
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from two, adjacent cleanout covers, in beauty strip grass in front of 621 Main St.
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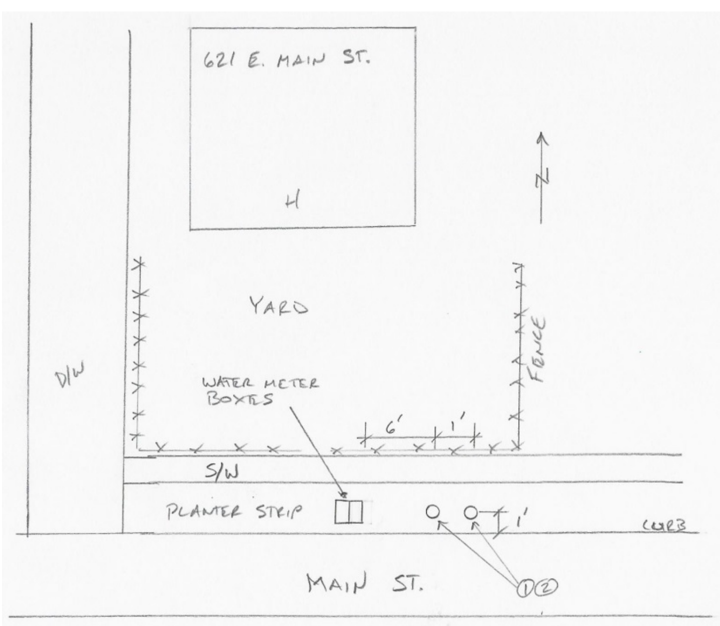
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing
Project Name :

621 and 623 Main St.
Location / Address:

100.26
Project No.

2-55
Report No.

TL_A
Basin:

TL_A_30 and TL_A_31
MH No. / Main:

Ryan Quigley
Tested By:

Wednesday, October 18, 2017
Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from cleanout area
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from fence line, between backyards of 621 and 623 Main St.
- Could not confirm broken or uncovered cleanout.
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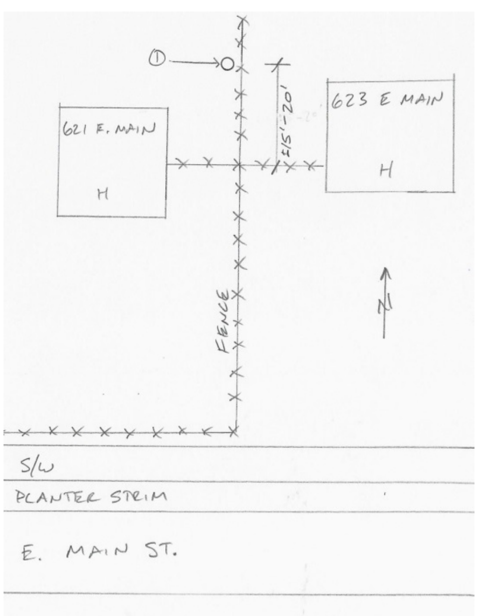
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: 812 E. Main St.	
Project No.: 100.26	Report No.: 2-56	Basin: TL_A	MH No. / Main: TL_A_26 and TL_A_27
Tested By: Ryan Quigley			Date: Wednesday, October 18, 2017

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1/2	Smoke from cleanout area
LML = Leaking Main Line	3	Smoke from buried service lateral
CB = Catch Basin	4	Smoke from open pipe stub
LMH = Leaking Manhole	5/6	Smoke from buried service lateral
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- See aerial for picture locations.
- No. 2 – Cleanout covered with concrete block and open stub out pipe.
- No. 3 – Smoke from gravel area covering broken service lateral.
- No. 5/6 – Smoke from fence line. Possible broken service lateral under fence line.

SKETCH

Molalla Smoke Testing
Report No. 2-56
812 E. Main St.

No. 1

No. 2

No. 3

No. 4

No. 5

No. 6

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Berkley Ave.	
Project Name :		Location / Address:	
100.26	2-57	BC_A3	BC_A3_12 and BC_A3_14
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Wednesday, October 18, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Smoke from CB – 2nd St. & Berkley Ave.
LML = Leaking Main Line	2	Smoke from CB – Berkley Ave.
CB = Catch Basin	3	Smoke from CB – Berkley Ave.
LMH = Leaking Manhole	4	Smoke from CB – 3rd St. & Berkley Ave.
OCO = Open Cleanout	5	Smoke from CB – 4th & Berkley Ave.
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- See attached aerial for locations and pictures.
- CB shown in Picture No. 2 is on the east side of Berkley Ave., between 2nd and 3rd Streets.
- CB shown in Picture No. 3 is on the west side of Berkley Ave., between 2nd and 3rd Streets.
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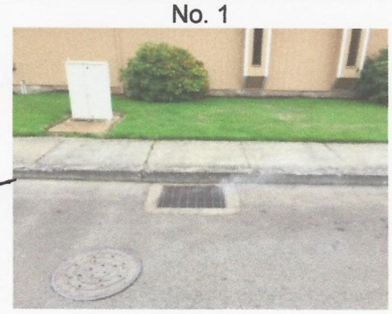
SKETCH

See Attached

Molalla Smoke Testing
Report No. 2-57
Berkley Ave.

No. 1



No. 2

No. 3

No. 4

No. 5

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		323 E. 3rd St.	
Project Name :		Location / Address:	
100.26	2-58	BC_A3	BC_A3_13 and BC_A3_14
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Wednesday, October 18, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from broken cleanout cap
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Broken cleanout cap, located in gravel area under trailer.
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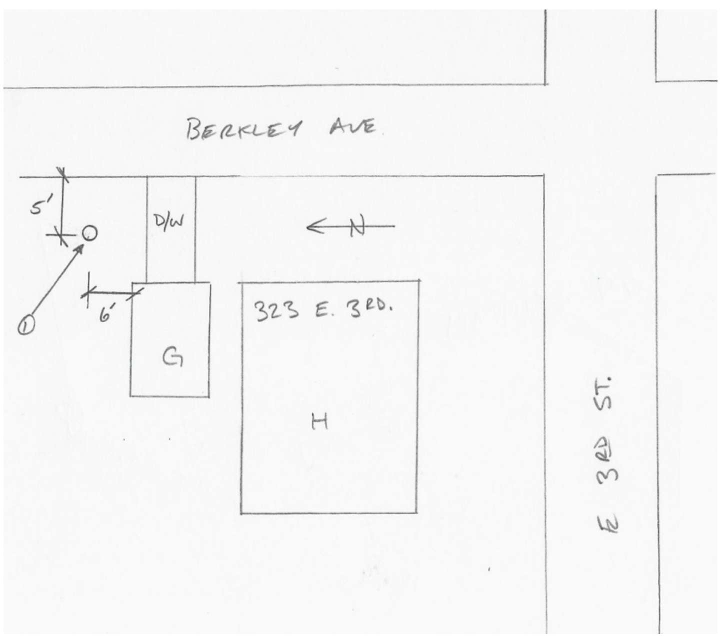
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	Swiegle Ave.
Project No.	100.26
Report No.	2-59
Basin:	BC_A3
MH No. / Main:	BC_A3_13 and BC_A3_14
Tested By:	Ryan Quigley
Date:	Wednesday, October 18, 2017

TESTING CODE

LSL = Leaking Service Lateral
LML = Leaking Main Line
CB = Catch Basin
LMH = Leaking Manhole
OCO = Open Cleanout
PHV = Plugged House Vent
RD = Roof Drain

PHOTOGRAPHS

No.	Description
1	Smoke from CB – 2nd & Swiegle Ave.
2	Smoke from CB – 3rd & Swiegle Ave.
3	Smoke from CB – 4th & Swiegle Ave.

Comments

- See attached aerial for pictures and locations.
- Storm system manholes on Swiegle Ave., adjacent to catch basins, were also smoking.
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SKETCH

See Attached

Molalla Smoke Testing
Report No. 2-59
Swiegle Ave.


No.1


No. 2


No. 3

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		223 Swiegle Ave.	
Project Name :		Location / Address:	
100.26	2-60	BC_A3	BC_A3_9 and BC_A3_10
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Wednesday, October 18, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from cleanout area
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from cleanout area on north side of house. Could not confirm broken or missing cap.
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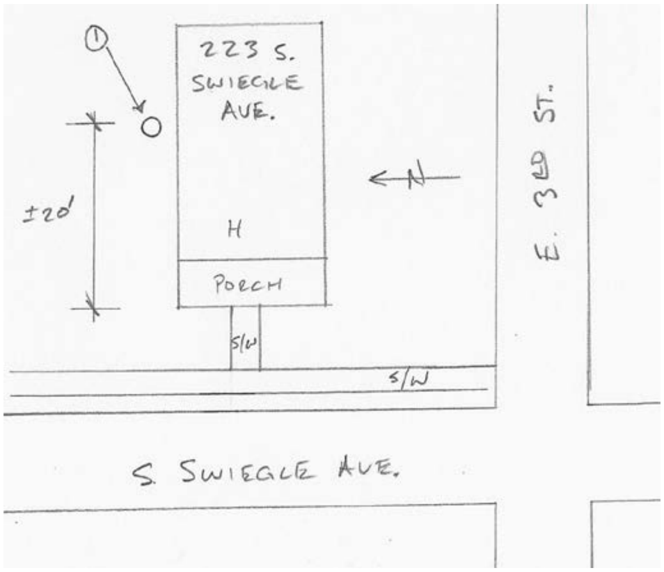
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	Engle Ave.
Project No.	100.26
Report No.	2-61
Basin:	BC_A3
MH No. / Main:	BC_A3_15 and BC_A3_16
Tested By:	Ryan Quigley
Date:	Wednesday, October 18, 2017

Testing Code	Photographs No.	Photographs Description
LSL = Leaking Service Lateral	1	Smoke from catch basins
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from catch basins on east and west side of Engle Ave., between 2nd and 3rd Streets.
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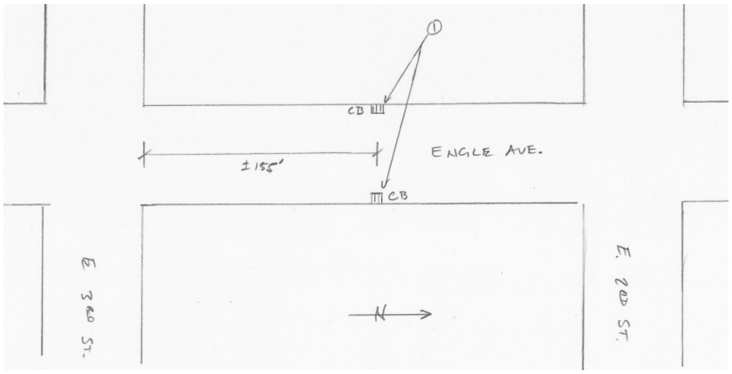
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Fox Park	
Project Name :		Location / Address:	
100.26	2-62	BC_A3	BC_A3_3
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Wednesday, October 18, 2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Smoke from splash pad drain
LML = Leaking Main Line	2	Smoke from broken clean out cap
CB = Catch Basin	3	Smoke from lawn area
LMH = Leaking Manhole	4	Smoke from lawn area
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

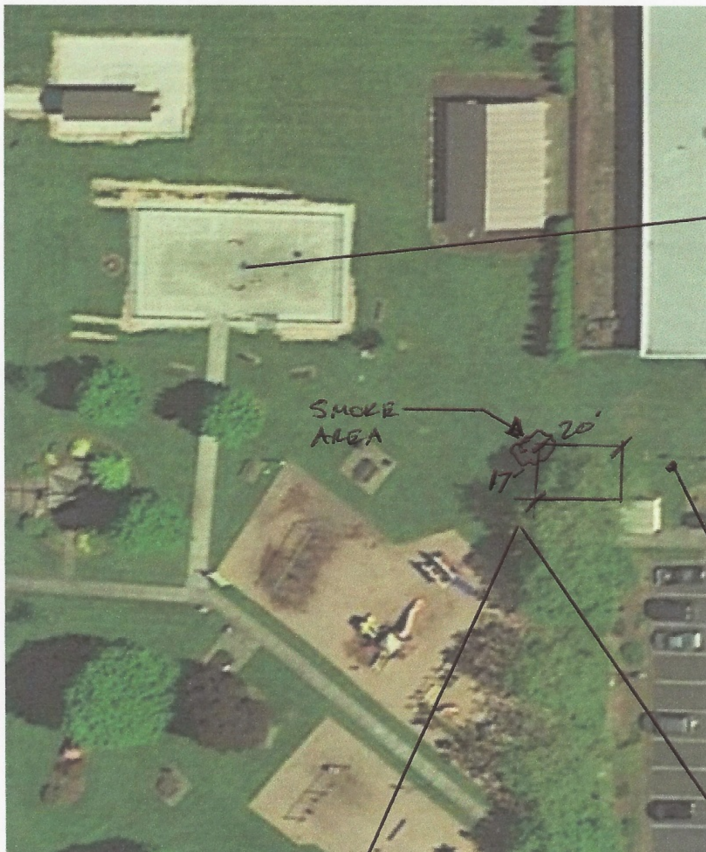
Comments

- See attached aerial for locations.
- Picture No. 1 – Smoke coming up from the new splash pad play area drain.
- Picture No. 3 & 4 – Approximate10 sq. ft. area in the lawn was smoking. No cleanout found. Assumed to be broken sewer lateral or main. 20' north and 17' west of northwest bathroom corner.
-
-

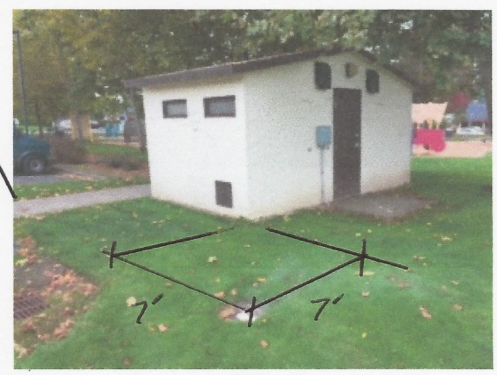
SKETCH

See Attached

Molalla Smoke Testing
Report No. 2-62
Fox Park



No. 1



No. 2

No. 3

No. 4

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Metzler Ave.	
Project Name :		Location / Address:	
100.26	2-63	BC_A3	BC_A3_2
Project No.	Report No.	Basin:	MH No. / Main:
Ryan Quigley			Wednesday, October 18, 2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Smoke from mainline cleanout cover
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke from mainline cleanout cover located at 4th St. and Metzler Ave.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla Smoke Testing		Location / Address: Mary Drive	
Project No.: 100.26	Report No.: 3-1	Basin: BC_C1	MH No. / Main: Manhole No. BC_C1_19
Tested By: Andy Hall			Date: 10/16/17

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking Manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from crack in pavement east of the manhole lid.

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Mary Drive	
Project Name :		Location / Address:	
100.26	3-2	BC_C1	Manhole No. BC_C1_10
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/16/17
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Leaking Manhole
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from crack in pavement east of the manhole lid.
-
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Mary Drive	
Project Name :		Location / Address:	
100.26	3-3	BC_C1	Manhole No. BC_C1_13
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/16/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Leaking Manhole
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from crack in pavement south of the manhole lid.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: 1000 Harvey Ln	
Project No.: 100.26	Report No.: 3-4	Basin: BC_C	MH No. / Main: BC_C_10 to BC_C_22
Tested By: Andy Hall			Date: 10/16/17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout has broken pipe and missing lid.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 1413 Meadowlawn PL
Project No.: 100.26	Report No.: 3-5
Basin: BC_C	MH No. / Main: BC_C_26 to BC_C_59
Tested By: Andy Hall	Date: 10/16/17

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Open Cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout has broken lid.
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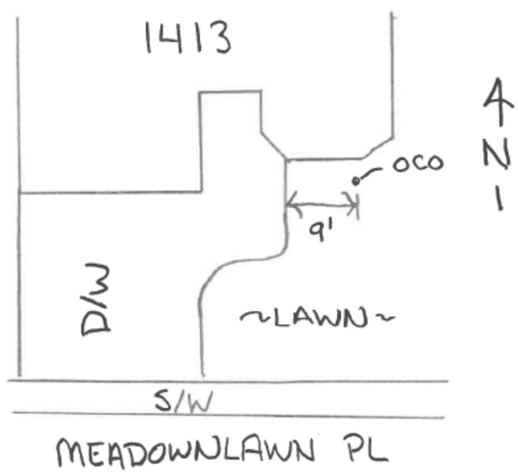
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 1419 Meadowlawn PL
Project No.: 100.26	Report No.: 3-6
Basin: BC_C	MH No. / Main: BC_C_26 to BC_C_59
Tested By: Andy Hall	Date: 10/16/17

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Open Cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout does not have lid.
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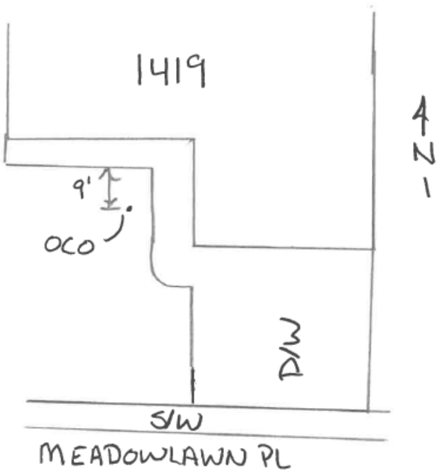
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	1212 Toliver Road
Project No.	100.26
Report No.	3-7
Basin:	TL
MH No. / Main:	TL_36 to TL_37
Tested By:	Andy Hall
Date:	10/16/17

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Leaking Service Lateral?
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Could not confirm (Private property).
-
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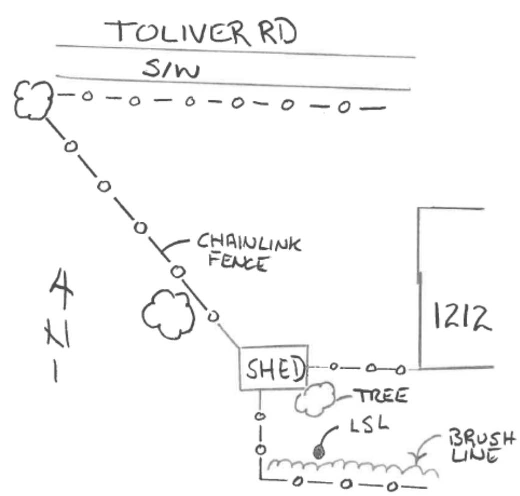
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: Toliver Road	
Project No. 100.26	Report No. 3-8	Basin: TL	MH No. / Main: TL_36 and TL_37
Tested By: Andy Hall			Date: 10/16/17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Leaking Manhole
LML = Leaking Main Line	2	Leaking Manhole
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Photo 1 (TL_37): Design may allow for inflow.
- Photo 2 (TL_36): Design may allow for inflow.
- Note: Manhole Inflow Protector may help with possible inflow issues.

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	737 Trinity Ct
Project No.	100.26
Report No.	3-9
Basin:	TL
MH No. / Main:	TL_SB6_2 to TL_SB6_3
Tested By:	Andy Hall
Date:	10/16/17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Above grade cleanout does not have lid.
-
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 730 Trinity Ct

Project No.: 100.26	Report No.: 3-10	Basin: TL	MH No. / Main: TL_SB6_2 to TL_SB6_4

Tested By: Andy Hall	Date: 10/16/17

Testing Code	Photographs	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout?
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Behind gate. Could not confirm (Private property).
-
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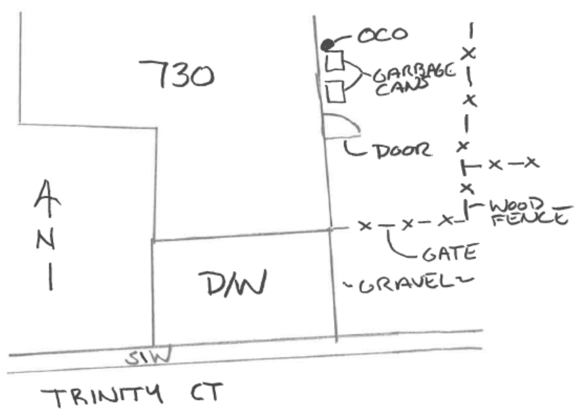
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla Smoke Testing

Location / Address: 707 Toliver Road

Project No.: 100.26

Report No.: 3-11

Basin: TL

MH No. / Main: TL_ 27 to TL_28

Tested By: Andy Hall

Date: 10/16/17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Broken cleanout lid.
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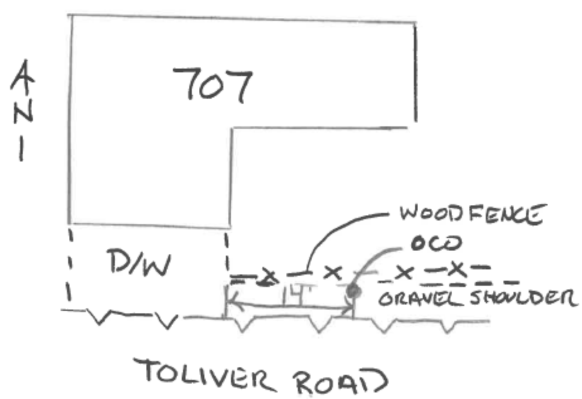
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: Lakota Ln (Near Toliver Road)	
Project No. 100.26	Report No. 3-12	Basin: TL	MH No. / Main: TL_ 24 to TL_25
Tested By: Andy Hall			Date: 10/16/17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line	2	Open Cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Photo 1: Water meter lid smoking below grade.
- Photo 2: Smoke around cleanout lid and cracks in pavement.
-
-
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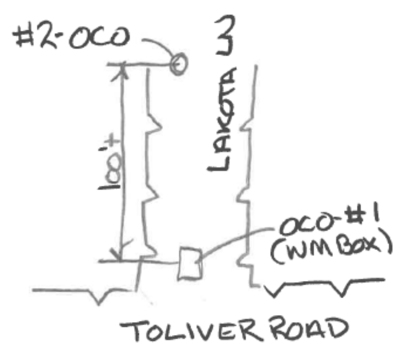
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: 405 Ridings Avenue	
Project No. 100.26	Report No. 3-13	Basin: TL_F	MH No. / Main: TL_F_2 to TL_F_29
Tested By: Andy Hall			Date: 10/17/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Above grade cleanout lid has holes drilled in top.
-
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		406 Ridings Avenue	
Project Name :		Location / Address:	
100.26	3-14	TL_F	TL_F_2 to TL_F_20
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout has grated lid.

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: Ridings Avenue	
Project No. 100.26	Report No. 3-15	Basin: TL_F	MH No. / Main: TL_F_20
Tested By: Andy Hall			Date: 10/17/17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Leaking Manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from cracks in pavement south of the manhole.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Dixon Avenue	
Project Name :		Location / Address:	
100.26	3-16	TL_F	TL_F_7 to TL_F_8
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Catch Basin
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from catch basin.
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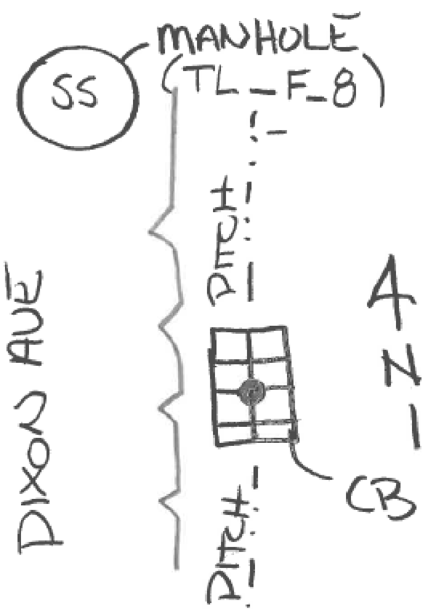
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: W Heintz Street	
Project No. 100.26	Report No. 3-17	Basin: TL_F	MH No. / Main: East of MH TL_F_11
Tested By: Andy Hall			Date: 10/17/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout lid recessed below pavement grade. Smoke coming from sides of lid and center.
-
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-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Leroy Avenue	
Project Name :		Location / Address:	
100.26	3-18	TL_F	TL_F_18
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking Manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Manhole smoking from southwest side next to ditch.
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-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Lynn Ln.	
Project Name :		Location / Address:	
100.26	3-19	TL_F	West of MH TL_F_18
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout pipe broken next to ditch.
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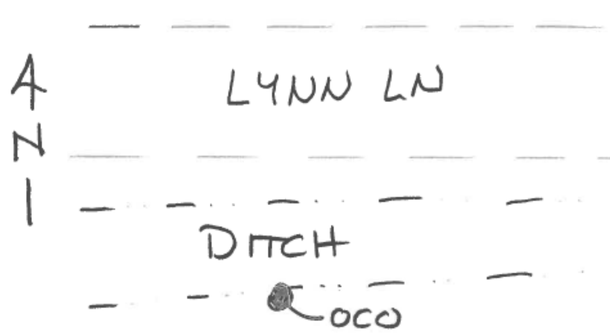
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla Smoke Testing	Location / Address: 509 & 507B Leroy Avenue (Map shows same lot)
Project No.: 100.26	Report No.: 3-20
Basin: TL_F	MH No. / Main: TL_F_9 to TL_F_18
Tested By: Andy Hall	Date: 10/17/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	None
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- OCO (509 Leroy Ave): Cleanout had cast iron lid but was smoking from sides in yard.
- PHV (507B Leroy Ave): Garage off of house 507B had smoke coming from underneath.
-
-
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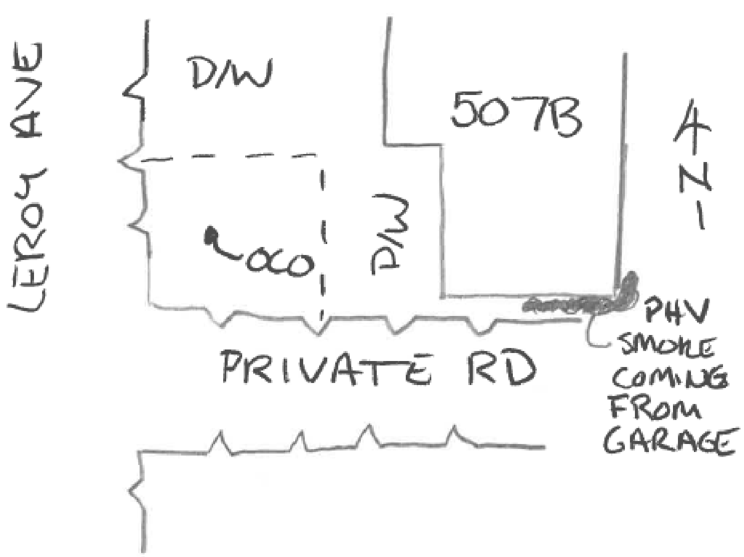
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

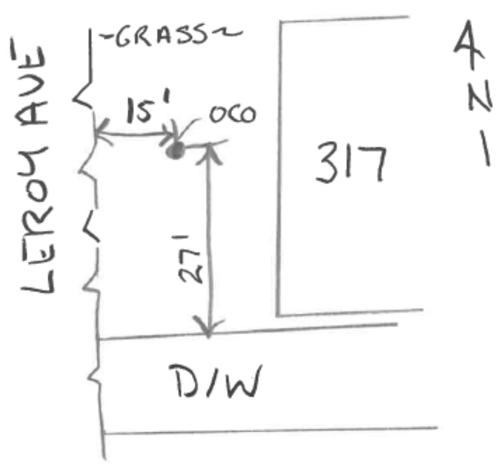
Project Name : Molalla Smoke Testing		Location / Address: 317 Leroy Avenue	
Project No.: 100.26	Report No.: 3-21	Basin: BC_A4	MH No. / Main: BC_A4_1 to BC_A4_2
Tested By: Andy Hall			Date: 10/17/17

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Open Cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout with cast iron lid smoking from sides of lid in yard.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: Les Schwab	
Project No. 100.26	Report No. 3-22	Basin: TL_SB10	MH No. / Main: TL_SB10_1 to TL_SB10_2
Tested By: Andy Hall			Date: 10/17/17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Broken cleanout pipe.
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Safeway	
Project Name :		Location / Address:	
100.26	3-23	BC_SB1	BC_SB1_4
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking Manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from crack in pavement south of the manhole lid.
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

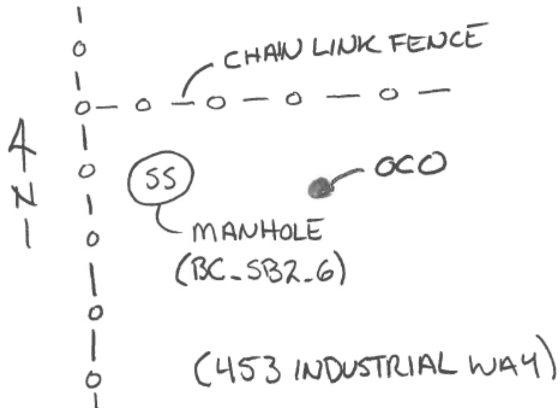
Project Name : Molalla Smoke Testing		Location / Address: 453 Industrial Way	
Project No. 100.26	Report No. 3-24	Basin: BC_SB2	MH No. / Main: BC_SB2_6 to BC_SB2_8
Tested By: Andy Hall			Date: 10/17/17

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Open Cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from ground at base of cleanout riser pipe.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

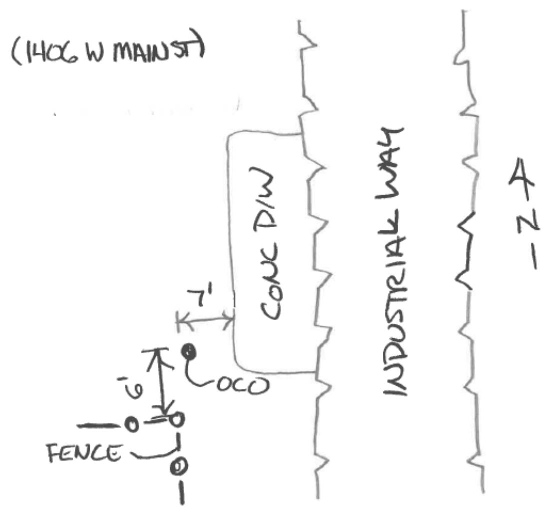
Molalla Smoke Testing		1406 W Main Street	
Project Name :		Location / Address:	
100.26	3-25	BC_B	BC_B_10 to BC_B_15
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout pipe broken at surface.
-
-
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Woodburn-Estacada Highway 211	
Project Name :		Location / Address:	
100.26	3-26	BC_A	BC_A_35
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Leaking Manhole
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from manhole cone and grade ring in ditch.
-
-
-
-

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: 500 W Main St (O'Reilly Auto Parts)	
Project No.: 100.26	Report No.: 3-27	Basin: BC_A2	MH No. / Main: BC_A_41 to BC_A2_2
Tested By: Andy Hall			Date: 10/17/17

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Open Cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Broken cleanout cap.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		524 W Main St (Car Wash)	
Project Name :		Location / Address:	
100.26	3-28	BC_A2	BC_A2_1 to BC_A2_2
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking Vault
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from vault in parking lot west of car wash.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: 821 E 8^{th} Street	
Project No.: 100.26	Report No.: 3-29	Basin: TL_A1	MH No. / Main: TL_A1_1 to TL_A1_6
Tested By: Andy Hall			Date: 10/17/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout has grated lid.
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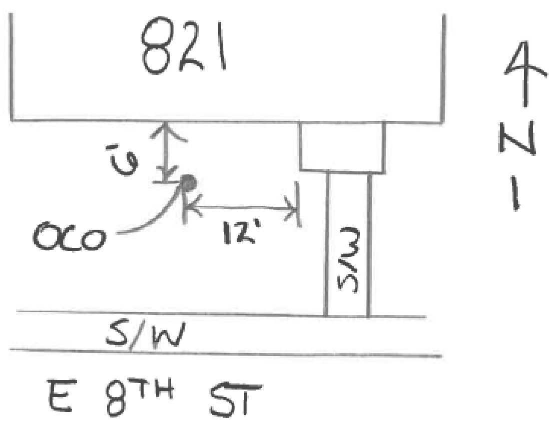
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing

Location / Address: 802 Mathias Ct.

Project No.: 100.26

Report No.: 3-30

Basin: TL_A1

MH No. / Main: TL_A1_4 to TL_A1_6

Tested By: Andy Hall

Date: 10/17/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout does not have cap.
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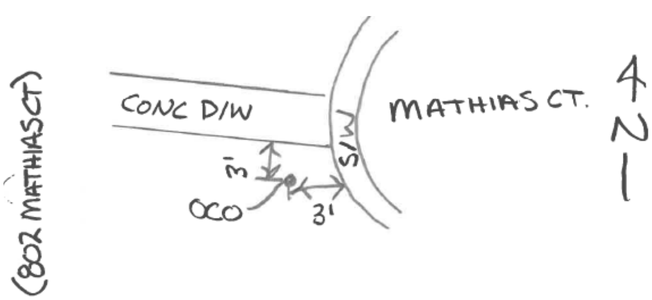
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		E 7th Street	
Project Name :		Location / Address:	
100.26	3-31	TL_A2	East of TL_A2_5
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/17/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from cracks in asphalt around cleanout lid.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: May Street	
Project No.: 100.26	Report No.: 3-32	Basin: BC_A1	MH No. / Main: BC_A1_4 and BC_A1_5
Tested By: Andy Hall			Date: 10/18/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking Manhole (BC_A1_4)
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Manhole BC_A1_4: Smoke coming from crack in pavement west of the manhole lid.
- Manhole BC_A1_5: Smoke coming from crack in pavement near manhole lid.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

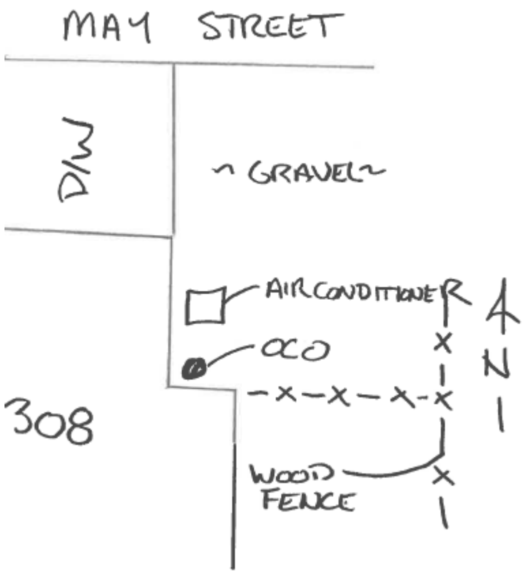
Project Name : Molalla Smoke Testing		Location / Address: 308 May Street	
Project No.: 100.26	Report No.: 3-33	Basin: BC_A1	MH No. / Main: BC_A1_4 to BC_A1_5
Tested By: Andy Hall			Date: 10/18/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout?
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Could not identify source of smoke.

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: South of S Taylor Ct.	
Project No.: 100.26	Report No.: 3-34	Basin: BC_A1	MH No. / Main: BC_A1_9
Tested By: Andy Hall			Date: 10/18/17

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Leaking Manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from grass around manhole in wetland area.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		South of S Taylor Ct.	
Project Name :		Location / Address:	
100.26	3-35	BC_A1	BC_A1_10
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/18/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Leaking Manhole
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from grass around manhole in wetland area.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 612 S Molalla Avenue
Project No.: 100.26	Report No.: 3-36
Basin: BC_A	MH No. / Main: BC_A_15 to BC_A_16
Tested By: Andy Hall	Date: 10/18/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout does not have cap.
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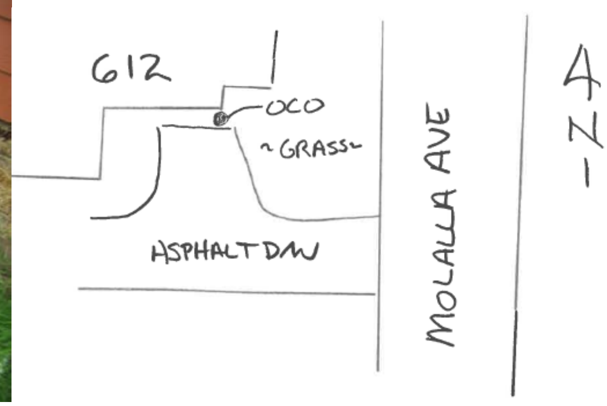
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	508 Metzler Avenue
Project No.	100.26
Report No.	3-37
Basin:	BC_A
MH No. / Main:	BC_A_14 to BC_A_24
Tested By:	Andy Hall
Date:	10/18/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Cleanout smoking around cast iron lid. Plastic cleanout cap behind cast iron lid also smoking.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 604 S Molalla Avenue
Project No.: 100.26	Report No.: 3-38
Basin: BC_A	MH No. / Main: East of BC_A_24
Tested By: Andy Hall	Date: 10/18/17

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Open Cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- OCO (Apartment No. 9): Smoke coming from cleanout pipe at ground level in brush.
- PHV (Apartment No. 3): Smoke coming from bathroom sink.

SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		135 Hart Avenue	
Project Name :		Location / Address:	
100.26	3-39	BC_A	BC_A_12 to BC_A_13
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/18/17
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Leaking Service Lateral
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from under bricks, rock, and old retaining wall.
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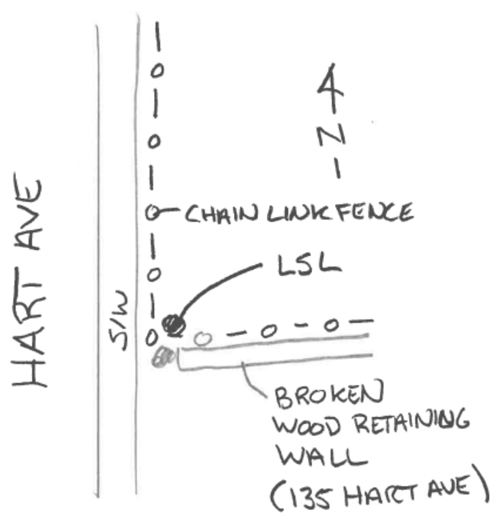
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		202 W 3rd Street	
Project Name :		Location / Address:	
100.26	3-40	BC_A	BC_A_11 to BC_A_27
Project No.	Report No.	Basin:	MH No. / Main:
Andy Hall			10/18/17
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Roof Drain
LML = Leaking Main Line	2	Open Cleanout?
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from gutter drain. Roof drain might connect into open cleanout.
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SKETCH


SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: 205 W 4th Street	
Project No.: 100.26	Report No.: 3-41	Basin: BC_A	MH No. / Main: East of BC_A_10
Tested By: Andy Hall			Date: 10/18/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open Cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from broken cleanout cap.
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SKETCH

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: 209 W 4th Street	
Project No.: 100.26	Report No.: 3-42	Basin: BC_A	MH No. / Main: East of BC_A_10
Tested By: Andy Hall			Date: 10/18/17

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking Service Lateral
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Smoke coming from grass.
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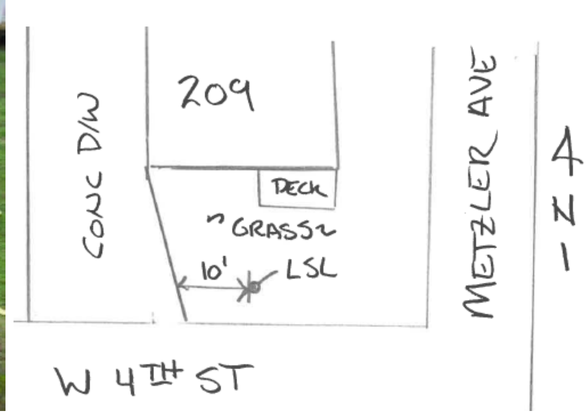
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		640 Anne Lane	
Project Name :		Location / Address:	
100.26	4-1	BC_C1	BC_C1_32
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/16/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Leaking manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Leaking around manhole rim.
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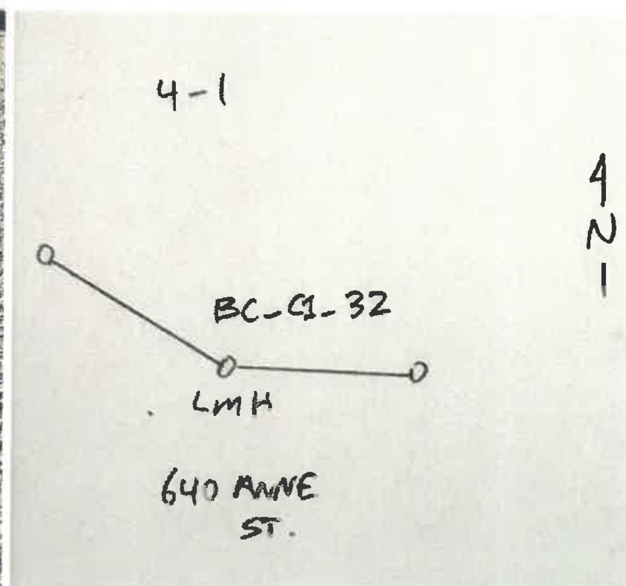
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla Smoke Testing	Location / Address: 698 Columbia
Project No.: 100.26	Report No.: 4-2
Basin: BC_C1	MH No. / Main: BC_C1_17
Tested By: Tyler J. Molatore	Date: 10/16/2017

TESTING CODE		**PHOTOGRAPHS**	
LSL = Leaking Service Lateral		No.	Description
LML = Leaking Main Line		1	Leaking manhole
CB = Catch Basin			
LMH = Leaking Manhole			
OCO = Open Cleanout			
PHV = Plugged House Vent			
RD = Roof Drain			

Comments

- Leaking around manhole rim.
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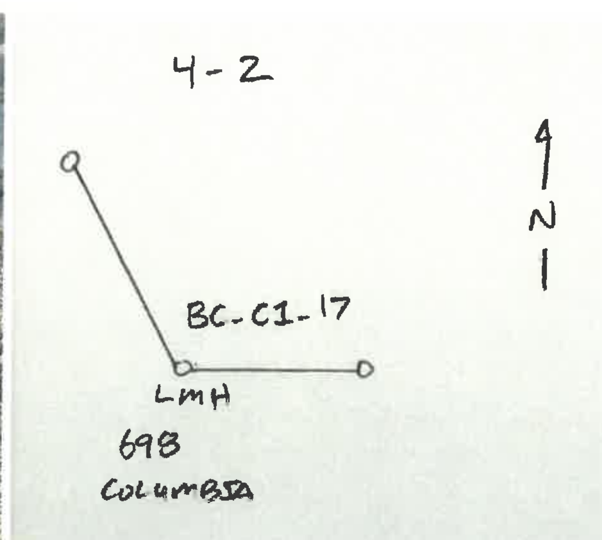
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		668 Columbia	
Project Name :		Location / Address:	
100.26	4-3	BC_C1	BC_C1_18
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/16/2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Leaking around manhole rim.
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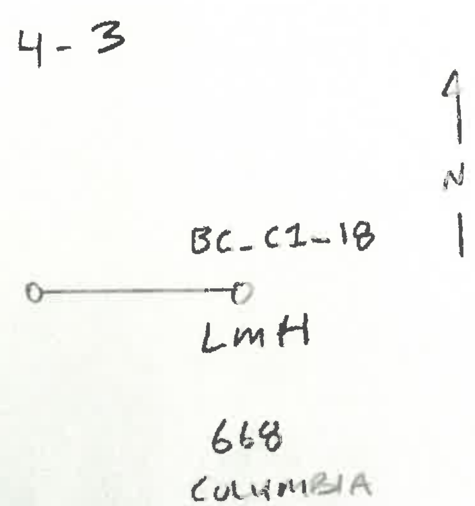
SKETCH



SMOKE TEST REPORT
The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing Project Name :		1012 Julie Ln Location / Address:	
100.26 Project No.	4-4 Report No.	BC_C Basin:	BC_C_12 MH No. / Main:
Tyler J. Molatore Tested By:			10/16/2017 Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Leaking manhole
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Leaking around manhole rim.
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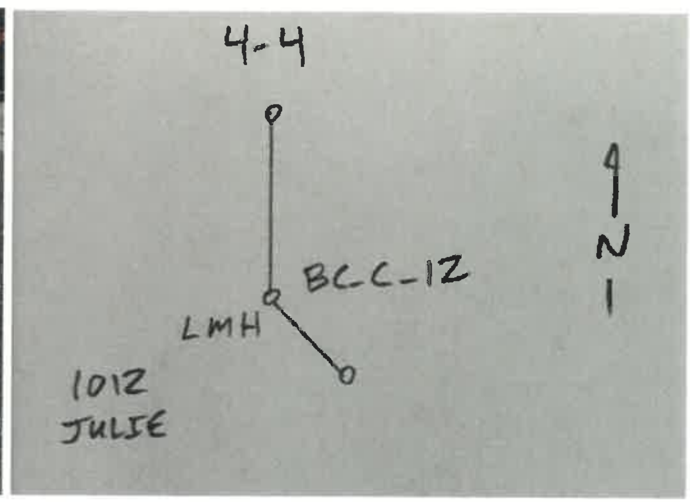
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 1000 Julie Ln
Project No. 100.26 / Report No. 4-5	Basin: BC_C / MH No. / Main: BC_C_13
Tested By: Tyler J. Molatore	Date: 10/16/2017

TESTING CODE

- LSL = Leaking Service Lateral
- LML = Leaking Main Line
- CB = Catch Basin
- LMH = Leaking Manhole
- OCO = Open Cleanout
- PHV = Plugged House Vent
- RD = Roof Drain

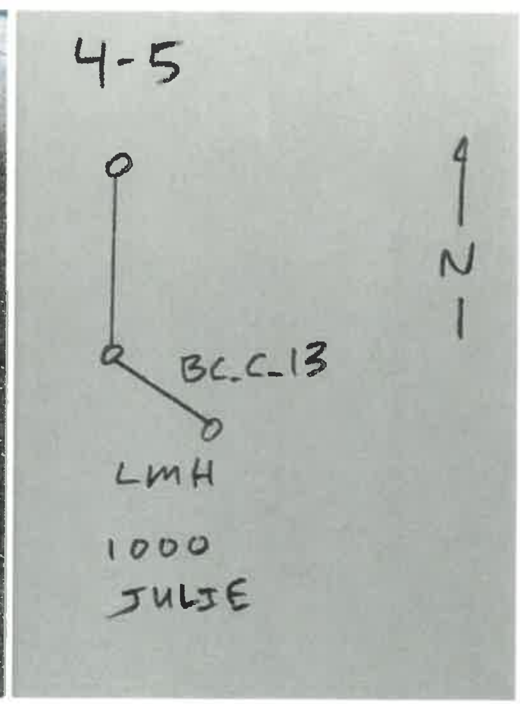
PHOTOGRAPHS

No.	Description
1	Leaking manhole

Comments

- Leaking around manhole rim and surrounding cracks in asphalt.

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

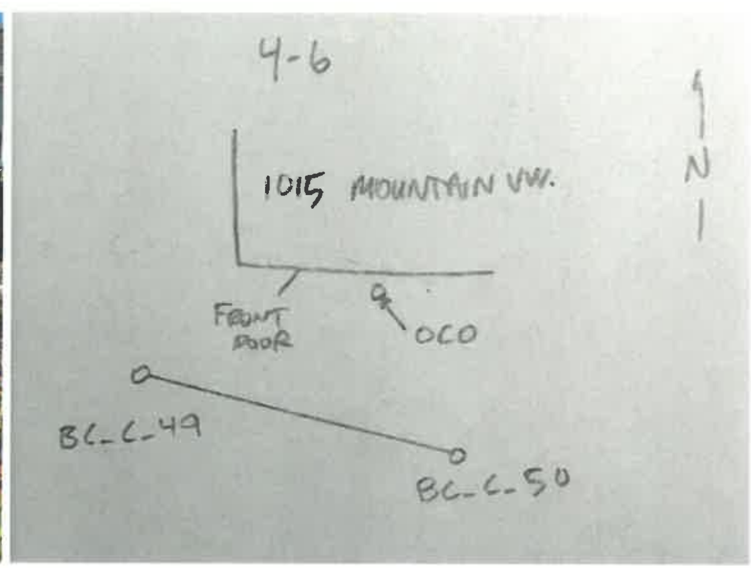
Project Name : Molalla Smoke Testing		Location / Address: 1015 Mountain View	
Project No. 100.26	Report No. 4-6	Basin: BC_C	MH No. / Main: BC_C_49 to BC_C_50
Tested By: Tyler J. Molatore			Date: 10/16/2017

TESTING CODE		PHOTOGRAPHS	
LSL = Leaking Service Lateral		No.	Description
LML = Leaking Main Line		1	Open cleanout
CB = Catch Basin			
LMH = Leaking Manhole			
OCO = Open Cleanout			
PHV = Plugged House Vent			
RD = Roof Drain			

Comments

- Open cleanout located immediately to the right of the front door. Right next to hose reel.
- Also refer to aerial on following page.

SKETCH



AERIAL


Big Meadow Park
1015 Mountain View Lane
Mountain View Ln
Open Cleanout

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name :	Molalla Smoke Testing
Location / Address:	1045 Cascade Lane
Project No.	100.26
Report No.	4-7
Basin:	BC_C
MH No. / Main:	BC_C_39 to BC_C_46
Tested By:	Tyler J. Molatore
Date:	10/16/2017

TESTING CODE		
LSL	=	Leaking Service Lateral
LML	=	Leaking Main Line
CB	=	Catch Basin
LMH	=	Leaking Manhole
OCO	=	Open Cleanout
PHV	=	Plugged House Vent
RD	=	Roof Drain

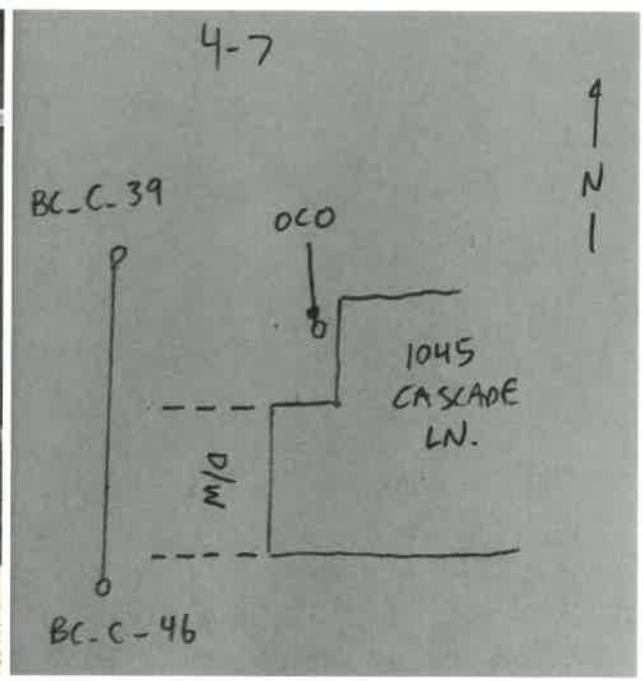
PHOTOGRAPHS

No.	Description
1	Open cleanout

Comments

- Open cleanout located about 10 ft to the left of the front door. Right in front of the front window.
- Also refer to aerial on following page.

SKETCH



AERIAL

Homestead Pl
Cascade Ln
1045 Cascade Lane
Cascade Ln
Open Cleanout

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		906 Toliver Rd	
Project Name :		Location / Address:	
100.26	4-8	TL	TL_31 and TL_32
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/16/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
LSL = Leaking Service Lateral	**No.**	**Description**
LML = Leaking Main Line	1	Open cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Open cleanout. House was undergoing some landscaping and upgrades. Open cleanout may only be temporary.
- Also refer to aerial on following page.
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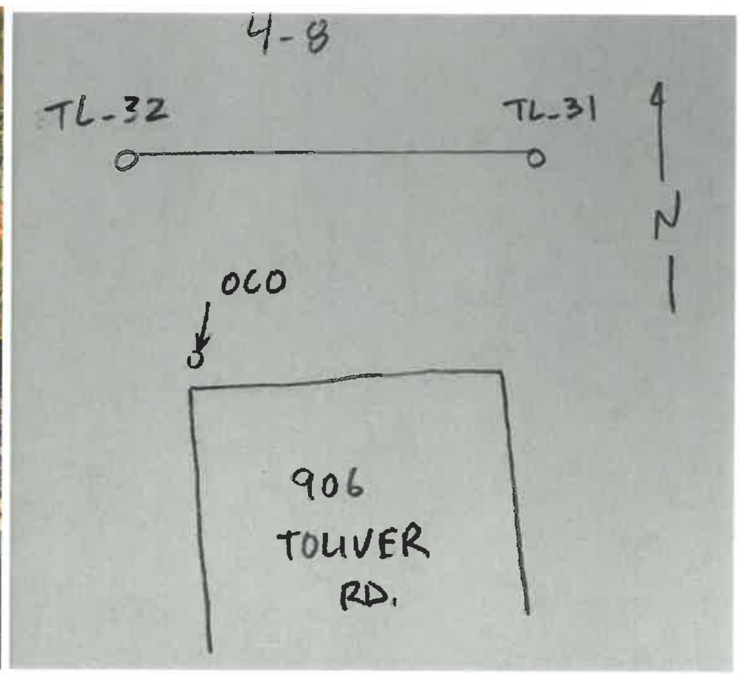
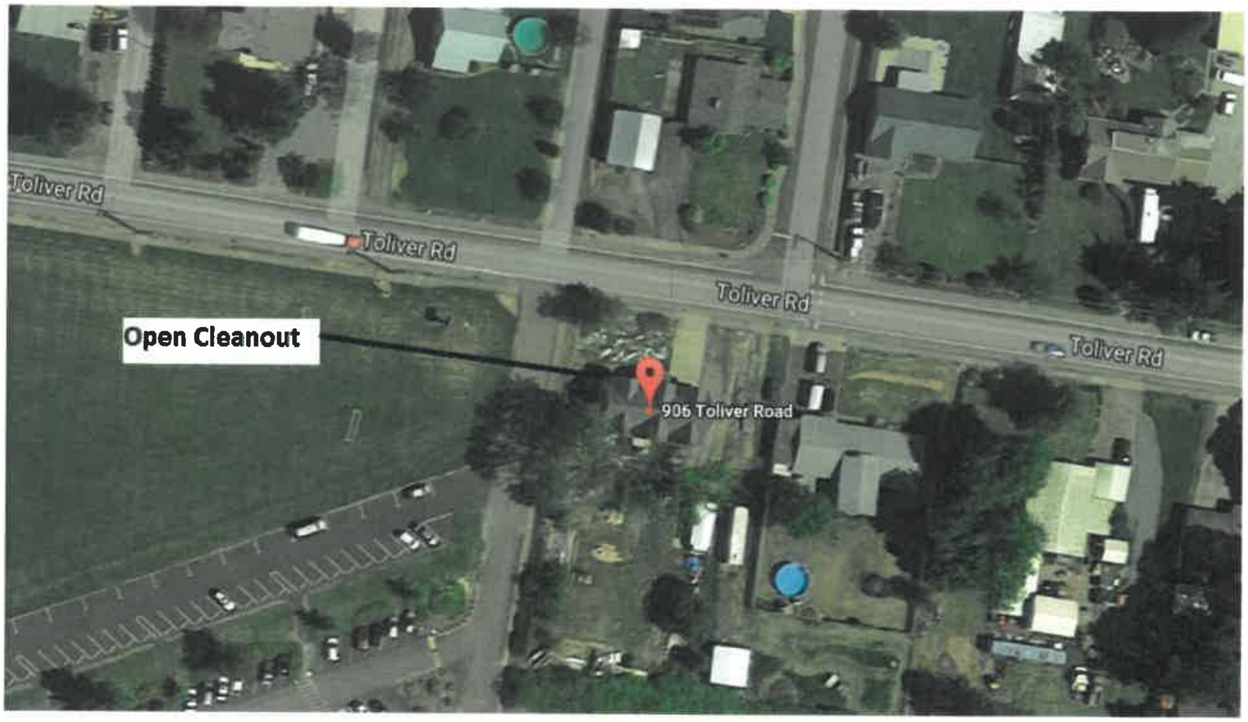
SKETCH



AERIAL



Toliver Rd
Toliver Rd
Toliver Rd
Toliver Rd
Open Cleanout
906 Toliver Road

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		Molalla River Middle School	
Project Name :		Location / Address:	
100.26	4-9	TL	TL_10
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/16/2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
LSL = Leaking Service Lateral	No.	Description
LML = Leaking Main Line	1	Leaking manhole
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Manhole was located at perimeter of soccer field. Manhole was leaking significantly around adjacent soil.
- Also refer to aerial on following page.
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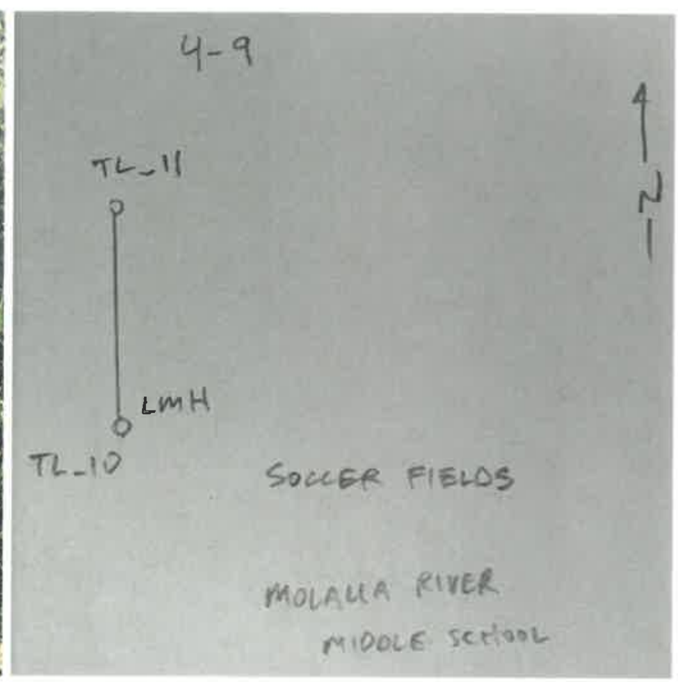
SKETCH



AERIAL No. 1

AERIAL No. 2

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing Project Name :		580 N. Hezzie Location / Address:	
100.26 Project No.	4-10 Report No.	TL Basin:	TL_11 to TL_12 MH No. / Main:
Tyler J. Molatore Tested By:			10/16/2017 Date:

TESTING CODE

LSL = Leaking Service Lateral
LML = Leaking Main Line
CB = Catch Basin
LMH = Leaking Manhole
OCO = Open Cleanout
PHV = Plugged House Vent
RD = Roof Drain

PHOTOGRAPHS

No.	Description
1	Open cleanout

Comments

- Open cleanout adjacent to electrical box, in between driveways.
- Also refer to aerial on following page.
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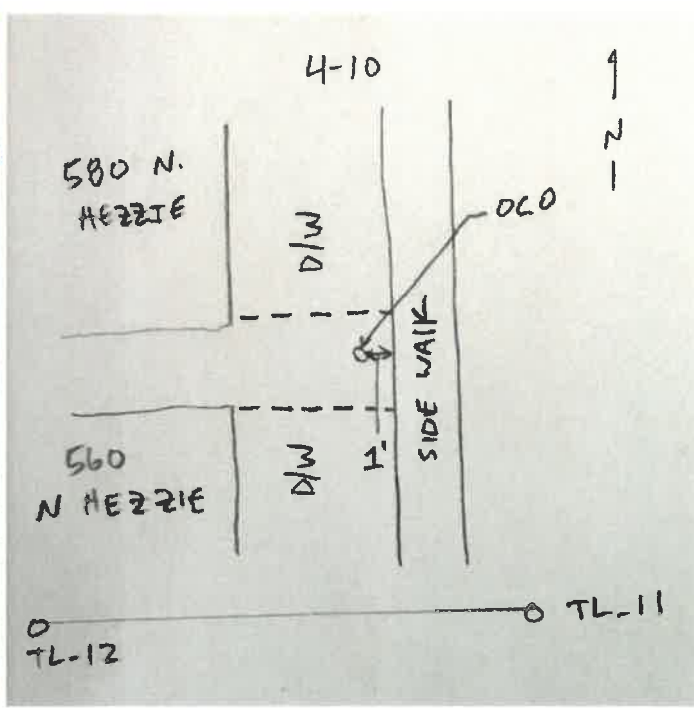
SKETCH



AERIAL

Toliver Rd
Toliver Rd
N Hezzie Ln
580 North Hezzie Lane
Open Cleanout

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla Smoke Testing		Location / Address: 806 Toliver Rd	
Project No.: 100.26	Report No.: 4-11	Basin: TL	MH No. / Main: TL_30 to TL_42
Tested By: Tyler J. Molatore			Date: 10/16/2017

TESTING CODE	
LSL	= Leaking Service Lateral
LML	= Leaking Main Line
CB	= Catch Basin
LMH	= Leaking Manhole
OCO	= Open Cleanout
PHV	= Plugged House Vent
RD	= Roof Drain

PHOTOGRAPHS

No.	Description
1	Open cleanout

Comments

- Open cleanout located to the right of the front porch.
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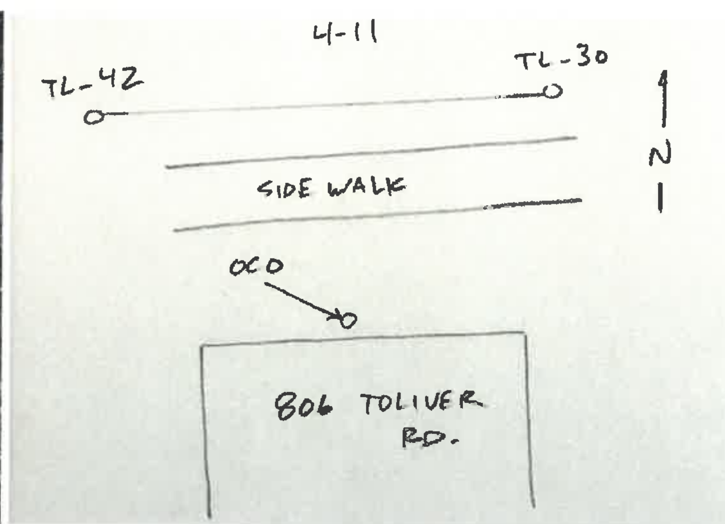
SKETCH



SMOKE TEST REPORT
The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing Project Name :		802 Toliver Road Location / Address:	
100.26 Project No.	4-12 Report No.	TL Basin:	TL_8 to TL_30 MH No. / Main:
Tyler J. Molatore Tested By:			10/16/2017 Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Roof drain connected
LML = Leaking Main Line	2	Location of deficiency.
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments
- Roof drain connected on northwest corner of house.
- Also refer to aerial on following page.
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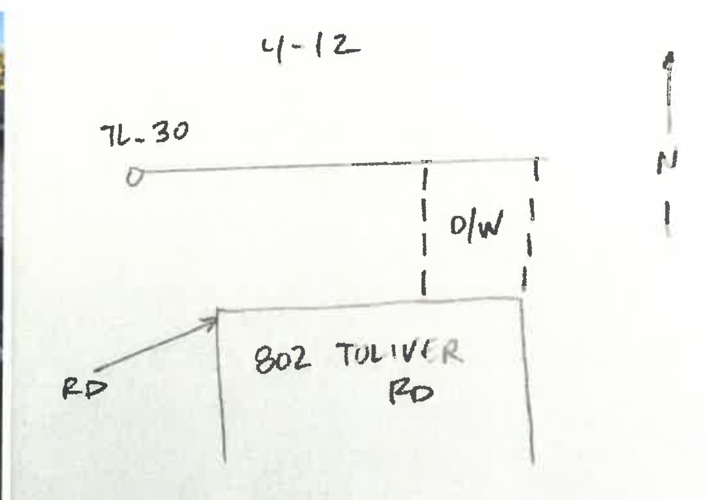
SKETCH



AERIAL

PHOTOGRAPH No. 2

SMOKE TEST REPORT
The Dyer Partnership, Engineers & Planners, Inc.

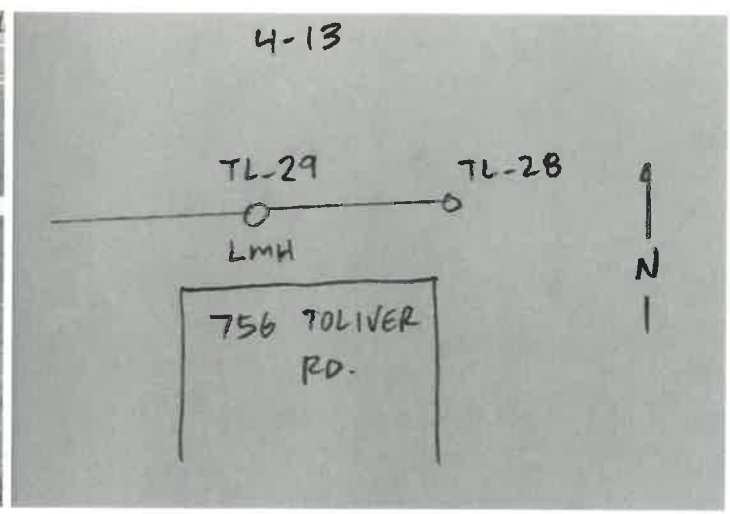
Molalla Smoke Testing		756 Toliver Road	
Project Name :		Location / Address:	
100.26	4-13	TL	TL_29
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/16/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Manhole was leaking around rim and surrounding cracks around manhole.

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		754 Toliver	
Project Name :		Location / Address:	
100.26	4-14	TL	TL_27 and TL_28
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/16/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking service lateral
LML = Leaking Main Line	2	Location of deficiency.
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Service lateral was leaking significantly immediately south of chain link fence. With brush, it was difficult to see, but there was a large amount of smoke, and the area was recessed.
- Also refer to aerial on following page.
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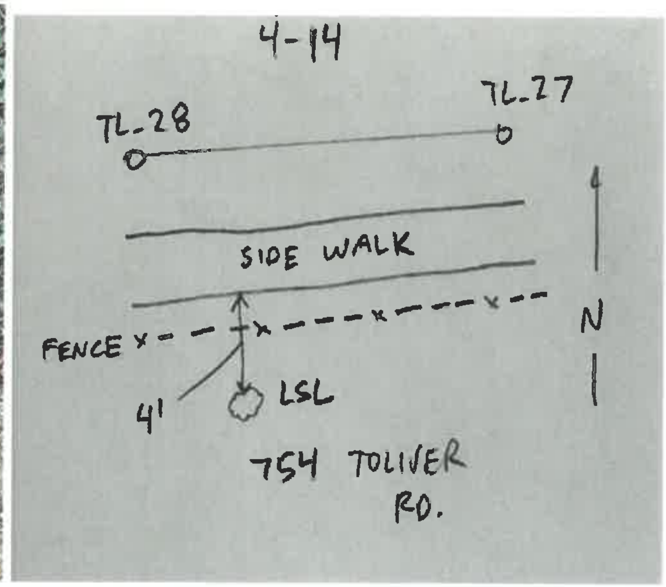
SKETCH



AERIAL

PHOTOGRAPH No. 2

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

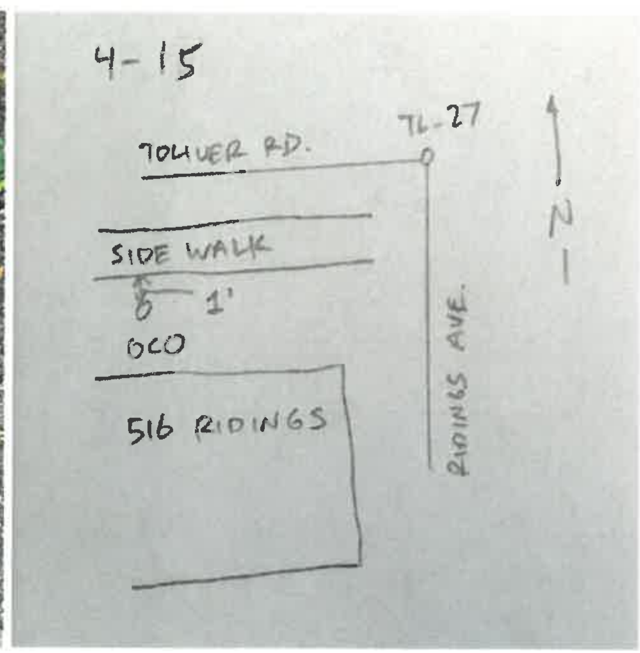
Project Name : Molalla Smoke Testing	Location / Address: 516 Ridings
Project No.: 100.26	Report No.: 4-15
Basin: TL	MH No. / Main: TL_27 and TL_28
Tested By: Tyler J. Molatore	Date: 10/16/2017

TESTING CODE	**PHOTOGRAPHS**	
	No.	**Description**
LSL = Leaking Service Lateral	1	Open cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Open cleanout west of side walk. Exposed pipe was cracked.

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		745 Zepher Way	
Project Name :		Location / Address:	
100.26	4-16	TL	TL_SB4_2 and TL_SB4_3
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/17/2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Two open cleanouts
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Two open cleanouts located approximately two and five feet from north side of drive way.
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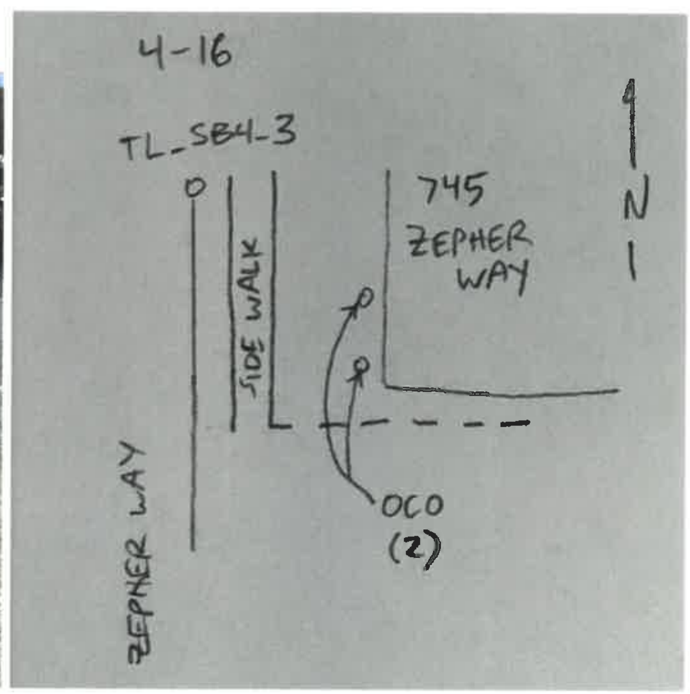
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla Smoke Testing	Location / Address: 152 Dixon
Project No.: 100.26	Report No.: 4-17
Basin: TL_F	MH No. / Main: TL_F_5 and TL_F_7
Tested By: Tyler J. Molatore	Date: 10/17/2017

TESTING CODE	
LSL	= Leaking Service Lateral
LML	= Leaking Main Line
CB	= Catch Basin
LMH	= Leaking Manhole
OCO	= Open Cleanout
PHV	= Plugged House Vent
RD	= Roof Drain

PHOTOGRAPHS

No.	Description
1	Catch basin
2	Location of deficiency.

Comments

- Catch basin is tied into the sewer system. Catch basin is located in roadway ditch.
- Also refer to aerial on following page.
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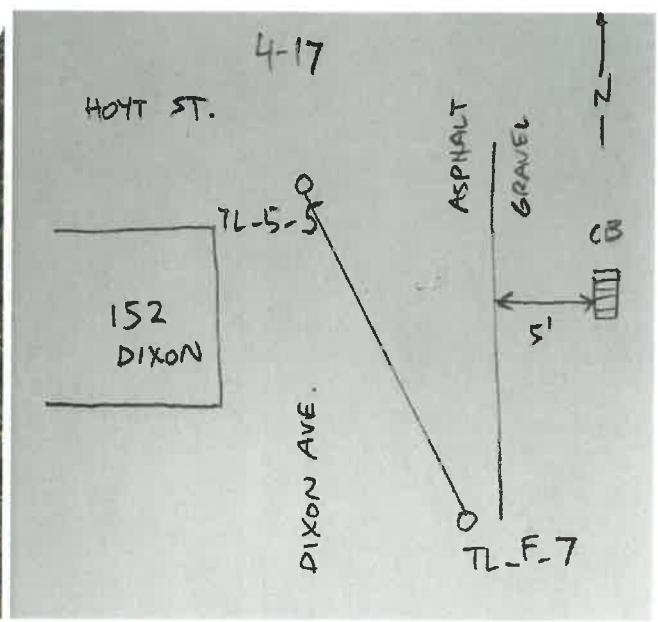
SKETCH



AERIAL

PHOTOGRAPH No. 2

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

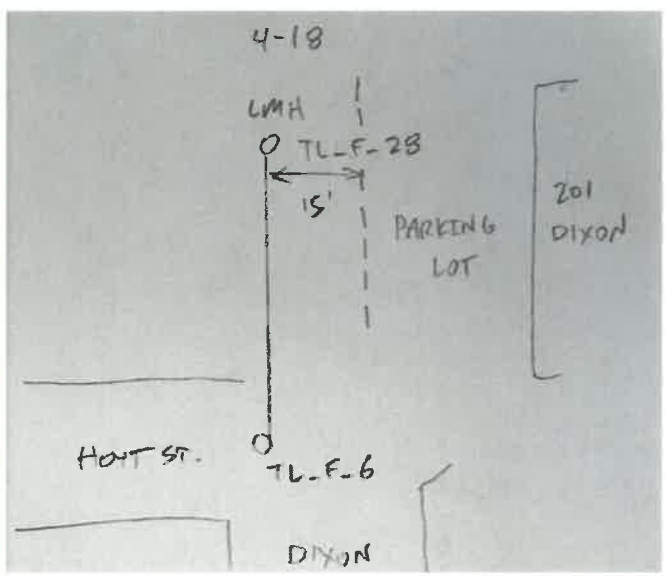
Molalla Smoke Testing		201 Dixon	
Project Name :		Location / Address:	
100.26	4-18	TL_F	TL_F_28
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/17/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Manhole located to the west of the parking lot was leaking into surrounding soil.
- Also refer to the aerial on the following page.

