CITY OF OREGON CITY
PLANNING COMMISSION
AGENDA

Virtual

Monday, December 14, 2020 at 7:00 PM

This meeting will be held online via Zoom; please contact planning@orcity.org for the meeting link. In-person attendance will not be available.

CALL TO ORDER

APPROVAL OF MINUTES

1. Approval of Minutes for July 13, 2020

PUBLIC COMMENT

Citizens are allowed up to 3 minutes to present information relevant to the City but not listed as an item on the agenda. Prior to speaking, citizens shall complete a comment form and deliver it to the City Recorder. The Citizen Involvement Committee does not generally engage in dialog with those making comments but may refer the issue to the City Manager. Complaints shall first be addressed at the department level prior to addressing the Citizen Involvement Committee.

PUBLIC HEARING

2. GLUA-20-00020: CU-20-00002 / SP-20-00043 - 182 Warner Parrott Road - Proposed 30-Bed Residential / Memory Care Facility

3. GLUA 20-00033 LEG-19-00002 Amendments to the Water Master Plan

COMMUNICATIONS

ADJOURNMENT

PUBLIC COMMENT GUIDELINES

Complete a Comment Card prior to the meeting and submit it to the City Recorder. When the Mayor/Chair calls your name, proceed to the speaker table, and state your name and city of residence into the microphone. Each speaker is given three (3) minutes to speak. To assist in tracking your speaking time, refer to the timer on the table.

As a general practice, the City Commission does not engage in discussion with those making comments.

Electronic presentations are permitted but shall be delivered to the City Recorder 48 hours in advance of the meeting.

ADA NOTICE

The location is ADA accessible. Hearing devices may be requested from the City Recorder prior to the meeting. Individuals requiring other assistance must make their request known 48 hours preceding the meeting by contacting the City Recorder's Office at 503-657-0891.

Agenda Posted at City Hall, Pioneer Community Center, Library, City Website.

Video Streaming & Broadcasts: The meeting is streamed live on the Oregon City's website at www.orcity.org and available on demand following the meeting. The meeting can be viewed on Willamette Falls Television channel 28 for Oregon City area residents as a rebroadcast. Please contact WFMC at 503-650-0275 for a programming schedule.

City of Oregon City

625 Center Street
Oregon City, OR 97045
503-657-0891

Meeting Minutes - Draft

Planning Commission

Monday, July 13, 2020 **7:00 PM** **Commission Chambers**

1. Convene Regular Meeting and Roll Call

Chair Mitchell called the meeting to order at 7:00 PM.

Present: 6 - Chair Mike Mitchell, Commissioner Tom Geil, Commissioner Vern Johnson, Commissioner Dirk Schlagenhaufer, Commissioner Patti Gage, and Commissioner Christopher Staggs

Absent: 1 - Commissioner Gregory Stoll

Staffers: 3 - Community Development Director Laura Terway, City Attorney Carrie Richter, and Assistant Planner Diliana Vassileva

2. Public Comment – *None*

3. Public Hearing

GLUA-20-00014/SP-20-00025/VAR-20-00005/WRG-20-00001/NROD-20-00008/FP-20-00001: I-205 Widening and Abernethy Bridge Seismic Upgrades

Chair Mitchell opened the public hearing and read the hearing statement. He asked if any Commissioner had ex parte contacts, conflicts of interest, bias, or any other statements to declare including a visit to the site.

Commissioner Geil drove by the site regularly.

Commissioner Schlagenhaufer visited the site where the parking would be added and drove over the bridge.

Commissioner Staggs knew where the site was.

Chair Mitchell visited the site multiple times but not intentionally in advance of this hearing.

Diliana Vassileva, Assistant Planner, presented the staff report. She described the subject site and explained the project included seismic improvements to the bridge over Main Street and Abernethy Bridge as well as widening of I-205 for additional travel lanes and a northbound auxiliary lane. Additional parking would be added to Jon Storm Park. New bridge piers would be installed to accommodate the widening and the Abernethy Creek outfall into the Willamette River would be rerouted. She discussed the Natural Resource Overlay District review and condition for a revised mitigation plan to recalculate the disturbance area and provide mitigation at a 2:1 ratio. She also discussed the Willamette River Greenway review, Floodplain Overlay review, site plan and design review for parking and alternative landscaping plan, variance review for the height of the bridge piers, and tree removal review. She noted corrections to the staff report for Conditions 12, 21, 26, and 29. Staff recommended approval with the revised conditions.

There was discussion regarding rerouting Abernethy Creek, protection of fish, effect on Oregon City Shopping Center and future hotel site, detours during construction, Natural Resources Committee review, and traffic impact to downtown.

Della Mosier, Deputy Director of ODOT's Office of Urban Mobility, and Brian Bauman, environmental consultant with HDR, said they had presented this information to the Natural Resources committee and the Parks and Recreation Advisory Committee. This project was included in HB 2017 to bring seismic resiliency and operational improvements to the I-205 corridor. They explained the scope of the project, update on the initial portion that was underway, funding for the project, community engagement, and voter support for Ballot Measure 3-539. The minor realignment of Abernethy Creek would be a shift of a few feet. The fish passage would be upgraded. There would be no right-of-way impacts in the vicinity of the hotel or shopping center. There was a potential noise wall to be constructed on the north side of I-205 to accommodate the new development in that area. Work still had to be done to verify the wall would be constructed. Regarding the traffic control plan, there would be robust outreach to the community and they would work with the City to minimize the impacts as much as possible.

There was discussion regarding the timeline for the project which would be completed in three years, need for the noise wall on both the north and south sides of the corridor, how the City had no noise criteria to require a wall on the south side, using the ODOT right-of-way for the parking lot, what the new piers would look like, and preserving the view of Willamette Falls from Jon Storm Park.

Karen Tatman, Quincy Engineering, explained the retaining wall on Main Street would be in the State right-of-way. If Main Street was ever widened for standard shoulders or sidewalks, it could accommodate those. They would replace the sidewalks underneath the Main Street Bridge and the City had requested that the sidewalk connect from underneath the bridge from the Cove to McLoughlin Boulevard.

Mike Bertram from HDR explained the work that would be done for the new bridge piers and the closures of I-205. They would maintain as much capacity and accessibility from the freeway and local street networks as possible.

Chair Mitchell closed the public hearing.

Commissioner Geil and Chair Mitchell expressed concern about the traffic impacts, especially to downtown.

A motion was made by Commissioner Johnson, seconded by Commissioner Schlagenhaufer, to approve GLUA-20-00014/SP-20-00025/VAR-20-00005/ WRG-20-00001/NROD-20-00008/FP-20-00001: I-205 Widening and Abernethy Bridge Seismic Upgrades with the conditions as amended. The motion carried by the following vote:

Aye: 6 - Chair Mike Mitchel, Commissioner Vern Johnson, Commissioner Tom Geil, Commissioner Dirk Schlagenhaufer, Commissioner Patti Gage, and Commissioner Chris Staggs

4. Communications

Support for Diversity, Equity, and Inclusion

Chair Mitchell asked for feedback on the letter he had drafted regarding Diversity, Equity, and Inclusion.

A motion was made by Commissioner Geil, seconded by Commissioner Gage, to approve the letter as written. The motion carried by the following vote:

Aye: 6 - Chair Mike Mitchel, Commissioner Vern Johnson, Commissioner Tom Geil, Commissioner Dirk Schlagenhaufer, Commissioner Patti Gage, and Commissioner Chris Staggs

Laura Terway, Community Development Director, gave an update on the OC 2040 Comprehensive Plan project.

5. Adjournment

Chair Mitchell adjourned the meeting at 8:40 PM.

CITY OF OREGON CITY

Staff Report

625 Center Street
Oregon City, OR 97045
503-657-0891

To: City Commission **Agenda Date:** 12/14/2020

From: Senior Planner Pete Walter

SUBJECT:

GLUA-20-00020: CU-20-00002 / SP-20-00043 - 182 Warner Parrott Road - Proposed 30-Bed Residential / Memory Care Facility

STAFF RECOMMENDATION:

Staff recommends that the Planning Commission:

- Consider and discuss the applicant's additional information
- Take testimony from staff, the applicant, and the public
- Continue this public hearing for GLUA-20-00020 to a date certain of January 11, 2021 to allow staff and the public time to review the additional information.

Staff will prepare a recommendation and revised findings for next available hearing date.

EXECUTIVE SUMMARY:

At 4:51 p.m. on 12/7/2020, the applicant submitted new information immediately prior to the Planning Commission agenda publishing deadline. The applicant provided supplemental information on 12/10/2020 and 12/11/2020. Staff has not had time to review the material and cannot provide a recommendation regarding the application at this time. The public also deserves the standard seven days which is sufficient time to review the new information.

This public hearing has been continued several times to allow the applicant additional time to provide additional information in support of their application in response to public comments (see "Summary of Continuances").

Between 12/7/2020 and 12/11/202, the applicant submitted the following:

- Voluntary Solar Shading and Height study based on the requirements and standards of Lake Oswego since Oregon City does not have these standards in their code.

- Memorandum to the planning commission regarding some comments and concerns from the neighbors as well as a discussion about shared parking with the church down the street.
- A map of properties in the vicinity of the property that are uses other than single family as requested at the first planning commission hearing.
- An aerial photograph of the property indicating shade thrown by existing structures and vegetation. The exact date of this photograph is unknown.

Due to the lateness of the submittal of new information, which was not provided seven days prior to the public hearing, staff recommends a continuance for the reasons provided.

BACKGROUND:

This application consists of Conditional Use and Site Plan and Design Review approval for a 25-bed expansion of an existing 5-room adult care home into a 30-bed, 17,728 square foot residential care facility for elderly and memory care. The property is zoned R-10 Low-Density Residential, and the site is 23,886 square feet in area (0.5 acres).

Public comments have been received concerning the compatibility of the proposed building mass and height with the existing adjacent single-family neighborhood and character, impacts to parking, safe access to the street, general livability, setbacks, privacy, impacts to property values, traffic and road safety concerns, demolition and construction noise issues, tree and vegetation removal, and loss of visibility and light. Public comments have also been received in support of the application.

The applicant has granted a second extension of the decision deadline for this application to February 3, 2021.

SUMMARY OF CONTINUANCES

At the public hearing on 11/23/2020, Planning Commission requested a summary detailing the continuance requests for this application. Staff and the applicant are in constant communication by email and phone regarding the status of the applicant's proposal and the preparation of additional information. It is taking the applicant longer than anticipated to prepare this information.

- 8/24/2020: Staff recommended, and applicant agreed to continuance allow time for revisions to the original submittal in response to initial public comment.
- 10/26/2020: Following staff and applicant presentation and public hearing, Planning Commission continued hearing to 11/9/2020 to allow applicant time to add additional information into record.
- 11/9/2020: The applicant agreed to a continuance to 11/23/2020 to allow additional time to complete a survey of surrounding properties and a shade study.

- 11/23/2020: The applicant agreed to a continuance to 12/14/2020 to allow additional time to complete a survey of surrounding properties and a shade study.

