

Final Report



Water Line Leak Detection Project for: City of Cannon Beach, OR



Project Dates:
02/05/2018 through 02/07/2018

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COVER LETTER

February 15, 2018

City of Cannon Beach
Attn: Dan Willyard
163 E. Gower St.
Cannon Beach, OR 97110

Re: February 2018 Water Distribution System Leak Detection Project

Dear Mr. Willyard:

Utility Services Associates, LLC, (USA) is pleased to submit the enclosed Final Report on leak detection services recently completed.

The information contained in this Final Report details the procedures and results specific to this project. When applicable, recommendations have been made concerning the best approach for the repair of leaks detected and preparation for future leak detection projects.

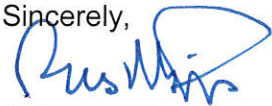
As you review this Final Report, please pay close attention to the Water Loss Consultant's remarks and field observations in the Project Observation section of this report. These may assist you in determining the best course of action regarding specific leaks.

At times specific individual Leak Reports may differ in the Final Report from those provided during the course of the project. These changes, usually insignificant, generally pertain to the manner in which we report leaks and do not alter the methods used or results of pinpointing.

We strongly suggest you contact us prior to excavating any leak that we have labeled with "CAUTION" for further explanation.

This leak detection project is productive since we pinpointed leakage that, when repaired, can reduce your water loss, saving City of Cannon Beach dollars now and in the future. We appreciate your confidence in USA. If you have any questions, call us at (877) 585-5325 or (206) 429-3751.

Sincerely,



Rob Meston
President



EXECUTIVE SUMMARY

LEAK DETECTION EXECUTIVE SUMMARY

From February 5, 2018 through February 7, 2018, USA performed a leak survey for **City of Cannon Beach, OR**. Our Water Loss Consultant, Thomas Olson, used and appreciated the information provided by Shawn Cole and Darryl Walker to expedite and provide an accurate survey. The tables below detail the information gathered.

Time Spent on Project

Surveying:	16.8 Hr
Pinpointing:	4.2 Hr
Other Time:	3 Hr
Total Time:	24 Hr

Total Areas Surveyed

Total Distance in Miles	4.22
Total Distance in feet	22,282

The mileage was estimated by the Water Loss Consultant and may not match maps.

Access Points Contacted

Hydrants	23
Valves	87
Services	371
Other	0
Total	481

Leak Type Noises Detected

Hydrants	0
Valves	1
Services	8
Other	0
Total	9

Leaks Pinpointed

Main	0
Valve	1
Hydrant	0
Service Line	4
Service Connection	1
Curbstop	0
Meter	0
Total	6

Total Water Loss Identified

Gallons Per Minute (GPM):	50.85
Gallons Per Day:	73,224
Gallons Per Month:	2,227,230
Gallons Per Year:	26,726,760

Unidentified Water Loss

Faulty Meters	0
Unidentified Leaks	1
Possible Consumer Side Leaks	0

This project was divided into two phases; the survey phase and the pinpointing phase. The following pages outline exactly how those two phases progressed and the results of each. Any leaks pinpointed will be detailed in the attached Leak Reports.

PROJECT OBSERVATIONS

PROJECT OBSERVATIONS

(Water Distribution Lines)

GENERAL

USA recently completed a water leak detection project for City of Cannon Beach, OR. The 3-day (8-hour day) fieldwork portion of the project was started on February 5, 2018 completed on February 7, 2018. The information listed below was generated by data collected by USA Water Loss Consultant Thomas Olson during the fieldwork.

SPECIFICS

The project was broken down into two different phases:

1. **Survey Phase** – sounding of appurtenances and recording all leak anomalies detected for further investigation.
2. **Pinpointing Phase** – pinpointing all anomalies that were detected during the survey phase.

1. **Survey Phase Information**

An estimated 6 miles of water distribution piping was sounded for leaks during the project. A point-to-point technique was deployed in all instances. This technique includes sounding all available appurtenances to gain thorough coverage.

Overall, the survey portion of the project went well. We detected and recorded nine (9) leak type noises for reinvestigation during the Pinpointing Phase.

2. **Pinpointing Phase Information**

Upon completion of the Pinpointing Phase, we have pinpointed six (6) leaks. In addition, we have listed one (1) location as an undefined leak, which is an area we suspect leakage. For more information and a drawing of each leak, please refer to the Leak Report section of this Final Report.