SKETCH



AERIAL

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

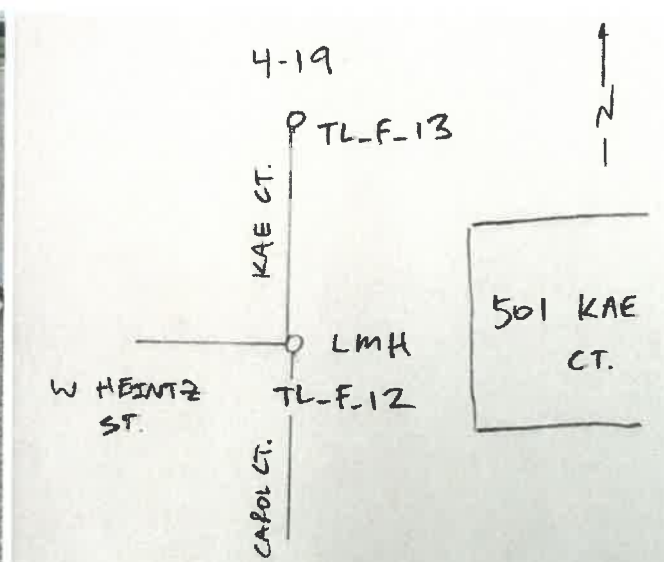
Project Name: Molalla Smoke Testing	Location / Address: 501 Kae Ct.
Project No.: 100.26	Report No.: 4-19
Basin: TL_F	MH No. / Main: TL_F_12
Tested By: Tyler J. Molatore	Date: 10/17/2017

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Leaking manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- We set up the smoke machine on this manhole and smoke exited from cracks in adjacent asphalt.

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		31291 South Highway 213	
Project Name :		Location / Address:	
100.26	4-20	BC_SB1	BC_C_91
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/17/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Floor drains connected
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- All of the floor drains in Les Schwab are connected to the gravity sewer mains. Smoke exited throughout floor drains.
- Picture is showing location where all of the floor drains are connected, to the south of the building.
- Also refer to aerial on following page.
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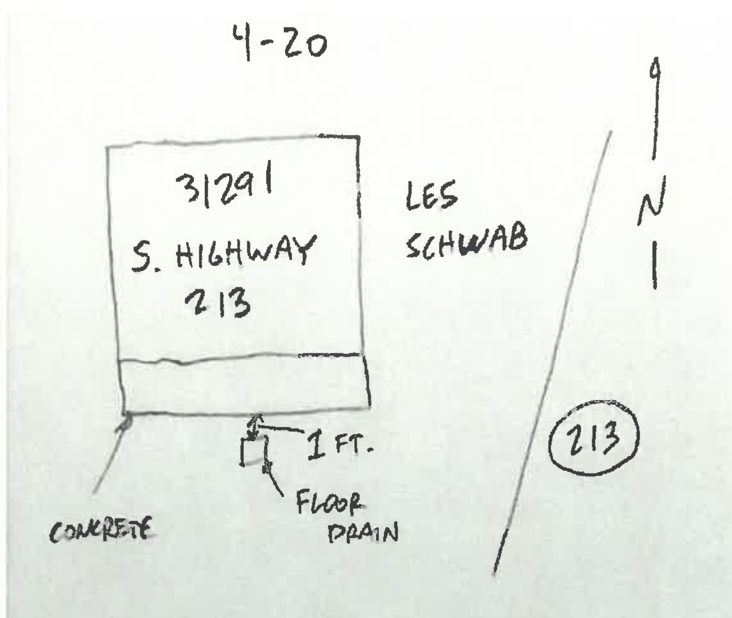
SKETCH



AERIAL


31291 S
Highway 213
Floor Drains Connected
Cascade Hwy
Cascade Hwy

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		1535 Highway 211	
Project Name :		Location / Address:	
100.26	4-21	BC_SB1	BC_SB1_11 to SB_SB1_6
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/17/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- There was an open cleanout to the north of the Safeway building. The pipe is a few inches below ground level, and probably receives quite a bit of inflow.
- Also refer to aerial on following page.
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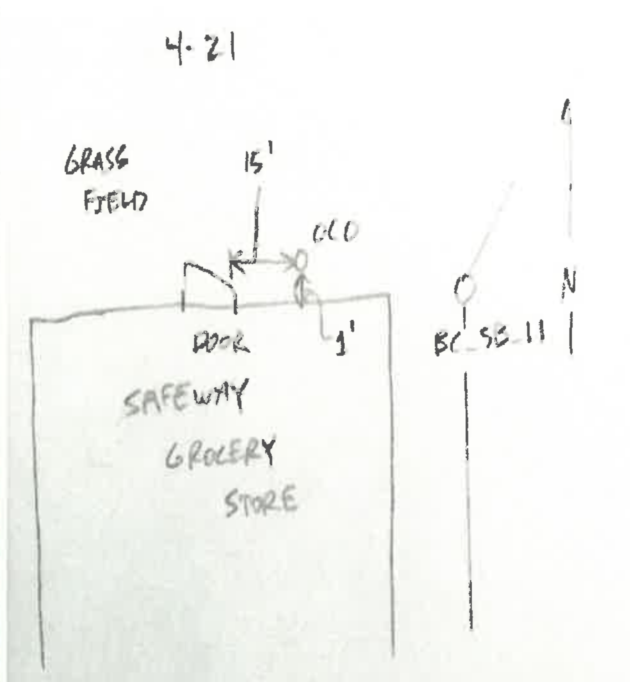
SKETCH



AERIAL


Open Cleanout
Cascade Hwy
Cascade Hwy
Bear Creek
Bear Creek

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		180 Industrial Way	
Project Name :		Location / Address:	
100.26	4-22	BC_B	BC_B_8 and BC_B_9
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/17/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Roof drains connected (multiple)
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- The roof drains on the Lumberjack Restaurant are all connected to the sewer system. The roof drains to the north and south of the building are all connected. Photo shows drains connected to the north.
- Also refer to aerial on following page.
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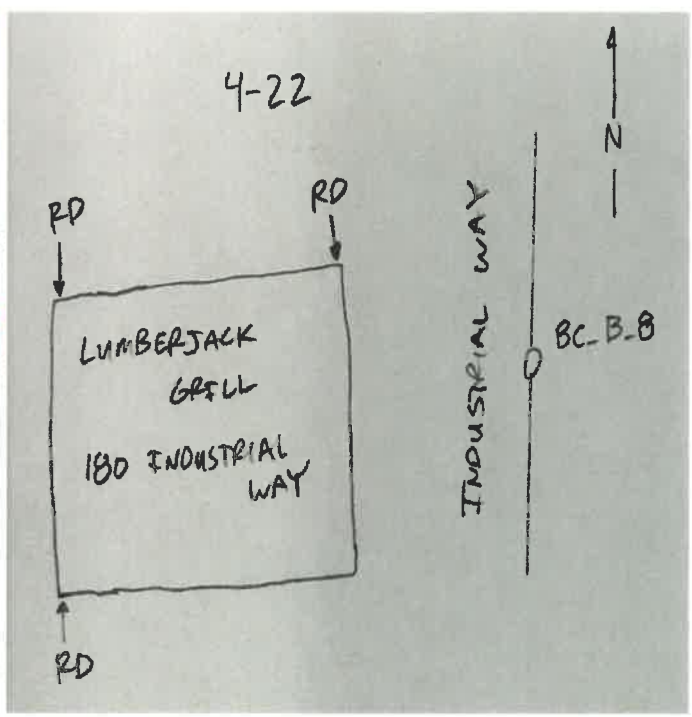
SKETCH



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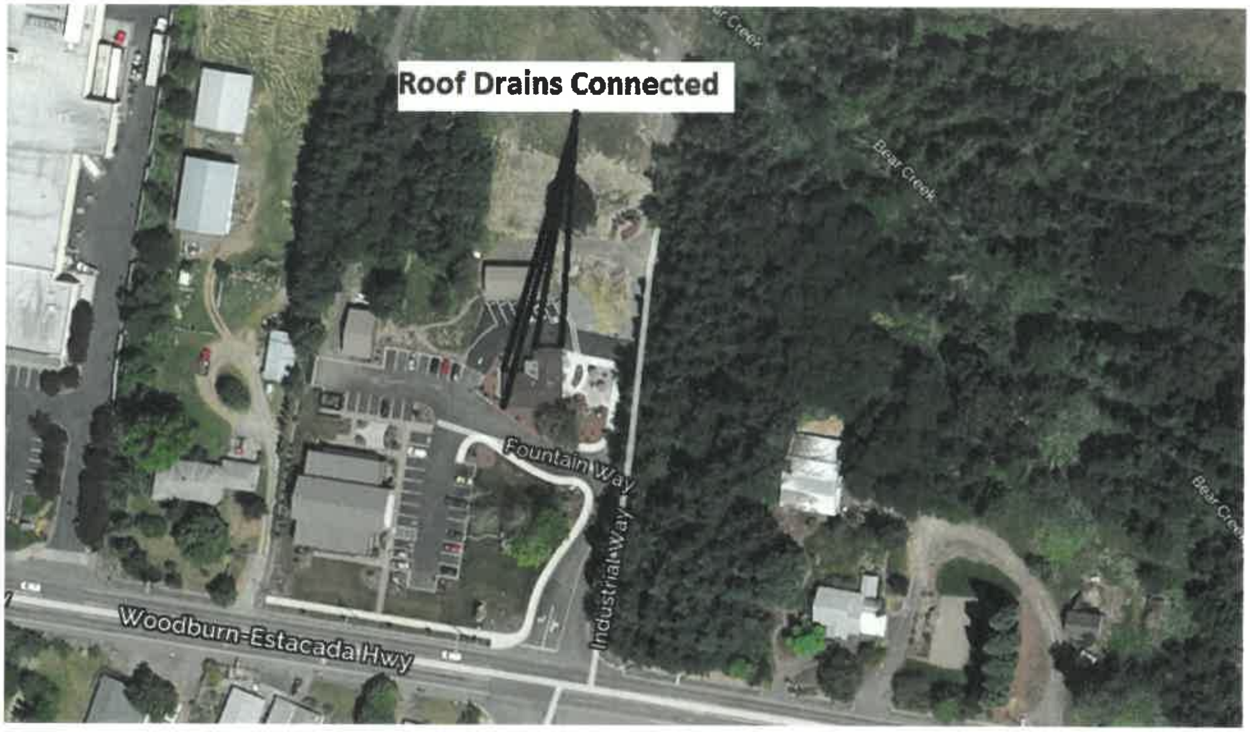
Roof Drains Connected
Bear Creek
Bear Creek
Fountain Way
Industrial Way
Woodburn-Estacada Hwy

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: Commercial Parkway
Project No. 100.26 / Report No. 4-23	Basin: BC_B / MH No. / Main: BC_B_11 and BC_B_12
Tested By: Tyler J. Molatore	Date: 10/17/2017

TESTING CODE	**PHOTOGRAPHS**	
	No.	**Description**
LSL = Leaking Service Lateral	1	Leaking manhole
LML = Leaking Main Line	2	Location of deficiency.
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Manhole was unmarked and located approximately 15ft to the west of the sidewalk, due west of BC_B_12. Smoke exited from around manhole.
- Also refer to aerial on following page.
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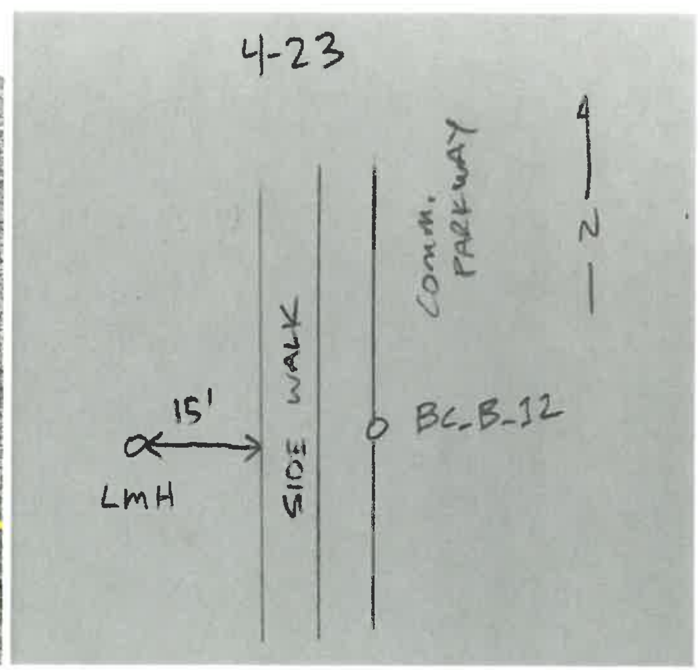
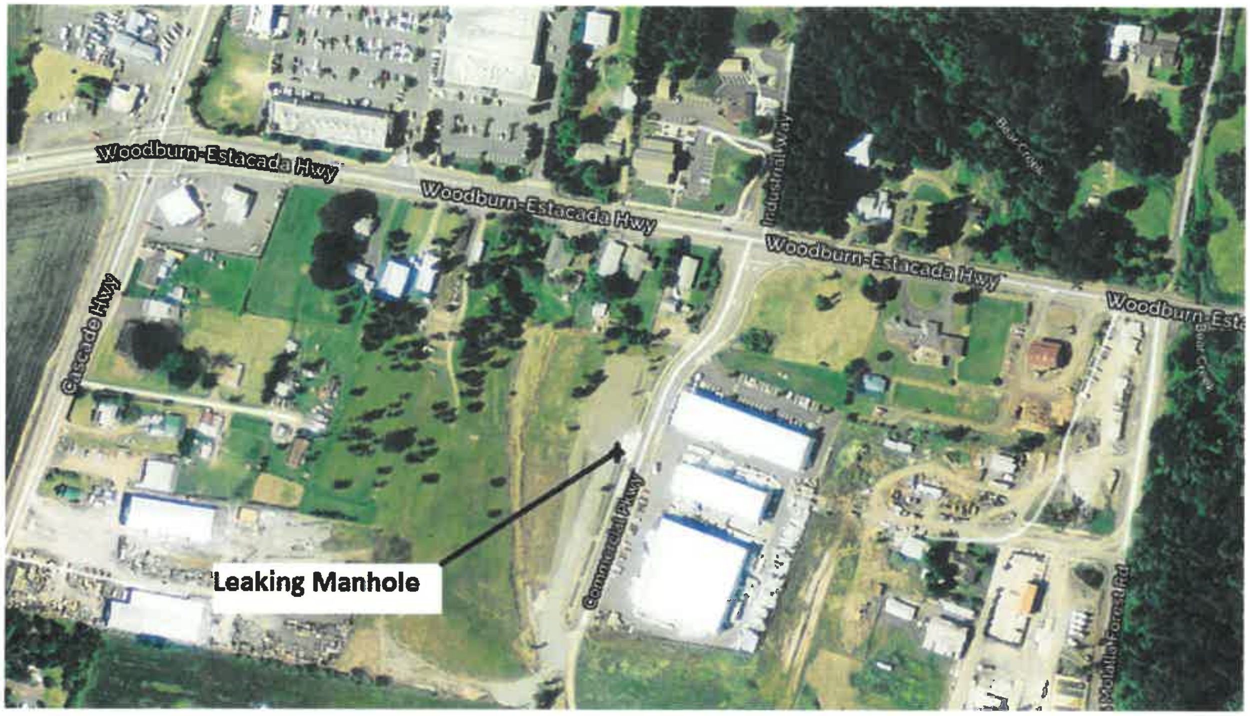
SKETCH



AERIAL



PHOTOGRAPH No. 2

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing

Location / Address: Commercial Parkway

Project No.: 100.26

Report No.: 4-24

Basin: BC_B

MH No. / Main: BC_B_11 and BC_B_12

Tested By: Tyler J. Molatore

Date: 10/17/2017

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Leaking manhole
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Manhole was unmarked and located approximately 75 yards to the west of the sidewalk, due west of BC_B_12. Smoke exited from around manhole. Manhole is located in field.
- Also refer to aerial on following page.
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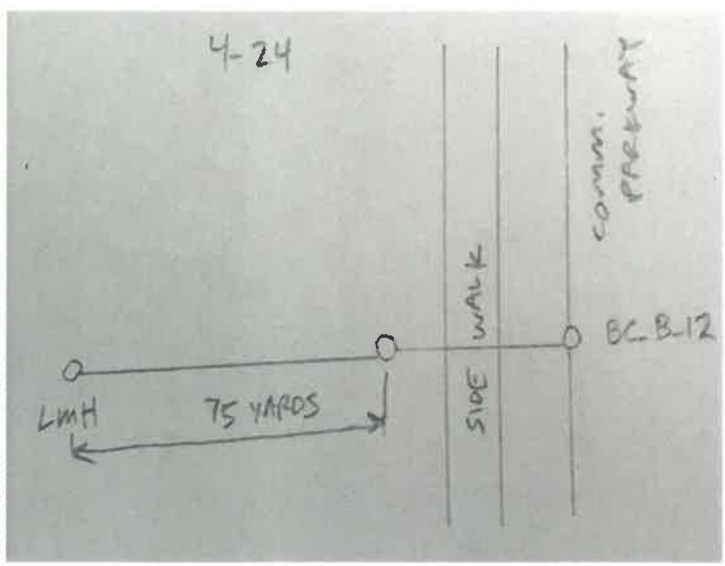
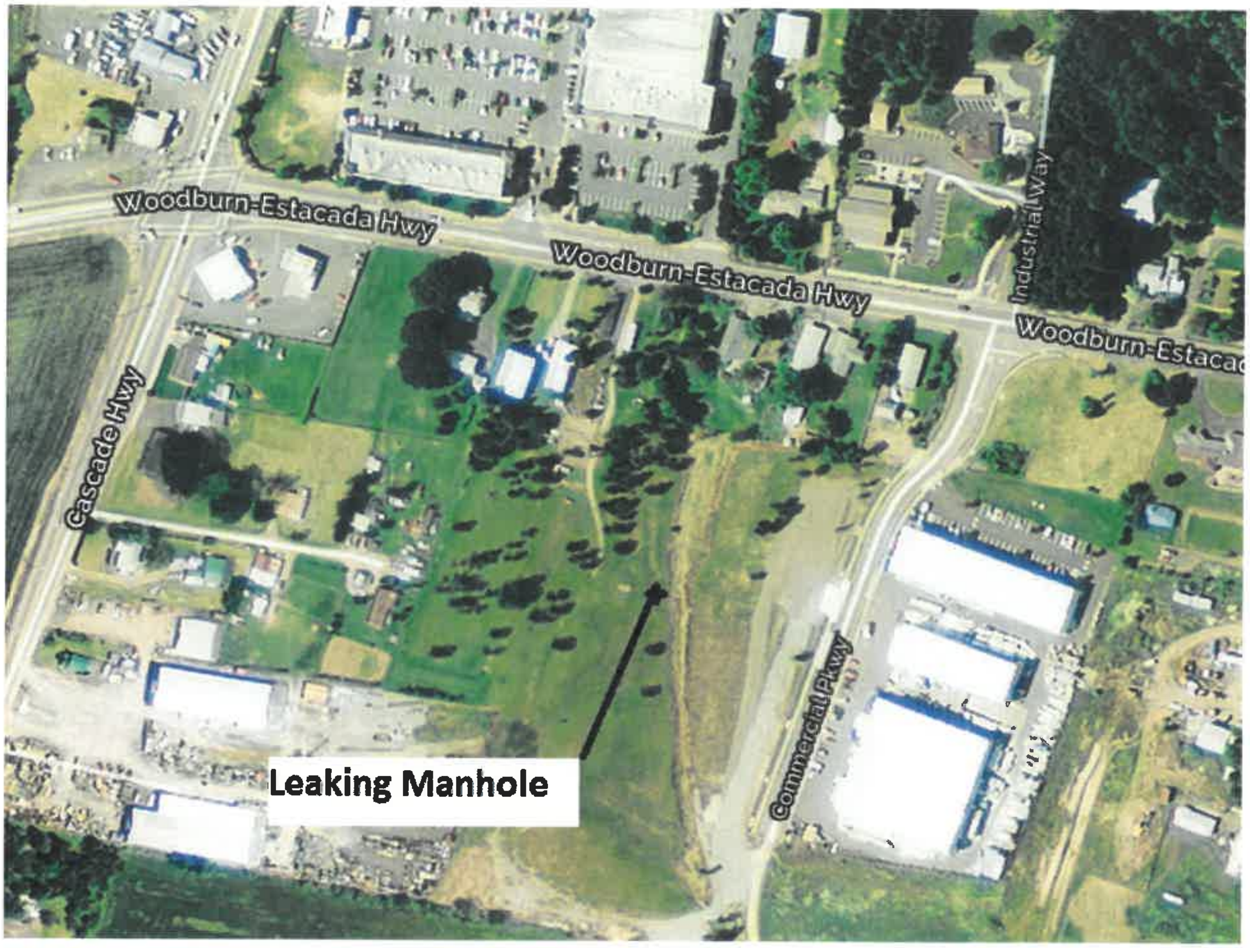
SKETCH



AERIAL



Woodburn-Estacada Hwy
Woodburn-Estacada Hwy
Woodburn-Estacad
Industrial Way
Cascade Hwy
Commercial Pkwy
Leaking Manhole

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name: Molalla Smoke Testing		Location / Address: 825 East 7th St.	
Project No.: 100.26	Report No.: 4-25	Basin: TL_A2	MH No. / Main: TL_A2_2 and TL_A2_5
Tested By: Tyler J. Molatore			Date: 10/17/2017

Testing Code	Photographs	
LSL = Leaking Service Lateral	**No.**	**Description**
LML = Leaking Main Line	1	Open cleanout
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Open cleanout located immediately to the right of the front door.
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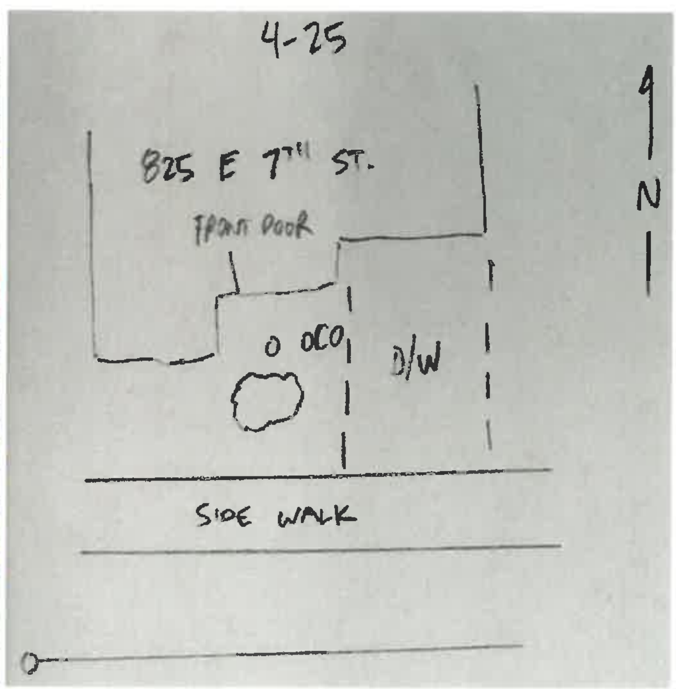
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

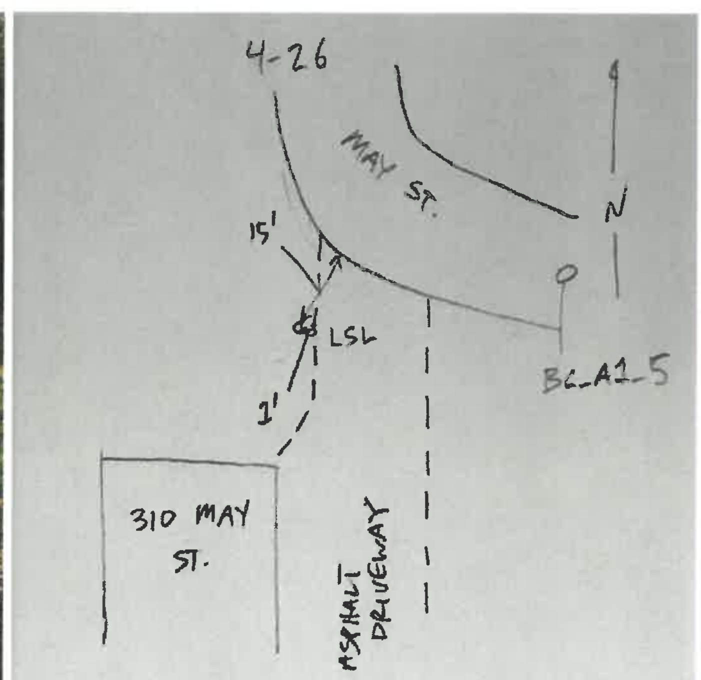
Molalla Smoke Testing		310 May Street	
Project Name :		Location / Address:	
100.26	4-26	BC_A1	BC_A1_5 and BC_A1_14
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/18/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking service lateral
LML = Leaking Main Line	2	Location of deficiency.
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Service lateral was leaking to the west of the drive way, approximately 15 ft from May Street.
- Also refer to aerial on following page.

SKETCH



AERIAL

PHOTOGRAPH No. 2

SMOKE TEST REPORT
The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		645 South Taylor Street	
Project Name :		Location / Address:	
100.26	4-27	BC_A1	BC_A1_6 and BC_A1_16
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/18/2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Open cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments
- Open cleanout located immediately to the right of the walk way, in the flower patches. It was leaking around the cleanout, suggesting something deficient underground.
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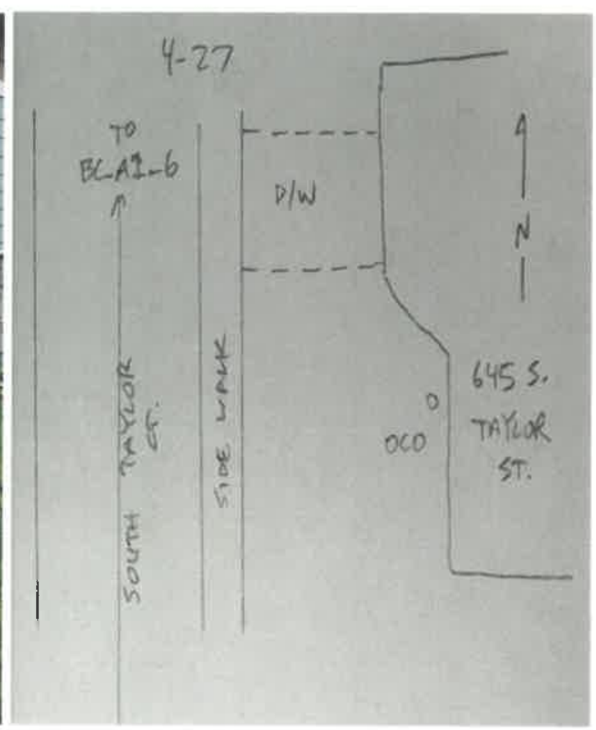
SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing		Location / Address: 114 East 5th	
Project No.: 100.26	Report No.: 4-28	Basin: BC_A	MH No. / Main: BC_A_17 and BC_A_18
Tested By: Tyler J. Molatore			Date: 10/18/2017

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Open cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Open cleanout located south of the concrete drive way, and just north of the electric meter.
- Also refer to aerial on following page.
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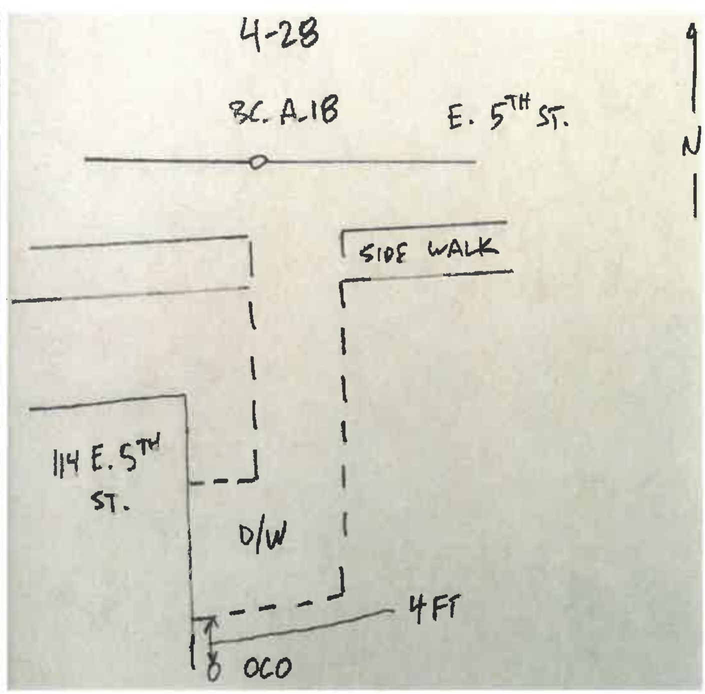
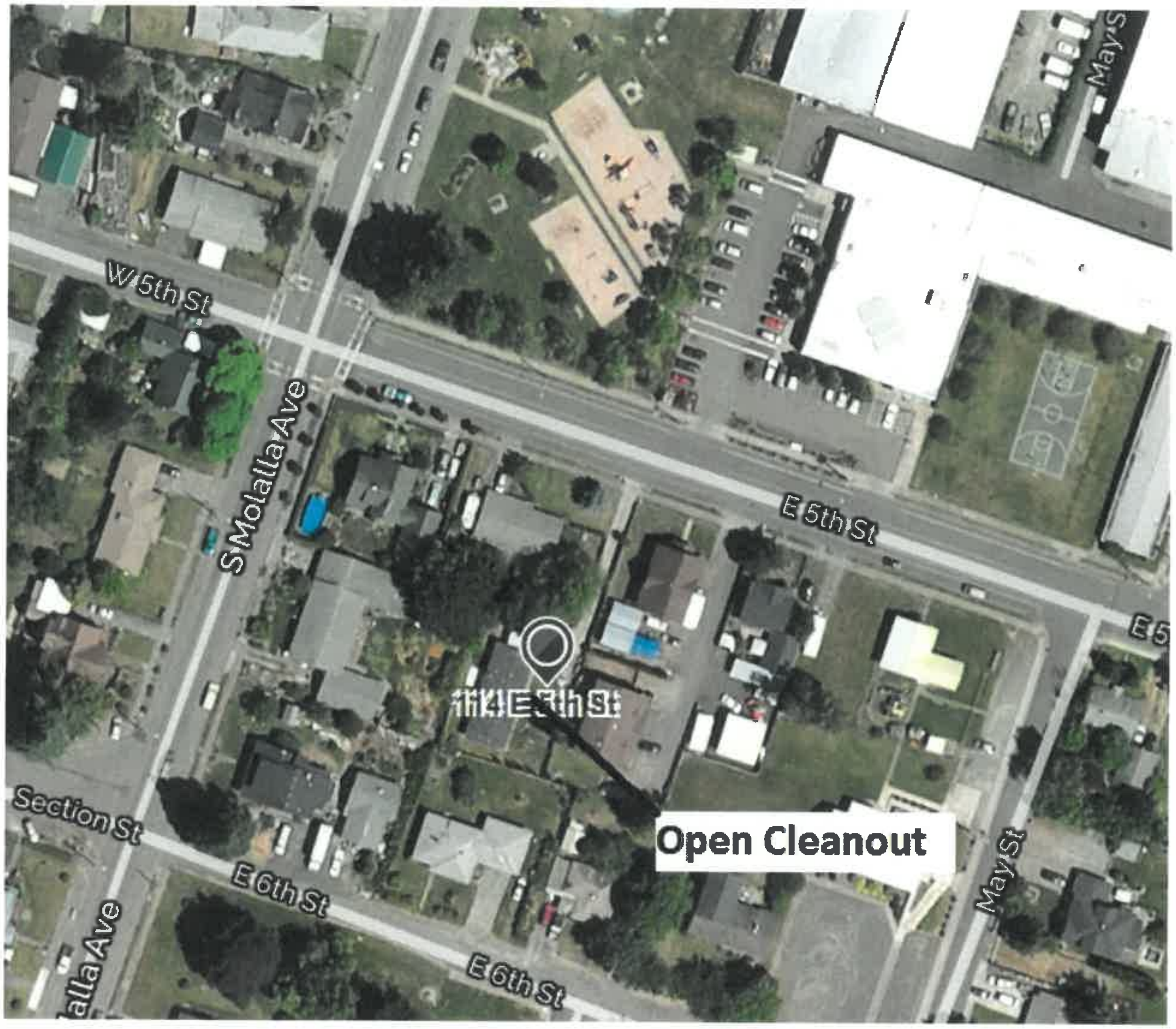
SKETCH



AERIAL



W 5th St
S Molalla Ave
E 5th St
May St
Section St
E 6th St
E 6th St
Open Cleanout

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		102 East 5th	
Project Name :		Location / Address:	
100.26	4-29	BC_A	BC_A_17 and BC_A_16
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/18/2017
Tested By:			Date:

Testing Code	Photographs No.	Description
LSL = Leaking Service Lateral	1	Roof drain connected
LML = Leaking Main Line	2	Location of deficiency.
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- The roof drain was connected to the sewer system. The drain on the southwest corner of the house was smoking.
- Also refer to aerial on following page.
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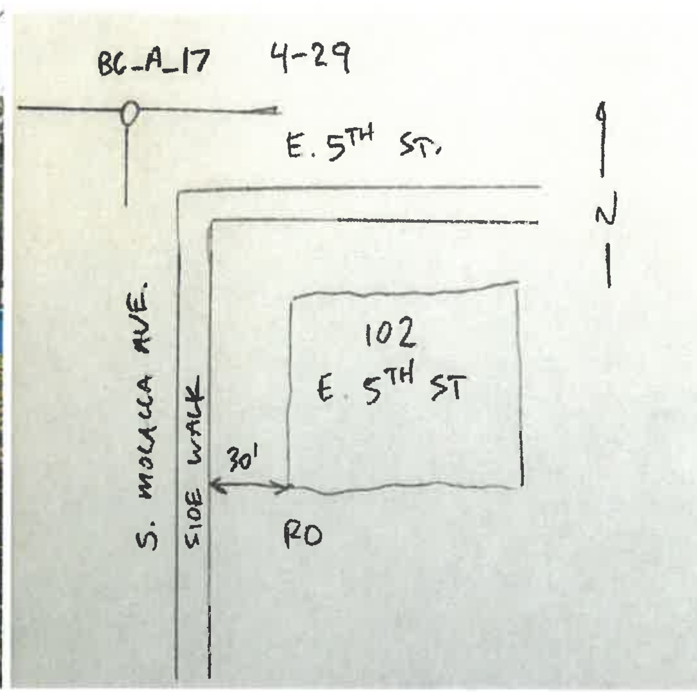
SKETCH



AERIAL

PHOTOGRAPH No. 2

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		615 South Molalla	
Project Name :		Location / Address:	
100.26	4-30	BC_A	BC_A_15 and BC_A1_1
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/18/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Open cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Open cleanout is located to the north of the drive way. Suspected cleanout has 5 gallon bucket and concrete footing located above it. Smoke exited rapidly.
- Also refer to aerial on following page.
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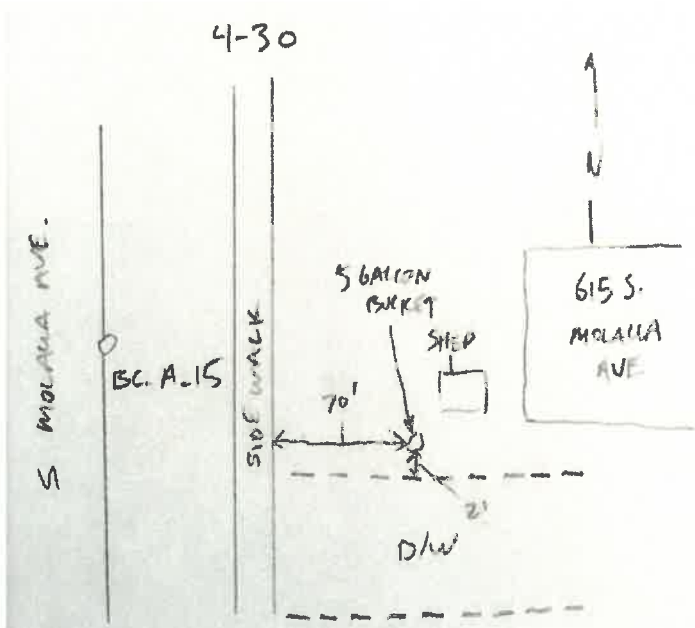
SKETCH