OPTIONS FOR THE PLANNING COMMISSION

Staff has provided a recommendation to continue the public hearing, however, the Planning Commission has various options, which include the following:

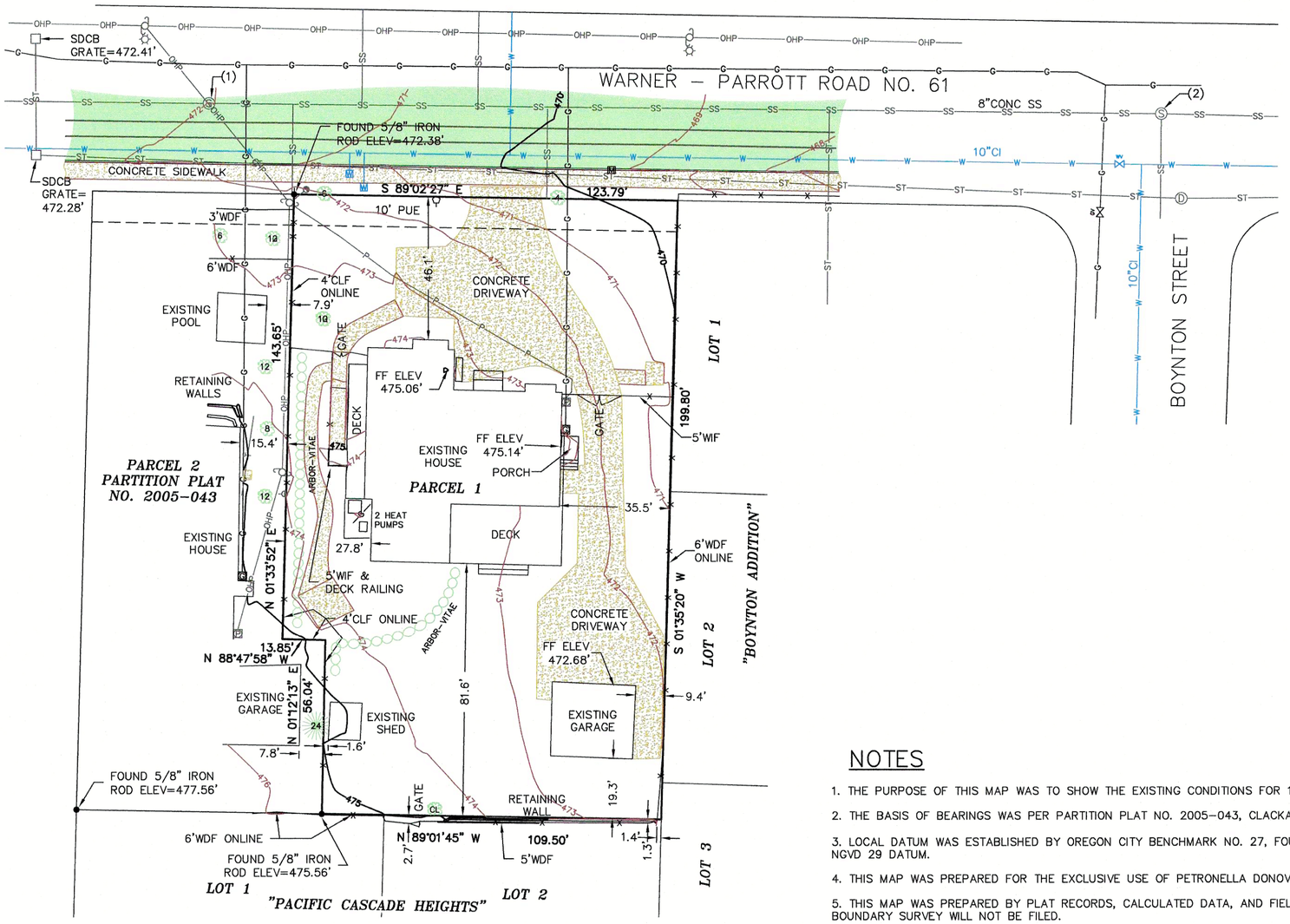
1. Accept staff's recommendation and continue the Public Hearing to allow time for consideration of the additional information and a recommendation from staff; or
2. Approve the application with Conditions as Recommended, based on the additional information provided; or
3. Approve the application with Conditions as Modified by the Planning Commission, based on the additional information provided; or
4. Continue the Public Hearing if requested by the applicant or the public; or
5. Deny the application.

PLANNING COMMISSION MEMORANDUM

RE: 182 Warner Parrott Rd. Oregon City, Oregon 97045
GLUA-20-00020:
CU-20-00002 Conditional Use / SP-20-00043 Site Plan and Design Review

In this memorandum the applicant wishes to address and add the following information to the application:

- Parking:
  A verbal agreement was given by the church on Warner Parrott Rd. that Petronella and the facility staff can use their parking lot in order to allow for the on-site parking to be used by the visitors. This will help alleviate the need to park on the side of Warner Parrot Rd. However, we do not feel that we will need this additional parking and are not proposing an adjustment to include this as part of our parking program. Further, the parking spaces on Warner Parrot Rd. are designated as public street parking that anyone can use, including the facility, and should not be considered a safety hazard if the city of Oregon City has designed and designated Warner Parrot Rd. to be equipped with on-street parking. Further, the development proposed meets the minimum and maximum requirement for on-site parking.
- Continuance of Application:
  A question came up about why the applicant has requested so many continuances to this project. The applicants did not wish to have continuances of the planning commission meetings but did so in order to prepare the additional site survey work that the City of Oregon City required. These surveys take time as they are done by a licensed land surveyor and includes field work and measurements as well as office time to prepare the documents. Further, the first planning commission continuance was initiated by the neighbors stating that they did not have time to prepare for the meeting with their comments.
- Shading of nearby properties by the proposed development:
  The proposed building meets the maximum height standards as set forth in the Oregon City code for R10 zoned sites. In addition, we have voluntarily used the shading and height standards from the City of Lake Oswego because Oregon City does not have or require these studies to demonstrate max solar shading heights. See memorandum provided for this study.



SCALE 1" = 30'

LEGEND

- EXISTING ARBOR–VITAE
- EXISTING DECIDUOUS TREE W/ TRUNK DIAMETER (INCHES)(CL=CLUSTER)
- EXISTING CONIFEROUS TREE W/ TRUNK DIAMETER (INCHES)
- EXISTING SIGN
- EXISTING UNDERGROUND TELEPHONE
- EXISTING ELECTRIC METER
- EXISTING POWER/LIGHT POLE
- EXISTING POWER POLE
- EXISTING GUY ANCHOR
- EXISTING LIGHT POLE
- EXISTING UNDERGROUND POWER LINES
- EXISTING OVERHEAD POWER LINES
- EXISTING WATER METER
- EXISTING WATER VALVE
- EXISTING UNDERGROUND WATER
- EXISTING GAS VALVE
- EXISTING GAS RISER
- EXISTING GAS PUMP
- EXISTING GAS METER
- EXISTING UNDERGROUND GAS LINE
- EXISTING CATCH BASIN
- EXISTING SANITARY MANHOLE
- EXISTING STORM MANHOLE
- EXISTING SANITARY SEWER LINE
- EXISTING STORM SEWER LINE
- EXISTING MAILBOX
- EXISTING FENCE
- WDF EXISTING WOOD FENCE
- CLF EXISTING CHAIN LINK FENCE
- WIF EXISTING WROUGHT IRON FENCE
- FOUND MONUMENTS
- EXISTING GRAVEL
- EXISTING CONCRETE
- EXISTING ASPHALT
- (1) SSMH RIM=471.98' IE 8"CONC IN W=464.48' IE 8"CONC OUT E=464.28'
- (2) SSMH RIM=465.95' IE 8"CONC IN W=458.45' IE 8"CONC IN N=458.35' IE 10"CONC OUT E=458.25'

NOTES

1. THE PURPOSE OF THIS MAP WAS TO SHOW THE EXISTING CONDITIONS FOR 182 WARNER–PARROTT ROAD.
2. THE BASIS OF BEARINGS WAS PER PARTITION PLAT NO. 2005–043, CLACKAMAS COUNTY RECORDS.
3. LOCAL DATUM WAS ESTABLISHED BY OREGON CITY BENCHMARK NO. 27, FOUND A BRASS DISK, ELEVATION=459.664' NGVD 29 DATUM.
4. THIS MAP WAS PREPARED FOR THE EXCLUSIVE USE OF PETRONELLA DONOVAN.
5. THIS MAP WAS PREPARED BY PLAT RECORDS, CALCULATED DATA, AND FIELD MEASUREMENTS, A RECORDED BOUNDARY SURVEY WILL NOT BE FILED.
6. ALL UTILITY LOCATIONS ARE SHOWN BY ABOVE GROUND FEATURES AND LOCATION OF PAINT MARKS SUPPLIED BY THE LOCAL UTILITY COMPANIES. CMT TAKES NO RESPONSIBILITY OF UNDERGROUND LOCATION. PLEASE NOTIFY THE UTILITY NOTIFICATION CENTER BEFORE ANY DIGGING 1–800–332–2344.

REGISTERED PROFESSIONAL LAND SURVEYOR

OREGON
SEPTEMBER 11, 2018
DAVID ROEGER
86811

EXPIRES DECEMBER 31, 2020

EXISTING CONDITIONS

182 WARNER–PARROTT ROAD

PARCEL 1 PARTITION PLAT NO. 2005–043
SW 1/4 SEC 6, T 3 S, R 2 E, W.M.
CITY OF OREGON CITY
CLACKAMAS COUNTY, OREGON
DECEMBER 8, 2020
DRAWN: DMR–RLMc CHECKED: SPF
SCALE 1"=30' ACCOUNT #500–1008
Y:\500–1008\DWG\5001008BASE.DWG

CMT SURVEYING AND CONSULTING
20330 SE HIGHWAY 212
DAMASCUS, OR 97089
PHONE (503) 850–4672 FAX (503) 850–4590

PLANNING COMMISSION MEMORANDUM

RE: 182 Warner Parrott Rd. Oregon City, Oregon 97045
GLUA-20-00020:
CU-20-00002 Conditional Use / SP-20-00043 Site Plan and Design Review

The City of Oregon City does not have a code requirement for solar shading. For the purposes of this voluntary exploration, we have used the standards adopted by other Jurisdictions, such as the City of Lake Oswego, in order to determine what the maximum allowed height at the shade point for the proposed structure would be in order to demonstrate that although the structure is far below the maximum allowed building height for the R10 zone, it is also at or below the maximum shade point height that would be required in other jurisdictions. The following standards, tables, and formulas were used from the City of Lake Oswego development code Section 50.06.007 Solar Access:

c. Maximum Shade Point Height Standard

The height of the shade point shall comply with either subsection 2.c.i or ii of this section.

i. Basic Requirement

The height of the shade point shall be less than or equal to the height specified in Table 50.06.007-1 or computed using the following formula. If necessary, interpolate between the five-ft. dimensions listed in Table 50.06.007-1.

TABLE 50.06.007-1: CALCULATION OF HEIGHT OF SHADE POINT

$$H = \frac{(2 \times SRL) - N + 150}{5}$$

Where H = The maximum allowed height of the shade point.

SRL = Shade reduction line (the distance between the shade point and the northern lot line); and

N = The north-south lot dimension; provided, that a north-south lot dimension more than 90 ft. shall use a value of 90 ft. for this section.

Provided, the maximum allowed height of the shade point may be increased one ft. above the amount calculated using the formula or Table 50.06.007-2 for each ft. that the average grade at the rear property line exceeds the average grade at the front property line.