Undefined Leak Report U1

We suggest this service line be replaced. We are certain the leak is on the service line but were unable to pinpoint it. We were told the line has had prior leak issues.

RECOMENDATIONS

We recommend a continued focus on water loss and real loss reduction. Once repairs are made, note any observed differences in our estimates as errors in our estimates will have a significant impact on water loss numbers if this report will be used for that purpose or to support other estimated/actual real loss.

CONCLUSION

Overall, the survey was successful as we found a significant amount of loss. We believe repair will greatly reduce water losses experienced by the City. We would like to thank Darryl Walker and Shawn Cole for their field assistance. We look forward to working with the City of Cannon Beach, OR on future conservation projects.

Thomas Olson
Water Loss Consultant

SURVEY PHASE REVIEW

SURVEY PHASE REVIEW (Water Distribution Lines)

The first step in our survey was to review the distribution maps of the system for familiarization of the pipe network and available appurtenances to be used for contact points.

We then conducted a comprehensive survey by making physical contact with all available appurtenances (valves, hydrants, and services). USA used a sonic leak detection amplification instrument designed for this purpose.

Appurtenances Surveyed

Hydrant	23
Valves	87
Services	371
Other	0
Total	481

When normal contact points were not available or could not be created within a reasonable distance, we made an attempt to use a sonic ground listening instrument to make physical ground contact at intervals no greater than 6 feet directly over the pipe. If conditions did not allow this procedure our Water Loss Consultant advised you at time of project and notes of such are included in the Project Observations. Ground listening devices are employed when ground cover is pavement, cement or similar hard surface.

When ground cover was not a hard surface and normal contact points were not available, we made an attempt to use probe rods or a specially designed sounding plate at 6-foot intervals. A sound amplification instrument with 3VG or greater transducer was employed in conjunction with this equipment, directly over the pipe. If conditions did not allow this procedure our Water Loss Consultant advised you at time of project and was detailed in the Project Observations section of this Final Report. Direct contact to the main line at intervals outlined in Preparation for Service resulted in the most thorough survey.

Areas Surveyed

Street	From	To
HEMLOCK ST	FERNWOOD AVE	SOUTH END OF LINE
SIUSLAW ST	HEMLOCK ST	EAST END OF LINE
TYEE ST	HEMLOCK ST	SOUTH END OF LINE
KENAI ST	HEMLOCK ST	WEST END OF LINE
NOATAK ST	HEMLOCK ST	WEST END OF LINE
SITKA ST	HEMLOCK ST	WEST END OF LINE
WATTS WAY	HEMLOCK ST	PACIFIC ST
PACIFIC ST	WATTS WAY	WEST WAY
WEST WAY	HEMLOCK ST	LOGAN LN
LOGAN LN	WEST WAY	SOUTH END OF LINE
MAHER ST	HEMLOCK ST	LOGAN LN
LOGAN LN	MAHER ST	SOUTH END OF LINE
BRALLIER ST	HEMLOCK ST	WEST END OF LINE
OCEAN LN	SOUTH OF BRALLIER ST	ORFORD ST

PACIFIC ST	SOUTH OF BRALLIER ST	SIUSLAW ST
ORFORD ST	OCEAN LN	HEMLOCK ST
COOS ST	PACIFIC ST	HEMLOCK ST
UMPQUA ST	PACIFIC ST	HEMLOCK ST
SIUSLAW ST	PACIFIC ST	HEMLOCK ST
WARREN WAY	HEMLOCK ST	W CHINOOK AVE
W CHINOOK AVE	WARREN WAY	DEER PLACE
DEER PLACE	W CHINOOK AVE	COHO PLACE
COHO PLACE	DEER PLACE	ELK RUN AVE
ELK RUN AVE	W CHINOOK AVE	E CHINOOK AVE
E CHINOOK AVE	SOUTH END OF LINE	N CHINOOK ST
N CHINOOK ST	E CHINOOK AVE	W CHINOOK AVE
ASH ST	W 7TH ST	W 8TH ST
W 8TH ST	ASH ST	OAK ST
OAK ST	SOUTH OF W 8TH ST	NORTH END OF LINE
ZONE 1 - LINE	W 8TH ST	ECOLA STATE PARK RD
Total Area Surveyed in Feet		22,282
Total Area Surveyed in Miles		4.22

A detailed report of decibel levels at suspected leak sound locations and observations were compiled during the survey for reinvestigation and possible pinpointing at a later time. This reinvestigation increased the speed of the survey and eliminated correlating on most false leak sounds.