S Molalla
Metzler St
615 S Molalla Ave
Leaking Cleanout
S Taylor Ct
May St
W 7th St

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Molalla Smoke Testing		617 South Molalla	
Project Name :		Location / Address:	
100.26	4-31	BC_A	BC_A_15 and BC_A1_1
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/18/2017
Tested By:			Date:

Testing Code	**Photographs**	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking service lateral
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Leaking service lateral or open cleanout located on western edge of gravel drive way. Smoke exited significantly.
- Also refer to aerial on following page.
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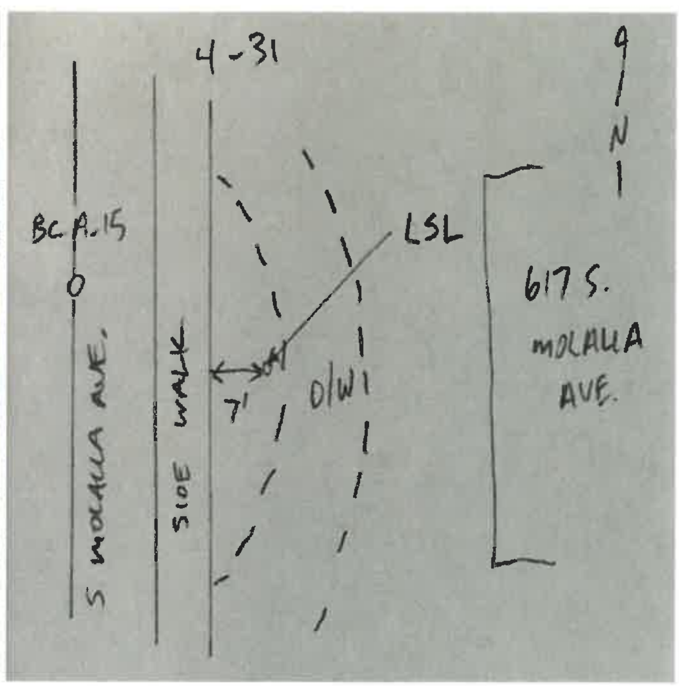
SKETCH




Leaking Service Lateral
617 S Molalla Ave
W 7th St
Meister St
S Taylor Ct
May St

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 612 South Molalla
Project No.: 100.26	Report No.: 4-32
Basin: BC_A	MH No. / Main: BC_A_15 and BC_A_16
Tested By: Tyler J. Molatore	Date: 10/18/2017

TESTING CODE

LSL = Leaking Service Lateral
LML = Leaking Main Line
CB = Catch Basin
LMH = Leaking Manhole
OCO = Open Cleanout
PHV = Plugged House Vent
RD = Roof Drain

PHOTOGRAPHS

No.	Description
1	Open cleanout

Comments

- Open cleanout located north of the driveway, immediately adjacent to the house.
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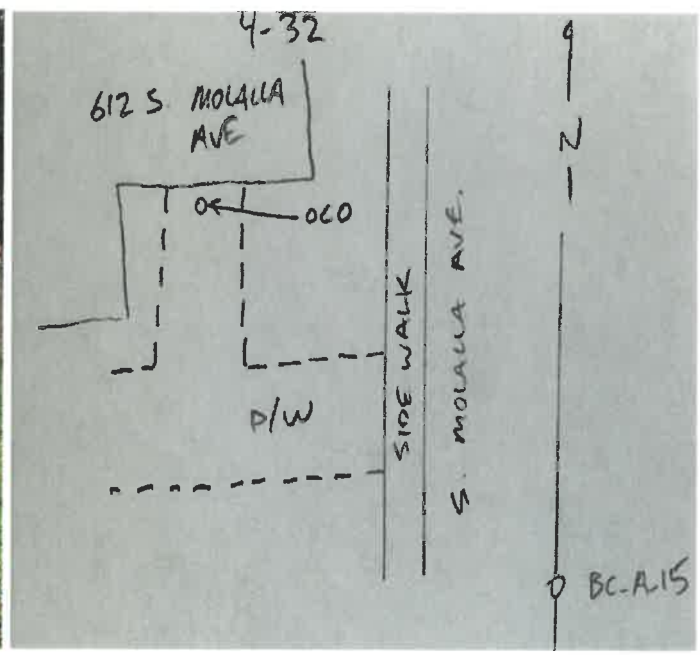
-
-

SKETCH



SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

Project Name : Molalla Smoke Testing	Location / Address: 425 South Molalla
Project No.: 100.26	Report No.: 4-33
Basin: BC_A	MH No. / Main: BC_A_17 and BC_A_18
Tested By: Tyler J. Molatore	Date: 10/18/2017

TESTING CODE	
LSL	= Leaking Service Lateral
LML	= Leaking Main Line
CB	= Catch Basin
LMH	= Leaking Manhole
OCO	= Open Cleanout
PHV	= Plugged House Vent
RD	= Roof Drain

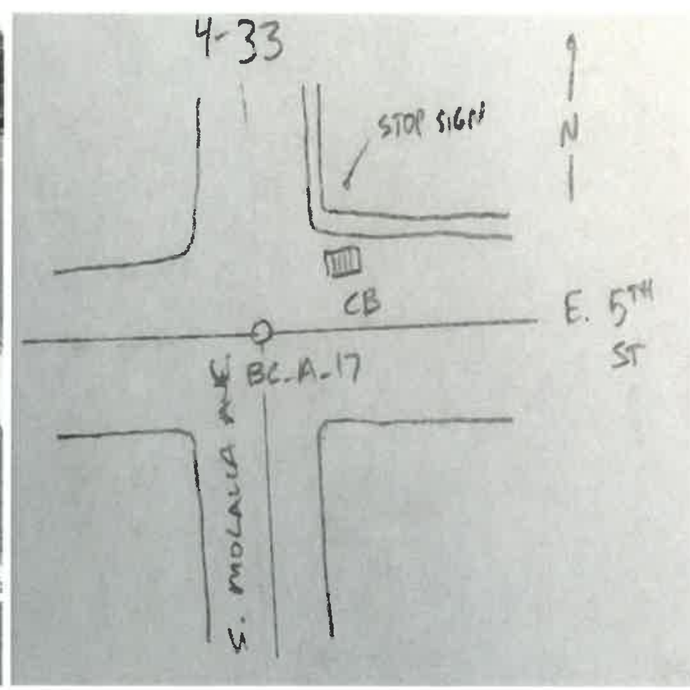
PHOTOGRAPHS

No.	Description
1	Catch basin
2	Location of deficiency.

Comments

- Catch basin was only lightly smoking, but it is connected to the sewer system. It's the catch basin located in the northeast of the intersection of East 5th and South Molalla.
- It's hard to tell from the picture that it's smoking. It was light.
- Also refer to aerial on following page.

SKETCH



AERIAL

PHOTOGRAPH No. 2

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

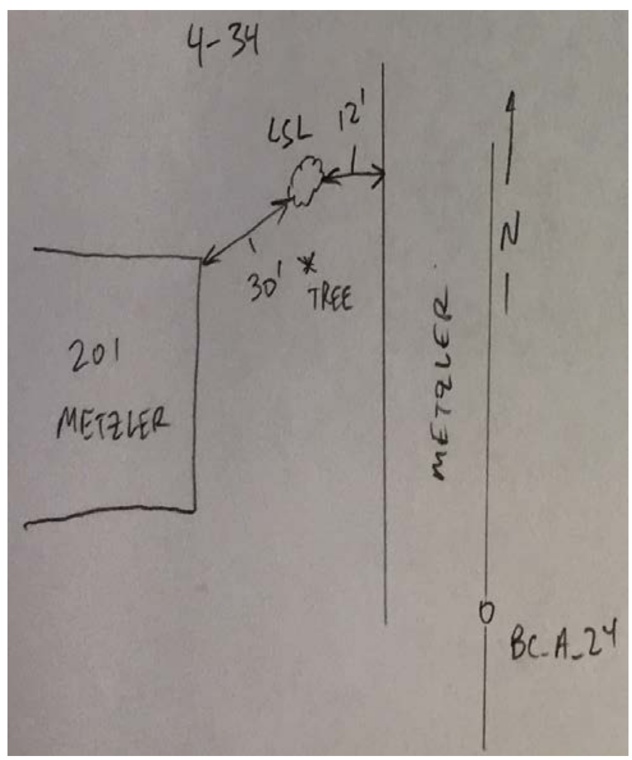
Molalla Smoke Testing		201 Metzler	
Project Name :		Location / Address:	
100.26	4-34	BC_A	BC_A_16 and BC_A_26
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/18/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	Description
LSL = Leaking Service Lateral	1	Leaking service lateral
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Leaking service lateral located to the north of a small tree.
- Also refer to aerial on following page.
-
-
-

SKETCH



LOCATION

AERIAL

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

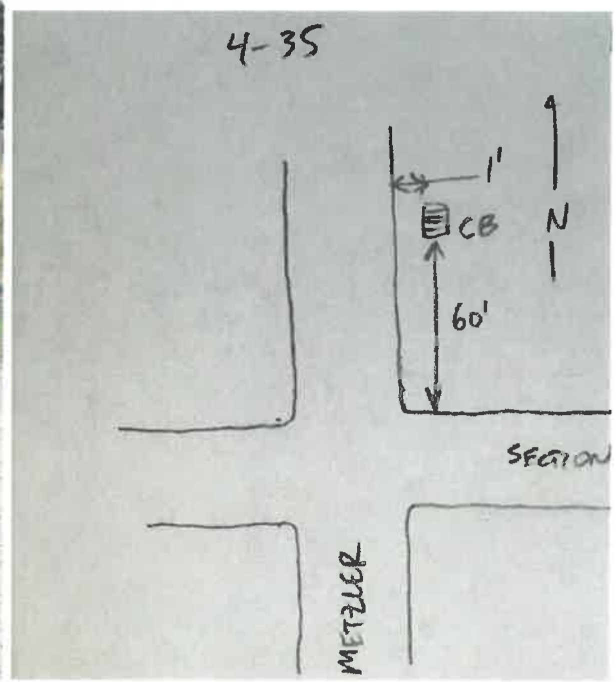
Molalla Smoke Testing		370 Metzler	
Project Name :		Location / Address:	
100.26	4-35	BC_A	BC_A_24 and BC_A_26
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/18/2017
Tested By:			Date:

TESTING CODE	**PHOTOGRAPHS**	
	No.	Description
LSL = Leaking Service Lateral	1	Catch basin
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Catch basin is located underneath the black car. Smoke was rapidly existing from catch basin.
- Also refer to aerial on following page.
-
-
-

SKETCH



AERIAL

Hart St
Metzler St
S Molalla Ave
Section St
E 6th St
E 6th St
Hart St
Metzler St
Catch Basin
S Molalla Ave
S Taylor Ct

SMOKE TEST REPORT

The Dyer Partnership, Engineers & Planners, Inc.

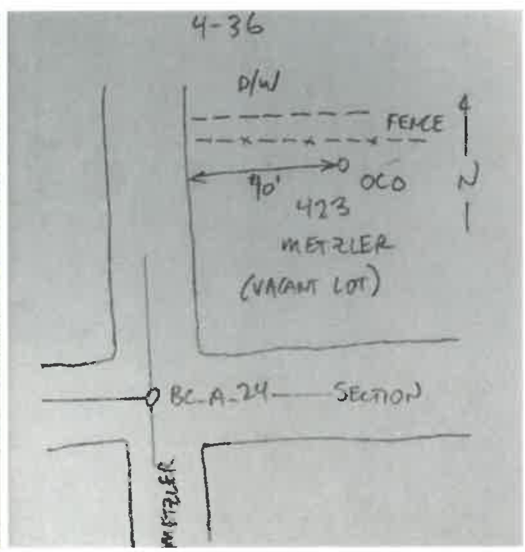
Molalla Smoke Testing		370 Metzler	
Project Name :		Location / Address:	
100.26	4-36	BC_A	BC_A_16 and BC_A_26
Project No.	Report No.	Basin:	MH No. / Main:
Tyler J. Molatore			10/18/2017
Tested By:			Date:

TESTING CODE	PHOTOGRAPHS	
	No.	**Description**
LSL = Leaking Service Lateral	1	Open cleanout
LML = Leaking Main Line		
CB = Catch Basin		
LMH = Leaking Manhole		
OCO = Open Cleanout		
PHV = Plugged House Vent		
RD = Roof Drain		

Comments

- Open cleanout located to the south of the fence. Pipe extends approximately six feet into the air. Property is an abandoned house.
- Also refer to aerial on following page.
-
-
-

SKETCH



AERIAL

Open Cleanout
Hart St
Metzler St
S Molalla Ave
Hart St
Section St
Metzler St
S Molalla Ave
E 6th St

APPENDIX B: SAMPLE NOTIFICATION LETTER

CITY OF ___________________

Address

____

1-541- _____

Date______________________

Owner____

Address____

City, State____

Subject Property____

Dear Property Owner:

The City of _______________ experiences high in-flows during the winter months. This can, in large part, be attributed to “holes” in the sewage collection and piping system. In an effort to locate these holes and reduce the high seasonal inflows, the City of _______________ recently completed a City-wide smoke testing project. The project included pumping smoke into manholes and observing where the smoke escapes from the system. If smoke is observed leaving the sewer system through a “hole,” surface and/or groundwater is capable of entering the system through the same “hole.” The potential for one of these infiltration “holes” was discovered on your property and requires some immediate attention to correct the problem.

Some of the problems discovered are directly related to the infiltration waters that overload the sewer system during the winter months. Other problems are related to plumbing deficiencies outside the home that should be corrected.

A side benefit of the smoke testing project was that, in some cases, smoke was observed entering homes. While this could be a result of a dry or unused “trap” in a home’s plumbing, it could pose a serious health risk. If a trap is not present or not functioning properly, harmful sewer gases may find their way into a home. This type of plumbing deficiency should be corrected immediately.

The following sheet includes a checklist of potential problems discovered during the smoke testing project. If a problem is marked with an X, it requires the action described immediately after the marked description.

If for some reason you are unable to correct the problem in the time suggested, please contact ____________________. We are interested in correcting these problems and will help in any way we can to do that.

1._____DOES NOT HAVE A SEWER CONNECTION PERMIT ON RECORD.
Please provide City Hall with date and contractor's name or obtain permit.

2._____RVs HOOKED INTO SEWER SYSTEM.
Notification is hereby given to remove.

3._____PIPING OR LATERAL PIPE PROBLEMS ON SITE.
Have plumbing inspection by qualified person. Report result to City Hall within two (2) weeks of this notice.

4._____RAIN GUTTERS CONNECTED TO SEWER SYSTEM.
Immediate removal of roof drains from sewer system required. City personnel will be on site within two (2) weeks of the date of this notice to inspect the outfall of the roof drain system to confirm disconnection.

5._____AREA DRAIN OR OTHER SURFACE DRAINAGE SYSTEM TIED INTO SEWER SYSTEM.
Immediate removal of area drains from sewer system required. City personnel will be on site within two (2) weeks of the date of this notice to inspect the area drain to confirm disconnection.

6._____UNCAPPED OR OPEN SEWER LATERAL CLEANOUT.
Immediate cap of lateral cleanout required with water-tight cap. City personnel will be on site within two (2) weeks of the date of this notice to inspect the cleanout to confirm capping.

7._____SMOKE INSIDE HOUSE OR BUILDING.
Have inspection and repairs performed by qualified plumber. Sewer gas passing into the home can pose a serious health risk.

8._____OTHER PROBLEM.
____
____

Please note that any of these problems are of a serious nature. Any items marked with an X require your immediate attention and cooperation. Please call _________________ at (541)____________ if you have any questions. By reducing these high seasonal inflows to the sewer system, we can help reduce unnecessary sewer treatment costs and associated rate increases.

Thank you for your help in this matter.

Sincerely,

____
Public Works Director

Presented by:

DONOVAN
enterprises, inc.

July

2017

Utilities Rate Study

Final Report

Prepared for:

Molalla
Oregon

Donovan Enterprises, Inc.
9600 SW Oak Street, Suite 335
Tigard, Oregon 97223-6596
☎ 503.517.0671
www.donovan-enterprises.com

Printed on Recycled Paper

Utilities Rate Study

Table of Contents

Executive Summary

The City of Molalla is the sole provider of municipal utilities services to customers within the urban services boundary of the City. Revenues required to fund the delivery of these urban services are obtained from monthly user fees which are set by the City Council via its City charter authority. This study addresses two things; first, the revenue required from rates needed to support future operations and maintenance costs for the water, wastewater, and stormwater utilities along with a funding plan for capital needs identified in the City's capital improvement plans. Second, this study formulated a strategy for implementing a transportation capital projects fee. If implemented by the City Council, future revenues derived from this monthly user fee would be dedicated to fund streets and other transportation capital improvement projects

Monthly User Fees

With the active involvement of City staff, twenty year planning models were developed for this project; however, the focus for the rate study is the five year near-term forecast of fiscal 2017-18 through fiscal 2022-23. These financial models have been reviewed with the City as they were developed and will be provided to Molalla as a project deliverable enabling the City to make future updates.

The purpose of this study is to develop a cost of service-based methodology that will accurately determine the cost the city incurs to deliver municipal utilities services. The models developed for this project have been populated with adopted fiscal 2017-18 budgeted revenues and costs, estimated results for fiscal 2017, along with actuals for fiscal 2015 through 2016. During this study, the project team presented multiple rate scenarios to the City Staff for their consideration. These model runs simulated the current service levels (CSL) of the utilities, and sensitivity cases for a number of funding issues facing the City's utilities. The results of each model run were expressed in terms of the rate impacts on the average single family residential customer's monthly bill for each utility service. Over the near-term five year forecast horizon, we are projecting average annual increases is system revenue requirements as follows:

Water .... 2.86% per year

Wastewater.. 6.09% per year

Stormwater .... 3.50% per year

Transportation Capital Projects Fee

In 2016, the City reviewed its system development charge (SDC) methodology and schedule of charges for transportation SDCs. As part of that study, the City concluded it was facing a transportation funding gap. Over the next ten years, there was an identified need of $21.7 million for transportation capital improvement projects. Out of this total needs assessment, the City estimated $15.0 million could legally be funded from SDCs (i.e., growth). This left a funding gap of $6.7 million. The only dedicated funding sources available to fund this gap are motor fuel taxes and PGE franchise fees. It is estimated that roughly 90% of these resources are dedicated to street maintenance and not capital projects funding. For fiscal 2017-18, the total budgeted receipts from these two sources is $694,000. Assuming only ten percent of this total could be dedicated to capital projects funding, that amounts to $69,400 per year.

City Staff and the rate study project team were tasked with identifying a new dedicated funding source that could fund the projected $6.7 million. This effort resulted in the formulation of a monthly fee that would be added to all active water customers' bills within the City. Our analysis of fiscal 2017-18 budget and utility billing data indicate this transportation capital projects fee could be in the range of $12.29 - $18.28 per active account per month. The low end of the range assumes the City borrows (bonds) the total revenue requirement of the program, and pledges the monthly rate revenues to pay the future debt service on the bonds. The high end of the range assumes a pay as you go strategy. A complete discussion of the rate making methodology for both scenarios is contained in the body of this report.

Conclusions

The schedules of utility rates and the proposed transportation capital projects fee shown above were developed through consultation with City staff and the members of the rate study project team. The study process included an evaluation of revenue requirements, cost of service, and rate design for the five year forecast (fiscal 2019 through fiscal 2023). The revenue requirements analysis determined the amount of annual revenue needed to be generated by rates. This analysis addressed the level, rather than the structure of rates.

A number of specific conclusions and policy recommendations were developed through this collaboration, and are briefly discussed in this executive summary. Itemized below is a listing of these conclusions and recommendations.

- On balance, the City's utilities are in good financial condition. Fund balances exceed minimum operating reserve requirements for water and stormwater. However, the projected ending fund balance in the wastewater fund on June 30, 2018 does not meet a minimum reserve requirement of 60 days of operating expenses, and will have to be rectified via future general rate increases. Revenue bond debt service coverage on water and wastewater debt exceeds covenants.

- Over the next five years (including the fiscal year that just started on July 1, 2017), the water utility has planned capital improvements that total $6.9 million (adjusted for inflation). In order to keep rate increases manageable, our modeling indicates the City will have to borrow approximately $3.8 million over this time frame (before issuance costs and debt service reserves funding). The balance of the water system capital costs will be funded from SDCs ($2.1 million), and cash contributions from rates ($1.0 million). By the end of fiscal 2021-22, we are forecasting total principal and interest payments on this new water system debt to be $263,207 per year (assuming 20 year senior lien revenue bonds). Fortunately, the current water system legacy debt, the Series 2010 Water Refunding Revenue Bonds will by retied in fiscal 2017-18 freeing up $350,000 per year in free cash flow. By the end of this five year forecast period, we estimate the water SDC fund will have an ending fund balance of $82k and the water operating fund will have and ending fund balance of $350k. This can be accomplished with average annual rate increases of 2.86% per year, and will be sufficient to meet system financial needs.

- The wastewater utility is facing some financial challenges. First, the utility has $3.8 million in principal outstanding on long term debt as of June 30, 2017. This legacy debt consists of the 2010 sewer refunding bonds and the 2008 Clean Water State Revolving Fund (SRF) loan. These debts will not be retired until 2025 for the bonds, and 2028 for the loan. The total annual debt service on these two debt instruments is $502k per year. Second, over the next five years, the wastewater utility is planning on spending $7.1 million (adjusted for inflation) on capital improvements. In order to manage future rate spikes resulting from this spend, our modeling indicates the City will have to bond a significant portion of the future capital projects costs. Out of the $7.1 million need, we conclude the City will have to borrow $6.0 million (before issuance costs and debt service reserves funding). Even though most of the total is SDC eligible, the City will only be able to contribute $846k in SDCs over the forecast horizon. This is due to low wastewater SDC fund balance and the City policy of using SDCs to pay the annual principal component of the SRF loan debt service. Finally, based on the adopted fiscal 2017-18 wastewater system budget, the City is projected to end the year with an operating reserve of $215k (i.e., Wastewater Fund ending fund balance). This reserve represents 35 days of wastewater system operating expenses, and is well below our recommended reserve level of 60 days of operating expenses. In order to correct this deficiency, we have gradually increased rates over the five year forecast horizon to bring the wastewater fund balance up to 60 days of operating expenses by June 30, 2022. Our modeling indicates that all of these system requirements can be funded with average annual rate increases of 6.09% per year. By the end of the five year forecast horizon, we project the wastewater SDC fund will have and ending fund balance of $129k, and the wastewater operating fund will have a corresponding cash balance of $440k.

- The stormwater utility has a revenue recovery problem, and the City Council is aware of this problem. In 1999, the City adopted a stormwater fee methodology to provide a mechanism that would generate revenue for the maintenance and operation of the stormwater collection and detention system. That fee methodology used impervious area (IA) as the basis for charging customers. Initially, the City assumed single family residential customers contributed 2,640 square feet of IA per home. This became the basis for the Equivalent Dwelling Unit (EDU). The plan then called for the City to measure the IA from all commercial, industrial, and institutional customers (via GIS data) to calculate their fees. The measured IA for each of these non-single family residential customers would be divided by 2,640 to calculate the number of EDUs they contributed to the system and then be billed at the rate of $2.00 per EDU. Unfortunately, at the time of implementation, the City chose to "cap" the total number of EDUs that any non-single family residential customer would be charged at 20 EDUs. This policy has resulted in an under recovery of revenues required to fund the operations and maintenance of the stormwater systems. During the fiscal 2017-18 budget process, the City Council was apprised of this commercial cap policy, and they have decided to discontinue the policy and they have directed Staff to bill the non-single family residential accounts based on their actual measured IA. As part of this process, Public Works staff have remeasured all parcels in the City (via geographical information system (GIS) data) and have recalibrated the EDU to 2,980 square feet of IA. We have assumed this will be the case, and have recommended the City set the current monthly rate per EDU at $3.60. If the cap policy had been continued, the calculated rate would have been $4.51 per EDU.

- The methodology that we are proposing for the construction of a transportation capital projects fee is based on generally accepted rate making practice, and has been reviewed by City Staff. We believe the City is justified in implementing this fee because there is no other dedicated funding source that we could find to meet the need. There are two options for the construction of the fee, as discussed in the opening remarks of this report. If the City bonds the entire capital projects revenue requirement, the monthly fee comes to $12.15 per active utility account per month. If the City chooses to follow a pay as you go strategy, the fee comes to $18.08 per active utility account per month.

Recommendations

The recommendations of this municipal utilities rates study are pragmatic and reasonable. Our recommendations are focused on securing the financial future of the utilities and to make sure that all customers who receive the benefits of utilities services pay their proportionate share of the costs of delivering those utility services. Itemized in Table 1 are the key recommendations for each utility over the next five years:

Table 1 – Summary of the 2017 Utilities Rate Study Recommendations

2017 Utilities Rate Study Recommendations
• No rate increases are required for the current fiscal year 2017-18. However, beginning on July 1, 2018, we recommend the City adjust utility rates by an average annual percentage increase through June 30, 2023 as follows: ✓ Water - 2.86% per year for each year of the five year forecast ✓ Wastewater – 6.09% per year for each year of the five year forecast ✓ Stormwater – 3.5% per year for each year of the five year forecast
• Follow through with the elimination of the current stormwater fee “capping” policy for non-single family residential properties. The primary purpose of the stormwater utility is to keep City streets clear of standing stormwater, eliminate localized flooding throughout the City, and enhance water quality in the receiving streams. Exemptions only hamper the City from completing this mission.
• Present the proposed methodology for implementing a monthly transportation capital projects fee to the Molalla City Council via work session. Offer both of the funding options (i.e., bonding of the revenue requirement and the pay as you go strategy), and get feedback from the Council. If the Council chooses to proceed with one of the options, develop a customer outreach and education plan for rolling out the fee. Consider a target implementation date of July 1, 2018.
• Continually monitor the cash positon of the wastewater fund. If the fund balance falls below 30 days of operating expenses in this fiscal year (FY 2017-18), consider implementing cost controls and or an interim rate increase to bring the fund balance up. Our proposed future wastewater rate increases are programmed to build the fund balance to an acceptable reserve level of 60 days of operating expenses over five years.

Analysis Section

Background and Study Methodology

Molalla is a residential community located near the Molalla River in Clackamas County. It is positioned 14 miles south of Oregon City on Highway 213, and 25 miles northeast of Salem. The City owns and operates a culinary water system that serves 2,750 customers and provided about 42.2 million cubic feet of water to customers in fiscal 2015-16. Out of the 2,750 active accounts, 94% are residential/small commercial customers. The balance of the accounts are larger multifamily, institutional, and industrial customers.

The City also owns and operates a wastewater collection and treatment system. The wastewater treatment plant was constructed in 1980. The plant has a headworks, which includes comminution (grinding) and flow measurement using a Parshall flume. Influent flows by gravity from the headworks to an aeration basin. A pump station is required to transfer the wastewater from the aeration basin to the first of two facultative lagoons, which provide both treatment and storage. Disinfection is accomplished using aqueous chlorine. Dry-weather effluent is disposed of by land application on the plant site and on lands in private ownership. Excess dry weather effluent is stored in the lagoons. Wet-weather flows and stored effluent are further treated using dissolved air flotation (DAF) and gravity filters prior to a stage-based surface water discharge to the Molalla River. The collection system has approximately 100,000 feet of piping and over 250 manholes. Most of the system was installed after 1955 and uses piping made of concrete, asbestos cement (AC) or polyvinyl chloride (PVC). The 3,700 feet of pre-1955 sewer lines are open-jointed concrete pipe. Much of the system drains to the north and then follows Toliver Road west to the treatment plant. A trunk installed in the south end of the City diverts some of the flows along Highway 211 and Bear Creek to the plant. There are also five small collection system pump stations.

Finally, the City owns and operates a storm drainage system that consists of 27.7 miles of storm drainage lines ranging in size from 6-inch diameter to 72-inch diameter, 1,553 storm structures (catch basins, manholes, cleanouts, storm inlets and outfalls), 13 stormwater detention basins, and 0.73 miles of culverts ranging in size from 6-inch diameter to 72” diameter. The City does not own or operate any stormwater pump stations. Stormwater runoff in the City flows directly to one of three natural systems: the Molalla River, Bear Creek or Creamery Creek. Two branches of Creamery Creek flow through the north end of the City, generally from southeast to northwest, and meet east of Highway 213; Creamery Creek flows into the Molalla River several miles outside the Urban Growth Boundary (UGB). Bear Creek runs generally parallel to and south of Creamery Creek and eventually flows into the Pudding River. The Pudding River flows into the Molalla River just before the Molalla River enters the Willamette River.

To pay for the operation, maintenance, replacement, and improvement of these water, wastewater, and stormwater systems, the City charges its customers fees on a monthly basis. The purpose of this study is to evaluate the City’s methodology for calculating these fees and to perform an industry standard, cost of service analysis (COSA). The process used to prepare the COSA for the City’s utilities follows standard ratemaking principles, as outlined by the American Water Works Association (AWWA), the Water Environment Federation (WEF), and the U.S. Environmental Protection Agency (EPA). This process consists of three steps:

1. Determine revenue requirements…(how much does it cost to provide service system-wide)
2. Allocate costs to customer classes…(who is causing the need for the service, and in what proportion)
3. Determine rate structure and develop rates…(align rates to recover costs from those causing the need)

Step 1: Determination of Revenue Requirements

Revenue requirements are the total costs of providing services to utility customers over a specific period of time (usually one year). These costs include operation and maintenance (O&M) and capital costs. O&M costs are the routine costs of operating and maintaining a utility system in order to provide service. For the purpose of rate setting, revenue requirements are projected from budgeted expenses, and adjusted based on historical cost trends and the expertise of utility staff. Examples of O&M costs are chemicals and electricity used at plants, skilled plant operator labor, and administrative expenses.

Capital costs, as defined for the City's rates structures, are the resources used to acquire or construct capital assets. These include current revenue funded (pay-as-you-go) improvements, planned annual contributions to funds for such purposes, and ongoing debt service requirements (principal and interest payments on outstanding loans and other obligations). Capital assets are defined as major assets that benefit more than a single fiscal period. Typical examples are land, improvements to land, easements, buildings, improvements, vehicles, machinery, equipment and other infrastructure. Capital costs are projected for the rate-setting period based on the capital improvement plan, the City's bond covenants and utility staff expertise.

To determine the amount of revenue that rates must generate annually, the total revenue requirements are reduced by nonrate or other system revenues. Examples of other system revenues are unrestricted interest earnings, revenues from wholesale contract customers, and revenue from miscellaneous charges. Total requirements less other system revenues equal requirements from rates.

Step 2: Allocate Revenue Requirements to Customer Classes

Determination of the costs-of-service by customer class is a four-step process. These steps are referred to as functionalization, joint and specific groupings, classification, and allocation. Functionalization involves categorizing revenue requirements according to utility functions. For example, wastewater functions typically include treatment (often broken up by unit process), collection, pumping, and customer service. Utilities incur varying levels of costs to perform the different system functions needed to meet customer demands. Therefore, the first step in the cost allocation process is to determine what it costs the utility to perform different service functions. Next, functional costs are grouped by joint and specific categories. This process allows for certain types of costs (e.g., industrial pretreatment costs) to be allocated directly to benefiting customers. The majority of costs are generally joint or common to all customers.

Following functionalization and joint and specific groupings, a classification process is undertaken. A fundamental objective in developing a rate system is to price utility services so that each customer pays for the service they receive in proportion to their use. Some costs incurred by the utilities are a function of quantity. In the case of water, is means metered water sales. In the case of wastewater, it means the amount of wastewater discharged to the collection system. Other costs are associated with serving customers regardless of the quantity that flows through the system.

Ideally, each customer would be charged according to the actual cost of providing service to his or her connection. However, it is impractical to estimate the cost of serving each individual customer. Therefore, it is accepted practice in the utility industry to classify customers into relatively few, reasonably homogeneous groups, and then to develop rates for each group. In the final step of the cost allocation process, the characteristics of the utilities' customers are analyzed and costs are allocated to each class. For water systems, user characteristics include number of meters, base daily demand, and extra capacity demand measured in maximum day and maximum month demand. For wastewater systems, user characteristics include sewage flows, strengths and the number of customer accounts.

The user characteristics serve as the basis for allocating costs by service characteristic to each customer class. The sum of each class's proportionate cost share of each service characteristic is that class's total cost-of-service.

Step 3: Determine Rate Structure and Develop Rates

The last step in the rate development process is the design of the rate structure and the development of rates. There are a variety of rate structure options available to meet a wide range of policy objectives. Molalla water and wastewater rates are comprised of a fixed charge per customer per billing period (monthly) and a volume charge that varies based on water usage or estimated sewage flow. Stormwater fees are flat rated for residential customers at an assumed amount of impervious surface equal to 2,984 square feet. Commercial, institutional, and industrial customers are billed based on actual measured impervious surface.

Once a rate structure is selected, rates are calculated based on the costs-of-service by class determined in Step 2. The end result of this rate development process is an equitable distribution of system revenue requirements to system users.

Analysis of Water System Revenue Requirements

This analytical task determines the amount of revenue needed from water rates. This is driven by utility cash flow or income requirements, constraints of bond covenants, and specific fiscal policies related to the water utility. Based on two years of actual financial records (i.e., fiscal 2015 through 2016), estimated results for fiscal 2017, and for the upcoming budget year 2018, a base case analysis was developed. This case is predicated on a number of planning assumptions. These planning assumptions are discussed in detail below.

For the upcoming budget year (fiscal 2018), it is forecasted that the water utility will generate sufficient revenues from rates, charges and fees to meet its obligations and produce an unappropriated ending balance in the water operating fund of $365,499. The beginning balance for the water operating fund in this same fiscal year is estimated to be $774,043. In order to establish and maintain cash balances in the water operating fund while continuing to support the funding of future operations and maintenance work, average annual general water rate increases of 2.86% per year will be required for each of the ensuing five fiscal years starting on July 1, 2018 (i.e., the start of fiscal 2018-19).