TABLE 50.06.007-2: MAXIMUM PERMITTED SHADE POINT HEIGHT													
Distance to Shade Reduction Line from Northern Lot Line (in ft.)	**North-South Lot Dimension (in ft.)**												
	100+	**95**	**90**	**85**	**80**	**75**	**70**	**65**	**60**	**55**	**50**	**45**	**40**
70	40	40	40	41	42	43	44						
65	38	38	38	39	40	41	42	43					
60	36	36	36	37	38	39	40	41	42				
55	34	34	34	35	36	37	38	39	40	41			
50	32	32	32	33	34	35	36	37	38	39	40	41	42
45	30	30	30	31	32	33	34	35	36	37	38	39	40
40	28	28	28	29	30	31	32	33	34	35	36	37	38
35	26	26	26	27	28	29	30	31	32	33	34	35	36
30	24	24	24	25	26	27	28	29	30	31	32	33	34
25	22	22	22	23	24	25	26	27	28	29	30	31	32
20	20	20	20	21	22	23	24	25	26	27	28	29	30
15	18	18	18	19	20	21	22	23	24	25	26	27	28
10	16	16	16	17	18	19	20	21	22	23	24	25	26
5	14	14	14	15	16	17	18	19	20	21	22	23	24

Based on the formula these are he figures that were used:

- SRL (Shade Reduction Line; the distance between the shade point and the northern lot line) = 40 – This figure was taken from table 50.06.007-2 where the north-south lot dimensions is 100'+ and the distance from the shade reduction line (shown on the Shade Point Height Site Plan provided) being over 70'.
- N = 90 – this value was given based on the north-south lot dimension being over 90' in length and therefore the formula states to use the value of 90'.
- The formula then is computed as follows:
  H = {(2x40)-90+150} / 5

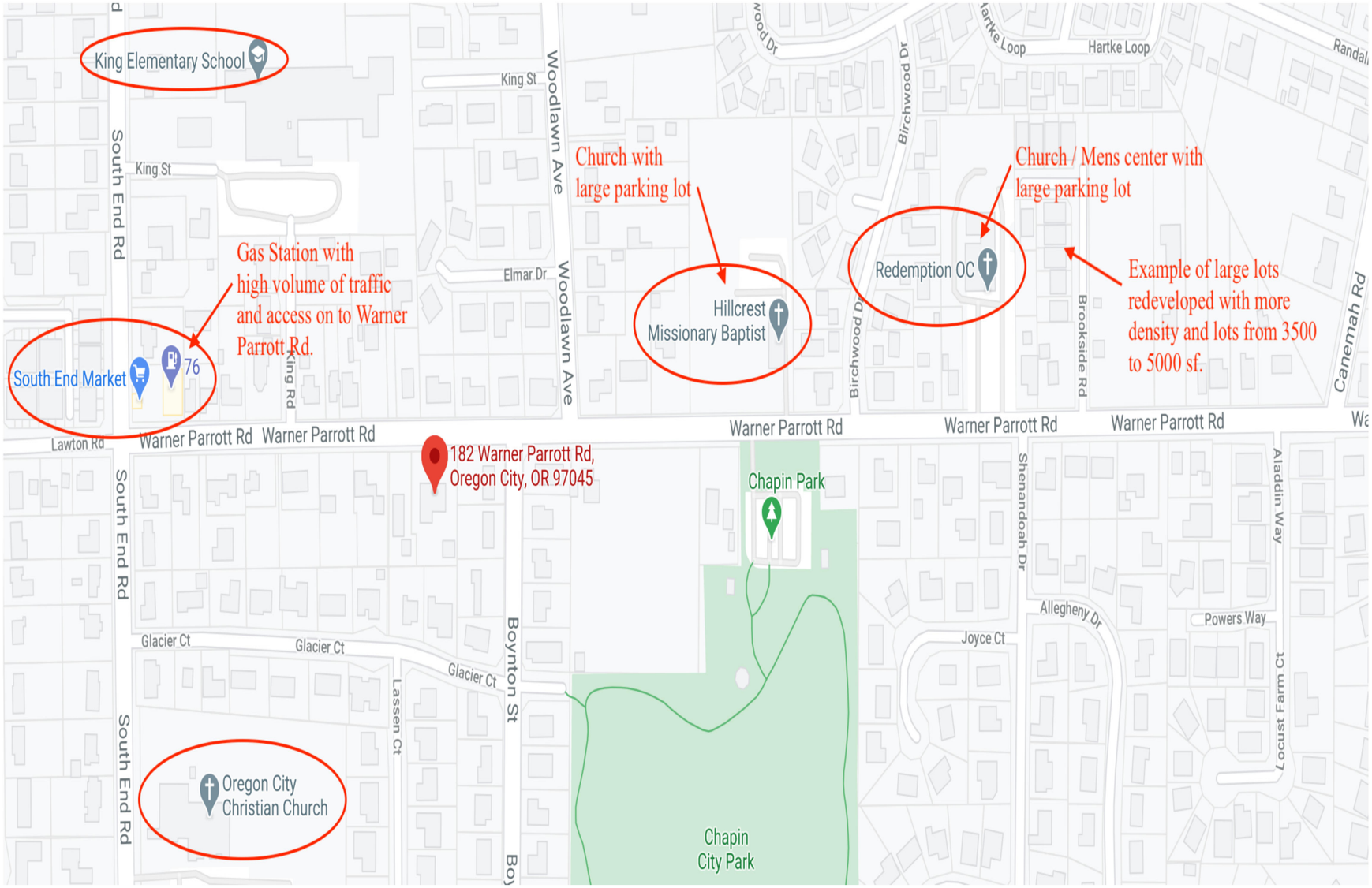
  H = (80-90+150) / 5

  H = 140 / 5 = 28'

H = 28’ (The maximum shade point height). The proposed building height at its highest point (on the northern side of the lot) is 28’-11-1/2” the majority of the building height is 27’-6” or less.

In the Solar Access code from the City of Lake Oswego under section 50.06.007.1.c that was also used for this study, it states that a lot automatically complies with the standard if the lot has a north-south dimension of 90’ or more (the subject property has a dimension of 199.78’); and if the front lot line is oriented within 30 degrees or less of a true east-west axis (the subject property is oriented to within 5 degrees or less of the east-west axis).

At the first planning commission hearing there was a concern about shading onto the property located at 18621 Boynton St. however, that property has a large tree that far exceeds the height of the proposed structure, in this development, that is located on that neighbor’s property. That tree will far exceed the shade creation it casts on that individual’s property than the proposed building given its height and width. The proposed building is located 12’-35’+ away from that property line at the location with the existing tree being located on the neighbor’s property between their yard and the proposed building addition. We do not believe that this proposal will cause any solar loss to the adjacent properties as outlined in this study and given the setbacks and heights of the proposed building.


King Elementary School
King St
South End Rd
King St
Woodlawn Ave
Church with large parking lot
Church / Mens center with large parking lot
Gas Station with high volume of traffic and access on to Warner Parrott Rd.
Elmar Dr
Woodlawn Ave
Hillcrest Missionary Baptist
Redemption OC
Example of large lots redeveloped with more density and lots from 3500 to 5000 sf.
Birchwood Dr
Brookside Rd
Canemah Rd
Hartke Loop
Hartke Loop
South End Market
76
King Rd
Lawton Rd
Warner Parrott Rd
Warner Parrott Rd
Warner Parrott Rd
Warner Parrott Rd
Warner Parrott Rd
182 Warner Parrott Rd, Oregon City, OR 97045
Chapin Park
Shenandoah Dr
Aladdin Way
Allegheny Dr
Powers Way
Joyce Ct
Locust Farm Ct
South End Rd
Glacier Ct
Glacier Ct
Glacier Ct
Boynton St
Lassen Ct
South End Rd
Oregon City Christian Church
Chapin City Park


Warner Parrott Rd
Warne
TALLEST POINT OF ROOF (EXISTING) WITH THE ADDITION INCLUDED

Pete Walter

From: Edward Radulescu <eddie@eprdesign.com>
Sent: Wednesday, December 9, 2020 6:10 PM
To: Petronella Donovan; Pete Walter
Cc: Daniel Donovan
Subject: Re: Dec. 14th Agenda for Virtual Planning Commission Hearing
Attachments: Existing Conditions Survey.pdf; Surrounding Uses.pdf

Pete,
Please find attached the existing conditions survey showing all site elements to within 25' of the existing site. As you can see there is only 1 neighbor to the west whose home is within 25' of the property line. All other neighbors homes are set back further and have large trees that would generate far more shade to their properties than our building would make (also see solar height memorandum provided previously). I also included a survey of the different uses in the immediate vicinity and down Warner Parrot Rd. Uses that are other than Single Family Dwellings, although several large lots were developed and more densely built with single family homes. Please let me know if you need anything else for the hearing on the 14th. Thanks

Regards,
Edward Radulescu, B. Arch
epr DESIGN
www.eprdesign.com
919 N.E. 19th Ave
Suite 155
Portland, Or. 97232
Office: 503-265-8461
Direct: 503-679-2493
eddie@eprdesign.com

From: Petronella Donovan <petra@donovaninvestments.com>
Date: Tuesday, December 8, 2020 at 9:56 AM
To: Pete Walter <pwalter@orcity.org>
Cc: "eddie@eprdesign.com" <eddie@eprdesign.com>, Daniel Donovan <daniel13donovan@gmail.com>
Subject: Re: FW: Dec. 14th Agenda for Virtual Planning Commission Hearing

Thanks Pete!

Petronella Donovan

On Tue, Dec 8, 2020 at 9:48 AM Pete Walter <pwalter@orcity.org> wrote:

From: Laura Terway <lterway@orcity.org>
Sent: Monday, December 7, 2020 8:26 PM
Subject: Dec. 14th Agenda for Virtual Planning Commission Hearing

Good Evening,

Please find attached the agenda for the December 14th, 2020 Planning Commission work session and hearing, which will be held on Zoom. **No in-person attendance will be available. Please contact planning@orcity.org for the meeting link.**

6pm Planning Commission Work Session

7pm Planning Commission Hearing

The complete agenda packet can be found at the following link: https://www.orcity.org/meetings. Please post where required and forward to any interested party. If citizens require additional accommodations, contact planning@orcity.org

The public is strongly encouraged to relay concerns and comments via email at any time up to 12 p.m. the day of meeting to planning@orcity.org.

What's your Vision for Oregon City?

Laura Terway, AICP

Community Development Director - Planning & Building Departments

She/Her

695 Warner Parrott Road (PO Box 3040), Oregon City, Oregon 97045
Direct 503.496.1553 Office 503.722.3789

www.orcity.org | webmaps.orcity.org | www.rediscoverthefalls.com

Think **GREEN** before you print.

COVID-19 (Coronavirus) Information

The City of Oregon City is open for business and continues to offer services and programs online and virtually. Some City facilities are open to the public, find current openings here, we encourage visitors to wear a mask, practice physical distancing, and reschedule in-person visits if you are feeling unwell. The City has installed additional shielding and is providing hand sanitizer as well as occupancy limits to ensure our staff and visitors have a safe, no touch experience. Our goal is to be responsive to our community throughout this pandemic; we appreciate your understanding and cooperation.

Pete Walter

From: Edward Radulescu <eddie@eprdesign.com>
Sent: Monday, December 7, 2020 4:50 PM
To: Pete Walter; Petronella Donovan; Daniel Donovan
Subject: Re: Additional Information for Planning Commission
Attachments: SOLAR SHADING.docx; MEMORANDUM TO COMMENTS.docx

Pete,
Attached are the additional items we wanted to submit with the exception to a more complete survey of the site and the surrounding properties to within 15' of the property lines. We do not wish for a continuance but we will be getting that additional survey over to you by tomorrow:

- Voluntary Solar Shading and Height study based on the requirements and standards of Lake Oswego since Oregon City does not have these standards in their code.
- Memorandum to the planning commission regarding some comments and concerns from the neighbors as well as a discussion about shared parking with the church down the street.
- Survey of properties down Warner Parrot Rd. that are uses other than single family as requested at the first planning commission hearing.

Let me know if there is anything else you need and as mentioned, I should have the detailed site survey over to you tomorrow as well. Thank you

Regards,
Edward Radulescu, B. Arch
epr DESIGN
www.eprdesign.com
919 N.E. 19th Ave
Suite 155
Portland, Or. 97232
Office: 503-265-8461
Direct: 503-679-2493
eddie@eprdesign.com

From: Pete Walter <pwalter@orcity.org>
Date: Monday, December 7, 2020 at 8:46 AM
To: "eddie@eprdesign.com" <eddie@eprdesign.com>, Petronella Donovan <petra@donovaninvestments.com>
Subject: Additional Information for Planning Commission

Good morning Eddie and Petronella,

I hope you had a good weekend. Please can you give me a status update on the additional information you are preparing for the Planning Commission?

If you still need additional time to prepare these materials, please can you provide:

1. A separate email requesting a continuance, and please provide the reason why the continuance is needed.
2. A 30-day extension of the current decision deadline to February 3, 2021.