Leak Type Noises Detected

Contact Points	Noises Detected
Hydrant	0
Valves	1
Services	8
Other	0
Total	9

All indications of leaks found during the survey were verified a second time, after which, the leaks were pinpointed with a computer based sound correlator when possible. Pinpointing information can be found in the Pinpointing and Leak Reports Sections.

End of Section

PINPOINTING PHASE REVIEW

PINPOINTING PHASE REVIEW (Water Distribution Lines)

All indications of leaks found during the survey were verified a second time, after which, the leaks were pinpointed with a computer based sound correlator when possible. Pinpointing leak locations through interpretation of sound intensity, either by ear, decibel metering or other like methods was not used when contact points were available for use with the correlator. However, ground listening devices were used as a quick double check on pinpointed leaks.

The equipment used did not normally require valves to be operated during surveying and pinpointing. However, on occasion, services or valves were operated to eliminate service draw noises or to change velocity noise.

The correlator equipment used had the capability to prompt the operator to input the variables when different pipe sizes and/or pipe material were encountered in the same span to be investigated. This is necessary to insure accuracy of results based on the automatic computation of the correct leak sound velocity in leak pinpointing operations. Our correlators have the capability of correlating up to seven various pipe sizes and types at one time in a given space. To insure effective performance in all field environments encountered in the distribution system (i.e. traffic noise, draw, pump operation, industrial noise, etc.), the correlator equipment provides 16 auto filter options and/or infinite manual filter options.

We provided a copy of leak reports, when pinpointed, which included leak locations and estimated GPM loss.

Leaks Pinpointed

Number	Leak Type	Location	GPM
1	SERVICE LINE	3679 PACIFIC ST	0.50
2	SERVICE LINE	4428 PACIFIC ST	20.00
3	SERVICE LINE	264 W COOS ST	20.00
4	VALVE	763 OAK ST	0.10
5	SERVICE LINE	860 ECOLA STATE PARK RD	0.25
6	SERVICE CONNECTION	870 ECOLA STATE PARK RD	10.00
Total			50.85

These leak reports, also included a leak repair priority classification. These classifications are as follows:

Class I Any leak which is hazardous in terms of potential undermining, possibly resulting in surface collapse, encroachment and/or damage to nearby utilities, commercial or private properties or leaks severe enough to warrant immediate repair.

Class II All leaks that display water losses significant enough to be monitored on a regular repair schedule.

Class III Relatively small leaks that should be repaired as workload permits.

Repair Priority

Number	Leak Type	Location	GPM
Total Class I			0.00

Number	Leak Type	Location	GPM
2	SERVICE LINE	4428 PACIFIC ST	20.00
3	SERVICE LINE	264 W COOS ST	20.00
6	SERVICE CONNECTION	870 ECOLA STATE PARK RD	10.00
Total Class II			50.00

Number	Leak Type	Location	GPM
1	SERVICE LINE	3679 PACIFIC ST	0.50
4	VALVE	763 OAK ST	0.10
5	SERVICE LINE	860 ECOLA STATE PARK RD	0.25
Total Class III			0.85

Whenever any of the leaks detected by USA were repaired prior to completion of the field work, we gave City of Cannon Beach the option to have that section of the system re-surveyed to be sure no very quiet leaks were missed due to an over powering noisy leak sound.

Please note that leakage that was detected and pinpointed may be larger or smaller than estimated. Estimates are based on several variables including type and size of pipe, pressure and interpretation of correlation filter results.

It should be noted that we have listed one area as "Undefined". This is an area where we believe one or more leaks exist, however, after spending considerable time at each location, we could not pinpoint the suspect leakage. This may be due to one or more of many different variables including; poor sound travel, limited number of appurtenances, etc. For further information and/or assistance, please contact our main office.

Undefined Leaks

Leak Location	Notes
3607 E CHINOOK AVE	LEAK NOISE DETECTED ON METER. LEAK WAS NOT PINPOINTED DUE TO UNKNOWN LINE LOCATION. THE SERVICE IS VERY DEEP AND HAS BEEN REPAIRED IN THE PAST. THERE IS NO CORRELATION DATA AVAILABLE. THERE WAS NO LEAK NOISE DETECTED WHEN USING A GROUND MICROPHONE.