For the forecast of revenue requirements, the following assumptions were made based on discussions with City staff:

Inflation in costs and growth in the customer base – In order to accurately reflect likely future conditions, the revenue requirements model was programmed to allow for inflation and cost escalation factors by budget line item. Per guidance from City staff, the following factors were applied for estimating future cost escalation:

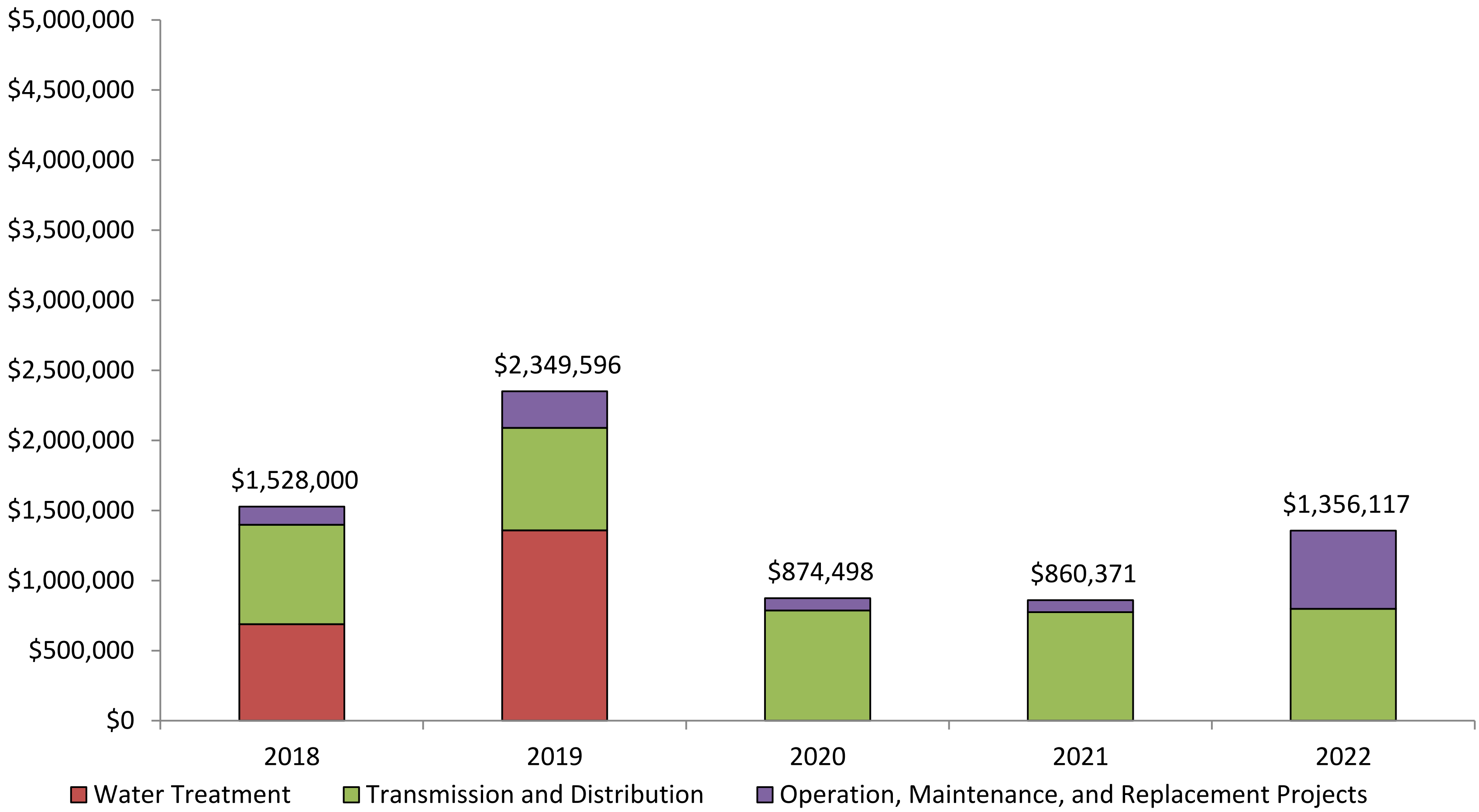
- All direct labor line items – 3.0% per year
- Pension plan contributions (City cost) – 8.0% per year
- Health insurance premiums (City cost) – 6.0% per year
- Professional services (OMI contract) – 3.0% per year
- All other operating expense line items – 3.0% per year
- The growth forecast expressed in the annual increase in 3/4" meters is estimated to be 1.0% per year over the five (5) year forecast horizon.

Capital Improvement Plan Funding - In the upcoming budget year 2018, total water system capital improvement costs are estimated to be $1,528,000, and consist of the following projects:

Project Description	Cost
Metzler, 3rd, and Faurie street improvements	$349,000
Lola Avenue improvements	318,000
City Shops improvements	137,000
WTP – New Trident 1,400 GPM filter unit	445,200
WTP – Sodium hypochlorite & controls unit	243,800
WTP – Security fencing	35,000
Total	$1,528,000

With the assistance of City Staff, a 20 year water system capital improvement plan was developed for this rate study effort. Over this 20 year horizon, the City's water system capital improvement plan calls for the investment of $15,908,932 (2016 dollars). For the purposes of this rate study, the project team focused on the funding strategy for the first five (5) years of the Plan. The first five years of investments amounts to $6,968,581 (adjusted for inflation), and is also shown graphically in Figure 1. The water system financial plan calls for all of these costs to be funded from a combination of long term debt proceeds, SDCs, and internally generated cash flow.

Figure 1 - Forecast of Water Capital Expenditures



As discussed above, under this water system financial plan, it is assumed that all of the capital improvement costs are to be funded from a mix of new debt, water SDCs, and free cash flow generated in the water operating fund. The water CIP funding plan is shown below in Table 2.

Table 2 - Forecast of Future Water System Capital Financing Plan

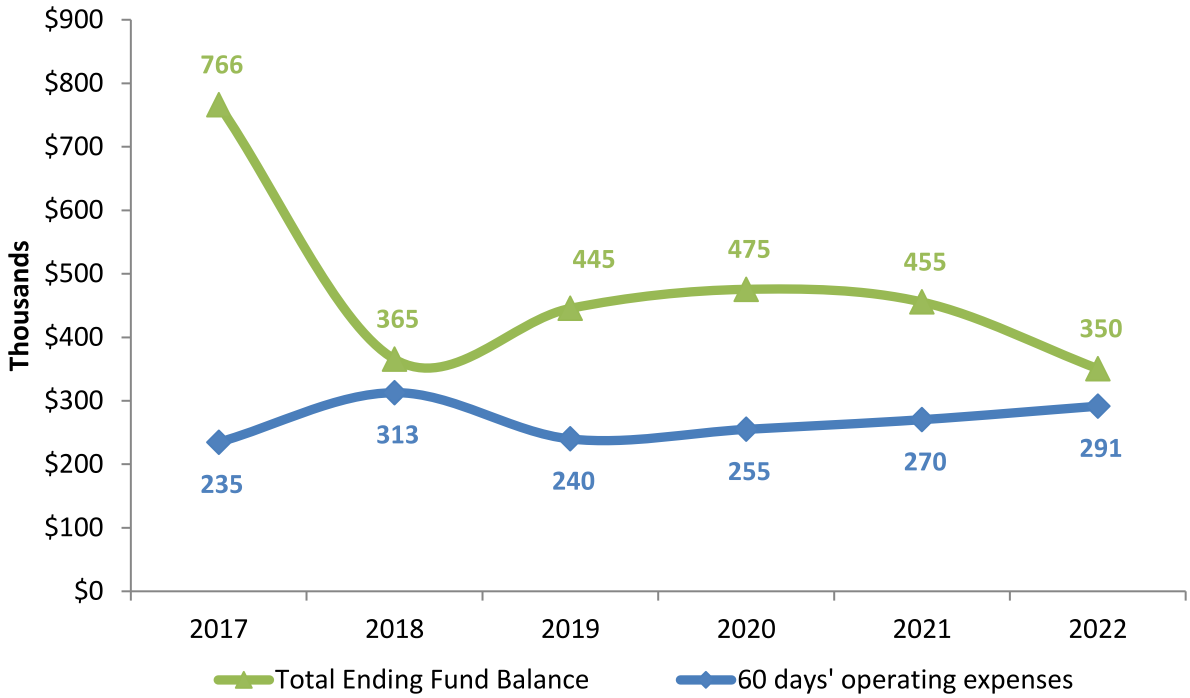
Capital Improvements Financing	2018	2019	2020	2021	2022
Capital Costs to be Funded	$ 1,528,000	$ 2,349,596	$ 874,498	$ 860,371	$ 1,356,117
less: Contributions from SDCs	855,200	998,664	84,347	78,559	80,071
less: Contributions From Construction Fund bal	(0)	-	-	-	-
less: Contributions From Utility Rates	672,800	100,000	100,000	100,000	100,000
less: Developer Contributions	-	-	-	-	-
Amount to be Financed	-	1,250,933	690,151	681,812	1,176,046
Long-term Borrowing:					
Revenue Bonds:					
Amount Borrowed	-	1,351,114	745,422	736,415	1,270,230
less: Financing Cost	-	13,511	7,454	7,364	12,702
less: Reserve Funding	-	86,670	47,817	47,239	81,482
less: Refunding of BANs	-	-	-	-	-
Net Funds from Revenue Bonds	-	1,250,933	690,151	681,812	1,176,046
New Annual Debt Service:					
Debt Service	$ -	$ 86,670	$ 134,487	$ 181,726	$ 263,207

It should be noted, the City is budgeting for total water rate revenues of $1,550,000 for fiscal 2017-18. This level of ongoing cash flow in combination with future debt proceeds, fund balances in the water SDC and operating funds is sufficient to make the water capital funding plan work.

Operating Costs in Excess of Inflation – In most rate studies, there are certain operating cost categories that tend to grow in excess of the general price index. We have not identified any categories in this analysis. Also, we have not planned or budgeted for any additional labor. If the water utility does add staff, these costs will impact the current revenue requirements forecast.

Modeling for Contingencies, Reserves, and Ending Fund Balances - The financial engine of the water utility is the water operating fund. Because the utility cash finances all of its operations, the ending fund balance in the water operating fund is in effect the contingency fund for the utility. Over the past three years, the ending fund balance in the Water Operating Fund has been stable, primarily due to steady growth in rate revenue receipts, and expense controls initiated by City management. For planning purposes, we are expecting the Water Operating Fund will end all forecast years with a target ending fund balance in excess of sixty days of operating expenses. This target balance gives the water utility enough contingency to fund unforeseen operating cost spikes. The five year forecast of targeted Water Operating Fund balances and operating reserve requirements is shown below in Figure 2.

Figure 2 - Forecast of Water Operating Fund Balances and Operating Reserve Requirements



Revenue Requirements Forecast & Results

All of the above cost elements are contained in the revenue requirements model which is the platform for the "base case" forecast. The base case assumes the utility will fund the capital improvements strategy (discussed above). Also, the utility would fund the operating costs as adjusted for inflation. This base case resulted in the following forecast of water system revenue requirements (Table 3).

Table 3 – Base Case Forecast of Water System Revenue Requirements

	Budget	Forecast				
	2018	2019	2020	2021	2022	2023
Projection of Cash Flow:						
Revenues:						
Total licenses and permits	-	-	-	-	-	-
Total Service Charges	1,550,000	1,550,000	1,593,581	1,636,558	1,681,144	1,727,245
Total interest earned	-	2,924	3,564	3,804	3,644	2,804
Total other financing sources	-	-	-	-	-	-
Total miscellaneous income	10,000	10,300	10,609	10,927	11,255	11,593
Subtotal gross operating revenues	1,560,000	1,563,224	1,607,754	1,651,289	1,696,043	1,741,641
Operations & Maintenance Expense:						
Total personal services	561,365	583,725	607,141	631,674	657,386	684,345
Total materials and services	566,650	583,650	601,159	619,194	637,770	656,903
Total capital outlay	65,729	67,701	69,732	71,824	73,979	76,198
Transfers to other funds	102,000	191,730	242,699	293,184	378,009	381,453
Total operations and maintenance expense	1,295,744	1,426,805	1,520,731	1,615,876	1,747,144	1,798,899
(Use)/replacement of fund balance	(408,544)	180,000	130,000	80,000	(5,000)	
Net Cash	672,800	(43,581)	(42,977)	(44,587)	(46,100)	(57,257)
Net Deficiency/(Surplus)	(672,800)	43,581	42,977	44,587	46,100	57,257
Test of Coverage Requirement:						
Gross Revenues:						
Operating revenues	1,560,000	1,563,224	1,607,754	1,651,289	1,696,043	1,741,641
System Development Charges	74,860	76,357	77,884	79,442	81,031	82,651
Total Gross Revenues	1,634,860	1,639,581	1,685,639	1,730,731	1,777,074	1,824,293
Operating Expenses:						
Total personal services	561,365	583,725	607,141	631,674	657,386	684,345
Total materials and services	566,650	583,650	601,159	619,194	637,770	656,903
Transfers to other funds	102,000	105,060	108,212	111,458	114,802	118,246
Transfers to/(from) the rate stabilization account	(18,668)	-	-	-	-	-
Total Operating Expenses	1,211,347	1,272,434	1,316,512	1,362,326	1,409,958	1,459,493
Net Revenues	423,513	367,147	369,126	368,405	367,117	364,799
Debt Service	350,200	86,670	134,487	181,726	263,207	263,207
Coverage Recognized	1.21	4.24	2.74	2.03	1.39	1.39
Coverage Required	1.20	1.20	1.20	1.20	1.20	1.20
Net Deficiency/(Surplus)	(3,273)	(263,143)	(207,742)	(150,334)	(51,268)	(48,951)
Projection of Revenue Sufficiency and Forecasted Rates:						
Maximum Deficiency	-	43,581	42,977	44,587	46,100	57,257
Percent Increase Required Over Current Rate Revenues	**0.00%**	**2.81%**	**2.70%**	**2.72%**	**2.74%**	**3.31%**
Five Year Average Increase in Revenue Requirements		**2.86%**	**2.86%**	**2.86%**	**2.86%**	**2.86%**
Revenues Recovered From Existing Rates and Charges:	1,550,000	1,550,000	1,593,581	1,636,558	1,681,144	1,727,245
add: Revenues Recovered From Rate Increase	-	43,581	42,977	44,587	46,100	57,257
Total Revenues Recovered From Rates & Charges after Increase	1,550,000	1,593,581	1,636,558	1,681,144	1,727,245	1,784,502

Table 3 shows, forecasted annual changes in water system revenue requirements average 2.86% per year from fiscal 2018-19 through fiscal 2022-23. On July 1, 2017, the City enacted a 2.1% general rate increase that is accounted for in the budget year 2017-18 budgeted rate revenues.

Analysis of Water Rates and Recommended Policy Changes

Allocation of Revenue Requirements to Customer Classes (Cost of Service)

The ratemaking methodology that was used to allocate water system revenue requirements is called the "base-extra capacity method", and is consistent with industry standards in water rate making. The City has been using this method at least since 2007. Under this methodology, costs of service are separated into three primary cost components: (1) base costs, (2) extra capacity costs, and, (3) customer costs.

Base costs are those that tend to vary with the total quantity of water used plus those operations and maintenance (O&M) expenses and capital costs associated with service to customers under average load conditions, without the elements of cost incurred to meet water use variations and resulting peaks in demand. Base costs include O&M expenses of supply, treatment, pumping, and distribution facilities. Base costs also include capital costs related to water plant investment associated with serving customers to the extent required for a constant, or average, annual rate of demand/usage.

Extra capacity costs are those associated with meeting rate of use requirements in excess of average and include O&M expenses and capital costs for system capacity beyond that required for average rate of use. These costs have been subdivided into costs necessary to meet maximum-day extra demand, and maximum-hour demand in excess of maximum day demand.

Customer costs comprise those costs associated with serving customers, irrespective of the amount or rate of water use. They include meter reading, billing, and customer accounting and collection expense, as well as maintenance and capital costs related to meters and services.

Water Customer Profile

The City's water utility served 2,750 active water accounts in fiscal 2015-16. At any given time, this number fluctuates due to move-in, and move-outs. Out of this total, 2,700 accounts were inside the City limits, and 50 were outside. From a demand perspective, 97% of all customers were single family residential or small commercial accounts, and are served by ¾" water meters. The breakdown of water meters in service as of June 30, 2016 are shown below in Table 4.

Table 4 - Water Meters in Service as of June 30, 2016

	Meter Size							
	⅝ inch	¾ inch	1 inch	1 ½ inch	2 inch	3 inch	4 inch	Total
Inside City:								
Residential	-	2,508	12	6	3	-	-	2,529
Multifamily	-	-	-	-	-	-	-	-
Commercial	-	111	10	24	11	-	-	156
Industrial	-	-	-	-	-	12	3	15
Subtotal inside city	-	2,619	22	30	14	12	3	2,700
Outside City:								
Residential	-	41	-	-	2	-	-	43
Multifamily	-	-	-	-	-	-	-	-
Commercial	-	4	-	-	3	-	-	7
Industrial	-	-	-	-	-	-	-	-
Subtotal outside City	-	45	-	-	5	-	-	50
System Total	-	2,664	22	30	19	12	3	2,750

Analysis of Water Demand

An analysis of actual water sales in fiscal 2015-16 was undertaken to understand overall system demands, and to specifically identify who is buying water and when they buy that water. In fiscal 2015-16, 77% of all water was sold to the single family residential customer class. The balance, 23% was sold to commercial, master metered multi-family, industrial, and institutional customers. From a peak day demand perspective, the residential class had a peak day factor (i.e., peak day demand divided by average day demand) 1.87 compared to a peak day factor for the commercial/industrial class of 1.69. Intuitively, this makes sense since peaking demand for water occurs in the hot summer months when irrigation demand is at its highest. The largest users of irrigation water in the City are single family residential customers. The water sales data for fiscal 2015-16 is contained in Table 5.

Table 5 - Molalla Water Sales Volumes in Fiscal 2015-16

Classification	Commercial/Industrial			Residential			Bulk CF	Total CF
	Total CF	Inside CF	Outside CF	Total CF	Inside CF	Outside CF		
July-15	1,019,929	990,159	29,770	4,109,614	4,045,478	64,136	4,509	5,134,052
August-15	1,379,871	1,360,013	19,858	5,121,849	5,044,476	77,373	4,859	6,506,579
September-15	993,256	975,294	17,962	2,597,701	2,556,685	41,016	3,217	3,594,174
October-15	685,984	664,769	21,215	2,416,380	2,378,684	37,696	2,498	3,104,862
November-15	551,017	523,799	27,218	1,891,108	1,857,279	33,829	2,365	2,444,490
December-15	(5,842)	2,782	(8,624)	22,196	20,512	1,684	-	16,354
January-16	1,037,295	992,166	45,129	3,876,402	3,805,060	71,342	6,900	4,920,597
February-16	498,178	486,377	11,801	1,890,491	1,848,960	41,531	6,011	2,394,680
March-16	551,501	524,521	26,980	2,063,314	2,023,537	39,777	5,114	2,619,929
April-16	493,379	480,050	13,329	1,925,695	1,893,350	32,345	3,035	2,422,109
May-16	1,369,689	1,341,431	28,258	3,267,772	3,040,594	227,178	2,417	4,639,878
June-16	1,050,804	999,019	51,785	3,329,364	3,271,659	57,705	2,741	4,382,909
Total	9,625,061	9,340,380	284,681	32,511,886	31,786,274	725,612	43,666	42,180,613
Average Month	802,088	778,365	23,723	2,709,324	2,648,856	60,468	3,639	3,515,051
Peak Month - Volume	1,379,871	1,360,013	51,785	5,121,849	5,044,476	227,178	6,900	6,506,579
Peak Month	Aug-15	Aug-15	Jun-16	Aug-15	Aug-15	May-16	Jan-16	Aug-15
Peak Month Factor	1.7203	1.7473	2.1829	1.8905	1.9044	3.7570	1.8962	1.8511
Average Day	26,370	25,590	780	89,074	87,086	1,988	120	115,563
Peak Day	44,512	43,871	1,726.17	165,221	162,725	7,328	223	209,890
Peak Day Factor	1.6880	1.7144	2.2132	1.8549	1.8686	3.6863	1.8605	1.8162

Existing and Projected Water Rates

The City's current water rate structure was last reviewed in 2010. A number of rate increases have been implemented by the Council since that time, but the basic water rate methodology has remained intact. Billings for customers include two components: a fixed rate (demand charge) and a volume rate (commodity charge). The two components are added together to compute an invoice for each customer. The fixed rates are based on costs associated with maintaining/reading meters and the costs associated with billing and are charged per connection to the water system. Volume rates are based on the customer class for each 100 cubic feet (ccf) of water. The last rate adjustments were made by the City Council via Resolution no. 2016-08 (dated May 25, 2016) with an implementation date of July 1, 2017. The current and projected schedule of water rates and charges is shown below in Table 4.

Table 6 - Schedule of Current and Projected Molalla Water Rates

Water Rate Component	Effective on July 1 2017	2018	2019	2020	2021	2022
Monthly base rate - $/Account	$ 13.07	$ 13.44	$ 13.80	$ 14.18	$ 14.57	$ 15.05
Volume charge - $/Ccf	$ 2.87	$ 2.95	$ 3.03	$ 3.11	$ 3.20	$ 3.31

Rate Design Alternatives

The City's current water rate methodology is sound, conforms to industry practice, and promotes conservation. We see no reason to move off of this methodology.

Analysis of Wastewater System Revenue Requirements

For the budget year (fiscal 2018), it is forecast that the wastewater utility will generate sufficient revenues from rates, charges and fees to meet its obligations and produce an unappropriated ending balance in the Wastewater Operating Fund of $215,240. The beginning balance for this same fiscal year is estimated to be $380,021. This level of operating reserve represents 35 days of wastewater system operating expenses and is below our recommended level of sixty (60) days of operating expenses. The strategy for the wastewater utility is to gradually raise the fund balance (via annual rate increases) up to the recommended reserve level by the end of the five year forecast horizon.

For the forecast of revenue requirements, the following assumptions were made based on discussions with City staff:

Inflation in costs and growth in the customer base – Per guidance from City staff, the following factors were applied for estimating future cost escalation:

- All direct labor line items – 3.0% per year
- Pension plan contributions (City cost) – 8.0% per year
- Health insurance premiums (City cost) – 6.0% per year
- Professional services (including contract services) – 3.0% per year
- All other operating expense line items – 3.0% per year
- The growth forecast expressed in the annual increase in Equivalent Dwelling Units (EDUs) is estimated to be 1.0% per year over the five (5) year forecast horizon.

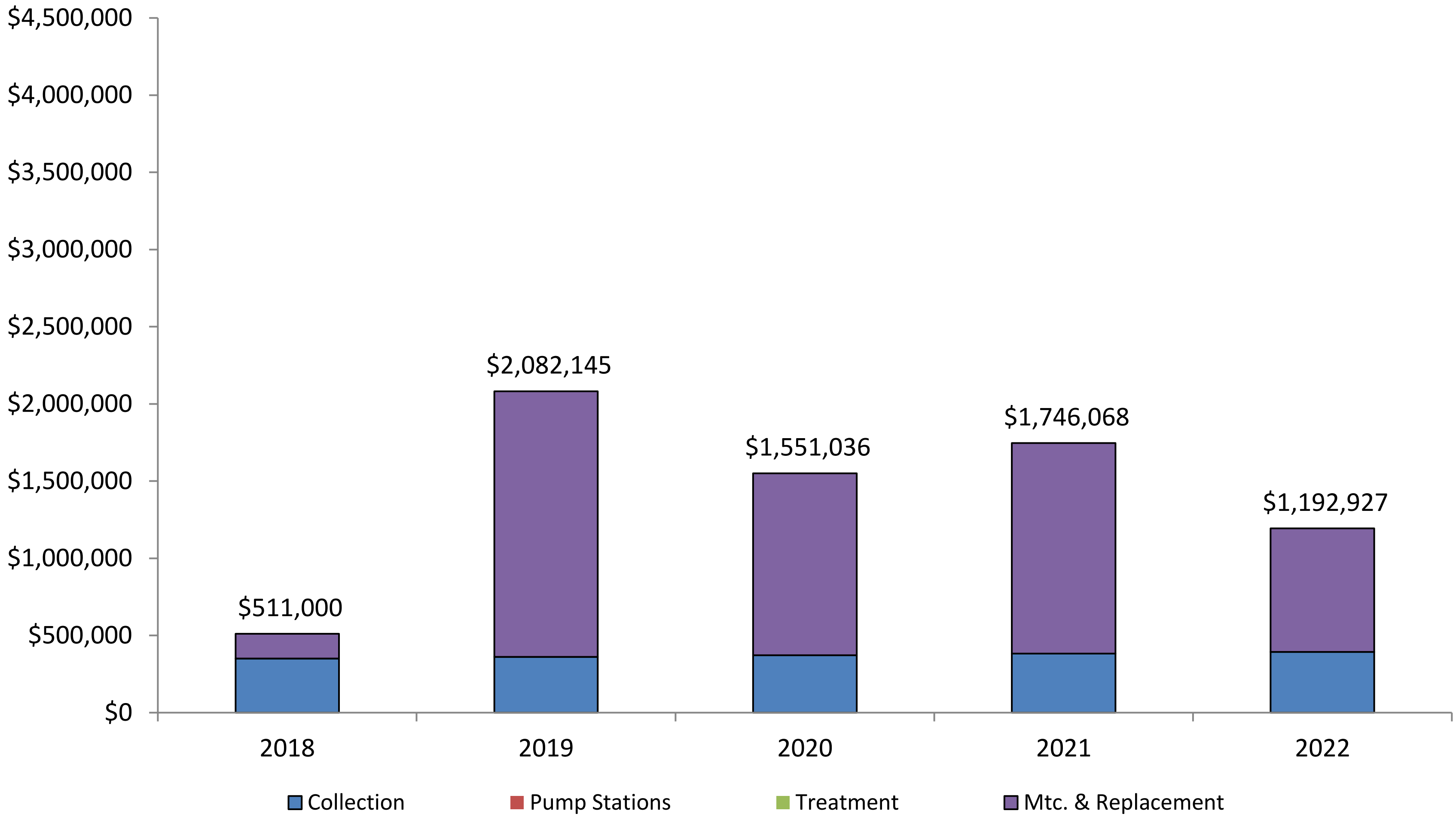
Capital Improvement Plan Funding In the upcoming budget year 2018, total wastewater system capital improvement costs are estimated to be $511,000. All of the projects are related to the wastewater treatment and collection system, and consist of the following projects:

Project Description	Cost
Wastewater master plan	$200,000
City Shops improvements	137,000
WWTP – Rebuild & add new headworks screen	121,000
WWTP – Headworks gantry crane	3,000
WWTP – Spare parts inventory	50,000
Total	$511,000

It is assumed all project costs will be funded with cash on hand or cash that is generated from wastewater rates, and is accounted for in the revenue requirements calculations. We have not budgeted for any costs in the other minor capital line items.

Over the next twenty years, the City plans on investing $29,561,772 (2016 dollars) in the wastewater system, the preponderance of which will be spent on collection system repair, replacement, and expansion. The first five years of investments amounts to $7,083,176, and is also shown graphically in Figure 3.

Figure 3 - Forecast of Wastewater Capital Expenditures



Under this initial wastewater system financial plan, it is assumed that all of the capital improvement costs are to be funded from a mix of new debt, wastewater SDCs, and free cash flow generated in the wastewater operating fund. The water CIP funding plan is shown below in Table 7.

Table 7 - Forecast of Future Wastewater System Capital Financing Plan

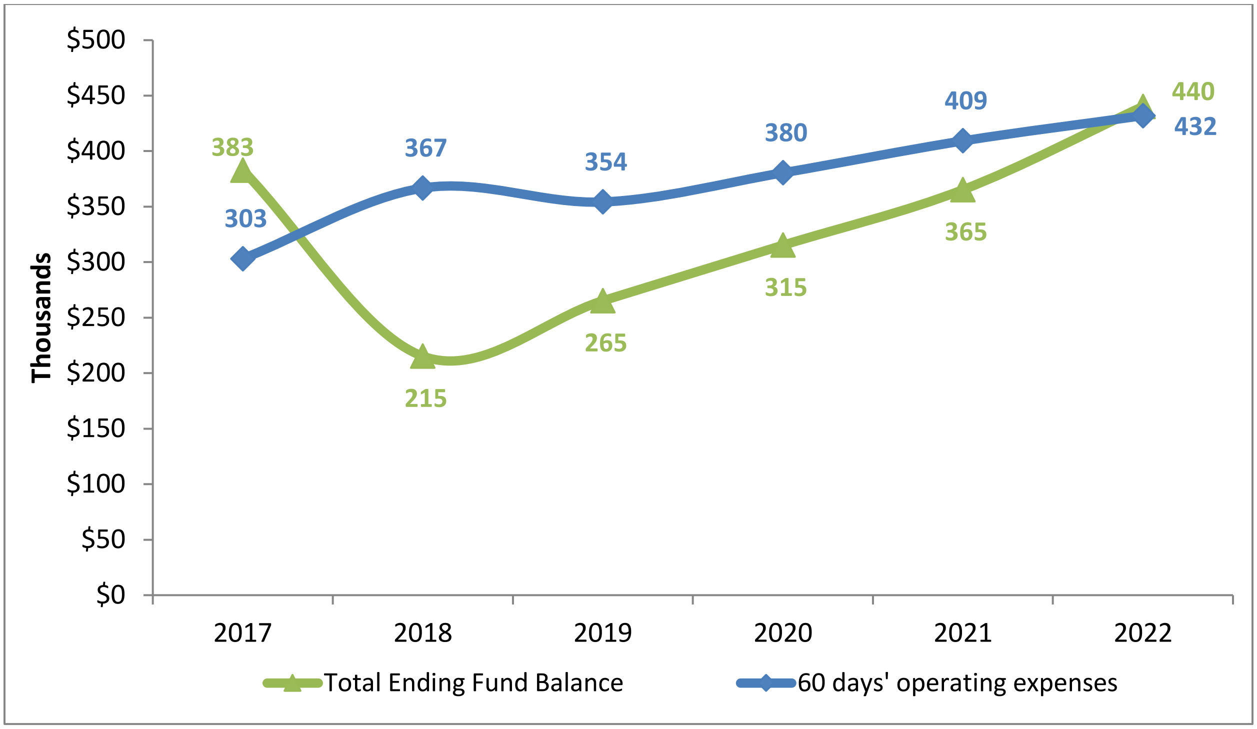
Capital Improvements Financing	2018	2019	2020	2021	2022
Capital Costs to be Funded	511,000	2,082,145	1,551,036	1,746,068	1,192,927
less: Contributions from SDCs	283,000	563,350	-	-	-
less: Contributions From Construction Fund bal	-	-	-	-	-
less: Contributions From Utility Rates	228,000	-	-	-	-
less: Developer Contributions	-	-	-	-	-
Amount to be Financed	-	1,518,795	1,551,036	1,746,068	1,192,927
Long-term Borrowing:					
Revenue Bonds:					
Amount Borrowed	-	1,640,428	1,675,251	1,885,903	1,288,463
less: Financing Cost	-	16,404	16,753	18,859	12,885
less: Reserve Funding	-	105,229	107,463	120,975	82,651
less: Refunding of BANs	-	-	-	-	-
Net Funds from Revenue Bonds	-	1,518,795	1,551,036	1,746,068	1,192,927
New Annual Debt Service:					
Debt Service	-	105,229	212,691	333,667	416,318

As in the case of the water financial forecast, it should be noted, the City is budgeting for total wastewater rate revenues of $2,100,000 for fiscal 2017-18. This level of ongoing cash flow in combination with future debt proceeds, fund balances in the water SDC and operating funds is sufficient to make the water capital funding plan work.

Operating Costs in Excess of Inflation – As in the case of water, we have not identified any categories in this analysis. Also, we have not planned or budgeted for any additional labor. If the wastewater utility does add staff, these costs will impact the current revenue requirements forecast.

Modeling for Contingencies, Reserves, and Ending Fund Balances – As discussed above, the Wastewater Operating Fund is expected to end fiscal 2017-18 with an unappropriated ending fund balance of $215,240; not enough to meet our minimum operating reserve requirements. Our forecast assumes the City will be raising rates to fund all future wastewater system obligations and generate additional cash to increase the ending fund balance in the wastewater fund to meet the minimum operating reserve requirement by the end of fiscal 2021-22. The forecast of targeted wastewater operating fund balances and operating reserve requirements is shown below in Figure 4.

Figure 4 - Forecast of Wastewater Operating Fund Balances and Operating Reserve Requirements



Revenue Requirements Forecast & Results

All of the above cost elements are contained in the revenue requirements model and from this, the "base case" forecast was developed. The base case assumes the utility would fund the operating costs as adjusted for inflation. This base case resulted in the following forecast of wastewater system revenue requirements (Table 8).

Table 8 – Base Case Forecast of Wastewater System Revenue Requirements

	Budget 2018	Forecast 2019	2020	2021	2022	2023
Projection of Cash Flow:						
Revenues:						
Total licenses and permits	-	-	-	-	-	-
Total Service Charges	2,100,000	2,100,000	2,237,762	2,398,246	2,573,861	2,737,861
Total interest earned	-	1,722	2,122	2,522	2,922	3,522
Total other financing sources	-	-	-	-	-	-
Total miscellaneous income	33,000	33,990	35,010	36,060	37,142	38,256
Subtotal gross operating revenues	2,133,000	2,135,712	2,274,894	2,436,828	2,613,925	2,779,639
Operations & Maintenance Expense:						
Total personal services	588,575	611,826	636,167	661,658	688,364	716,354
Total materials and services	1,016,119	1,046,603	1,078,001	1,110,341	1,143,651	1,177,960
Total capital outlay	66,652	68,652	70,711	72,833	75,018	77,268
Transfers to other funds	398,435	496,394	600,499	717,612	795,892	791,011
Total operations and maintenance expense	2,069,781	2,223,474	2,385,378	2,562,443	2,702,925	2,762,593
(Use)/replacement of fund balance	63,219	50,000	50,000	50,000	75,000	100,000
Net Cash	(0)	(137,762)	(160,484)	(175,615)	(164,000)	(82,954)
Net Deficiency/(Surplus)	0	137,762	160,484	175,615	164,000	82,954
Test of Coverage Requirement:						
Gross Revenues:						
Operating revenues	2,133,000	2,135,712	2,274,894	2,436,828	2,613,925	2,779,639
System Development Charges	94,000	95,880	97,798	99,754	101,749	103,784
Total Gross Revenues	2,227,000	2,231,592	2,372,691	2,536,581	2,715,673	2,883,423
Operating Expenses:						
Total personal services	588,575	611,826	636,167	661,658	688,364	716,354
Total materials and services	1,016,119	1,046,603	1,078,001	1,110,341	1,143,651	1,177,960
Transfers to other funds	25,000	25,750	26,523	27,318	28,138	28,982
Transfers to/(from) the rate stabilization account	-	-	-	-	-	-
Total Operating Expenses	1,629,694	1,684,179	1,740,690	1,799,317	1,860,153	1,923,296
Net Revenues	597,306	547,414	632,002	737,265	855,521	960,127
Debt Service	369,050	470,644	573,976	690,294	767,755	762,029
Coverage Recognized	1.62	1.16	1.10	1.07	1.11	1.26
Coverage Required	1.20	1.20	1.20	1.20	1.20	1.20
Net Deficiency/(Surplus)	(154,446)	17,359	56,770	91,088	65,785	(45,692)
Projection of Revenue Sufficiency and Forecasted Rates:						
Maximum Deficiency	0	137,762	160,484	175,615	164,000	82,954
Percent Increase Required Over Current Rate Revenues	**0.00%**	**6.56%**	**7.17%**	**7.32%**	**6.37%**	**3.03%**
Five Year Average Increase in Revenue Requirements		**6.09%**	**6.09%**	**6.09%**	**6.09%**	**6.09%**
Revenues Recovered From Existing Rates and Charges:	2,100,000	2,100,000	2,237,762	2,398,246	2,573,861	2,737,861
add: Revenues Recovered From Rate Increase	0	137,762	160,484	175,615	164,000	82,954
Total Revenues Recovered From Rates & Charges after Increase	2,100,000	2,237,762	2,398,246	2,573,861	2,737,861	2,820,815

Table 8 shows, forecasted annual changes in wastewater system revenue requirements average 6.09% per year from fiscal 2018-19 through fiscal 2022-23. On July 1, 2017, the City enacted a 6.48% general rate increase that is accounted for in the budget year 2017-18 budgeted rate revenues.

Allocation of Revenue Requirements to Customer Classes (Cost of Service)

The cost of service analysis is intended to provide the analytical basis for equitably recovering the forecasted revenue requirement from customer classes according to the demand they place on the wastewater system. Consistent with industry practice, the analysis involves a two-step process; first, capital and O&M costs are allocated to the functional categories (service functions) of the wastewater system using operational and system design criteria. Then, based on customer class characteristics derived from historical billing system data (i.e., number of customers and monthly water usage), these functionally allocated costs are distributed to the customer classes.

Cost of service allocations are made for a test year considered representative of the period in which proposed rates are expected to be in effect. Fiscal 2018 has been used as the test year for the cost of service analysis.

Functional Cost Allocations

Capital and operating costs are allocated to the following functional components of the wastewater system. The wastewater functional components and their descriptions are shown in Table 9.

Table 9 - Wastewater System Functional Components

Wastewater Functional Component	Description
Customer Accounts	Costs associated with providing service to customers regardless of the level of wastewater contribution, such as billing and customer service. These costs are typically associated with the number of accounts or customers.
Wastewater Flow (Q)	Costs are associated with conveying and treating customer contributed wastewater flow (volume).
Infiltration & Inflow (I&I)	Costs are associated with conveying and treating I&I of groundwater and stormwater runoff into sanitary sewers.
Strength of Discharge	Costs are associated with treating effluent loadings of biochemical oxygen demand (BOD) and total suspended solids (TSS).

Capital related costs include debt service payments, system reinvestment funding, and a portion of additions/uses of cash reserves. The most common method of assigning the capital portion of the revenue requirement to functional components is to allocate such costs on the basis of existing plant-in-service. The allocation of historical plant assets utilizes documented engineering and planning criteria from both the City and industry standards.

Operating costs include O&M expenses and a portion of additions/uses of cash reserves. These costs are allocated to the functions based on a detailed review of line item categories, generally following the cost causation process used in the allocation of plant. For example, customer billing related costs are assigned to the customer component; system operating costs for collection and treatment are allocated in the same manner as collection and treatment plant costs; other operational costs are assigned in proportion to total plant; and general and administrative costs are allocated in proportion to all other costs.