We are sending out the Planning Commission agenda at 4:00 p.m. today, so please can you let me know ASAP?

Thanks,

Pete Walter

Peter Walter, AICP, Senior Planner
He/him/his pronouns (learn about gender pronouns here)
695 Warner Parrott Rd, Oregon City, OR 97045
(503) 496-1568 Direct
(503) 867-2575 Mobile
(503) 722-3789 Main
Today in Black History
What's your Vision for Oregon City?

Interactive Maps and Apps
On-Line Submittal of Land Use Applications
COVID-19 (Coronavirus) Information

The City of Oregon City is open for business and continues to offer services and programs online and virtually. Some City facilities are open to the public, find current openings here, we encourage visitors to wear a mask, practice physical distancing, and reschedule in-person visits if you are feeling unwell.

The City has installed additional shielding and is providing hand sanitizer as well as occupancy limits to ensure our staff and visitors have a safe, no touch experience. Our goal is to be responsive to our community throughout this pandemic; we appreciate your understanding and cooperation.

Pete Walter

From: John Kies <jkies1@gmail.com>
Sent: Friday, November 20, 2020 10:08 AM
To: Pete Walter
Subject: 182 Warner Parrot Rd-project

I know that I'm not a voting member, but a thought on this project. I drove by the location:

The building on the premises is already a dominating building in the area.

There is a two car garage at the end of the driveway now. Reviewed the drawings again and it appears that will be eliminated.

The new building would really take a neighborhood look , out of the area. The size of these properties would make it a logical place for others to add businesses in the area.

Just a thought

30 September, 2020

Oregon City Planning Commission
695 Warner Parrott Road
Oregon City, OR. 97045

RE: GLUA-20-00002 Conditional use/SP-20-00043 Site Plan & Design Review
Subject Property: 182 Warner Parrott Rd., Oregon City, OR. 97045

To Whom It may Concern:

I am writing this letter in favor of Oregon City Adult Care Home expanding their facility and services at the above location.

This business has an excellent reputation and is known for their compassionate, empathetic care of our senior citizens. The Oregon City Community needs more caring senior facilities, it is clean quiet industry, which will provide for more employment opportunities and increased senior services in our City. The current site is adequate for this expansion and will not overextend other services currently available in that area.

I urge you to approve this application.

Sincerely yours,

Janet M. Hochstatter

Janet M. Hochstatter
Secretary, Oregon City Chamber of Commerce
Founding member, Clackamas Volunteers in Medicine, Founders Clinic
14539 S. Thayer Road
Oregon City, OR. 97045
jmhochstatter@comcast.net

Mary Nerpel Smith

191 Warner Parrott Rd.

Oregon City, OR 97045

November 2, 2020

Oregon City Planning commission:

I am writing in concern of increasing the number of beds at the adult care home on Warner Parrott Rd. My understanding is that they will be using four parking spaces on Warner Parrott Rd.

When the facility was approved by the neighborhood it was with the understanding that they would provide their own off-street parking.

As you are aware Warner Parrott Rd. only has parking on one side of the street, because of this the on-street parking becomes very precious.

When I have family picnics or holiday dinners my guests must park on the street using those spaces.

When there are games at Chapin park, the attendees park up and down the road. I have witnessed them parking to the west of the park past 152, which is farther west on Warner Parrott Rd. than the adult care home.

When my neighbors have garage sales, their customers must park on that side of the street using those spaces.

I know that the memory care center on South End utilizes street parking spaces. Those spaces are on the side street not on the main Rd.

I implore you, please do not approve the expansion of the adult care home on Warner Parrott Rd.

Cordially,

Mary Nerpel Smith

Mary Nerpel Smith

ENTERED INTO THE RECORD
DATE RECEIVED: 11/12/2020
SUBMITTED BY: M. Peters
SUBJECT: Ltr. re. CU 20-00020

11/9/2020

To the Planning Commission of Oregon City:

Following are some of my additional concerns about the proposed expansion at 182 Warner Parrott Rd. Oregon City Or. 97045

1. Current 20 year plan Goal 1.7.1 Neighborhood plans "Ensure the neighborhood plans are consistent with the Comprehensive Plan."

According to the Zoning Map we are still an R-10 which is listed as Low Density defined as "primarily single –family detached homes". How is 30 patients + staff a low density facility? Will the owners continue to live there so it is still their residence?

2. Quote from the application-"The existing house is actually conforming to the R-10 zone, but the change in use from Group Home to Assisted Living Facility triggers full compliance with the commercial siting standards."

This area is not zoned commercial. I am concerned if you let one commercial building be in this R-10 zone it will set a precedent for other commercial properties. Most of us living here would no longer be able to afford the increased property taxes the new designation would bring

3. As described in OAR 411, division 057, memory care communities licensed as a RCF must be located on the ground floor. A CF cannot be endorsed as a memory care community. **There was some mention in the meeting 10/26/20 meeting that this facility may become a memory care unit. The upper floors would not be allowable as memory care under Oregon code.**

4. Exhibits 1, 2, and 3, show the church buildings currently on Warner Parrott Rd. These churches each provide adequate parking that does not interfere with the parking by other residents of the neighborhood. They are also set back from the street to blend in better with the designs of this older residential neighborhood. The addition at 182 does not provide enough on site parking and the design does not blend in.

As stated in my previous testimony, I feel the Donovans give excellent quality care, but this design of an expanded facility is not appropriate for this neighborhood.

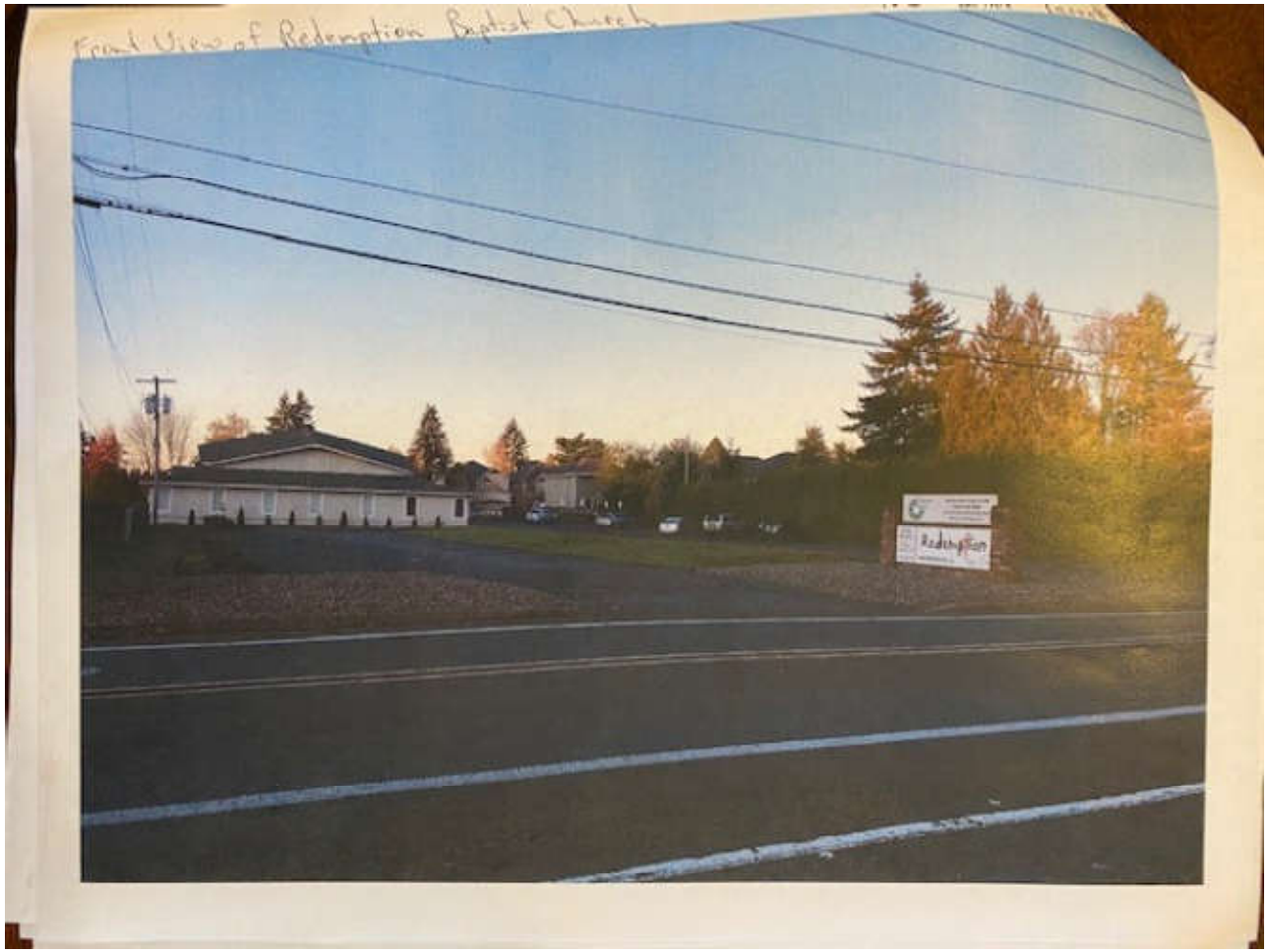
Marilyn Fergus

152 Warner Parrott Rd

ENTERED INTO THE RECORD
DATE RECEIVED: 11/09/2020
SUBMITTED BY: M. FERGUS
SUBJECT: 4. GLUA-20-00070


Side View of Hillcrest Missionary Baptist Church


Front view of Hillcrest Missionary Baptist Church


Front View of Redemption Baptist Church

PO Box 516
Oregon City OR 97045
503-656-1619
F: 503-656-2274
www.oregoncity.org

OREGON CITY CHAMBER of COMMERCE

October 9, 2020

Oregon City Planning Commission
695 Warner Parrott Road
Oregon City, OR. 97045

RE: GLUA-20-00002 Conditional use/SP-20-00043 Site Plan & Design Review
Subject Property: 182 Warner Parrott Rd., Oregon City, OR. 97045

To Peter Walter and the Planning Commission:

The Oregon City Chamber of Commerce is writing to support the expansion of the facility and services of Oregon City Adult Care Home, LLC at 182 Warner Parrott Rd., Oregon City, OR. 97045

Daniel and Petronella Donovan have been members in good standing with the Oregon City Chamber of Commerce since 2012. They have been exemplary in support of the City of Oregon City, and it's community members.

By allowing the proposed development:

- It affords longtime community members to stay in the same area they have lived in and allows them peace and continuity in their senior years.
- It brings more jobs to the city.
- Most importantly, it brings some of the much-needed housing in the state's significant shortfall of beds.

As advocates for businesses in Oregon City, the Chamber believes that Oregon City's best interest is to grant this application, thereby increasing senior housing in Oregon City. The Chamber fully endorses Daniel and Petronella Donovan's request for this expansion.

Respectfully,

Victoria Meinig, CEO
Oregon City Chamber of Commerce

Cc: Petronella Donovan

Pete Walter

From: Jennifer Roney, RN / All About Seniors Inc. <allaboutseniors1@cs.com>
Sent: Saturday, October 10, 2020 9:41 AM
To: Pete Walter
Subject: GLUA-20-00020: CU-20-00002 Conditional use / SP-20-00043 Site Plan and Design Review. Subject Property: 182 Warner Parrott Rd. Oregon City, OR. 97045

To Whom it May Concern,

I am writing to request your favorable decision in the expansion plans of this above property in Oregon City. I have worked with these providers, Petronella and Danny Donovan, for many years in my role as a nurse and placement agent serving the tri-county area.

These are exceptional Providers with an outstanding reputation as well as regulatory record in their Adult Care Home. I have done many placements in their Home over the years and have received only the highest compliments and feedback from families regarding their home and services. Their reputation is truly immaculate and they are highly sought after senior care Providers.