End of Section

LEAK REPORTS



LEAK REPORT

Leak #:	1
Date:	February 6, 2018
Map #:	
Lat:	
Long:	

Leak Type
SERVICE LINE
Leak Address
3679 PACIFIC ST

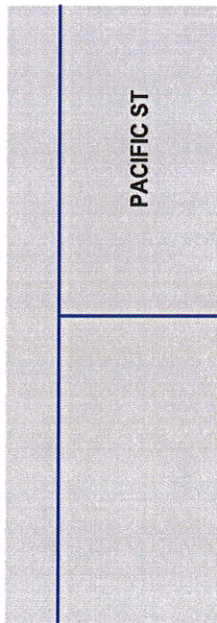
REMARKS

VISIBLE LEAK IN METER BOX. LEAK IS AUDIBLE WITHOUT LISTENING EQUIPMENT.

Action(s) Taken:

Recommendation(s): REPAIR / REPLACE

THIS DRAWING IS NOT TO SCALE



REPAIRED

3679

VISIBLE LEAK
WHERE
SERVICE LINE
MEETS METER

EQUIPMENT USED

S-30

VISIBLE

LEAK INFORMATION

Leak Consultant:	TO
Leak Class:	III
Leak Rate (GPM):	0.5
Cover Type:	SOIL
Site Marked:	NO
Mins. Pinpointing:	15

LEAK IMAGE NOT AVAILABLE

Computer Correlation Results

Scan Time	Grade	Dist. "Red"	Dist. "Blue"

Water Loss (gallons)

Daily:	720
Weekly:	5,040
Monthly:	21,600
Annual:	262,800



LEAK REPORT

Leak #:	2
Date:	February 6, 2018
Map #:	
Lat:	
Long:	

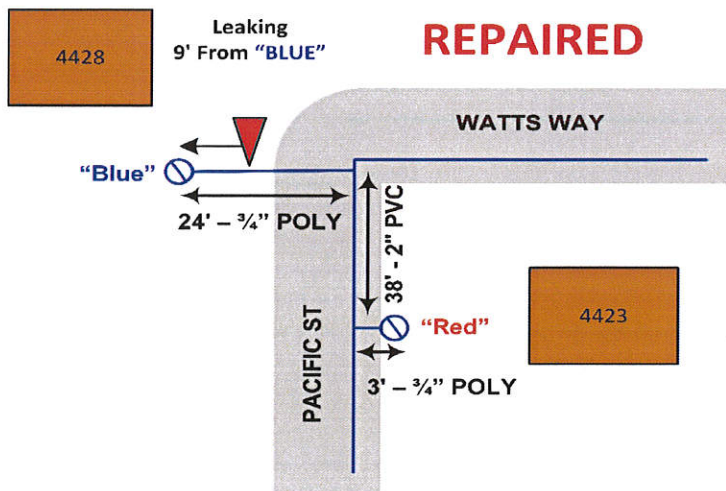
Leak Type
SERVICE LINE
Leak Address
4428 PACIFIC ST

REMARKS

EXCELLENT LEAK NOISE DETECTED ON METER. ONE LOW QUALITY CORRELATION POINTS 8 FEET FROM METER. EXCELLENT GROUND MICROPHONE NOISE DETECTED 9 FEET FROM METER. THERE IS ALSO GROUND MICROPHONE NOISE DETECTED NEAR THE SERVICE CONNECTION AREA OR 90 DEGREE BEND. THE EXACT LOCATION OF SERVICE IS UNKNOWN BUT MOST LIKELY CLOSE TO 90 DEGREE BEND. THE NOISE DETECTED NEAR 90 DEGREE BEND OR SERVICE CONNECTION COULD BE TURBULENCE FEEDING THE LEAK ON THE SERVICE LINE.