The functional cost allocation process results in a pool of costs for each functional category. From these cost pools, unit costs are created that form the building blocks for designing rate structures that recognize the demands of each customer class. As a result, costs will be recovered from customer classes based on their demand by functional category. Through this process if one customer class places a higher or lower proportional average demand in one functional category, that customer class pays a higher or lower portion of that functional category's cost.

Allocations to Customer Classes

The next step in the cost of service analysis involves distribution of the functionally allocated system costs to the customer classes. A key component in the allocation of system costs to customer classes is testing the reliability and accuracy of customer statistics. This is accomplished through a review of historical billing system data and application of the rate schedule in effect for that year. City staff provided historical billing system records for fiscal 2015-16, including number of accounts, equivalent residential units (ERUs), and monthly water usage. The test of reliability is conducted by applying the detailed billing statistics to the rates in effect for that year. The total revenue generated from these customer statistics should approximate the actual revenue receipts shown in the financial statements (with minor differences due to accounts receivables, delinquencies, timing of connections and disconnections throughout the year, etc.). If the revenue estimates are within reasonable limits, statistics are determined "valid" and an adjustment factor is applied to the statistics if necessary to account for any minor discrepancies. The results of this analysis indicated that the customer statistics are valid and will serve as a reasonable basis for projecting revenues and allocating system costs to the customer classes.

Customer usage statistics are also evaluated to determine if current customer class designations represent an appropriate grouping of customers, or if revisions are warranted to better reflect groupings that exhibit similar usage patterns. The City currently categorizes customers into two major groups for rate design purposes: Residential includes single family residential (SFR), multi-family residential (MFR), and manufactured home parks. The same schedule of rates applies to all customers within this class.

Commercial includes all non-residential customers, such as commercial businesses, schools, churches, etc. The same base charge applies to all customers within this class. The volume charge varies by subclass depending on an assumed strength concentration.

The functionally allocated system-wide costs are allocated to the recommended customer classes to determine "cost shares" based on the relative demands placed on the system by each class. Test year fiscal 2016 customer statistics form the basis for this allocation.

Functional costs are allocated to the customer classes as follows: Customer costs are allocated based on proportional shares of total system number of accounts. Wastewater flow costs are allocated to the customer classes based on their proportional share of total billed volume (winter water usage for SFR and actual monthly water usage for MFR and commercial customers). I&I costs are allocated based on customer flow patterns. Finally, strength costs are allocated to the customer classed based on their proportional share of total billed volume.

Determine Rate Structure and Develop Rates

The principal consideration in establishing utility rates is to obtain rates for customers that generate sufficient revenues for the utility and that are reasonably commensurate with the cost of providing service. Other considerations in designing rates should include customer equity, incentives for conservation, ease of implementation, and impact on customer bills. These considerations are consistent with the City's identified rate structure goals noted in the previous section.

Existing and Projected Wastewater Rates

The City’s current wastewater rate structure was last reviewed in 2010. Although the structure has not changed since that time, the rates have been increased on a regular basis. As in the case of water rates, billings for customers include two components: a fixed rate (demand charge) and a volume rate (commodity charge). The two components are added together to compute an invoice for each customer. The fixed rates are based on costs associated with maintaining/reading meters and the costs associated with billing and are charged per connection to the sewer system. Volume rates are based on the customer class for each 100 cubic feet (ccf) of water or a fixed amount if no measurable consumption is available. The last rate adjustments were made by the City Council via Resolution no. 2017-09 (dated June 14, 2017) with an implementation date of July 1, 2017. The current and projected schedule of wastewater rates and charges is shown below in Table 10.

Table 10 - Schedule of Molalla Wastewater Rates Effective December 15, 2015

Wastewater Rate Component	Effective on July 1 2017	2018	2019	2020	2021	2022
Monthly base rate - $/EDU	$ 35.95	$ 38.31	$ 41.06	$ 44.07	$ 46.88	$ 48.30
Volume charge - $/Ccf	$ 3.56	$ 3.79	$ 4.06	$ 4.36	$ 4.64	$ 4.78

The City's current wastewater rate structure is consistent with industry standard, and promotes conservation and equity. Some of the key elements of this rate structure are:

Treatment of Customers without Measurable Water Consumption

Under the City's wastewater rate structure, accounts are considered to be "without measurable water consumption" when potable water is obtained from a well or where the customer has no personal water consumption history established during the winter averaging period within the service area. For single family and multifamily residential customers, new customer accounts without history are set based on 5.50 ccf (monthly) per dwelling unit until measurable consumption is recorded and used to establish a new rate. Customers receiving only sewer service who obtain potable water from a well or another water provider are set based on 5.50 ccf (monthly). Adjustments may be made based on actual usage during the winter averaging months of November through April if the customer can provide sufficient documentation.

For commercial customers without measurable water consumption history, a two-step policy is used as follows:

1. Strengths will be defined by Standard Industrial Classification (SIC) code (i.e. restaurants defined as high) or the customer may elect to have a qualified laboratory regularly monitor and provide measurements of Biological Oxygen Demand (BOD), Total Suspended Solids (TSS) and other particulates (i.e. fats, oils, and grease) to the City.
2. Volumes will be from certification of meter readings provided at the source (well or 3rd party provider). It will be the customer's responsibility to obtain and forward meter readings to the City on a regular bases. In absence of actual meter readings, the City will utilize average usage patterns from similar commercial customers with measurable usage. This method is to be an interim step until such time as a system to measure water usage can be implemented and/or received.

Residential Customers Charged Based on Winter Average Water Consumption

At one time, the City charged all residential wastewater customers on a flat rate basis. Some time ago, the City moved off of this approach and implemented a consumption based rate (CBR) strategy for its residential class. Commercial/industrial and wholesale customers have always been billed based on metered water consumption. Under a CBR methodology, a portion of the wastewater bill is based on how much water a customer uses during the non-irrigation or winter average period, as winter water use is a reasonable estimate of a customer's wastewater discharge. A CBR structure enhances the equity of the wastewater rates by relating a portion of an individual's wastewater bill to the actual discharge into the collection and treatment system. When coupled with a service charge per account that continues to assess the majority of wastewater system costs on a fixed monthly basis, a CBR structure generally balances revenue stability and equity objectives. The policy workings of the City's winter average billing methodology for residential accounts is:

1. Volume will be based on 6-month winter averaging of water consumption. The winter average period will be defined as the 6-month period starting with the first full billing cycle starting on or after November 1st of each year.
2. Accounts with an average usage of less than 1 ccf of water consumption are automatically assessed at the 5.50 ccf average.
3. Customers may request in writing to have the sewer based on actual usage if the property is vacant (transition between tenants, foreclosure, etc.) or consistently averages below 1 ccf per billing cycle over a 12-month period.
4. The assigned average for water consumption may be appealed to the City Manager, or his/her designee, and could be modified pending a review of the account and findings thereof.

Commercial Customers Charged Based on Assumed Strength of Discharge

The City's current wastewater volume charge is monolithic and assumes all customers' strength of discharge is the same. Based on analysis of historical billing records, we have found that 94.0% of all accounts are single family residential, and 5.5% are large multifamily residential, light commercial. The strength of discharge characteristics of this 99.5% of the Molalla population is indeed the same. Industry surveys by the U.S. EPA, and the Water Environment Federation indicate these groups produce low strength of discharge in the range of 200 mg/liter BOD, and 200 mg/liter TSS.

However, the remaining 0.5% of the Molalla population is classified as industrial (i.e., 15 accounts in fiscal 2015-16). We suggest the City consider billing these customers on their assumed strength of discharge. Under this approach, heavy commercial and industrial customers are grouped into low, medium, high, and industrial extra strength categories based upon their standard industrial classification. The City's strength of discharge class limits could be as follows (per industry guidelines):

Strength Classification	BOD (mg/l)	TSS (mg/l)
Low	0-250	0-300
Medium	251-500	301-600
High	501-1,000	601-1,200
Special	1,001+	1,201+

Under this approach, the responsible person for paying the sewer charge may appeal the strength classification made by the City. Such appeal would be made in writing to the City Manager. The person appealing must provide sufficient information as to the strength of the sewer discharge created by their use so that the City Manager or designee may evaluate the evidence and determine the proper strength of the waste generated.

Rate Design Alternatives

There are a variety of wastewater rate structures in use across the state and the nation. This study seeks to establish the guiding principles to be considered during the wastewater rate setting. It is important to establish the principles in advance of undertaking the technical work of rate setting. Once the principles are established and fixed, then the rate setting process evolves from them. It must also be recognized that there needs to be a balance in how the principles are applied; e.g., a flat rate is simple, but it may not necessarily be fair and equitable if customers are not equally responsible for the cost of the system. The Review will seek to determine and evaluate alternatives by comparing the various types of rate structures against each principle to determine which structure most satisfies the principles. One must recognize that one or more principles may compete or be in direct contrast with another. Ultimately, the objective is to identify the structure that best meets as many of the principles as possible.

Any rate structure that is considered must respect current legislation and contractual commitments. The main objective is to ensure the wastewater system is sustainable over the long term, thereby ensuring the protection of the health of citizens and the environment. The concepts of user pay and full cost pricing are key elements of which the City should address in the future. The question of what each customer pays is, however, a complex issue with varying viewpoints and interests.

The following principles should be used to develop alternative rate structures for Council's consideration:

1. be fair and equitable
2. promote conservation
3. be affordable and financially sustainable
4. stabilize revenue
5. be justifiable
6. be simple to understand
7. support economic development;

The City's CBR rate structure has been in place for many years, and works well for the City and its customers. Based on the equity the rate structure provides to customers, there is no reason to think the current rate structure for wastewater services is unfair or unreasonable. We recommend the City stay with this rate structure at this time.

Analysis of Stormwater System Revenue Requirements

For the budget year (fiscal 2018), it is estimated the stormwater utility will generate sufficient revenues from rates, charges and fees to meet its obligations and produce an unappropriated ending balance in the Stormwater Operating Fund of only $47,570. The beginning balance for this same fiscal year is estimated to be $43,631.

The stormwater utility has a revenue recovery problem, and the City Council is aware of this problem. In 1999, the City adopted a stormwater fee methodology to provide a mechanism that would generate revenue for the maintenance and operation of the stormwater collection and detention system. That fee methodology used impervious area (IA) as the basis for charging customers. Initially, the City assumed single family residential customers contributed 2,640 square feet of IA per home. This became the basis for the EDU. The plan then called for the City to measure the IA from all commercial, industrial, and institutional customers (via GIS data) to calculate their fees. The measured IA for each of these non-single family residential customers would be divided by 2,640 to calculate the number of EDUs they contributed to the system and then be billed at the rate of $2.00 per EDU. Unfortunately, at the time of implementation, the City chose to "cap" the total number of EDUs that any non-single family residential customer would be charged at 20 EDUs. This policy has resulted in an under recovery of revenues required to fund the operations and maintenance of the stormwater systems. During the fiscal 2017-18 budget process, the City Council was apprised of this commercial cap policy, and they have decided to discontinue the policy and they have directed Staff to bill the non-single family residential accounts based on their actual measured IA. We have assumed this will be the case, and have recommended the City set the current monthly rate per EDU at $3.60. If the cap policy had been continued, the calculated rate would have been $4.51 per EDU. For modeling purposes, we have assumed new policy will be completely implemented in fiscal 2017-18.

In the 1999 Storm Drainage User Fee Calculation, the EDU's were set at 2,640 square feet of IA based on a Unified Sewerage Agency (now Clean Water Services) stormwater user fee. A budget for operations and maintenance of the system was calculated and divided by the total number of EDU's to determine a monthly price for EDU. Eighteen years have passed since the adoption of this methodology and to date no revisions to the methodology have been approved. As part of the 2017 utilities rate study, the Public Works Department performed an analysis of 30 randomly selected single family residential properties utilizing the City's GIS system. Each property was measured for total IA and an average of 2,984 square feet of IA was calculated. A selection was made of all commercial, industrial, and residential properties not classified as single family residential and each property was measured for IA. The total IA calculated was 11,270,359 square feet, or 3,777 EDU's. The total number of single family residential properties was 2,244 giving a grand total of 6,021 EDU's within the City. Applying the existing methodology from the 1999 report, a cap of 20 EDU's was applied to all large properties which in turn decreased the total number of EDU's in the City to 4,539, a difference of 1,482 EDU's or single family homes. The total number of properties which currently receive the 20 EDU cap is approximately 1.5% of all users.

For the forecast of revenue requirements, the following assumptions were made based on discussions with City staff:

Inflation in costs and growth in the customer base – Per guidance from City staff, the following factors were applied for estimating future cost escalation:

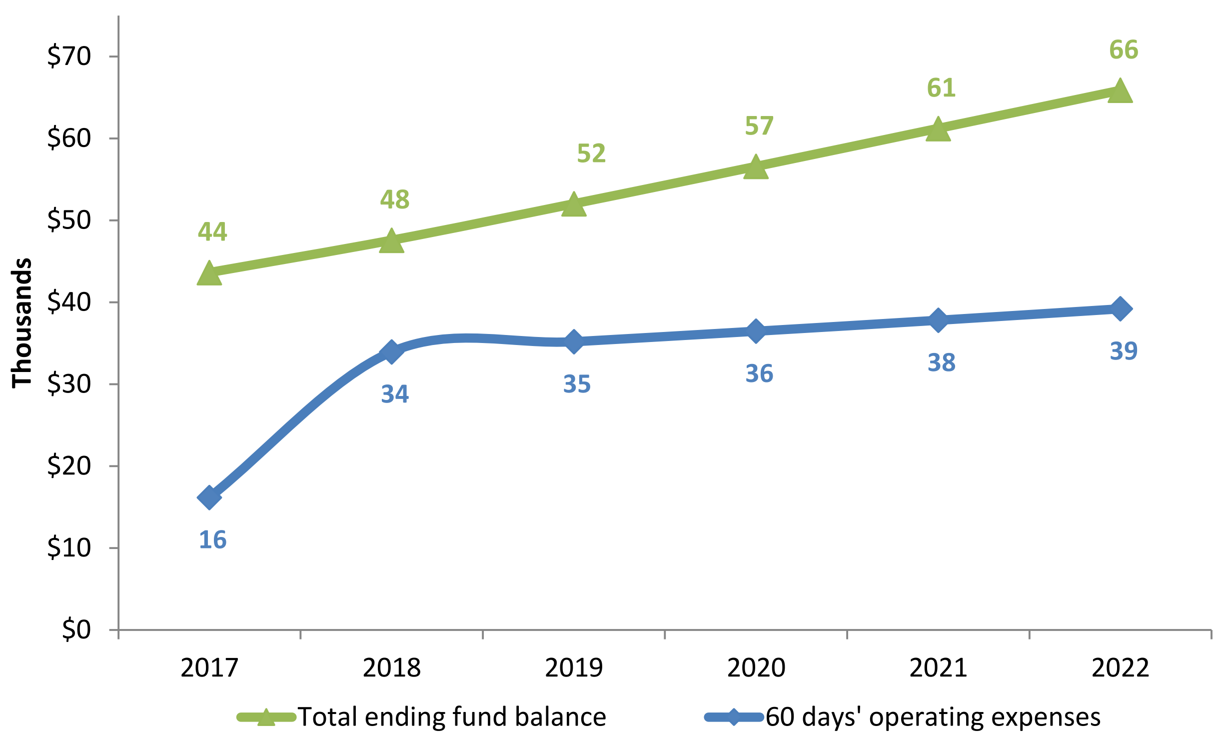
- All direct labor line items – 3.0% per year
- Pension plan contributions (City cost) – 8.0% per year
- Health insurance premiums (City cost) – 6.0% per year

- Professional services (including contract services) – 3.0% per year
- All other operating expense line items – 3.0% per year
- The growth forecast expressed in the annual increase in Equivalent Dwelling Units (EDUs) is estimated to be 2.0% per year over the five (5) year forecast horizon. For stormwater, an EDU is now defined as 2,984 square feet of IA.

Capital Improvement Plan Funding – In the upcoming budget year 2018, total stormwater system capital improvement costs are budgeted at just $15,000. Because the stormwater utility is so small, management's focus is not on capital investments. The primary focus is on operations and maintenance of the systems. It is assumed this $15k will be funded with cash on hand or cash that is generated from stormwater rates, and is accounted for in the revenue requirements calculations. We have not budgeted for any costs in the other minor capital line items.

Modeling for Contingencies, Reserves, and Ending Fund Balances – As discussed above, we expect to end fiscal 2017-18 with an unappropriated ending fund balance of $47,570 in the Stormwater Operating Fund. This forecast is predicated on the assumption that the City will charge all 6,021 EDUs a monthly rate of $3.60 per EDU throughout the fiscal year. In other words, the commercial property cap policy is no longer in force. Based on this assumption, our modeling indicates the Stormwater Operating Fund will end all forecast years with an ending fund balance excess of sixty days of operating expenses. The forecast of targeted Stormwater Operating Fund balances and operating reserve requirements is shown below in Figure 5.

Figure 5 - Forecast of Stormwater Operating Fund Balances and Operating Reserve Requirements



Revenue Requirements Forecast & Results

All of the above cost elements are contained in the revenue requirements model and from this, the "base case" forecast was developed. The base case assumes the utility would fund the operating costs as adjusted for inflation. This base case resulted in the following forecast of stormwater system revenue requirements (Table 11).

Table 11 – Base Case Forecast of Stormwater System Revenue Requirements

	Budget	Forecast				
	2018	2019	2020	2021	2022	2023
Projection of Cash Flow:						
Revenues:						
Total licenses and permits	-	-	-	-	-	-
Total Service Charges	260,107	260,107	269,220	278,636	288,399	298,488
Total interest earned	-	381	416	453	490	527
Total other financing sources	-	-	-	-	-	-
Bond proceeds for projects	-	-	-	-	-	-
Total miscellaneous income	-	-	-	-	-	-
Subtotal gross operating revenues	260,107	260,488	269,636	279,088	288,889	299,015
Operations & Maintenance Expense:						
Total personal services	128,081	133,219	138,603	144,246	150,164	156,371
Total materials and services	78,410	80,762	83,185	85,681	88,251	90,899
Total capital outlay	49,678	51,168	52,703	54,284	55,913	57,590
Transfers to other funds (including debt service)	-	-	-	-	-	-
Total operations and maintenance expense	256,169	265,150	274,492	284,212	294,328	304,860
(Use)/replacement of fund balance	3,938	4,450	4,560	4,640	4,650	4,610
Net Cash	0	(9,112)	(9,416)	(9,763)	(10,089)	(10,455)
Net Deficiency/(Surplus)	(0)	9,112	9,416	9,763	10,089	10,455
Test of Coverage Requirement:						
Gross Revenues:						
Operating revenues	260,107	260,488	269,636	279,088	288,889	299,015
System Development Charges	17,480	17,830	18,186	18,550	18,921	19,299
Total Gross Revenues	277,587	278,317	287,822	297,638	307,810	318,314
Operating Expenses:						
Total personal services	128,081	133,219	138,603	144,246	150,164	156,371
Total materials and services	78,410	80,762	83,185	85,681	88,251	90,899
Transfers to/(from) the rate stabilization account	-	-	-	-	-	-
Total Operating Expenses	206,491	213,982	221,788	229,927	238,415	247,270
Net Revenues	71,096	64,336	66,033	67,711	69,395	71,045
Debt Service	-	-	-	-	-	-
Coverage Recognized	N/A	N/A	N/A	N/A	N/A	N/A
Coverage Required	1.20	1.20	1.20	1.20	1.20	1.20
Net Deficiency/(Surplus)	-	-	-	-	-	-
Projection of Revenue Sufficiency and Forecasted Rates:						
Maximum Deficiency	-	9,112	9,416	9,763	10,089	10,455
Percent Increase Required Over Current Rate Revenues	**0.00%**	**3.50%**	**3.50%**	**3.50%**	**3.50%**	**3.50%**
Five Year Average Increase in Revenue Requirements						
Revenues Recovered From Existing Rates and Charges:	260,107	260,107	269,220	278,636	288,399	298,488
add: Revenues Recovered From Rate Increase	-	9,112	9,416	9,763	10,089	10,455
Total Revenues Recovered From Rates & Charges after Increase	260,107	269,220	278,636	288,399	298,488	308,943

Table 11 shows, forecasted annual changes in stormwater system revenue requirements average 3.50% per year from fiscal 2018-19 through fiscal 2022-23. On July 1, 2017, the City enacted a 20% general rate increase that is accounted for in the budget year 2017-18 budgeted rate revenues. On a percentage basis, this is substantial, but the reader should consider the monthly rate went from $3.00 per EDU per month to $3.60 per EDU per month.

Stormwater Rate Forecast – Eliminate Commercial Properties Cap Case

The new stormwater base case rate forecast accounts for the added revenues recovered from commercial, industrial, and institutional customers that have previously been capped at 20 EDUs per account. Under this case, our modeling indicates the City can move forward with modest stormwater rate increases over the five year forecast horizon, and actually add to its current tenuous reserve base. The forecast of targeted Stormwater Operating Fund balances and operating reserve requirements for the new base case is shown below in Table 12.

Table 12 - Forecast of Monthly Stormwater Rates

	Budget	Forecast				
	2018	2019	2020	2021	2022	2023
Gross revenues required from rates:						
Operations and maintenance expense	206,491	213,982	221,788	229,927	238,415	247,270
Operating fund capital outlays	49,678	51,168	52,703	54,284	55,913	57,590
Transfers to other funds (including debt service)	-	-	-	-	-	-
(Use)/Replacement of Operating Fund balance	3,938	4,450	4,560	4,640	4,650	4,610
Subtotal gross revenues required from rates	260,107	269,600	279,052	288,852	298,978	309,470
Revenue offsets to cost of service:						
Total licenses and permits	-	-	-	-	-	-
Total interest earned	-	381	416	453	490	527
Total other financing sources	-	-	-	-	-	-
Bond proceeds for projects	-	-	-	-	-	-
Total miscellaneous income	-	-	-	-	-	-
Subtotal revenue offsets to cost of service	-	381	416	453	490	527
Net revenues required from rates	260,107	269,220	278,636	288,399	298,488	308,943
Forecasted billable retail EDUs	6,021	6,141	6,264	6,389	6,517	6,648
Monthly rate - $/EDU	$ 3.60	$ 3.65	$ 3.71	$ 3.76	$ 3.82	$ 3.87

Transportation Capital Projects Fee Methodology

In 2016, the City reviewed its system development charge (SDC) methodology and schedule of charges for transportation SDCs. As part of that study, the City concluded it was facing a transportation funding gap. Over the next ten years, there was an identified need of $21.7 million for transportation capital improvement projects. Out of this total needs assessment, the City estimated $15.0 million could legally be funded from SDCs (i.e., growth). This left a funding gap of $6.7 million. The projects (and costs) that comprise these ten year needs total are shown below in Table 13.

Table 13 - Ten Year Transportation Needs and Proposed Funding Sources

Project Description	Estimated Cost of Improvements in 2016 Dollars	Project Cost Attributed to Existing Demands	Project Cost Attributable to Future Demands	Total Costs
Intersection Improvments:				
Highway 211/Highway 213	$ 675,855	$ -	$ 675,855	$ 675,855
Toliver Road/Highway 213	495,627	-	495,627	495,627
Meadow Drive/Highway 213	225,285	-	225,285	225,285
Mathias Road/Freyrer Park Road	150,190	-	150,190	150,190
Main Street/Grange Street	30,038	-	30,038	30,038
Molalla Avenue/Main Street	240,304	-	240,304	240,304
Molalla Avenue/Toliver Road	225,285	-	225,285	225,285
Leroy Avenue/Main Street	300,380	-	300,380	300,380
Molalla Avenue/Shirley Street	225,285	-	225,285	225,285
Mathias Road/Main Street	600,760	-	600,760	600,760
Molalla Forest Road/Main Street	225,285	-	225,285	225,285
Vick Road/Highway 213	135,171	-	135,171	135,171
Vaughn Road/Highway 211	150,190	-	150,190	150,190
Sawtell Road/Molalla Avenue/Wilhoit	150,190	-	150,190	150,190
Sawtell Road/Eves Road	150,190	-	150,190	150,190
Street Reconstruction Projects:				
May Avenue	112,643	62,579	50,063	112,643
Section Avenue	150,190	66,751	83,439	150,190
Heintz Street	315,399	315,399	-	315,399
South Cole	210,266	116,814	93,452	210,266
Shirley	555,703	555,703	-	555,703
Lola Avenue	347,100	173,550	173,550	347,100
Roadway Widening Projects:				
Ped and Bicycle Improvements	187,738	-	187,738	187,738
Ped and Bicycle Improvements	187,738	-	187,738	187,738
Toliver Road	3,003,800	1,181,823	1,821,977	3,003,800
Ped and Bicycle Improvements	375,475	-	375,475	375,475
Downtown Bypass (Highway 211)	277,852	91,099	186,753	277,852
Downtown Bypass (Molalla Forest Road)	6,458,170	2,117,433	4,340,737	6,458,170
Downtown Bypass (Mathias Road)	1,952,470	640,154	1,312,316	1,952,470
Highway 213	750,950	295,456	455,494	750,950
Molalla Avenue	2,543,540	1,000,737	1,542,803	2,543,540
Plans, Studies, & Policies:				
Update Transportation System Master Plan	250,000	-	250,000	250,000
Total	$ 21,659,067	$ 6,617,498	$ 15,041,569	$ 21,659,067

The only dedicated funding sources available to fund this gap are motor fuel taxes and PGE franchise fees. It is estimated that roughly 90% of these resources are dedicated to operation and maintenance of the public right of way, and not capital projects funding. For fiscal 2017-18, the total budgeted receipts in the Street Fund from these two sources is $694,000. Assuming only ten percent of this total could be dedicated to capital projects funding, that amounts to $69,400, or one percent (1%) of the total unfunded need. Over the ten years of capital needs (i.e., $6.7 million) dedicated funding sources would only be able to contribute $694,000. The net capital projects fee basis after deducting the contributions from these dedicated funding sources amounts to $5.9 million.

Once the net system revenue requirement is understood, a funding strategy has to be developed. In this case, there are two options available to the City. The first is a pay as you go strategy. As the title implies, a fee would have to be established to cash finance 100% of the ten year system revenue requirement. For ease of analysis, we have assumed the annual revenue requirement would be 1/10th per year, or $592k per year. The second strategy would call for debt financing of the ten year revenue requirement. In this case, the total net revenue requirement (i.e., $5.9 million) could be funded with the proceeds of a senior lien revenue bond. For this analysis, we have assumed the City would issue a 20 year bond at an interest rate of 3.00%. For ease of analysis, we have not complicated the analysis with any issuance costs, or debt service reserve requirements. The resulting annual debt service on this type of bond is $398,152.

Now that the annual net revenue requirements of the fee are calculated, we need to settle on who pays for the program. In Oregon, the most common approach to such fees is a surcharge on existing City utility customers. We have chosen to tie the fee to active water customer accounts for this analysis. As of June 30, 2016, there were 2,700 active, in-City, water customers.

The final step in the calculation of the fee is to divide the annual revenue requirements by the total number of active water accounts. The resulting annual fee is then divided by 12 to arrive at the monthly transportation capital projects fee. The calculations are shown below in Table 14.

Table 14 - Derivation of a Transportation Capital Projects Fee

	Pay As You Go	Bonded
Derivation of transportation capital projects fee (TCPF) basis:		
Total master plan project costs to be funded from non-SDC sources	$ 6,617,498	6,617,498
less: Known transportation funding sources		
Ten percent of state gas tax receipts for ten years	540,000	540,000
Ten percent of PGE franchise fees for ten years	154,000	154,000
Master plan project costs to be recovered from TCPF over ten years	$ 5,923,498	$ 5,923,498
Annual TCPF fee revenue requirement	$ 592,350	
Annual debt service on TCPF bonds (20 year bonds)		$ 398,152
Active in-city water accounts as of June 30, 2016	2,700	2,700
Fiscal 2017-18 monthly TCPF per active in-city water account	$ 18.28	$ 12.29

City Staff and the rate study project team were tasked with identifying a new dedicated funding source that could fund the projected $6.7 million. This effort resulted in the formulation of a monthly fee that would be added to all active water customers' bills within the City. Our analysis of fiscal 2017-18 budget and utility billing data indicate this transportation capital projects fee could be in the range of $12.29 - $18.28 per active account per month. The low end of the range assumes the City borrows (bonds) the total revenue requirement of the program, and pledges the monthly rate revenues to pay the future debt service on the bonds. The high end of the range assumes a pay as you go strategy.

Rate Study Conclusions and Recommendations

Conclusions

On balance, the City's utilities are in good financial condition. Fund balances exceed minimum operating reserve requirements for water and stormwater. However, the projected ending fund balance in the wastewater fund on June 30, 2018 does not meet a minimum reserve requirement of 60 days of operating expenses, and will have to be rectified via future general rate increases. Revenue bond debt service coverage on water and wastewater debt exceeds covenants.

Over the next five years (including the fiscal year that just started on July 1, 2017), the water utility has planned capital improvements that total $6.9 million (adjusted for inflation). In order to keep rate increases manageable, our modeling indicates the City will have to borrow approximately $3.8 million over this time frame (before issuance costs and debt service reserves funding). The balance of the water system capital costs will be funded from SDCs ($2.1 million), and cash contributions from rates ($1.0 million). By the end of fiscal 2021-22, we are forecasting total principal and interest payments on this new water system debt to be $263,207 per year (assuming 20 year senior lien revenue bonds). Fortunately, the current water system legacy debt, the Series 2010 Water Refunding Revenue Bonds will by retied in fiscal 2017-18 freeing up $350,000 per year in free cash flow. By the end of this five year forecast period, we estimate the water SDC fund will have an ending fund balance of $82k and the water operating fund will have and ending fund balance of $350k. This can be accomplished with average annual rate increases of 2.86% per year, and will be sufficient to meet system financial needs.

The wastewater utility is facing some financial challenges. First, the utility has $3.8 million in principal outstanding on long term debt as of June 30, 2017. This legacy debt consists of the 2010 sewer refunding bonds and the 2008 Clean Water State Revolving Fund (SRF) loan. These debts will not be retired until 2025 for the bonds, and 2028 for the loan. The total annual debt service on these two debt instruments is $502k per year. Second, over the next five years, the wastewater utility is planning on spending $7.1 million (adjusted for inflation) on capital improvements. In order to manage future rate spikes resulting from this spend, our modeling indicates the City will have to bond a significant portion of the future capital projects costs. Out of the $7.1 million need, we conclude the City will have to borrow $6.0 million (before issuance costs and debt service reserves funding). Even though most of the total is SDC eligible, the City will only be able to contribute $846k in SDCs over the forecast horizon. This is due to low wastewater SDC fund balance and the City policy of using SDCs to pay the annual principal component of the SRF loan debt service. Finally, based on the adopted fiscal 2017-18 wastewater system budget, the City is projected to end the year with an operating reserve of $215k (i.e., Wastewater Fund ending fund balance). This reserve represents 35 days of wastewater system operating expenses, and is well below our recommended reserve level of 60 days of operating expenses. In order to correct this deficiency, we have gradually increased rates over the five year forecast horizon to bring the wastewater fund balance up to 60 days of operating expenses by June 30, 2022. Our modeling indicates that all of these system requirements can be funded with average annual rate increases of 6.09% per year. By the end of the five year forecast horizon, we project the wastewater SDC fund will have and ending fund balance of $129k, and the wastewater operating fund will have a corresponding cash balance of $440k.

The stormwater utility has a revenue recovery problem, and the City Council is aware of this problem. In 1999, the City adopted a stormwater fee methodology to provide a mechanism that would generate revenue for the maintenance and operation of the stormwater collection and detention system. That fee methodology used impervious area (IA) as the basis for charging customers. Initially, the City assumed single family residential customers contributed 2,640 square feet of IA per home. This became the basis for the Equivalent Dwelling Unit (EDU). The plan then called for the City to measure the IA from all commercial, industrial, and institutional customers (via GIS data) to calculate their fees. The measured IA for each of these non-single family residential customers would be divided by 2,640 to calculate the number of EDUs they contributed to the system and then be billed at the rate of $2.00 per EDU. Unfortunately, at the time of implementation, the City chose to "cap" the total number of EDUs that any non-single family residential customer would be charged at 20 EDUs. This policy has resulted in an under recovery of revenues required to fund the operations and maintenance of the stormwater systems. During the fiscal 2017-18 budget process, the City Council was apprised of this commercial cap policy, and they have decided to discontinue the policy and they have directed Staff to bill the non-single family residential accounts based on their actual measured IA. As part of this process, Public Works staff have remeasured all parcels in the City (via geographical information system (GIS) data) and have recalibrated the EDU to 2,980 square feet of IA. We have assumed this will be the case, and have recommended the City set the current monthly rate per EDU at $3.60. If the cap policy had been continued, the calculated rate would have been $4.51 per EDU.

The methodology that we are proposing for the construction of a transportation capital projects fee is based on generally accepted rate making practice, and has been reviewed by City Staff. We believe the City is justified in implementing this fee because there is no other dedicated funding source that we could find to meet the need. There are two options for the construction of the fee, as discussed in the opening remarks of this report. If the City bonds the entire capital projects revenue requirement, the monthly fee comes to $12.29 per active utility account per month. If the City chooses to follow a pay as you go strategy, the fee comes to $18.28 per active utility account per month.

Recommendations

The recommendations of this municipal utilities rates study are pragmatic and reasonable. Our recommendations are focused on securing the financial future of the utilities and to make sure that all customers who receive the benefits of utilities services pay their proportionate share of the costs of delivering those utility services. We specifically recommend the following:

- No rate increases are required for the current fiscal year 2017-18. However, beginning on July 1, 2018, we recommend the City adjust utility rates by an average annual percentage increase through June 30, 2023 as follows:
  - ✓ Water... 2.86% per year for each year of the five year forecast
  - ✓ Wastewater .... 6.09% per year for each year of the five year forecast
  - ✓ Stormwater.................................... 3.5% per year for each year of the five year forecast
- Follow through with the elimination of the current stormwater fee "capping" policy for non-single family residential properties. The primary purpose of the stormwater utility is to keep City streets clear of standing stormwater, eliminate localized flooding throughout the City, and enhance the water quality in the receiving streams. Exemptions only hamper the City from completing this mission.
- Present the proposed methodology for implementing a monthly transportation capital projects fee to the Molalla City Council via work session. Offer both of the funding options (i.e., bonding of the revenue requirement and the pay as you go strategy), and get feedback from the Council. If the Council chooses to proceed with one of the options, develop a customer outreach and education plan for rolling out the fee. Consider a target implementation date of July 1, 2018.
- Continually monitor the cash positon of the wastewater fund. If the fund balance falls below 30 days of operating expenses in this fiscal year (FY 2017-18), consider implementing cost controls and or an interim rate increase to bring the fund balance up. Our proposed future wastewater rate increases are programmed to build the fund balance to an acceptable reserve level of 60 days of operating expenses over five years.

Neighboring Communities' Utility Rates

Shown below in Figures 8 through 12 are charts that compare the current utility rates for a single family customer in Molalla to the same charges in similar communities in the region.