Petronella and Danny are also leaders in the Adult Care Home Provider community. They have led their peers with integrity, wisdom and compassion. They have also helped in the creation of guidelines, regulations, education and training, both locally and state wide, towards the goal of continued quality care for our seniors and disabled.

Their goal to expand their care setting offerings brings me much happiness as an Senior care Placement Agent because I know they will continue to provide that same level of high quality care and services in everything that they plan to do. And the need is tremendous for the services they will be offering. Our senior population is growing at a fast rate and the need is tremendous for more high quality care settings. This is what Petronella and Danny propose and will provide. I have no doubts whatsoever about the quality and services that they are planning.

I also see a benefit to your community in that they will become a larger local business and employer, something we all appreciate tremendously for a multitude of reasons. And I fully anticipate they will be helping to meet the needs of seniors in the nearby rural communities that have VERY limited care options available to them currently.

I see so many reasons to thank them and cheer them on for taking on this project to even better serve the community. I encourage you to do the same and to vote favorably in the continuation of their work serving your local community as well as all of us in the surrounding area.

Respectfully yours,

Jennifer Roney, RN
Senior Care & Placement Agent
/ Owner
All About Seniors, Inc.
AllAboutSeniorsInc.com
503-659-1410

Pete Walter

From: Joanne Petrie <Joanne.Petrie@bristolhospice.com>
Sent: Saturday, September 19, 2020 2:59 PM
To: Pete Walter
Subject: Re: GLUA-20-00020:CU-20-00002 and SP-20-00043 SUBJECT PROPERTY: 182 Warner Parrot Rd. Oregon City, Oregon

Re: GLUA-20-00020:CU-20-00002 and SP-20-00043

SUBJECT PROPERTY: 182 Warner Parrot Rd. Oregon City, Oregon

Dear Oregon City Planning Commission,

I am writing this letter to confirm that Petronella owns a foster home and wants to enlarge the facility.

I have been a neighbor for five years and a friend for twenty years.

She has the ability to facilitate her present foster home with clarity, compassion and resourcefulness and dignity. She is capable of handling a larger facility that adds value to the neighborhood and will give people who need help a home away from home.

She has a unique ability to manage as well as as give people appropriate additional support and assistance in their decline in life.

I support her request to enlarge her facility whole-heartedly!

Any questions please feel free to call me.
Joanne Petrie
503-593-2301

Joanne Petrie
Chaplain/Bereavement Coordinator
Bristol Hospice-Oregon
503-698-8911
Joanne.Petrie@BristolHospice.com
www.bristolhospice-oregon.com

Pete Walter

From: Stacy Cox <stacylynn077@comcast.net>
Sent: Thursday, August 13, 2020 5:32 PM
To: Pete Walter
Subject: Concerns regarding proposed expansion located at 182 Warner Parrot rd.

Peter Walter,

Our property is connected to the proposed expansion of the adult care home located at 182 Warner Parrot rd. We have concerns regarding this project as listed below.

1- Dropping property values
2- Increased traffic hazards (already difficult to see pulling out of Boynton St onto Warner Parrot.) Plus the added increase in traffic coming to and from the facility daily.
3- The new structure doesn't fit into the look of our residential neighborhood. It will look more like a hotel or a commercial building.
4- Timeline of construction, with my husband working graveyard and 2 kids at home doing online schooling. This will affect our daily life.

Please consider the families this will affect in our neighborhood.

Stacy and Todd Cox
12011 Glacier st Oregon city OR 97045
stacylynn077@comcast.net

Attn: Peter Walter

Dear Mr. Walter,

I have been requested by a homeowner who lives adjacent to the proposed Asteria Care Residential Care Facility remodel to comment on this proposal. After reviewing the proposal, I believe this project would affect the six landowners who have property adjacent to the project much more than other neighborhood residents.

As a neighborhood resident,

1. I don't think that such a large structure would blend in with the surrounding homes.
2. I do not think that allowing such a large building to be placed 10 feet from the sidewalk on as busy a street as Warner Parrott is a good idea.
3. I have always felt that the existing building didn't really blend in with the surrounding homes and tripling it in size would make it even worse.
4. I am also concerned about the parking for this facility. With thirty residents, I don't think that 4 parking spots would be adequate for the need. There will be increase need for parking for increased working staff, suppliers and resident's guests. I would anticipate that the overflow will routinely end up on the street.

As a homeowner with property adjacent to this project:

I would not want such a large building towering over my home. A two-story complex would have upstairs windows looking down onto my property and home, removing some of my privacy and casting shade on my house and property.

I realize that progress and change must go on, but I feel that adjoining residents purchased their homes with the expectation that they would have homes next door, and not a huge motel. I went to this property with my mother as a child to buy cream and eggs and realize that this neighborhood has and will continue to change. I would urge that the variance be denied or revised to reduce the size of the addition, parking, and closeness to the road.

Sincerely.

David M. Chapin

8.13.2020 11:45 AM

Request for variance concerning project: GLUA-20-00020:
Conditional use: SP-2000043 Site Plan and Design Review.

As neighbors living at 152 Warner Parrott Rd., two houses west of the proposed project, we have the following concerns about this project:

1. There is not enough parking to accommodate this large of an expansion. The proposal does not allow for increased parking for visitors, let alone the increase in staff and medical workers. 4 off street spaces is just not enough. Those people will have to park on Warner Parrott. Trying to pull out of our driveway is difficult now. We have to turn our cars around in the driveway to head out rather than back out as the traffic is too heavy especially in the rush hours of the morning and evening.

2. This neighborhood is designated R-10. How does this comply? This addition is equivalent to having a hotel in our neighborhood. With the front addition being only 10 feet from the sidewalk, this will change the whole feel of the neighborhood. The existing houses are all set back farther on their property.

3. This expansion will remove the larger trees and most of the other vegetation that helps to keep our neighborhood cooler and reduce the impact of the carbon monoxide and carbon dioxide from the heavy road traffic.

4. We are also concerned that the front right addition of two stories will block us from getting any morning sun in our yard.

Gary Fergus Marilyn Fergus

Gary & Marilyn Fergus
152 Warner Parrott Rd

Pete Walter

From: Jackie Williams <abbnlil@msn.com>
Sent: Friday, August 14, 2020 3:09 PM
To: Pete Walter
Subject: Proposed expansion

Regarding the proposed expansion of adult care center on Warner Parrott.
We live on Boynton Street, just off Warner Parrorott.
There is no parking as it is, where will people park and what are the consequences of the additional traffic on our streets? There are schools nearby, and a park that does not have enough parking for sporting events already.
We do not think this is a wise expansion.
Sincerely,
Mr and Mrs Gary Geiger
18620 Boynton St
Oregon City

Sent from my iPad

August 11, 2020

Oregon City Planning Department
695 Warner Parrott Road
Oregon City, Oregon 97045

In reference to proposed project: GLUA-20-00020: CU-20-00002, Conditional use / SP-20-00043

As a property owner and resident of the immediate area of the above request for variances to city code, I object to the issuance of said variances for the following seven reasons:

1. The area is zoned single family dwellings, and the proposed use does not fit the zoning or look of the neighborhood. Proposed is a full two story, 29 foot tall, 17,728 square foot structure. This is nearly three times the size of the current building on the property, taking up some 39.3% of the physical lot (40% is code maximum). It does not fit into the predominately single story "ranch style home" neighborhood.

2. A specific variance to allow construction of the proposed building would put the structure within 10 feet of the street, city code is for 25 foot set back.

3. Adequate parking is not provided in the variance request. The proposal is for a 30 bed residential adult and memory care facility, yet only provides for four parking spaces, the current owners have three vehicles on the existing parcel, leaving only one additional space for employees, vendors, suppliers, and visitors. This would cause excessive "on street" parking issues.

4. Traffic and safety concerns. As the current use is a five room adult care facility (already a non residential use), and the request is for a variance becoming a thirty bed adult residence and memory care facility, this would cause traffic and safety issues. Employees, vendors, suppliers and visitors would park on Warner Parrott Road, Boynton and adjacent streets. It is already difficult to access Warner Parrott Road when vehicles are parked on the street due to obstructed vision. Additionally, the new Robert Libke Oregon City Public Safety building, for the Oregon City Police Department, is scheduled to open this fall, just a few blocks away, this will mean additional use of Warner Parrott Road by emergency vehicles.

5. Demolition and construction noise issues. Many of the immediate area residents work night and split shifts. Noise, dust and traffic issues caused by a project of this magnitude would be unacceptable and would continue for an indeterminate period of time.

6. The 'physical look of the proposed building' does not fit in the neighborhood. Although the proposed building would look appropriate in an area of apartments, hotels, business or commercial structures, it does not fit in our single family, primarily single story residential area. The potential net effect on property values in the area, due to the look of the structure and non complying use, would likely cause a reduction in home valuations.

7. Privacy concerns, the second story windows of the proposed building will look into the back or side yards of six neighboring residential properties.

It is for these reasons that I implore the Oregon City Planning Commission to reject the application for variances to city codes on the project noted at 182 Warner Parrott Road.

Jerry Yarberry
Owner and Resident
18641 Boynton Street
Oregon City, Oregon 97045

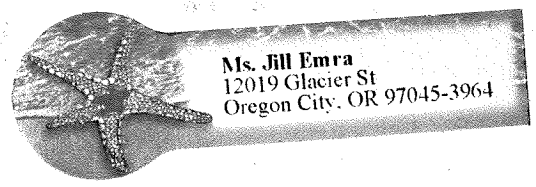
Note: approximately 12 feet of my property abuts the south east corner of the proposal. Additionally, the height of said proposed building will affect the vegetation, sunlight and air flow in the immediate area and neighborhood.

July 29th 2020

Dear O.C. planning dept.,

I live at 12019 Glacier Street and I oppose the plan for the new construction Project at 182 Warner Parrott Road. I am concerned about parking problems and being able to access warner parrott safely if their was additional vehicles parked along the road. Additionally, I am concerned about potential livability, privacy and property value problems and the change that a larger building would do in a single family neighborhood.

Sincerely, Jill Emra



PORTLAND
29 JUL 2020

NMP

Oregon City Planning
695 warner Parrott Road
oregon city, oregon 9704

NIXIE 971
UNABLE

Oregon City Planning Department

695 Warner Parrott Rd

Oregon City, OR. 97045

GLUA-20-00020: CU-20-00002 Conditional use /SP-20-00043 Site Plan and Design Review

I have some concerns about the expansion project for 182 Warner Parrott Rd (GLUA-20-00020: CU-20-00002 Conditional use /SP-20-00043 Site Plan and Design Review).

1. This will expand the building from a 5,982 square feet house to 17,728 square foot, double story house. Looking at the plans this house will run most of the length of my property line and block visibility and sunlight on my property with windows overlooking my property.
2. The current care facility is able to care for 5 adults and the plan show a growth to 30. I do believe this will require more people to care for the patients, but the plans only show 4 parking spots. That means there will always be cars parked on Warner Parrott Rd, I feel it Is already a dangerous road for coming out of my drive way but adjacent roads coming onto Warner Parrott will become even more hazardous.
3. Property value will go down with such a large business building in the middle of residential buildings.

I am against this proposal

Mark Turner

170 Warner Parrott Rd

Oregon City, OR. 97045

August 12, 2020

Re: GLUA-20-00020:CU-20-00002 and SP-20-00043

SUBJECT PROPERTY: 182 Warner Parrot Rd. Oregon City, Oregon

To Oregon City Planning Commission:

I am writing to object to the proposed variance and conditional use permit sought for the above captioned property. My husband and I reside at 18621 Boynton Street which is directly east of the subject property.

The proposed building is totally out of character with the neighborhood which is almost entirely single family homes. As currently proposed, the structure will loom over our home and those to the north and south of us. The current building blends well with the neighborhood while the proposed expansion will appear as a large commercial facility, totally out of character.