Action(s) Taken: LEAK REPAIRED
 Recommendation(s): EXCAVATE & REPAIR

THIS DRAWING IS NOT TO SCALE



EQUIPMENT USED

S-30
LD-12
LC-2500
PROBE ROD

LEAK INFORMATION

Leak Consultant:	TO
Leak Class:	II
Leak Rate (GPM):	20
Cover Type:	GRAVEL
Site Marked:	YES
Mins. Pinpointing:	60

LEAK IMAGE NOT AVAILABLE

Computer Correlation Results

Scan Time	Grade	Dist. "Red"	Dist. "Blue"
300	B	57	8

Water Loss (gallons)

Daily:	28,800
Weekly:	201,600
Monthly:	864,000
Annual:	10,512,000



LEAK REPORT

Leak #:	3
Date:	February 7, 2018
Map #:	
Lat:	
Long:	

Leak Type
SERVICE LINE
Leak Address
264 W COOS ST

REMARKS

ONE CORRELATION 31 FEET FROM METER. EXCELLENT CONFIRMATION WITH GROUND MICROPHONE.

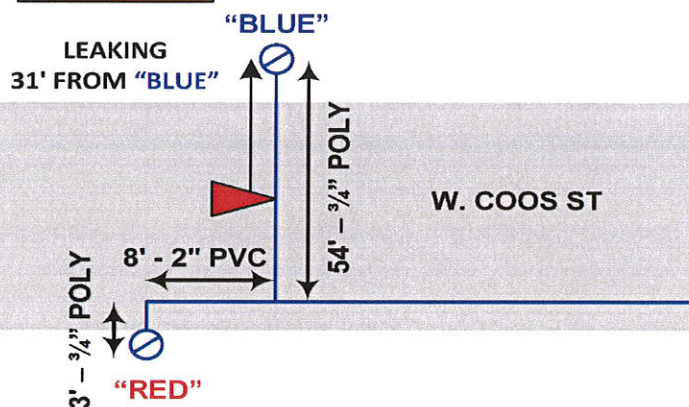
Action(s) Taken: LEAK REPAIRED
 Recommendation(s): EXCAVATE & REPAIR

THIS DRAWING IS NOT TO SCALE



264

REPAIRED



EQUIPMENT USED

S-30
LD-12
LC-2500

LEAK INFORMATION

Leak Consultant:	TO
Leak Class:	II
Leak Rate (GPM):	20
Cover Type:	GRAVEL
Site Marked:	YES
Mins. Pinpointing:	60

LEAK IMAGE NOT AVAILABLE

Computer Correlation Results

Scan Time	Grade	Dist. "Red"	Dist. "Blue"
120	B	34	31

Water Loss (gallons)

Daily:	28,800
Weekly:	201,600
Monthly:	864,000
Annual:	10,512,000



LEAK REPORT

Leak #:	4
Date:	February 7, 2018
Map #:	
Lat:	
Long:	

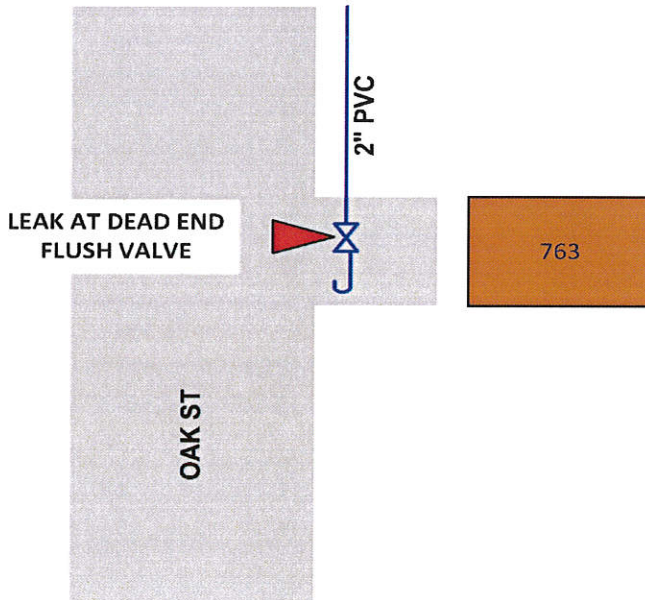
Leak Type
VALVE
Leak Address
763 OAK ST

REMARKS

LEAK NOISE DETECTED ON DEAD END FLUSH VALVE. CITY OF CANNON BEACH STAFF OPERATED VALVE SLIGHTLY AND NOISE OF LEAK CHANGED. LEAK IS PASSING THROUGH DEAD END FLUSH VALVE OR ASSOCIATED WITH THE VALVE CONNECTION OR PACKING.