Figure 6 - Comparison of Neighboring Communities' Water Rates

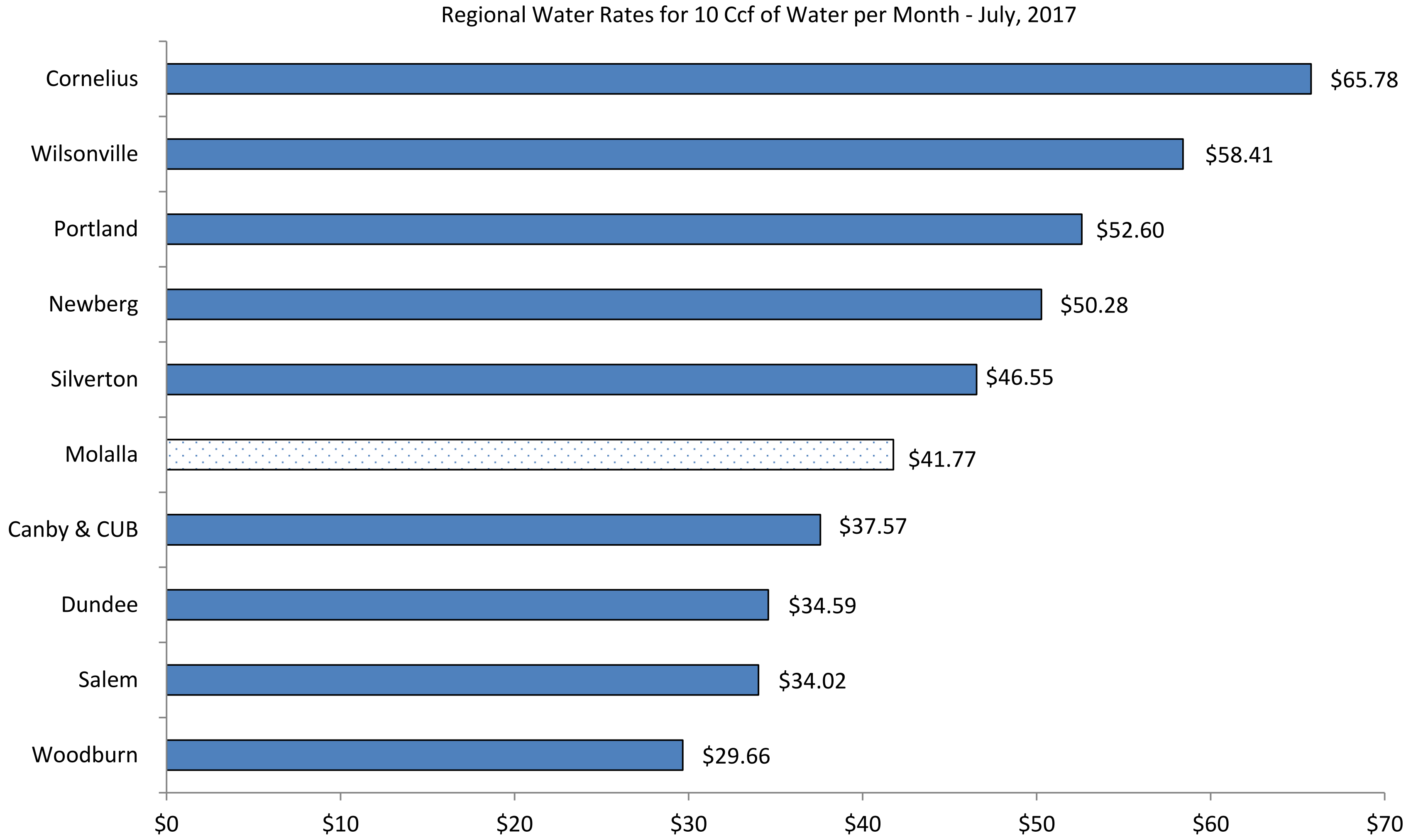


Figure 7 - Comparison of Neighboring Communities' Wastewater Rates

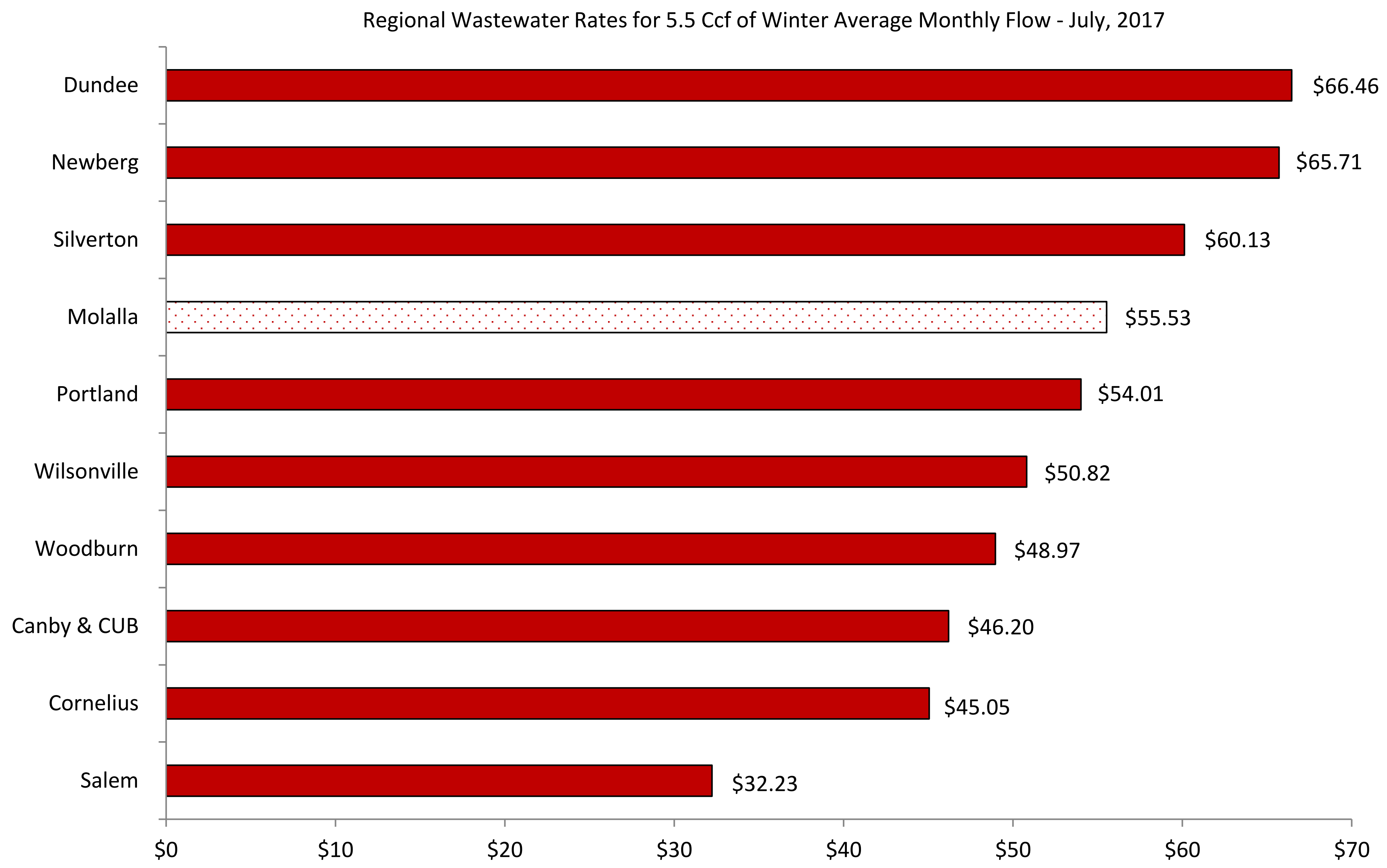


Figure 8 – Comparison of Neighboring Communities' Street Maintenance Fees

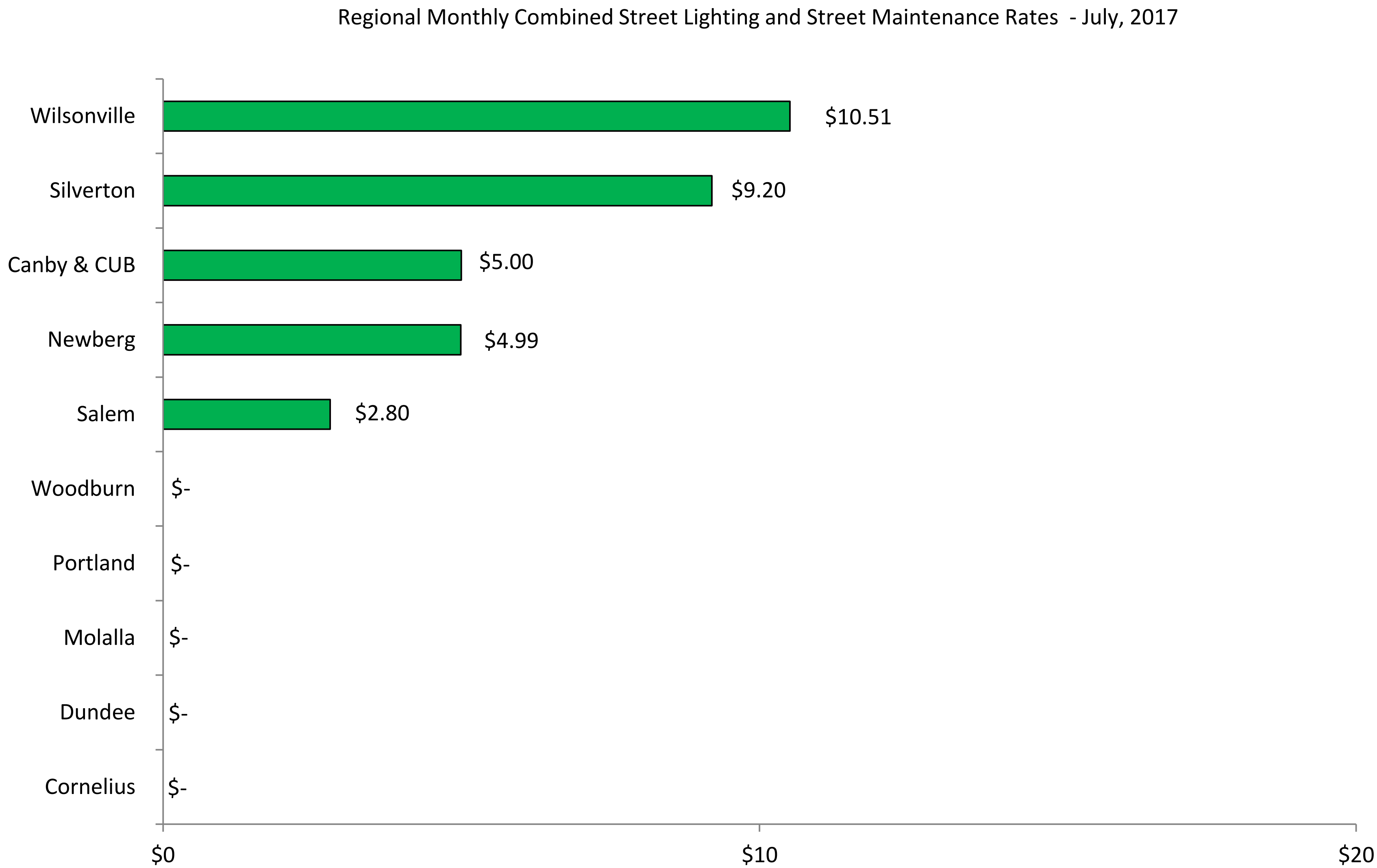


Figure 9 - Comparison of Neighboring Communities' Stormwater Rates

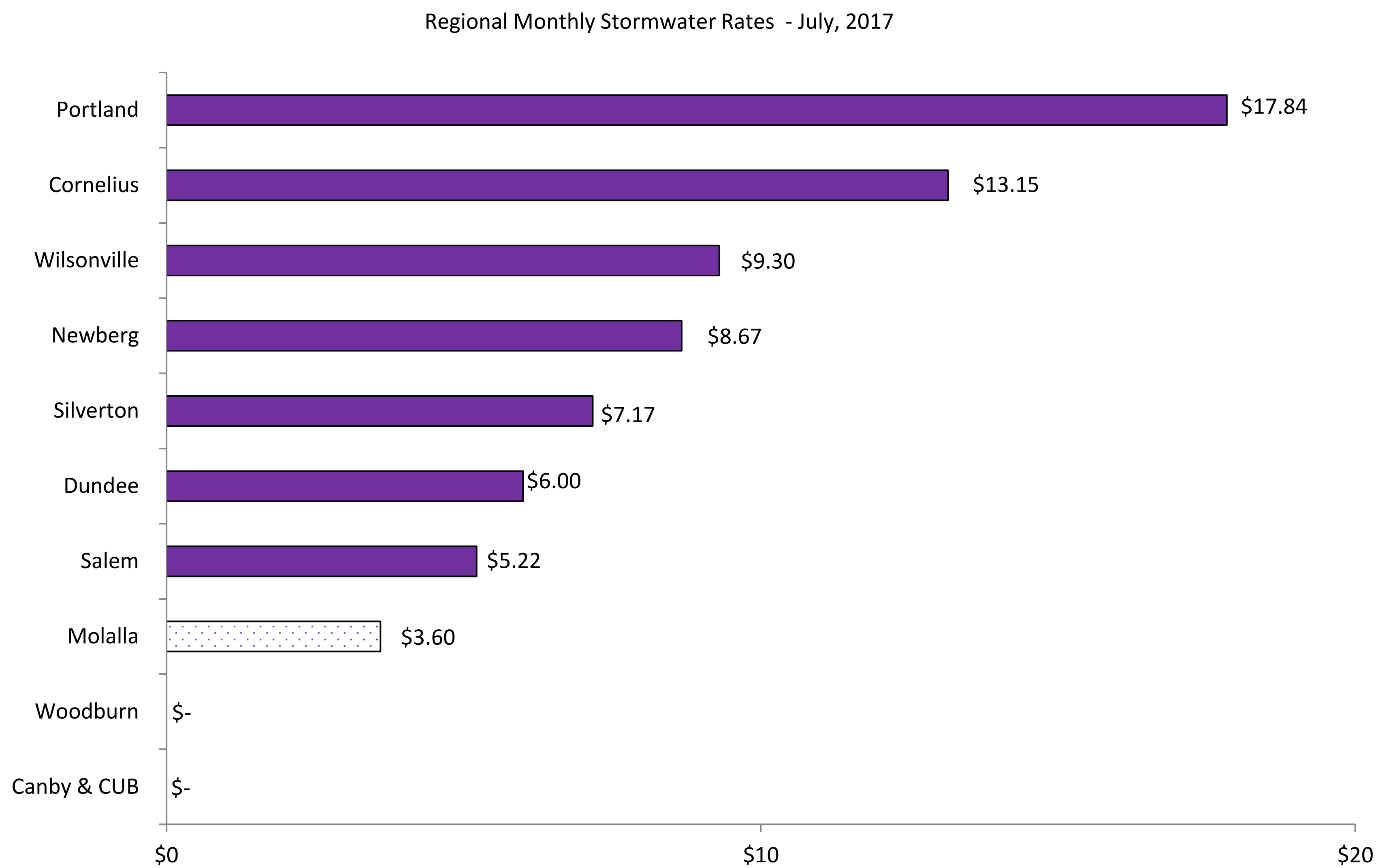
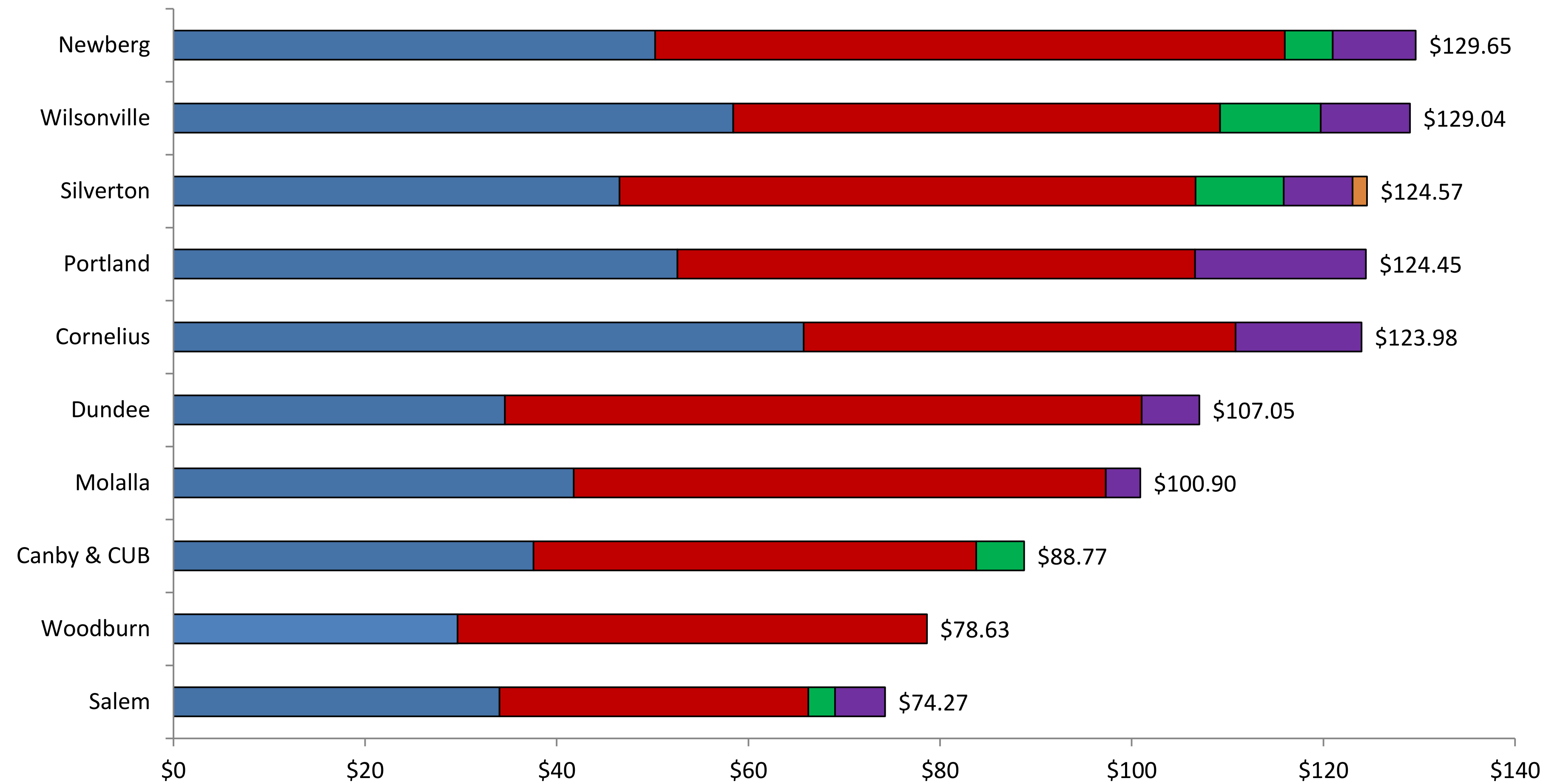


Figure 10 - Comparison of Neighboring Communities' Combined Water, Wastewater, Street Maintenance, Stormwater Rates, and Parks



	Salem	Woodburn	Canby & CUB	Molalla	Dundee	Cornelius	Portland	Silverton	Wilsonville	Newberg
Water	$34.02	$29.66	$37.57	$41.77	$34.59	$65.78	$52.60	$46.55	$58.41	$50.28
Wastewater	$32.23	$48.97	$46.20	$55.53	$66.46	$45.05	$54.01	$60.13	$50.82	$65.71
Street Maintenance	$2.80	$-	$5.00	$-	$-	$-	$-	$9.20	$10.51	$4.99
Stormwater	$5.22	$-	$-	$3.60	$6.00	$13.15	$17.84	$7.17	$9.30	$8.67
Parks	$-	$-	$-	$-	$-	$-	$-	$1.52	$-	$-
Total	$74.27	$78.63	$88.77	$100.90	$107.05	$123.98	$124.45	$124.57	$129.04	$129.65

I/I Assessment and Reduction Plan

City of Molalla
Oregon

Prepared For:
Oregon Department of Environmental Quality

Prepared By:
Jennifer Cline

NPDES Permit #:101514

January, 2015

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FIGURES

APPENDICES

ACRONYMS

CCTV	Closed Circuit Television
DEQ	Oregon Department of Environmental Quality
EPA	Environmental Protection Agency
FTE	Full Time Employee
GIS	Geographic Information System
GPS	Global Positioning System
I/I	Infiltration and Inflow
MACP	Manhole Assessment and Certification Program
MGD	Million Gallons per Day
MGH	Million Gallons per Hour
NPDES	National Pollution Discharge Elimination System
PACP	Pipe Assessment and Certification Program
RII	Rainfall Induced Infiltration
SDC	System Development Charges
SSES	Sewer System Evaluation Study
SSO	Sanitary Sewer Overflow
WWTP	Wastewater Treatment Plant

SECTION 1 INTRODUCTION

1.1 Purpose

Like many wastewater collection systems, the City of Molalla's collection system was designed according to industry standards, but now appears to experience levels of inflow and infiltration (I/I) that exceed levels originally expected. Consequently, the City has developed its I/I Assessment and Reduction Plan to implement a consistent, long-term approach to utilizing the City's limited resources to efficiently address I/I within the City's collection system.

The goals of the City's I/I Assessment and Reduction Plan include:

- Minimization of infiltration, inflow and exfiltration, and maximum conveyance of wastewater to the wastewater treatment plant;
- Efficient use of allocated funds; and
- Identification, design and prioritization of solutions to address I/I issues.

The intent of the City I/I Assessment and Reduction Plan is to optimize use of the City's limited human and material resources to effectively and efficiently address I/I. The City intends to establish its I/I Assessment and Reduction Plan as a matter of City policy.

The City's I/I Assessment and Reduction Plan complies with NPDES Permit No. 101514, Schedule D (July 1, 2014). Schedule D requires the City to develop an I/I plan within 180 days of the effective date of the NPDES permit. The NPDES permit requires the City's I/I program to address or include the following:

- Identification of all overflow points.
- Verification that sewer system overflows are not occurring up to a 24-hour, 5-year storm event or equivalent.
- Monitoring of all pump station overflow points.
- A process for identifying and removing inflow sources into the permittee's sewer system over which the permittee has legal control, including a time schedule for identifying and reducing inflow.
- If the permittee does not have the necessary legal authority for all portions of the sewer system or treatment facility, a strategy and schedule for gaining legal authority to require inflow reduction and a process and schedule for identifying and removing inflow sources once legal authority has been obtained.

The City's I/I Assessment and Reduction Plan addresses each of these items. It also outlines a comprehensive, long-term approach to efficiently prioritizing the City's I/I assessment and reduction efforts.

Maintaining the value of the City's investment in its infrastructure is vital. The collection system represents a major capital investment for the community and it is one of the community's major capital assets. Equipment and facilities will deteriorate through normal use and age. Maintaining value of the capital asset is a major goal of the City's I/I Assessment and Reduction Plan. The City's infrastructure provides crucial City's services and generates revenues. Proper reinvestment in capital facilities maintains the City's ability to provide those services at the lowest cost possible. It also helps ensure compliance with environmental requirements. As a capital asset, the collection system and wastewater treatment plant require ongoing investment to ensure design capacity while maintaining existing facilities and equipment, as well as extending the life of the system. The City will use its I/I Assessment and Reduction Plan to, in part, manage its assets; in this case, the collection system itself.

1.2 Background

The City of Molalla currently operates and maintains approximately 29.3 miles of sanitary sewer. In addition, the City maintains 5 lift stations and one wastewater treatment facility. Eleven (11) basins encompassing 1157.7 acres contribute flow to the wastewater treatment facility (see **Figure 1A**).

In February, 1997, the City's Public Works Department completed an I/I Field Monitoring Summary (1997 I/I Report) to determine the general condition of the wastewater conveyance system at that time. The 1997 I/I Report evaluated areas of the City that had significant I/I, specifically the older portions of the conveyance system where the pipes had been constructed mainly with concrete, AC and other materials that deteriorate with time. Flow metering was conducted at selected locations and data analysis was done utilizing a spreadsheet to calculate and organize the data. The data concluded that the following basins, as listed on the current Sewer Basin Map (**Figure 1**), appeared to have the highest I/I inputs: TL_A, TL_D, TL_F and BC_A.

More recently, when developing the 2013-14 fiscal budget, the City contracted with Curran-McLeod to complete an SDC Methodology and Sewer System Capital Improvement Plan (2013-14 Capital Improvement Plan). One component of the City's implementation of the 2013-14 Capital Improvement Plan in the 2013-14 fiscal budget was to target certain SDC funds for collection system I/I abatement and system expansion, trunk line upgrades and collection line upgrades.

In addition, over the past few years, the City has worked toward improving collection system reliability and maintenance. The City has completed the following activities as part of this work:

1. In 2013, the City purchased a new sewer jetter and vacuum truck to clean sewer lines and remove debris from manholes. The City's Public Works Department has integrated this equipment into its regular collection system maintenance activities.

2. In the 2013-14 Fiscal Year, the City budgeted $75,000 for I/I investigation to study the current system and identify areas for future targeted maintenance and capital improvements. This budget has been set aside to fund planned

field investigation work, but not limited to, I/I flow monitoring, smoke testing, dye testing, manhole or pipe inspections, training and data analysis.

3. In October 2014, the City completed mapping the collection system with GPS coordinates and utilizing current GIS technology. The City's updated Sewer Basin Map (**Figure 1**) provides the most comprehensive, accurate and complete map of the collection system the City has ever had.

1.3 Legal Authority

The City has the legal authority necessary to regulate the volume of flow entering the collection system, including from residential and commercial properties. *See* Molalla Code Ch. 13.08 (available at http://qcode.us/codes/molalla).

The City maintains strict control over the connection of private sewer laterals to sewer mains. Molalla Code Ch. 13.08.270. Generally, in older collection system such private sewer lateral connections can have significant potential to be sources of infiltration. Standards for new connections are clearly specified. Molalla Code Ch. 13.08.420. The City's sewer use ordinance also contains provisions for inspection, approval of new connections, and a program to implement the requirements. Molalla Code Ch. 13.08.620-640, 68-770 (inspections); Molalla Code Ch. 13.08.330-470 (new connections); Molalla Code Ch. 13.08.710 (authority to require repair of leaks).

The City also prohibits stormwater connections to the sanitary sewer. Molalla Code 13.08.440 ("No person shall make connection of roof downspouts, exterior foundation drains, areaway drains, or other sources of surface runoff or groundwater to a building sewer or building drain which in turn is connected directly or indirectly to a public sanitary sewer. (Ord. 2007-07 §1; Ord. 1976-2 Art. 4 §11)").

Direct stormwater connections to a separate sanitary sewer system are known as inflow. Inflow can severely impact the ability of the collection system to transport flows to the treatment plant during wet weather, leading to overflows and noncompliance with the wastewater treatment plant's NPDES permit. Generally, the City prohibits direct stormwater connections that could generate inflow. Consequently, the primary target of the City's I/I Assessment and Reduction Plan is infiltration.

1.4 Mapping

The City believes it crucial to develop and maintain accurate, current maps of the City's collection system. Efficient collection system maintenance and I/I identification requires functional maps. Collection system maps are also useful sources of information that City personnel use to carry out their assignments.

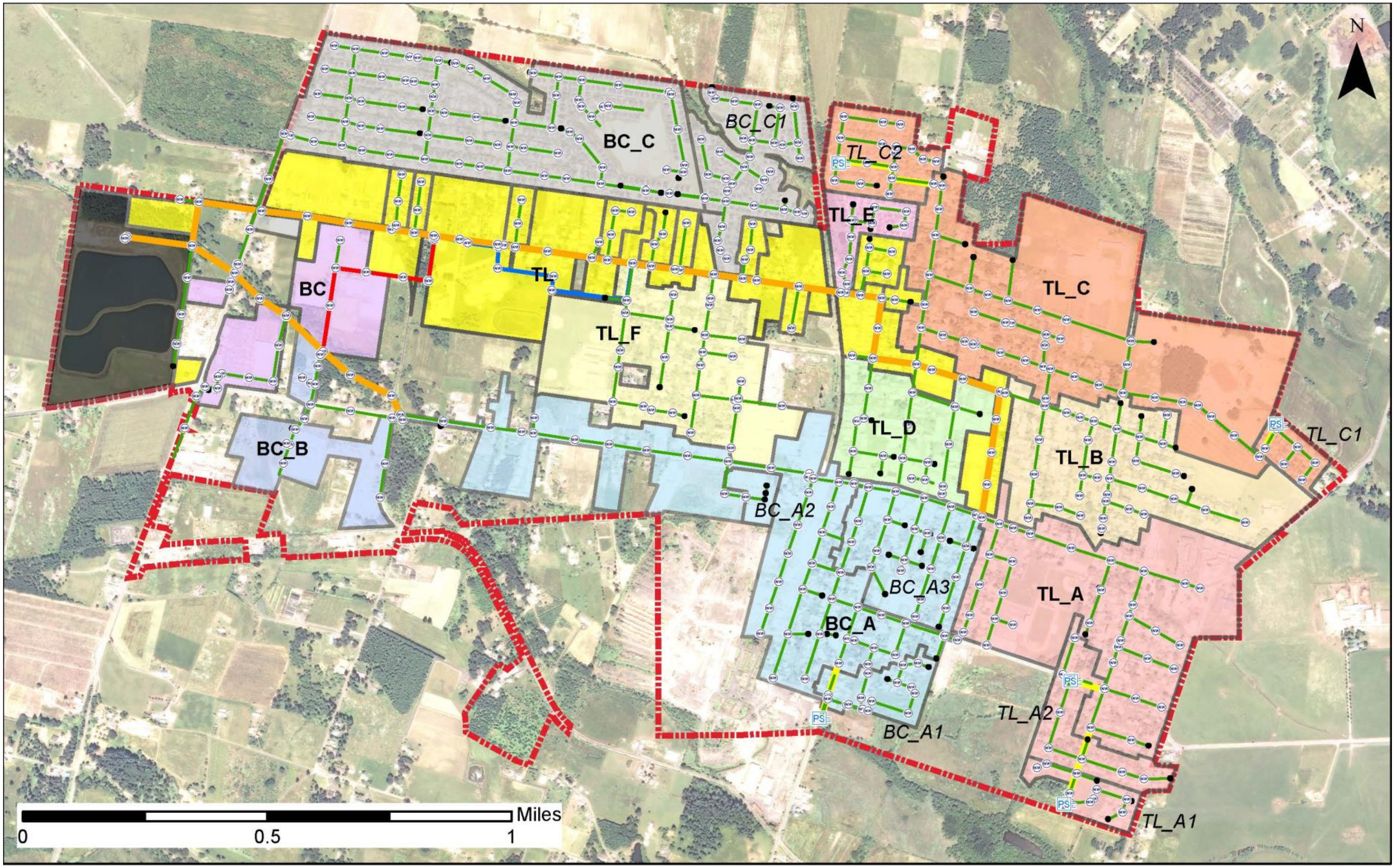
Prior to 2014, the City did not have a single unified map of sewer collection system features. As part of the City's ongoing O&M and general sewer system management and upgrade program, the City developed a GIS-based map of sewer system features. That Sewer Basin Map is shown in **Figure 1**.

The Sewer Basin Map contains information on the following:

- Mains, trunk lines and force mains;
- The Tolliver Bypass;
- The Bear Creek Bypass;
- Lift Stations;
- Lampholes;
- Manholes;
- Sub-basins and the City boundary (service area boundary); and
- The Wastewater Treatment Plant.

The City intends to continue to update the information contained on the Sewer Basin Map. The City plans to collect and add information concerning the following:

- Laterals;
- Cleanouts;
- The properties served; and
- Other landmarks (roads, water bodies).



Sewer Features

- Manholes
- Lampholes
- Lift Stations
- Sub-Basins

Sewer Mains

- Mains
- Trunk Lines
- Force Mains
- Tolliver Bypass
- Bear Creek Bypass

Other Features

- City Boundary
- Wastewater Treatment Plant

Figure 1: Sewer Basin Map

Map Prepared by the City of Molalla
Data current to Nov, 2014

SECTION 2 SELECTION OF STUDY AREAS

2.1 No I/I Historical Sewer System Overflows

The City of Molalla has had no known historic sewer system overflows (SSOs) associated with I/I since January 2006. The City does not presently have concerns that I/I related SSOs are likely nor has the Department of Environmental Quality expressed concern with the potential for I/I related SSOs in the City's collection system. In many Oregon cities, SSOs are a driver of I/I assessment and reduction programs because I/I often overwhelms the older collection systems present in many communities. Molalla does not have such a situation. The City's collection system and wastewater treatment plant is generally able to handle the wastewater quantities flowing into the wastewater treatment plant without any I/I related SSOs occurring.

2.2 Initial Prioritization of Sewer Basins

The City periodically evaluates the capacity of the sewer system in both wet and dry weather flows to ensure the capacity is maintained as it was designed. The City's I/I Assessment and Reduction Plan is intended to build upon ongoing activities and the everyday preventive maintenance that the City undertakes in the system.

The City's efforts as part of its I/I Assessment and Reduction Plan involve a number of components:

- Inventory and Prioritization;
- Flow Monitoring;
- Sewer System Testing;
- Identification of I/I Locations;
- Sewer Rehabilitation Program

The City's assessment begins with an inventory of the current collection system and prioritization of areas for initial investigation. The City's collection system inventory includes the following basic information about the system:

- Population served;
- Total system size;
- Inventory of pipe length, size, material and age, and interior and exterior condition as available;
- Inventory of appurtenances such as bypasses, siphons, diversions, pump stations, tide or flood gates and manholes, etc., including size or capacity, material and age, and condition as available;
- Force main locations, length, size and materials, and condition as available;

- Pipe slopes and inverts; and
- Location of laterals.

The next step in the City's assessment is to identify the locations of significant I/I input to the collection system. These locations may warrant further investigation in the form of flow and rainfall monitoring and inspection procedures to identify and quantify the I/I issues associated with a particular location. The City's ultimate goal is to identify the major sources of I/I that contribute to the influent entering the WWTP.

The City's collection system is divided into Ten (10) sewer basins and Eight (8) sewer sub-basins. For the purpose of its I/I Assessment and Reduction Plan, the City has prioritized these basins and sub-basins for assessment using factors such as the age of the basin and sub-basin infrastructure, known backups that have occurred at a given location, and anticipated high I/I areas. Since excessive I/I from deteriorated pipes, pipe joints, manholes, and illegal connections by private homeowners normally occurs to a greater extent in older sewer systems, the City's assessment has been prioritized accordingly.

Basin ID	**Manhole Count**	**Lamphole Count**	**Mileage (lines)**	**Acres Serviced**
Toliver Line Basins				
TL	**73**	**5**	**4.37**	**188.80**
*TL_GEN**	*26*	*3*	*1.48*	*63.93*
TL_A	**51**	**9**	**3.22**	**143.24**
TL_A1	*10*	*4*	*0.41*	*10.05*
TL_A2	*8*	*2*	*0.83*	*22.27*
TL_B	**32**	**5**	**1.82**	**81.60**
TL_C	**63**	**7**	**3.63**	**182.44**
TL_C1	*6*	*0*	*0.33*	*8.08*
TL_C2	*19*	*1*	*1.04*	*23.75*
TL_D	**15**	**7**	**1.11**	**41.02**
TL_E	**10**	**3**	**0.4**	**12.92**
TL_F	**28**	**3**	**1.63**	**83.90**
Bear Creek Line Basins				
BC	**27**	**2**	**1.56**	**43.83**
BC_A	**81**	**22**	**5.31**	**177.76**
BC_A1	*13*	*2*	*0.69*	14.44
BC_A2	*2*	*3*	*0.18*	5.47
BC_A3	*21*	*10*	*1.54*	41.15
BC_B	**16**	**1**	**0.65**	**31.35**
BC_C	**109**	**14**	**5.63**	**170.86**
BC_C1	*35*	*4*	*1.41*	40.02
Total**	**506**	**62**	**29.34*****	**1157.72**

Figure 1A: Collection System Basins

SECTION 3 SEWER SYSTEM EVALUATION STUDY

As part of the City's I/I Assessment and Reduction Plan, the priority basins and sub-basins identified in Section 2 will be studied to identify and assess the extent of I/I. All studies will generally follow the guidelines established in the Existing Sewer Evaluation & Rehabilitation, (WEF Manual of Practice FD-6 and ASCE/EWRI Manuals and Reports on Engineering Practice No. 62, 2010).

The City's program consists of the following six (6) key components:

- Administration;
- Public Relations;
- I/I Quantification;
- I/I Identification;
- Source Flow Analysis; and
- Final Recommendations and Implementation Plan.

The City will assign existing personnel (FTEs) to take on the roles of collection system I/I inspector/technician. These FTEs will be involved in all field inspection and rehabilitation activities, and will be supplemented by other City staff as necessary. An engineering consultant will assist with field inspections and will complete analysis of flow and rainfall data, quantify I/I flows based on field inspections, complete cost-effective analysis, and provide final recommendations for rehabilitation improvements.

The field inspections (I/I identification), source flow analysis, and the implementation plan will initially focus on critical areas identified during the investigation. These critical areas will be addressed first. Ultimately, the results of the investigation will be used to determine whether significant I/I is entering the collection system and to demonstrate whether I/I reductions can be achieved cost-effectively. The implementation plan will provide the projected costs of removing public sector I/I sources. Repairs that are shown to be cost effective will be compared with the costs of removing private sector (or laterals) I/I. The investigation will also determine whether private sector I/I is a significant source and, if so, how to cost-effectively address it.

3.1 Administration

Progress meetings will be held regularly to review the project goals, objectives, and schedule. Public hearings and Council meetings will be conducted to discuss the project and answer questions from the public and/or City.

3.2 Public Relations

Field inspection notification letters will be sent at least one week prior to any investigations. The notification letter will explain the field inspections that will be taking place and the reasons for these inspections. A press release will also be printed in the

City paper describing field inspections.

In the event that manhole structures identified for inspection are located on inaccessible private property, a door notification will be left for the property owner. The door notification will contain an explanation of the need to conduct an inspection of the structure, along with a telephone number enabling residents to contact the City for more information and to schedule a convenient time for the inspection.