The size of the proposed building leaves insufficient room for parking on the property. The result likely will be parking on Warner-Parrott which will create a safety issue for all of the vehicles which use Boynton to access Warner-Parrott. If parking is restricted there, the next logical place for staff to park will be Boynton which is already burdened by the press of citizens unable to park in the lot which serves Chapin Park.

Approval of a proposal of this nature sets a dangerous precedent which will likely generate other applications of this kind which will seriously erode the livability of other neighborhoods throughout the city.

Thank you for your consideration of our concerns.

Michelle Winters

John Winters

18621 Boynton Street

Oregon City, Oregon 97045

CITY OF OREGON CITY

Staff Report

625 Center Street
Oregon City, OR 97045
503-657-0891

To: Planning Commission **Agenda Date:** 12/14/2020

From: Senior Planner Christina Robertson-Gardiner

SUBJECT: GLUA 20-00033 LEG-19-00002 Amendments to the Water Master Plan.

STAFF RECOMMENDATION: Recommend approval of GLUA 20-00033 LEG-19-00002 Amendments to the Water Master Plan to the City Commission.

EXECUTIVE SUMMARY: The City seeks to amend its Water Master Plan, to reflect revised modeling and system analysis, which will result in an updated list of capital projects. The current Water Master Plan was adopted in 2012, providing a 20-year plan for expanding and upgrading our water system as necessary to accommodate planned growth. Since that time, the City has been working hard to complete projects identified in the plan. With the Amendment to the Water Master Plan, the City will have an updated plan to better operate, maintain, and improve our system over the next 20 years to provide customers with quality and reliable water.

BACKGROUND:

Water is arguably one of the most valuable resources. Without it, there is no life. While having quality drinking water is a necessity of life, we depend on water for our everyday activities such as showering, laundry, dishes, and for fire protection. We are fortunate here in Oregon City to have the rights to a great water source, the Clackamas River. A quality source and an excellent treatment facility, combined with one of the oldest water rights, makes Oregon City water supply one of the most reliable, efficient, high-quality water supplies in the state. While our water is supplied by the South Fork Water Board, jointly owned by Oregon City and West Linn, the City of Oregon City is responsible for getting the water to homes and businesses. Investing in our community water system benefits all of us now and in the future. Over the years, the city has grown and so has the water system.

In 2012, the Oregon City Water Master Plan was updated with the 2012 Water Distribution System Master Plan ("Water Master Plan") and is an Ancillary Document to the Oregon City

Comprehensive Plan (2004). The purpose of the Water Master Plan is to identify existing water system deficiencies and required improvements, to analyze existing and future water demands and develop a capital improvement program (CIP) to meet these needs.

In 2012 the Water Distribution System Master Plan ("Water Master Plan") was adopted including a CIP identifying projects over a 20-year planning horizon to satisfy growth, and water system operational and hydraulic criteria. In 2017, City staff identified several shortcomings with the 2012 CIP related to operational and implementation challenges:

- **Transmission Main Reliability**: Aging system condition combined with high water pumping pressures during current peak demand from the Mountain View Booster Station to Boynton and Henrici Reservoirs, results in leaking pipes and increases the risk of pipe breaks. As a result, the system operates at a reduced capacity, creating challenges to meet demands and maintaining fire protection.
- **Pressure Issues in System**: Customer feedback indicated pressure issues in the system that need to be addressed.
- **Future Growth Refinement:** Implementation challenges were realized with the current plan, due to topography and development locations in concept plan areas. Revised hydrologic modeling and subsequent analysis does not change the growth assumptions for areas located within the Urban Growth Boundary, but rather the approach to distributing water lines to those areas.

To address these identified challenges and better meet the needs of current and future customers, City staff secured professional services to update the water system model and CIP. The updated model incorporated updated information since 2012, including current adopted design standards, consumption rates, growth rates, expansion of system since 2012, and system operating data. Updated modeling was then used to evaluate the water distribution system needs for the next 20 years. The outcome is an updated list of capital improvements needed to support development, as projected within the Comprehensive Plan.

This is the 1st Planning Commission hearing date for GLUA 20-00033 LEG-19-00002 Amendments to the Water Master Plan. The number of hearings is at the discretion of the Planning and City Commissions.

OPTIONS:

1. Recommend approval of GLUA 20-00033 LEG-19-00002 Amendments to the Water Master Plan to the City Commission (Recommended)
2. Continuation of the GLUA 20-00033: GLUA 20-00033 LEG-19-00002 Amendments to the Water Master Plan to the October 12, 2020 Planning Commission Hearing

BUDGET IMPACT:

Amount: Unknown

FY(s):

Funding Source(s):

OREGON CITY

Community Development

695 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

LEGISLATIVE STAFF REPORT AND RECOMMENDATION

A preliminary analysis of the applicable approval criteria for a legislative proposal is enclosed within the following report. The applicant understands that all applicable criteria shall be met, or met with conditions, in order to be approved. The Planning Commission may choose to adopt the findings as recommended by staff or alter any finding as determined appropriate.

HEARING DATE: Planning Commission: December 14, 2020
FILE NUMBER: GLUA 20-00033 LEG-19-00002 Amendments to the Water Master Plan

APPLICATION TYPE: Legislative (OCMC 17.50.170)

APPLICANT: Oregon City Public Works
C/O Patty Nelson, Project Engineer
PO Box 3040
Oregon City, OR 97045

REQUEST: Proposed Amendments to the Water Master Plan

LOCATION(S): City Wide

I. BACKGROUND:

Water is arguably one of the most valuable resources. Without it, there is no life. While having quality drinking water is a necessity of life, we depend on water for our everyday activities such as showering, laundry, dishes, and for fire protection. We are fortunate here in Oregon City to have the rights to a great water source, the Clackamas River. A quality source and an excellent treatment facility, combined with one of the oldest water rights, makes Oregon City water supply one of the most reliable, efficient, high-quality water supplies in the state. While our water is supplied by the South Fork Water Board, jointly owned by Oregon City and West Linn, the City of Oregon City is responsible for getting the water to homes and businesses. Investing in our community water system benefits all of us now and in the future.

Over the years, the City has grown, and so has the water system. The system is now comprised of over 150 miles of pipe, ranging in diameter from 2 inches to 30 inches.

The City seeks to amend its Water Master Plan, to reflect revised modeling and system analysis, which will result in an updated list of capital projects. The current Water Master Plan was adopted in 2012, providing a 20-year plan for expanding and upgrading our water system as necessary to accommodate planned growth. Since that time, the City has been working hard to complete projects identified in the plan. With the Amendment to the Water Master Plan, the City will have an updated plan to better operate, maintain, and improve our system over the next 20 years to provide customers with quality and reliable water..

These amendments also provide the needed documentation and direction for ongoing discussions with Clackamas River Water, the neighboring water provider, on implementation of the City's capital projects to serve existing and future city residents as well as any future water rate discussions.

Project Purpose

In 2012, the Oregon City Water Master Plan was updated with the 2012 Water Distribution System Master Plan ("Water Master Plan") and is an Ancillary Document to the Oregon City Comprehensive Plan (2004). The purpose of the Water Master Plan is to identify existing water system deficiencies and required improvements, to analyze existing and future water demands, and develop a capital improvement program (CIP) to meet these needs.

In 2012 the Water Distribution System Master Plan ("Water Master Plan") was adopted including a CIP identifying projects over a 20-year planning horizon to satisfy growth, and water system operational and hydraulic criteria. In 2017, City staff identified several shortcomings with the 2012 CIP related to operational and implementation challenges:

- **Transmission Main Reliability**: Aging system condition combined with high water pumping pressures during current peak demand from the Mountain View Booster Station to Boynton and Henrici Reservoirs, results in leaking pipes and increases the risk of pipe breaks. As a result, the system operates at a reduced capacity, creating challenges to meet demands and maintaining fire protection.
- **Pressure Issues in System**: Customer feedback indicated pressure issues in the system that need to be addressed.
- **Future Growth Refinement:** Implementation challenges were realized with the current plan, due to topography and development locations in concept plan areas. Revised hydrologic modeling and subsequent analysis does not change the growth assumptions for areas located within the Urban Growth Boundary, but rather the approach to distributing water lines to those areas.

To address these identified challenges and better meet the needs of current and future customers, City staff secured professional services to update the water system model and CIP.

The updated model incorporated updated information since 2012, including current adopted design standards, consumption rates, growth rates, expansion of system since 2012, and system operating data. Updated modeling was then used to evaluate the water distribution system needs for the next 20

years. The outcome is an updated list of capital improvements needed to support development, as projected within the Comprehensive Plan.

The Amendment to the 2012 Water Distribution System Master Plan will incorporate the updated information into the Water Master Plan. The Amendment was developed in accordance with the Oregon Administrative Rule (OAR) 660-011 which requires that "..a City or County shall develop and adopt a public facility plan for areas within the urban growth boundary containing a population greater than 2,500 persons. The purpose of the plan is to help assure the urban development in such urban growth boundaries is guided and supported by the types and levels of urban facilities and services appropriate for the needs and requirements of the urban areas to be serviced, and that those facilities and services are provided in a timely, orderly and efficient arrangement..". The revisions made in theAmendment will satisfy the City's obligations with respect to OAR 660-011.

According to the 2004 Oregon City Comprehensive Plan (Introduction, "Implementing the Plan" Page 4, Exhibit 6): "Ancillary Plans are adopted by the City Commission for such things as parks and recreation, transportation systems, water facilities and sewer facilities. Usually prepared by City departments through public process, ancillary plans are approved by the City Planning Commission and adopted by the City Commission to provide operational guidance to City departments in planning for and carrying out city services. These plans are updated more frequently than the Comprehensive Plan."

The Oregon City Water Master Plan is a "public facilities plan", which is defined in the administrative rules implementing Goal 11, OAR 660-011-0005(1), and provides: "A public facility plan is a support document or documents to a comprehensive plan. The facility plan describes the water, sewer and transportation facilities which are to support the land uses designated in the appropriate acknowledged comprehensive plans which an urban growth boundary containing a population greater than 2,500. Certain elements of the public facility plan also shall be adopted as part of the Comprehensive Plan, as specified in OAR 660-11-045."

Project Description

Amendment to Water Master Plan: This Amendment amends portions of the Water Master Plan as outlined in the "2012 Water Distribution System Master Plan Amendment, August 2020" by Murraysmith (attached). The Amendment has been identified as a change that requires approval by the Planning Commission and City Commission. When approved, the 2012 Water Distribution System Master Plan will be Amended as outlined in the "2012 Water Distribution System Master Plan Amendment, August 2020", attached herein, an ancillary plan to the Comprehensive Plan

The City of Oregon City is seeking adoption of an Amendment to the 2012 Water Distribution System Master Plan ("Water Master Plan"), to reflect current conditions and system needs. A complete replacement of the Water Master Plan is not being proposed at this time. Instead, the City seeks to amend the Water Master Plan to reflect updated modeling and system analysis and revising the list of capital projects based on that analysis. Elements of the Master Plan are still valid; therefore this Amendment will modify only portions of the Master Plan as noted below:

Amend the affected chapters amended, as noted below:

The following is a brief description of the affected chapters of the 2012 Water Master Plan, including description of change and what information is superseded in the affected chapters. Upon adoption, these changes will improve the City's ability to ensure the safe and adequate provision of water to existing and future customers within the urban growth boundary.

Chapter 3: Water Demand:

Description of Amendment: The Amendment reflects updated demand forecasts reflecting actual growth rates since 2012 and updated population forecasts based on Metro/Clackamas County projections. Demand projections also consider updated water demand data, reflecting actual consumption rates. Methodology is consistent with 2012 Master Plan and uses current comprehensive plan and zoning designations, to estimate water consumption including adopted concept plans and zoning implementation for Beavercreek (Thimble Creek), South End and Park Place.