Action(s) Taken: ISOLATED TO ELIMINATE FLOW
 Recommendation(s): REPAIR / REPLACE

THIS DRAWING IS NOT TO SCALE



EQUIPMENT USED

S-30

LEAK INFORMATION

Leak Consultant:	TO
Leak Class:	III
Leak Rate (GPM):	0.1
Cover Type:	ASPHALT
Site Marked:	NO
Mins. Pinpointing:	20

LEAK IMAGE NOT AVAILABLE

Computer Correlation Results

Scan Time	Grade	Dist. "Red"	Dist. "Blue"

Water Loss (gallons)

Daily:	144
Weekly:	1,008
Monthly:	4,320
Annual:	52,560



LEAK REPORT

Leak #:	5
Date:	February 7, 2018
Map #:	
Lat:	
Long:	

Leak Type
SERVICE LINE
Leak Address
860 ECOLA STATE PARK RD

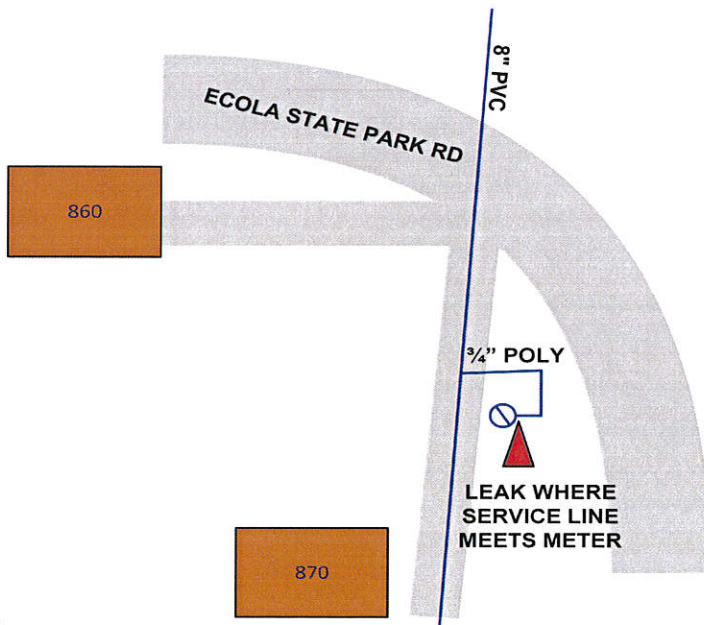
REMARKS

VISIBLE WATER MOVING IN METER BOX. LEAK MAY BE AT SERVICE LINE/SETTER CONNECTION.

Action(s) Taken:

Recommendation(s): REPAIR / REPLACE

THIS DRAWING IS NOT TO SCALE



EQUIPMENT USED

S-30

VISIBLE

LEAK INFORMATION

Leak Consultant:	TO
Leak Class:	III
Leak Rate (GPM):	0.25
Cover Type:	SOIL
Site Marked:	NO
Mins. Pinpointing:	20

LEAK IMAGE NOT AVAILABLE

Computer Correlation Results

Scan Time	Grade	Dist. "Red"	Dist. "Blue"

Water Loss (gallons)

Daily:	360
Weekly:	2,520
Monthly:	10,800
Annual:	131,400



LEAK REPORT

Leak #:	6
Date:	February 7, 2018
Map #:	
Lat:	
Long:	