Forty-eight hours (48) prior to smoke testing, a notification to potentially affected property owners will be provided via door hangers on homes and businesses. This notice will include general information about the testing, including instructions to fill infrequently used plumbing traps with water to prevent smoke from entering buildings via service lines. A telephone number will be provided enabling residents to contact the City for more information or with any special needs and concerns they may have.

3.3 I/I Quantification

Dry weather and wet weather flow rates measured in the system are a good indicator as to which priority areas experience significant I/I entering the system. The results of flow monitoring will be used to refine the priority ranking described in Section 2 so that the City can concentrate the assessment efforts on the areas that exhibit high rates of I/I.

3.3.1 Flow Monitoring

Fundamental information about the City's collection system can be obtained by flow monitoring. Flow monitoring provides information on dry weather flows as well as areas of the collection system potentially affected by I/I.

Flow measurements performed for the purpose of quantifying I/I are typically separated into three components: base flow, infiltration, and inflow. Base flow is generally taken to mean the wastewater generated without any I/I component. Infiltration is the seepage of groundwater into pipes or manholes through defects such as cracks, broken joints, etc. Inflow is the water which enters the sewer through direct connections such as roof leaders, direct connections from storm drains or yard, area, and foundation drains, the holes in and around the rim of manhole covers, etc. Many collection system owners or operators add a third classification: rainfall induced infiltration (RII). RII is stormwater that enters the collection system through defects that lie so close to the ground surface that they are easily reached. Although not from piped sources, RII tends to act more like inflow than infiltration.

In addition to the use of flow meters, other methods of inspecting flows will be employed such as visually monitoring manholes during low-flow periods to determine areas with excessive I/I. For a small system like Molalla's, this technique is often an effective and low-cost means of identifying problem areas in the system which require further investigation.

The City's goal is to efficiently identify locations of excessive I/I within its system. The program looks at the wastewater treatment plant, pump stations, flows, and rainfall data to characterize peaking factors for the system.

For the flow monitoring portion of its investigation, the City plans to purchase and place eight (8) temporary flow meters within the collection system. The City calculated the flow meter study design using the flow meter assessment rule of thumb of 1 meter per 15,000-25,000 linear feet (LF). The City currently has 29.34 miles or 154,915 LF of existing collection lines. Thus, eight flow meters will provide sufficient data with which to assess flows in the system under wet and dry conditions.

The flow meters are area velocity flow modules with sensors. The flow meters record flow, velocity and depth readings every fifteen minutes. The collection system's response to wet-weather events will be monitored through the winter of 2015, with a monitoring period for 2 weeks in late summer to determine average dry weather flow.

The data collected with the flow meters will be used to determine the flows in each basin and sub-basin under wet and dry conditions.

3.3.2 Rainfall Monitoring

Rainfall monitoring will be conducted concurrently with flow monitoring activities. A rainfall gauge will be placed near the center of town. Data collected from the rainfall gauge will be used in conjunction with flow monitoring data.

The flow and rainfall data collected will be analyzed for the following:

- Average daily and peak hourly dry-weather flows
- Peak high groundwater infiltration flows
- Peak wet-weather inflows
- Peak wet-weather total flows

The results of the flow analysis will be used to rank basins and sub-basins on I/I contributions to the collection system and to refine the priority ranking described in Section 2.

3.4 Interviews

Prior to field inspections, the City will interview current and past staff about the existing sewer system. City staff who have worked with the collection system are the people who are most familiar with the system. The City expects that those staff may have information on defect locations and the history of the performance within areas of the system. The staff also may have information on private property problems within the system. In areas with previously reported backups, residents will be interviewed during the field inspection process to determine the history of the problems.

The information collected from staff members and residents will be noted and special attention given in the field to the areas with historical problems.

3.4.1 Manhole and Visual Pipe Inspections

Defective manholes are typically significant contributors of I/I in a sanitary sewer system. Manhole inspections are used to locate these sources of I/I, assess the conditions and the state of deterioration inside manholes, and to determine the need for repair or replacement. Visual inspection of manholes and pipelines are the first line of defense in the identification of existing or potential problem areas. Visual inspections will take place on both a scheduled basis and as part of any preventive or corrective maintenance activity. Visual inspections provide additional information concerning the accuracy of system mapping, the presence and degree of I/I problems, and the physical state-of-repair of the system.

Manhole inspections will be accomplished using a two-person crew. Manholes will generally be inspected from the surface using survey rods, digital cameras, mirrors, and high-powered spot lights. Industry standard OSHA, NIOSH, and NASSCO confined space entry policies and practices will be followed to ensure safe entry and egress of all confined spaces.

Manhole inspection forms and visual pipe inspection forms will be completed for each manhole. Example forms are contained in Appendix A. The forms include a field sketch of the plan view of each manhole to verify sewer line configurations. Digital photographs of each manhole and the connecting pipe sections will be taken during manhole inspections. All photos shall be taken north-facing to ensure consistency and provide a standard point of reference for viewing and analysis.

The following manhole components will be inspected for signs of I/I and for structural soundness per the NASSCO Manhole Assessment Certification Program (MACP) inspection guidelines. Digital photographs will also be taken of noted I/I defects and other non-I/I related defects such as roots, debris, or structurally deteriorated steps.

Each field crew will use metal detectors and probing rods where necessary to assist in locating manholes. If a manhole cannot be located during a 15-minute time period, the manhole shall be placed on a “Can Not Locate” list and provided to the City with a general map of the position for location services at a later time. If a manhole is found to be buried, the approximate location of the manhole will be identified in the field and submitted to the City. New manholes found by field crews shall be assigned a temporary manhole number consisting of the last known downstream manhole number followed by a T1, T2, T3, etc., as applicable. If located on public sewer mains, these manholes will be inspected and location details for the manhole will be provided to the City.

In addition to manhole structure inspections, the incoming and outgoing sanitary sewer lines will be visually inspected by a pole mounted camera from accessible manholes. This procedure is called a visual pipe inspection and will be conducted in accordance with MACP guidelines. Data from the visual pipe inspection will be used to identify defects near the manhole structure and to select lines for further investigation through CCTV inspections.

Prior to inspection, all Public Works crew members will attend an MACP/PACP and QC informational training on the standardized processes for inspection of manholes and collection pipes.

The manholes will be labeled according the City's manhole ID numbers. The size, type, depth and condition of the manhole and pipes will be collected. Photos will be taken and recorded on each inspection form.

All of the information collected will be used to estimate the amount of rehabilitation work required for each manhole. The typical defects found in manholes are: broken/cracked covers, broken/cracked frames, deteriorated frame seals, deteriorated frame adjustments, defective cones, defective walls, defective or deteriorated steps, deteriorated troughs or inverts, deteriorated pipe seals, and deteriorated benches.

The following equipment will be used to perform the manhole and visual pipe inspections:

- Manhole pick and shovel to open the manholes;
- Wrench to open bolted down manholes;
- Flashlight;
- Camera mounted on a bar;
- Hand held camera;
- Traffic control equipment such as cones, signs, flags, etc.;
- Metal detector; and
- Probing rods.

3.4.2 Smoke Testing

Smoke testing is a relatively inexpensive and quick method of detecting sources of inflow in sewer systems, such as down spouts, or driveway and yard drains and works best for detecting cross connections and point source inflow leaks.

The City will conduct smoke testing on all line segments located within the priority basins in order to detect I/I sources, to locate manholes not identified on the City's existing map, and to obtain a lineal footage of the sewer line segments for the system inventory. Smoke sources will be photographically documented and precisely located with a handheld GPS unity to allow for efficient analysis and, as necessary, repair.

Although the initial purpose of the testing will not be to identify private sources of I/I, the smoke testing will likely identify some of these private sources. These sources will be recorded and the City will request that the homeowner remove any illicit connections identified through smoke testing.

Smoke testing will be used to augment the manhole and visual pipe inspections. Prior to any smoke testing, the fire department will be notified and door hangers will be placed at each property. An example notification letter/door hanger is provided in Appendix B.

Smoke testing will be completed by blowing white smoke into an isolated line segment with high-capacity blowers. Blowers will be placed over an isolated line segment and three five-minute smoke bombs will be inserted into the blower intake to blow smoke into the sewer. Smoke emissions from sewer mains, storm sewers, and manholes indicate possible leaks and cross connections.

Every sewer segment within the study scope will be attempted. Before any smoke testing is conducted a training workshop with the inspection crew will be conducted. Smoke testing forms and procedures will be explained. A smoke testing crew will consist of two people. One person will set up the smoke test for a segment while the other will walk around and note everywhere they see smoke, record the location with a hand held GPS unit, and take pictures of each emission. While one person from the crew is setting up for the next segment, the other person will be filling out the smoke testing form from the previous smoked segment. There will be one smoke testing crew.

The segment of main that will be smoked will be identified by an upstream and downstream manhole ID. A map created from the recorded locations of the handheld GPS unit of all visible smoke will be a description of the location (streets/cross-streets, address) with ties to this location (measurement from the corner of a building, house, survey marker, etc.). The smoke will be rated as light, medium, or heavy and the area that drains to this leak will be estimated and photographs will be taken. An example smoke testing form is provided in Appendix A.

The following equipment will be needed to perform the smoke testing:

- Blower;
- Sandbags;
- Smoke bombs;
- Flags;
- Hand held cameras;
- Tape measure;
- Manhole pick and shovel;
- Wrench for bolt down manhole lids;
- Flashlight; and
- Traffic control equipment such as cones, signs, flags, etc.

3.4.3 CCTV

The CCTV utilizes a closed circuit television camera to observe the conditions on the sewer mains and detect any defects. Inspections will be conducted per the NASSCO Pipeline Assessment Certification Program (PACP). For each segment that is inspected, a form will be completed, data collected electronically and a videotape of the segment will be created.

A CCTV inspection crew will consist of two people full time. There will be one crew member who will conduct the CCTV inspections.Before any CCTV inspections are conducted, a training of the inspection crew will be conducted. CCTV inspection forms (if necessary), controls and procedures will be explained.

The equipment that will be needed for the testing is as follows:

- Equipment required to clean sewer main segments
- Equipment required to conduct CCTV inspections of sewer main segments

The CCTV inspection will take place immediately following the field investigations, manhole inspection and smoke testing.

3.4.4 Dyed-Water Testing

Dyed-water testing is a rainfall simulation technique used to identify defects that can contribute significant I/I during a storm event. Dyed water testing may be used to establish the connection of a fixture or appurtenance to the sewer. It is often used to confirm smoke testing or to test fixtures that did not smoke. As is the case with smoke testing, it is not used on a routine basis but rather in areas that have displayed high wet weather flows. Dyed water testing can be used to identify structurally damaged manholes that might create potential I/I problems. This is accomplished by flooding the area close to the suspected manholes with dyed water and checking for entry of dyed water at the frame-chimney area, cone/corbel, and walls of the manhole.

Dyed-water will be deposited into the storm sewers, streams, ditches, or driveway, stairwell, or area drains that are suspected to be connected to, or leaking into, the sewer system. The presence of dye-water in the adjacent downstream manhole, or within the sewer main, observed visually by inspectors or through CCTV, indicates infiltration.

A dyed-water testing crew will consist of two people. There will be one crew member who will conduct the dyed-water testing and CCTV inspections. Only suspected cross connections, or leakage into the sewer system, identified through manhole, visual pipe, and smoke testing within the priority areas will be dyed-water tested.

Before any dyed-water testing is conducted, a training workshop with the inspection crew will be conducted. Dyed-water testing forms and procedures will be explained. An example dyed-water test form is included in Appendix A.

Fluorescent dyes will be used for dyed-water testing. The equipment that will be needed for the testing is as follows:

- Equipment required to carry water to the site;
- Fluorescent dye;
- Sand bags to block sewer segments;
- CCTV equipment, if required;
- Manhole pick and shovel;
- Wrench for bolt down manhole lids;
- Flashlight; and
- Traffic control equipment such as cones, signs, flags, etc.

The dyed-water testing will be conducted concurrently with Smoke or CCTV inspections, as potential I/I sources are identified.

3.5 Establishing Source Flows and Costs

Once the field inspections for a priority area have been completed, the data collected will be analyzed to determine how much I/I was identified (in terms of flow rates) and the associated reduction options and associated costs to remove this I/I from the system. These costs will be used to conduct a cost effective analysis to determine the most effective and efficient use of the City's limited funds.

Recognizing that the observations of I/I during manhole inspections, CCTV, smoke testing, and dye-testing may not be truly representative of the I/I entering the system during peak wet-weather events, the flow monitoring data will be used to calibrate a hydrologic and hydraulic model that will "mimic" the City's collection system and predict the I/I from each basin.

Based on work done in numerous communities in the Willamette Valley, the City is initially contemplating a basin-wide approach to collection system rehabilitation for the purposes of I/I abatement. This may include both the public and private portions of the collection system, including private laterals. Pilot projects may be implemented to determine the cost-effectiveness of this approach.

Once modeling has been completed and basins have been prioritized based on leakage rates, a cost effective analysis will be completed. This cost effective analysis will first determine what sources are the most cost effective to remove and how this cost compares to the cost of transporting and treating the I/I.

3.6 Recommendations and Implementation Plan

The completed inspections forms, video, and photographs will be incorporated into a database and/or other Asset Management tool. Through field inspections, it may be found that most of the defects are located on mains of a certain age or within certain areas. These mains can be grouped by these categories to better prioritize rehabilitation efforts. The field inspection forms for all field activities can be integrated. Once the data has been entered, QA/QC will be conducted to ensure all information was input correctly.

During field inspections, immediate attention items and maintenance items will be identified as work orders or scheduled maintenance. This will help to ensure that these items get repaired in a timely fashion.

A final report for each sewer basin will be provided in a clear and concise format summarizing the findings and recommendations for the field investigations and data analysis. The following information will be included in the reports:

- Executive Summary – highlights all tasks performed, conclusions, recommendations, and costs.
- Background Information – describes the problem statement, previous studies and rehabilitation work within the study area.
- Sewer Map – delineates sub-basins monitoring locations, and sewer sizes.
- Field Data Analysis – tabulates the results of the field activities and quantifies I/I flows per source.
- Recommendations – lists the recommended activities for each basin, including cost and finalized implementation schedule.
- Appendix – includes a complete bound copy of written inspection forms and a CD containing scanned images of the inspection forms and digital inspection photos.

SECTION 4 I/I REDUCTION

The I/I Reduction Plan to manage and control peak wastewater flows will consist of public sector I/I reduction/elimination. I/I reductions will be divided into the following categories:

- Priority 1 – Cost Effective Rehabilitation
- Priority 2 – Structural Rehabilitation
- Preventative Maintenance
- Post-Rehabilitation Flow Monitoring

The City has a sewer rehabilitation program, but it typically has addressed major problems when they occur, such as pipeline backups. The objective of the City's updated sewer rehabilitation program, as outlined in this I/I Assessment and Reduction Plan, is to maintain the overall viability of the City's collection system. This is done in three ways: (1) ensuring its structural integrity; (2) limiting the loss of conveyance and wastewater treatment capacity due to excessive I/I; and (3) controlling exfiltration from the pipe network. The rehabilitation program builds on information obtained from all forms of maintenance and observations made during O&M, as well as the specific investigative activities described in this Plan.

There are many rehabilitation methods which the City considers for particular issues. The City's choice of methods for addressing a given issue depends on pipe size, type, location, dimensional changes, sewer flow, material deposition, surface conditions, severity of I/I, and other physical factors, as well as cost-benefit ratio, available or anticipated funding and priority in comparison to other existing or anticipated O&M issues.

4.1 Priority 1 – Cost Effective Rehabilitation

Cost-effective rehabilitation are those repairs that remove I/I and meet the lowest costs as determined by the composite cost curve method described in Section 3.5. Cost effective rehabilitation can consist of manhole, pipeline and public lateral rehabilitation, as well as closing off stormwater sources.

4.1.1 Manhole Rehabilitation

Cost-effective manhole rehabilitation is typically focused on the top-end of the manhole where higher I/I flows are usually found. Such rehabilitation can include the following:

- Replace Vented Covers Below Grade;
- Raise Manhole to Grade;
- Replace/Rehabilitate Frame/Seal; and/or
- Replace/Rehabilitate Chimney.

4.1.2 Pipeline Rehabilitation

Cost-effective pipeline rehabilitation may consist of the following methods:

- Point Repairs;
- Full Line Replacement;
- Full Line Rehabilitation;
- Abandon/Realign Pipeline;
- Defective Service Tap Rehabilitation;
- Disconnecting Direct Storm Connections; and
- Disconnecting Indirect Storm Connections.

4.2 Priority 2 – Structural Rehabilitation

Additional defects that exhibited enough structural deterioration to warrant rehabilitation but may not be classified as cost effective will be recommended for further evaluation and possible repair. Structural rehabilitation also consists of both manhole and pipeline rehabilitation.

4.2.1 Manhole Rehabilitation

Structural manhole rehabilitation may consist of the following methods:

- Replace/Rehabilitate Frame Seal;
- Replace/Rehabilitate Chimney;
- Rehabilitate Cone and Wall;
- Rehabilitate Bench and Invert; and
- Rehabilitate Pipe Seals.

4.2.2 Pipeline Rehabilitation

Structural pipeline rehabilitation may consist of the following methods:

- Point Repairs;
- Full Line Replacement;
- Full Line Rehabilitation; and
- Abandon/Realign Pipeline.

4.3 Preventative Maintenance

The City is currently developing a preventative maintenance and emergency maintenance plan to more explicitly describe the City's current O&M activities. The City will integrate preventative maintenance activities into its O&M activities to address those areas with identified I/I but which are lower on the priority scale.

4.4 Post-Rehabilitation Flow Monitoring

Following the rehabilitation of individual study areas, post-rehabilitation flow analysis will be conducted to measure the success of the program. Flow monitoring will be performed in the same locations as were monitored prior to rehabilitation. Flow data will then be compared to pre-rehabilitation flow monitoring. Results will be evaluated to determine the success of the rehabilitation program and whether future rehabilitation methods should be altered.

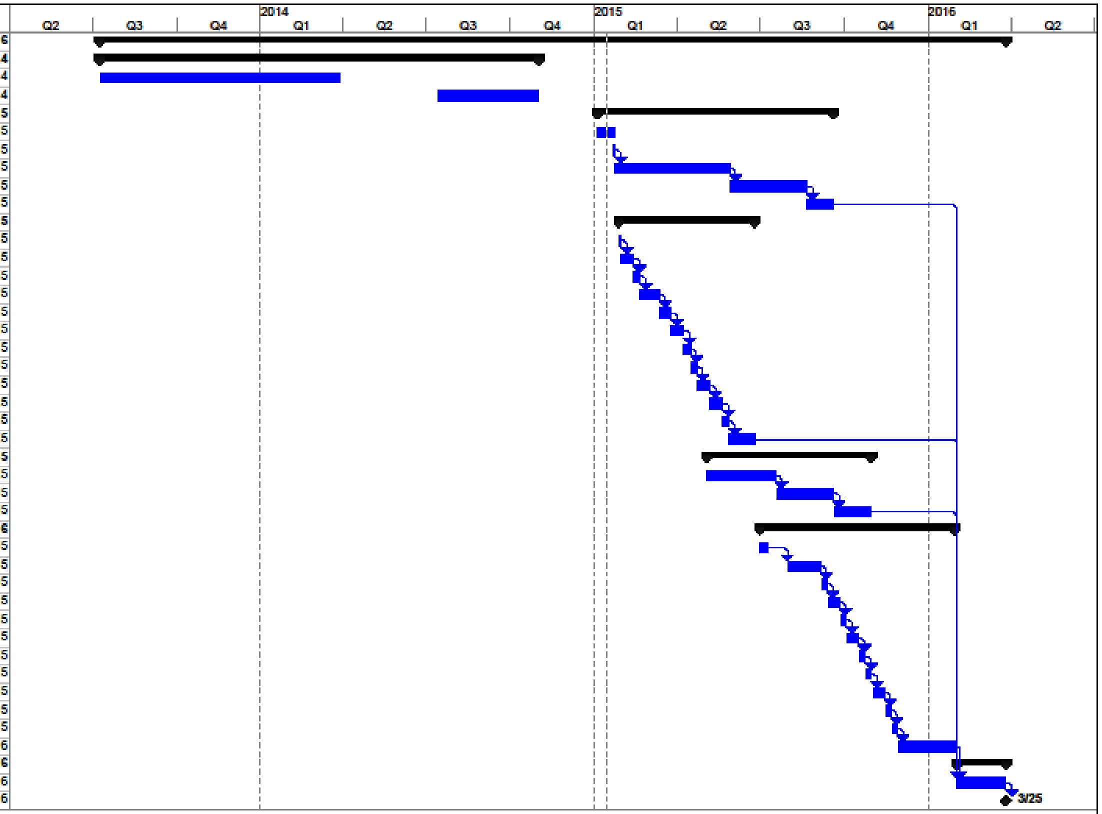
SECTION 5 PROJECT SCHEDULE

A project schedule for completion of the SSES and related I/I reduction improvements is presented in **Figure 2**. Each basin will be studied separately and is divided into five categories: initial flow monitoring; completion of the SSES, including the cost-benefit analysis and preparation of the final report; design and bidding of the selected I/I rehabilitation improvements; construction of the selected I/I rehabilitation improvements; and post-rehabilitation flow monitoring.

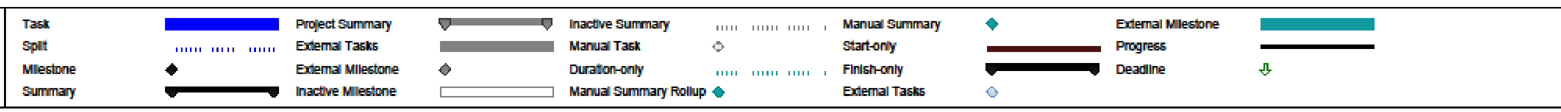
The project schedule is constrained by weather and other uncontrollable factors. For example, smoke testing cannot be performed when the soil surrounding the pipes is saturated or frozen or during windy days. Inspections will only be conducted during working hours, excluding holidays, and weather permitting days.

Figure 2: Proposed Schedule for I/I Assessment and Reduction Activities

ID		Task Name	Duration	Start	Finish
1		**City of Molalla I/I Removal Program - Characterization Phase**	**709 days**	**Tue 7/9/13**	**Fri 3/25/16**
2		**Pre-Field Activities**	**344 days**	**Tue 7/9/13**	**Fri 10/31/14**
3		Ordered Vac Truck	189 days	Tue 7/9/13	Fri 3/28/14
4		Map Collection System	80 days	Mon 7/14/14	Fri 10/31/14
5		**Flow Meters Analysis**	**185 days**	**Mon 1/5/15**	**Fri 9/18/15**
6		Purchase Flow Meters/Training	14 days	Mon 1/5/15	Thu 1/22/15
7		Install Flow Meters	2 days	Wed 1/21/15	Thu 1/22/15
8		Bi-weekly Flow Readings	90 days	Fri 1/23/15	Thu 5/28/15
9		Hydrologic/Hydraulic Modeling	60 days	Fri 5/29/15	Thu 8/20/15
10		Flow Data Analysis Report	21 days	Fri 8/21/15	Fri 9/18/15
11		**Manhole Inspections**	**106 days**	**Wed 1/28/15**	**Wed 6/24/15**
12		PACP/MACP Training	2 days	Wed 1/28/15	Thu 1/29/15
13		Inspect Basin TL_A	10 days	Fri 1/30/15	Thu 2/12/15
14		Inspect Basin TL_B	5 days	Fri 2/13/15	Thu 2/19/15
15		Inspect Basin TL_C	15 days	Fri 2/20/15	Thu 3/12/15
16		Inspect Basin TL_D & TL_E	9 days	Fri 3/13/15	Wed 3/25/15
17		Inspect Basin BC_A	10 days	Thu 3/26/15	Wed 4/8/15
18		Inspect Basin TL_F	5 days	Thu 4/9/15	Wed 4/15/15
19		Inspect Basin BC_C1	5 days	Thu 4/16/15	Wed 4/22/15
20		Inspect Basin BC_C	10 days	Thu 4/23/15	Wed 5/6/15
21		Inspect Basin BC_B & GEN	10 days	Thu 5/7/15	Wed 5/20/15
22		Inspect Basin TL	5 days	Thu 5/21/15	Wed 5/27/15
23		Manhole Inspection Report	20 days	Thu 5/28/15	Wed 6/24/15
24		**Smoke/Dye Testing**	**130 days**	**Mon 5/4/15**	**Fri 10/30/15**
25		Notify Public of Smoke Testing	55 days	Mon 5/4/15	Fri 7/17/15
26		Smoke Testing/Dye Testing	45 days	Mon 7/20/15	Fri 9/18/15
27		Smoke/Dye Testing Analysis Report	30 days	Mon 9/21/15	Fri 10/30/15
28		**CCTV**	**153 days**	**Wed 7/1/15**	**Fri 1/29/16**
29		Request Funding & Purchase CCTV Camera	6 days	Wed 7/1/15	Wed 7/8/15
30		Inspect Basin TL_A	26 days	Fri 7/31/15	Fri 9/4/15
31		Inspect Basin TL_B	5 days	Mon 9/7/15	Fri 9/11/15
32		Inspect Basin TL_C	10 days	Mon 9/14/15	Fri 9/25/15
33		Inspect Basin TL_D & TL_E	5 days	Mon 9/28/15	Fri 10/2/15
34		Inspect Basin BC_A	10 days	Mon 10/5/15	Fri 10/16/15
35		Inspect Basin TL_F	5 days	Mon 10/19/15	Fri 10/23/15
36		Inspect Basin BC_C1	5 days	Mon 10/26/15	Fri 10/30/15
37		Inspect Basin BC_C	10 days	Mon 11/2/15	Fri 11/13/15
38		Inspect Basin BC_B & GEN	5 days	Mon 11/16/15	Fri 11/20/15
39		Inspect Basin TL	5 days	Mon 11/23/15	Fri 11/27/15
40		CCTV Inspection Report	45 days	Mon 11/30/15	Fri 1/29/16
41		**Infiltration & Inflow Removal Analysis**	**40 days**	**Mon 2/1/16**	**Fri 3/25/16**
42		I & I Cost Effective Analysis	40 days	Mon 2/1/16	Fri 3/25/16
43		I & I Cost Effective Analysis Report Complete	0 days	Fri 3/25/16	Fri 3/25/16



City of Molalla, Oregon
Figure 2



City of Molalla, Oregon Figure 2			
	Task	Project Summary	Inactive Summary
	Split	External Tasks	Manual Task
	Milestone	External Milestone	Duration-only
	Summary	Inactive Milestone	Manual Summary Rollup

Appendix A

Field Inspection Forms

MANHOLE INSPECTION FORM

Surveyor's name (1)	Certificate number (1a)	System Owner (2)	Survey Customer (3)
Drainage Area (4)	Sheet No. (5)	P.O. No. (6)	Date (CCYY/MM/DD) (8)
Time (9)	Location (No. & Name) (10)	Locality/City Name (10a)	Further Location Details (11)
Manhole Number (12)	Outgoing Rim to Invert (13)	Outgoing Grade to Invert (14)	Rim to Grade (15)
Use of Sewer (20)	Year Laid (31)	Year Rehabilitated (32)	Tape/Media Number (33)
Purpose (34)	Sewer Category (35)	Pre-Cleaning (36)	Date Cleaned (CCYY/MM/DD) (36a)
Weather (37)	Location Code (38)	Additional Information (39)	Manhole Surface Type (40)
Potential for Runoff (41)	Access Point Type (42)	Northing (43)	Easting (44)
Elevation (45)	Coordinate System (46)	Accuracy of GPS (47)	Inspection Status (48)
Evidence of Surcharge (49)	Image Reference (50)	Video Name (51)	

SKETCH

MANHOLE COMPONENT OBSERVATIONS

Cover Shape	Cover Size/ Width		Cover Material	Cover Type	Vent Hole Diameter	# Vent Holes

Cover Bearing Surface Diameter/Width		Cover/Frame Fit	Cover Condition	Cover Insert Type	Cover Insert Condition

MH Adjustment Ring Type	MH Adjustment Ring Condition	MH Adjustment Ring Height

Frame Material	Frame Bearing Surface Width	Frame Bearing Surface Depth	Frame Clear Opening Diameter

Frame Condition	Frame Seal Condition	Frame Offset Distance	Frame Seal Inflow	Frame Depth	Chimney Material 1

Chimney Material 2	Int. Chim. Coating/Liner	Ext. Chim. Coating/Liner	Chimney I/I	Chimney Clear Opening	Chimney Depth

Cone Type	Cone Material	Int. Cone Coating/Liner	Ext. Cone Coating/Liner	Cone Depth	Wall Diameter (length/width)	

Wall Material	Int. Wall Coating/Liner	Ext. Wall Coating/Liner	Wall Depth	Bench Present?	Bench Coating/Liner

Bench Material	Channel Installed	Channel Material	Channel Type	Channel Exposure	# Steps

Step Material

PIPE CONNECTION FIELDS

Pipe Number	Pipe Clock Position	Rim to Invert	Pipe Direction	Pipe Material	Pipe Shape	Pipe Diameter	Pipe Width	Pipe Seal Condition	Pipe Special Condition	Connects to Access Point ID

Date: ____/____/____

Crew: ________________

SMOKE TESTING

City of Molalla, Oregon

Project No. ____________

Sub-Basin ____________

Line Segment: (   ) __________________ **Upstream** **To** (   ) __________________ **Downstream**

Weather Conditions: ____________
1 = 110-90°, 2 = 90-80°, 3 = 80-70°, 4 = 70°-below

Ground Conditions: ____________
1 = dry, 2 = moist, 3 = wet, 4 = saturated

Precipitation: ____________
1 = dry, 2 = drizzle, 3 = rain

Last Rain Event: ____/____/____

Pipe Length (ft.): ____________

Pipe Diameter (in.): ____________

Status Code: ____________

Measure Code: ____________

Status Code:
1=C.N.L. 4=Line too long
2=D.N.E. 5=Diameter too large
3=Buried 6=Complete

Measure Code:
1=Scaled from Map 4=Total Station
2=Walking Wheel 5=Estimated
3=Tape Measure

PART A: PRIVATE SECTOR

Smoke Defect No.	Bldg. Defect No.	Address	Defect Type	*Optional*: Footage (0=DS MH)	Offset (L/R)	Offset Footage	Smoke Intensity	Photo ID
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								

Defect Type:
1 = Downspout
2 = Uncapped Cleanout
3 = Driveway Drain
4 = Stairwell Drain
5 = Foundation Drain
6 = Area Drain
7 = Service Lateral
8 = Window Well
9 = Plumbing Defect

Smoke Intensity:
1 = Light
2 = Medium
3 = Heavy

PART B: PUBLIC SECTOR

Defect No.	Defect Type	Footage (0=DS MH)	*Optional*: Offset (L/R)	Offset Footage	Smoke Intensity	Photo ID	Comments
S							
T							
U							
V							
W							
X							
Y							
Z							

Defect Type:
1=Curb Inlet
2=Area Drain
3=Line Defect
4=Indirect Storm
5=Manhole Defect
6=Drainage Crossing
7=Water Valve
8=Direct Storm

Smoke Intensity:
1=Light
2=Medium
3=Heavy

Additional Comments: ________________________

Date: ____/____/____

Crew: ______________

____

____

DYE TESTING

City of Molalla, Oregon

Project No.: ____________

Sub-Basin: ____________

Manhole No. (   ) ______________________________

Address: **House No.** ______________________________

Street: ______________________________

Locality: ______________________________

Precipitation: ______________________________
1 = None, 2 = Light Rain, 3 = Heavy Rain, 4 = Snow

Ground Conditions: ______________________________
1 = Dry, 2 = Damp, 3 = Wet, 4 = Standing Water

Downstream Pipe Length: ________________ (ft.)

PART A: PRIVATE SECTOR

Drain No.	Type	Positive Y	Positive N	Suspect	Comments
A	______	☐	☐	☐	______________________
B	______	☐	☐	☐	______________________
C	______	☐	☐	☐	______________________
D	______	☐	☐	☐	______________________
E	______	☐	☐	☐	______________________
F	______	☐	☐	☐	______________________
G	______	☐	☐	☐	______________________
H	______	☐	☐	☐	______________________
I	______	☐	☐	☐	______________________
J	______	☐	☐	☐	______________________

Type:
1 = Downspout
2 = Uncapped Cleanout
3 = Driveway Drain
4 = Stairwell Drain
5 = Foundation Drain
6 = Area Drain
7 = Service Lateral
8 = Window Well

PART B: PUBLIC SECTOR

Defect No.	Defect Type	Footage (0=DS MH)	Positive Y	Positive N	Suspect	Comments
S	____	______	☐	☐	☐	______________________
T	____	______	☐	☐	☐	______________________
U	____	______	☐	☐	☐	______________________
V	____	______	☐	☐	☐	______________________
W	____	______	☐	☐	☐	______________________
X	____	______	☐	☐	☐	______________________
Y	____	______	☐	☐	☐	______________________
Z	____	______	☐	☐	☐	______________________`

Defect Type:
1=Curb Inlet
2=Area Drain
3=Line Defect
4=Indirect Storm
5=Manhole Defect
6=Drainage Crossing
7=Water Valve
8=Direct Storm

Additional Comments: ______________________________

____

____

____

Appendix B

Example Notification Letter and Door Hanger

Public Works
117 N Molalla Avenue, PO Box 248, Molalla, Oregon 97038
Phone: (503) 829-6855 Ext. #218 Fax: (503) 829-3676
jcline@cityofmolalla.com

Date

Resident name _______________________
Address______________________________
____

Re:

Dear Resident:

The City of Molalla will soon be implementing field inspection activities as part of the City's ongoing efforts to improve the sanitary sewer system. These improvements are intended to eliminate excess stormwater and groundwater from entering the sanitary sewer system. This excess stormwater and groundwater overloads the sanitary sewers causing basement flooding and sewer back-ups during and after periods of heavy rainfall. These field inspections will lead to improvements to the sanitary sewer system.

The field inspection activities include conducting smoke testing activities during the summer months. The purpose of "SMOKE TESTING" is to locate obstructions and defects in the sanitary sewer collection system. The smoke that you see coming from the vent stacks on houses or holes in the ground is: **NON-TOXIC, HARMLESS, HAS NO ODOR, AND CREATES NO FIRE HAZARD.**

The smoke should not enter your house unless you have defective plumbing or dry drain traps. If this occurs, you should consult your licensed plumber. In any event, the smoke can enter through faulty plumbing. The potential, likewise, exists for dangerous sewer gases to enter your home or establishment. Should smoke enter your building, you may contact a member of the smoke testing crew working in your neighborhood. If you have any seldom used drains, such as floor drains in basements, please pour water in the drain to fill the trap, which will prevent smoke from entering there. Drain traps should always be filled with water to prevent sewer gases or odors from entering the building. Additionally, washing machine drain pipes do not have traps. To help prevent smoke from entering your building around the washing machine drain pipe, tie a damp rag around the drain opening.

About 72 hours before smoke testing begins, door hangers will be distributed at each residence providing information regarding the procedure and names and phone numbers of personnel to contact for more information. During the smoke testing activities, personnel will be identifying defects that are revealed when smoke escapes through them. Locations for defects may include roof downspouts, uncapped cleanouts, driveway drains, stairwell drains, yard or area drains, window well drains, foundation-perimeter drains and defective service pipes. Smoke testing is anticipated to begin in early April and continue through the summer and fall months.

Thank you for your cooperation and assistance in helping the City of Molalla in its effort to improve the quality of service to all of our customers. Additional information concerning these activities may be found at either ____________.

If you have any questions or require additional information, please contact the City at 503-829-6855.

Sincerely,

City of Molalla, Oregon

City of Molalla, OR

ATTENTION

The City of Molalla is implementing field inspection activities as part of the City's ongoing efforts to improve the sanitary sewer system. These improvements are intended to eliminate excess stormwater and groundwater from entering the sanitary sewer system. This excess stormwater and groundwater overloads the sanitary sewers causing basement flooding and sewer back-ups during and after periods of heavy rainfall.

The field inspection activities include smoke testing. **The smoke testing will occur in your area during the week of ___________.**

The smoke should not enter into buildings unless leaks or plumbing defects exist. The smoke that you see coming from the vent stacks on houses or from holes in the ground is: **NON TOXIC, HARMLESS, HAS NO ODOR, AND CREATES NO FIRE HAZARD.** Please make sure that traps for all basement floor drains and other sink traps and plumbing fixtures are full of water by pouring approximately 24 ounces of water into each drain. Smoke may also enter your building around the wax ring, if faulty, at the base of the toilet.

Should you detect smoke in your building, the room should be ventilated through an open window or door. Leave the area and ventilate well to dissipate the smoke. Also, please notify the field technicians who are conducting the test should smoke enter your building.

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