Amendment to the Water Master Plan: *References to forecasted demands are superseded by this Amendment.*

Chapter 4: Water Distribution System Service Standards:

Description of Amendment: Since the 2012 Water Master Plan, certain specialty codes and design standards have changed. The Amendment incorporates updates to standards resulting from these code and standard changes, including:

- **Fire Flows:** Updated to align with recent revisions to the Oregon Fire Code.
- **Service Pressures:** Revised Minimum and Maximum service pressure criteria to reflect Oregon Plumbing Code requirements and industry standards, as well as City Operations input regarding acceptable minimums based on customer concerns.
- **Storage Criteria:** Updated to meet current industry standard.

Amendment to the Water Master Plan: *References to fire flow requirements, service pressures and storage criteria should be superseded by the Amendment.*

Chapter 5: Hydraulic Model Update:

Description of Amendment: Since 2012, system improvements and expansions have occurred consistent with the existing master plan. The Amendment includes an updated model reflecting system improvements since 2012, as well as incorporating updated data collected reflecting system operations and updated demand projections developed as part of this Amendment.

Amendment to the Water Master Plan: *The Amendment updates the hydraulic model and therefore supersedes the 2012 water master plan model.*

Chapter 6: Existing Water Distribution System Evaluation:

Description of Amendment: The water distribution system and design criteria have changed, as noted above, therefore the evaluation of the existing system has changed in the Amendment. Evaluation of the existing system was also expanded to include major maintenance items not captured in the 2012 Water Master Plan, but require a large capital outlay, such as reservoir coating and transmission main improvements. The updated hydraulic model and system operating information indicates the need to install pressure reducing valves (PRV) as well as transmission main and pump station improvements.

Amendment to the Water Master Plan: *The Amendment provides an updated evaluation of the existing system and supersedes the 2012 system evaluation.*

Chapter 7: Future Water Distribution System Evaluation:
Description of Amendment: As discussed above, the Amendment includes a new hydraulic model incorporating updated information since 2012, resulting in an updated evaluation of the future water demand throughout the City. Some key changes include looping of the water system to improve resiliency. This resulted in modification of size and location of some water lines. In addition,,water lines that are 8" or less in concept planning areas have been eliminated from the CIP, since these costs are born by the developer and are not a capital expense for the City. Changes in design criteria combined with an updated hydraulic model, modified storage needs has resulted in a size reduction of new reservoirs. Minor pipe location alignments and the reservoir location as identified in the concept plan areas are also reflected, informed by information gathered since 2012 regarding build out of the areas to accommodate topographical challenges and system needs. The Amendment also reflects the City Commission decision to serve the Beavercreek (Thimble Creek) Concept plan area with City-owned infrastructure, independent of Clackamas River Water.
Amendment of the Water Master Plan: *The Amendment provides an updated evaluation of the future water distribution system and supersedes the 2012 water master plan evaluation.*

Chapter 8: Recommended Capital Improvement Program:
Description of Amendment: Updated modeling and evaluation of the existing and future water distribution system needs has generated an updated list of projects to be completed in the Capital Improvement Program including those projects discussed above. The Amendment is intended to provide an update of the projects and proposed implementation plan.
Amendment of the Water Master Plan: *Amendment project list replaces the 2012 Water Master Plan project list. Implementation of the projects will be as set forth in the Capital Improvement Plan for the Water Distribution System, adopted by City Commission.*

Chapter 9: Water Distribution System Financing Plan:
Description of Amendment: This Amendment does not change the sources of funding identified in the 2012 Water Master Plan. An updated rate study has been performed using the updated project list, however this is done outside of the comprehensive plan process and will be reviewed by the City Commission separately.
Amendment of the Water Master Plan: *Proposed method of funding is not changed; however, project list is replaced by the project list in the Amendment.*

1. **Public Notice and Comments**

Public outreach for the Water Master Plan Amendment has been done throughout the development of the Amendment through the land-use process, including the following:

- September 7, 2019: City Commission Work Session: Presentation of Water Distribution System CIP Update
- May 12, 2020 City Commission Work Session: Presentation of Water Master Plan Amendment – Service
- June 20, 2020 City Commission Meeting: Resolution 21-15 Water Service
- July 6, 2020 Citizen Involvement Committee Meeting: Presentation of WMP Amendment

- Summer 2020 Trail News: Keep Your Water Flowing – Describes Water Master Plan Amendment
- Winter 2020 Trail News: Keep Your Water Flowing – Describes Water Master Plan Amendment

The following public comments were received prior to the release of the Staff Report.

Wes Rogers
The Oregon City School District indicated that the proposal did not conflict with their interests.

Clackamas River Water
Clackamas River Water Submitted the following comments along with an existing letter date June 2, 2020 sent to Mayor Dan Holladay.

The Amendment would not conflict with the interests of Clackamas River Water (CRW) if the following changes are noted/included:

- CRW may have infrastructure in these areas that is needed to continue to serve parts of the District outside of these areas. Therefore, note that such infrastructure (such as water transmission mains) shall remain the property of CRW regardless of the planning actions taken by the City, in accordance with State statute and the 2018 Joint Engineering Study between the City and CRW.
- Where applicable, infrastructure eligible for reimbursement shall follow the terms of the Remuneration Agreement between the City and CRW.
- If the City intends to construct water infrastructure to serve properties in certain areas still in CRW's service area, the District asks that the City follow established procedures for withdrawal of these areas as outlined by statute.
- CRW infrastructure may exist in certain areas that can currently, or with minor modification, serve properties in some of these areas. CRW remains willing to serve those customers that remain within our boundaries in a manner that can help the City accomplish Goal 11.3 of its Comprehensive Plan ("Water Distribution").
- For further information and clarification, please reference the attached letter dated June 2, 2020, which was previously sent to the City.

Adam M. Bjornstedt, P.E. Chief Engineer, in an email dated December 7, 2020, provided additional context to the reference to the 2018 Joint Engineering Study:

Please consider this as a clarifying response to CRW's 10/29/2020 letter addressing Oregon City's proposed water master plan amendments. In that letter, the first bullet describes the need to consider existing CRW water infrastructure that is necessary to serve other areas of the District. The comments therein included a reference to the 2018 Joint Engineering Study and state statute. Please note that the reference to the Joint Engineering Study was for information purposes only, since the Study includes some definition and discussion of existing water infrastructure. As long as any action by the City in implementing its Master Plan is done in accordance with state statute, including where existing District water infrastructure exists, CRW takes no exception. The other bullet points of the 10/29/2020 letter remain as written, for the City's consideration.

Staff Response: Oregon City is a party to a remuneration agreement with Clackamas River Water that has been signed by both agencies that addressees infrastructure within areas to be withdrawn and how they are retained or transferred. State statute outlines the withdrawal process and procedures which we are following. The proposed Amendment does not change the area the City is planning to serve, just the implementation measures (e.g., reservoir location and alignments). Oregon City is the planned service provider in areas we are able to serve, as outlined in the Amendment.

II. DECISION-MAKING CRITERIA

Chapter 17.68 - Zoning Changes and Comprehensive Plan Amendments

17.68.010 - Initiation of the Amendment.

A text amendment to the comprehensive Plan, or an amendment to the zoning code or map or the Comprehensive Plan map, may be initiated by:

A. A resolution request by the City Commission;
B. An official proposal by the Planning Commission;
C. An application to the Planning Division; or.
D. A Legislative request by the Planning Division.

All requests for Amendment or change in this title shall be referred to the Planning Commission.

Finding: Complies as Proposed. The proposal qualifies as initiated as a legislative request by the Public Works Director.

17.68.015 –Procedures.
Applications shall be reviewed pursuant to the procedures set forth in Chapter 17.50.
17.50.170 - Legislative hearing process.
A. Purpose. Legislative actions involve the adoption or Amendment of the City's land use regulations, comprehensive Plan, maps, inventories and other policy documents that affect the entire City or large portions of it. Legislative actions which affect land use shall begin with a public hearing before the planning commission.

B. Planning Commission Review.
1. Hearing Required. The planning commission shall hold at least one public hearing before recommending action on a legislative proposal. Any interested person may appear and provide written or oral testimony on the proposal at or prior to the hearing. The community development director shall notify the Oregon Department of Land Conservation and Development (DLCD) as required by the post-acknowledgment procedures of ORS 197.610 to 197.625, as applicable.

Finding: Complies as Proposed. This legislative action will follow the procedures found in OCMC 17.50.170, including meetings with the Planning Commission and City Commission where applicable.*17.68.020 - Criteria.*

The criteria for comprehensive plan amendment or text or map amendment in the zoning code are set forth as follows:
A. The proposal shall be consistent with the applicable goals and policies of the Comprehensive Plan;

Finding: Complies as Proposed. This legislative action will be consistent with the applicable goals and policies of the Comprehensive Plan. Therefore, the proposed amendments are consistent with Criterion (A).

The 2004 Oregon City Comprehensive Plan contains criteria for approving changes to the Comprehensive Plan and ancillary documents. Review of the Comprehensive Plan should consider:

1. Plan implementation process.
2. Adequacy of the Plan to guide land use actions, including an examination of trends.
3. Whether the Plan still reflects community needs, desires, attitudes and conditions. This shall include changing demographic patterns and economics.
4. Addition of updated factual information including that made available to the City of regional, state and federal governmental agencies.

"Statements of Principle - Page 3.

Provide efficient and cost-effective services. Water, sewer, fire protection, police services, streets, storm drainage, and other public services are directly affected by land-use decisions. This Plan ensures that land-development decisions are linked to master plans for specific services such as water or sewer and to capital improvement plans that affect budgets and require taxes to build.. The City Commission believes that citizens are economically well-served through compact urban form, redevelopment of existing areas, and public investments (for example, street improvements) that are carefully tied to private investments when development occurs."

"Implementing the Plan – Page 4

The Oregon City Comprehensive Plan is implemented through City Codes, **ancillary plans**, concept plans, and master plans.

Ancillary plans are adopted by the City Commission for such things as parks and recreation, transportation systems, water facilities, and sewer facilities. Usually prepared by City departments through a public process, ancillary plans are approved by the City Planning Commission and adopted by the City Commission to provide operational guidance to city departments in planning for and carrying out city services. These plans are updated more frequently than the comprehensive Plan."

"Ancillary Plans. – Page 15

Since 1982, several documents have been adopted as ancillary to the 1982 Comprehensive Plan: the *Public Facilities Plan* (1990), *Oregon City Transportation System Plan* (2001), *Oregon City Downtown Community Plan* (1999), *Oregon City Waterfront Master Plan* (2002), ***City of Oregon City Water Master Plan* (2012),** *City of Oregon City Sanitary Sewer Master Plan* (2003), *Drainage Master*

Plan (1988, updated in 1999 as the *City of Oregon City Public Works Stormwater and Grading Design Standards*), *Caufield Basin Master Plan* (1997), *South End Basin Master Plan* (1997), *Molalla Avenue Boulevard and Bikeway Improvements Plan* (2001), the *Oregon City Park and Recreation Master Plan* (1999), and the *Oregon City Trails Master Plan* (2004)." (Emphasis added.)

Applicable Comprehensive Plan and Statewide Planning Goals and Policies

Goal 9.1 Improve Oregon City's Economic Health
Provide a vital, diversified, innovative economy including an adequate supply of goods and services and employment opportunities to work toward an economically reasonable, ecologically sound and socially equitable economy

Finding: Complies as Proposed. One of the primary purposes of the legislative Amendment is to update planned water infrastructure for developing areas considering topographic challenges, given the need to develop consistent with planned densities and resource limitations. These updates will improve the efficient arrangement of public facilities to better serve the planned development framework within the Urban Growth Boundary, which includes the Park Place, South End and Thimble Creek Concept Plan areas.

Goal 9.2 Cooperative Partnerships
Create and maintain cooperative partnerships with other public agencies and business groups interested in promoting economic development.

Policy 9.2.1
Seek input from local businesses when making decisions that will have a significant economic impact on them.

Policy 9.2.2
Carefully consider the economic impacts of proposed programs and regulations in the process of implementing the City's Comprehensive Plan.