Leak Type
SERVICE CONNECTION
Leak Address
870 ECOLA STATE PARK RD

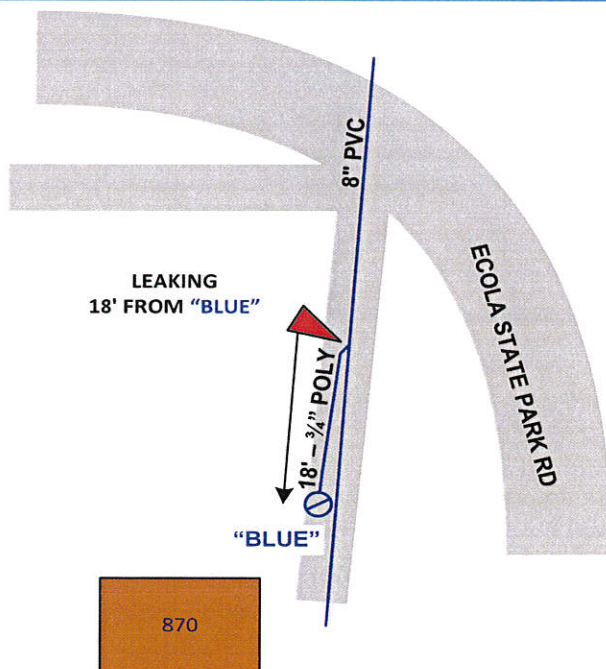
REMARKS

LEAK NOISE DETECTED ON METER. LEAK WOULD NOT CORRELATE. LEAK WAS LOCATED WITH GROUND MICROPHONE AND PROBE 18 FEET FROM METER. SERVICE LINE MAP SHOWS 17 1/2 FEET OF SERVICE LINE.

Action(s) Taken:

Recommendation(s): EXCAVATE & REPAIR

THIS DRAWING IS NOT TO SCALE



EQUIPMENT USED

S-30
LD-12
LC-2500
PROBE ROD

LEAK INFORMATION

Leak Consultant:	TO
Leak Class:	II
Leak Rate (GPM):	10
Cover Type:	GRAVEL
Site Marked:	YES
Mins. Pinpointing:	45

LEAK IMAGE NOT AVAILABLE

Computer Correlation Results

Scan Time	Grade	Dist. "Red"	Dist. "Blue"

Water Loss (gallons)

Daily:	14,400
Weekly:	100,800
Monthly:	432,000
Annual:	5,256,000



LEAK REPORT

Leak #:	U1
Date:	February 7, 2018
Map #:	
Lat:	
Long:	

Leak Type
Leak Address
3607 E CHINOOK AVE

REMARKS

LEAK NOISE DETECTED ON METER. LEAK WAS NOT PINPOINTED DUE TO UNKNOWN LINE LOCATION. THE SERVICE IS VERY DEEP AND HAS BEEN REPAIRED IN THE PAST. THERE IS NO CORRELATION DATA AVAILABLE. THERE WAS NO LEAK NOISE DETECTED WHEN USING A GROUND MICROPHONE.

Action(s) Taken:

Recommendation(s): **REPAIR / REPLACE**

THIS DRAWING IS NOT TO SCALE



3607

NOISE



**CAUTION
EXACT LEAK
LOCATION
UNDEFINED**

N CHINOOK ST

6" PVC

E CHINOOK
AVE

EQUIPMENT USED

S-30

LD-12

LC-2500

LEAK INFORMATION

Leak Consultant: **TO**

Leak Class:

Leak Rate (GPM):

Cover Type: **GRAVEL**

Site Marked: **NO**

Mins. Pinpointing: **30**

LEAK IMAGE NOT AVAILABLE

Computer Correlation Results

Scan Time	Grade	Dist. "Red"	Dist. "Blue"

Water Loss (gallons)

Daily:	
Weekly:	
Monthly:	
Annual:	

CONCLUSION

LEAK SURVEY CONCLUSION

Our thanks to Dan Willyard and all persons involved with this project for their assistance in gathering all the necessary paperwork and personnel to create, with USA, a mutually beneficial leak detection project.

With this survey you have demonstrated concern for prudent water utilization and conservation.

Capitalizing on the most advanced leak detection technology available today, USA has successfully completed this Leak Detection Survey. The contents of this Final Report provide City of Cannon Beach with a permanent record of the activities performed to complete a Leak Survey along with the results achieved.

An important characteristic of this Leak Report is that the facts contained herein can be used in formulating a database for decision making regarding: the need for possible future meter programs, rehabilitation and pipe line replacement and/or the investigation of new water sources, etc. These types of decisions, regarding your utilization of water, now can be predicated more on facts rather than supposition or conjecture.

Prompt repair of any leaks reported provide an immediate benefit to City of Cannon Beach, which includes recovery of most water revenue and water conservation, etc.

Having achieved these results, we recommend that you continue to set up the infrastructure necessary to continue investigating leakage in the water distribution system. Implementation of any on-going leak survey program will ensure that leak losses are kept to a minimum, and the added enhancement of saving costs due to emergency call outs.

Utility Services Associates, LLC, is proud to have served City of Cannon Beach in this way and we wish to thank you for your substantial assistance and cooperation in this project.

If you or your staff has any questions regarding this Final Report, please feel free to call us at (877) 585-5325 or (206) 429-3751.

Best Regards,



Rob Meston
President