Policy 9.2.3
Simplify, streamline, and continuously improve the permitting and development review process.

Finding: Complies as Proposed. This legislative Amendment has been proposed as a response to what other public agencies, local business, and citizens have conveyed to the City. These amendments also provide the needed documentation and direction for ongoing discussions with Clackamas River Water, the neighboring water provider, on implementation of the City's capital projects to serve existing and future city residents as well as any future water rate discussions.

Goal 11.1 Provision of Public Facilities
Serve the health, safety, education, welfare, and recreational needs of all Oregon City residents through the planning and provision of adequate public facilities.
Finding: Complies as Proposed. The Master Plan and Amendment are in compliance with Goal 11, Public Facilities, which requires that public facilities and services be provided in a timely, orderly, and efficient manner. The Goal's central concept is that local government should plan public services in accordance with

the community's needs as a whole, rather than be forced to respond to individual developments as they occur, including water service.

The Amendment reflects a number of updates that improve the City's ability to meet Goal 11. Specific updates include:

- Updating water demand projections
- Updates water distribution system service standards
- Updating hydraulic model and analysis of system needs
- Updated Capital Improvement Plan (CIP)

Comp Plan Policy, 11.1.1

Ensure adequate public funding for the following public facilities and services, if feasible: Water distribution

Finding: Complies as Proposed. While the Amendment provides a new list of projects, the funding sources are the same as those identified in the current Water Master Plan: Water Fund and System Development Charge Fund.

Comp Plan Policy 11.1.2

Provide public facilities and services consistent with the goals, policies and implementing measures of the Comprehensive Plan, if feasible.

Finding: Complies as Proposed. The Amendment updates portions of the Master Plan, thereby improving the City's ability to implement public facilities consistent with the goals, policies and implementation of the Comprehensive Plan consistent with Policy 11.1.2.

Comp Plan Policy 11.1.3

Confine urban public facilities and services to the city limits except where allowed for safety and health reasons in accordance with state land-use planning goals and regulations. Facilities that serve the public will be centrally located and accessible, preferably by multiple modes of transportation.

Finding: Complies as Proposed. The City's water distribution system and related facilities are located within the city limits. Storage and transmission facilities are identified outside the city limit and outside the UGB due to elevation requirements, but said facilities are for storage and supplying water to within the city limits. Interties to other jurisdictions water systems are located at various points around the City as allowed by state law. The water distribution facilities exist and are planned for in locations that are accessible by various modes of transportation.

Comp Plan Policy 11.1.4

Support development on underdeveloped or vacant buildable land within the City where public facilities and services are available or can be provided and where land-use compatibility can be found relative to the environment, zoning, and Comprehensive Plan goals.

Finding: Complies as Proposed. The Amendment reflects updated hydraulic model and system analysis to support the development consistent with the planned comprehensive planned zoning, inclusive of the adopted concept planned areas. An updated capital project list has been included in the Amendment showing system improvements to meet existing, and future water system needs.

Comp Plan Policy 11.1.5

Design the extension or improvement of any major public facility and service to an area to complement other public facilities and services at uniform levels.
Finding: Complies as Proposed. The Amendment includes updates to the water distribution model, supply and demand projects, and an updated Capital Improvement Plan that identifies water system improvements needed to provide a uniform level of service to the planning area.

Comp Plan Policy 11.1.7
Develop and maintain a coordinated Capital Improvements Plan that provides a framework, schedule, prioritization, and cost estimate for the provision of public facilities and services within the City of Oregon City and its Urban Growth Boundary.
Finding: Complies as Proposed. The Amendment provides an updated capital project list, which will replace the existing project list in the Water Master Plan. The CIP includes prioritization of projects, cost estimates and an implementation plan. The CIP includes system improvements needed to meet operational, capacity and development needs, as well as pipe replacement and facility rehabilitation.

Comp Plan Goal 11.3 Water Distribution
Seek the most efficient and economical means available for constructing, operating, and maintaining the City's water distribution system while protecting the environment and meeting state and federal standards for potable water systems.
Finding: Complies as Proposed. The Amendment improves the City's ability to efficiently and economically construct, operate and maintain the City's water system and protect the environment and meet state, federal standards for potable water by incorporating updates to standards and regulations, reflecting current demand projections, providing a current hydraulic model, updated evaluation of the existing distribution system, and update to the needed improvements to meet the system needs and growing demands.

Comp Plan Policy 11.3.1
Plan, operate and maintain the water distribution system for all current and anticipated city residents within its existing Urban Growth Boundary and plan strategically for future expansion areas.
Finding: Complies as Proposed. The Amendment enhances the City's ability to plan, operate and maintain the water distribution system for all current and anticipated city residents within the UBG, by incorporating updated projections for water demand, reflecting current standards, updated hydraulic model, system analysis and updated capital project list.

Comp Plan Policy 11.3.2
Collaborate with South Fork Water Board to ensure that an adequate water supply system is maintained for residents. Coordinate with the South Fork Water Board, City of West Linn and Clackamas River Water to ensure that there is adequate regional storage capacity.
Finding: Complies as Proposed. The Amendment provides updated and current storage capacity needs, developed from revised water demand projections and design standards and updated hydraulic modeling. In addition, it identifies interties to other distribution systems to provide water supply when needed to improve system resiliency. These amendments provide the needed documentation and direction for ongoing discussions with Clackamas River Water and South Fork Water Board on implementation of the City's capital projects to serve existing and future city residents.

Comp Plan Policy 11.3.3

Maintain adequate reservoir capacity to provide all equalization, operational, emergency and fire flow storage required for the City's distribution system.
Finding: Complies as Proposed. A key component of the Amendment is an updated water distribution model which was calibrated with the system operation and updated to reflect updated projected demands. The Amendment includes updated reservoir capacity needs for the City to ensure adequate capacity to provide all equalization, operational, emergency, and fire flow storage required for current and future distribution system needs. The Amendment also reflects the City Commission's decision to provide service to the Beavercreek (Thimble Creek) area.

Comp Plan Policy 11.3.4
Adopt a progressive water rate structure that will encourage water conservation.
Finding: Complies as Proposed. Water rate structure is addressed separately and not included in the existing Master Plan or Amendment proposal.

Goal 13.1 Energy Sources
Conserve energy in all forms through efficient land-use patterns, public transportation, building siting and construction standards, and city programs, facilities, and activities.
Finding: Complies as Proposed. One of the primary purposes of the legislative Amendment is to update planned water infrastructure for developing areas considering topographic challenges encountered in development plans. These updates will improve the efficient arrangement of public facilities to better serve the planned development framework within the Urban Growth Boundary, which includes the Park Place, South End and Thimble Creek Concept Plan areas.

B. That public facilities and services (water, sewer, storm drainage, transportation, schools, police and fire protection) are presently capable of supporting the uses allowed by the zone or plan amendment, or can be made available prior to issuing a certificate of occupancy. Service shall be sufficient to support the range of uses and development allowed by the zone or plan amendment;
Finding: Complies as Proposed. The proposed amendments to the Water Master Plan provide additional refinement to the capital project and proposed transmission line system indented service all areas within the Urban Growth Boundary. The work confirms and further refines the approach to efficiently services all areas of the City by utilizing currently modeling data and looks.

C. The land uses authorized by the proposal are consistent with the existing or planned function, capacity and level of service of the transportation system serving the proposed zoning district or plan amendment
Finding: Complies as Proposed.: Not applicable. None of the proposed amendments will have any impact on the existing or planned functions, capacity, and level of service of the transportation system. Therefore, the proposed amendments are consistent with Criterion (C).

D. Statewide planning goals shall be addressed if the Comprehensive Plan does not contain specific policies or provisions which control the Amendment.

STATEWIDE PLANNING GOAL 1:
To develop a citizen involvement program that ensures the opportunity for citizens to be involved in all phases of the planning process.

Finding: Complies as Proposed.

Public outreach for the Water Master Plan Amendment has been done through-out the development of the Amendment through the land-use process, including the following:

- September 7, 2019: City Commission Work Session: Presentation of Water Distribution System CIP Update
- May 12, 2020 City Commission Work Session: Presentation of Water Master Plan Amendment – Service
- June 20, 2020 City Commission Meeting: Resolution 21-15 Water Service
- July 6, 2020 Citizen Involvement Committee Meeting: Presentation of WMP Amendment
- Summer 2020 Trail News: Keep Your Water Flowing – Describes Water Master Plan Amendment
- Winter 2020 Trail News: Keep Your Water Flowing – Describes Water Master Plan Amendment

STATEWIDE PLANNING GOAL 2:

To establish a land use planning process and policy framework as a basis for all decision and actions related to use of land and to assure an adequate factual base for such decisions and actions.

Finding: Complies as Proposed. This Goal is implemented through the applicable Goals and Policies in Section 2 of the Oregon City Comprehensive Plan: Land Use. Because the Plan is an ancillary document to the City's Comprehensive Plan, the application was processed pursuant to the legislative hearing process outlined in Section 17.50.170 of the Oregon City Municipal Code.
Goal 2 also provides that the public and "affected governmental units" be given the opportunity to review and comment on proposed amendments.

STATEWIDE PLANNING GOAL 3: Agricultural Lands and GOAL 4: Forest Lands

Finding: Not Applicable. By definition, Oregon City does not have rural resource lands such as for agricultural or forest use within its city limits or UGB, and therefore, those goals are not applicable.

STATEWIDE PLANNING GOAL 5:

To protect natural resources and conserve scenic and historic areas and open spaces.

Finding: Complies as Proposed This goal requires the "protection of natural resources" through an inventory, conflict analysis and protection evaluation scheme that is prescribed by Oregon Administrative Rule 660, Chapter 23.

OAR 660-023-0250 specifies the circumstances that trigger Goal 5 review. In relevant part, an amendment affects a Goal 5 resource if the PAPA "amends a resource list or a portion of an acknowledged plan or land use regulation adopted in order to protect a significant Goal 5 resource." Adoption of a new Stormwater Master Plan and the proposed minor amendments to the Stormwater and Grading Design Standards do not alter the City's existing riparian or wetland inventories.

That said, the 2020 Water Master Plan Update may trigger Goal 5 review because it will be adopted as an ancillary document to the City's Comprehensive Plan and one of the purposes for its adoption to update planned water infrastructure for developing areas considering topographic challenges to meet planned development densities and protect natural resources. These updates will improve the efficient

arrangement of public facilities to better serve the planned development framework within the Urban Growth Boundary, which includes the Park Place, South End and Thimble Creek Concept Plan areas.

Construction of capital project that implement the Water Mater Plan will be reviewed under the City's development standards which include applicable overlay districts such as Natural Resource, a Flood, Geologic Hazards at that time of proposed development, just as they are today.

Where Goal 5 review is triggered under OAR 660-023-0250(3), the local government is not necessarily obligated to undertake each of the many sequential steps in the Goal 5 process identified in the rule. *Johnson v. Jefferson County*, 56 Or LUBA 25, 39-40, aff'd 221 Or App 190, 189 P3d 34 (2008); *NWDA v. City of Portland*, 50 Or LUBA 310, 338 (2005); *NWDA v. City of Portland*, 47 Or LUBA 533, 543 (2004), *rev'd on other grounds*, 198 Or App 286, 108 P3d 589 (2005); *Home Builders Assoc. v. City of Eugene*, 41 Or LUBA 370, 443-44 (2002). Rather, which and how many of the substantive steps in the Goal 5 decision process must be revisited, if any, and to what extent, will depend on the nature of the amendments, the existing acknowledged program, the particular Goal 5 resource and the conflicting use at issue. *Cosner v. Umatilla County*, 65 Or LUBA 9, 22 (2012).

The first step in the general Goal 5 process is to compile an inventory of resources to determine which resources are significant. OAR 660-023-0030. The proposed Amendment does not alter or amend the City's riparian or wetland inventories.[1] The quantity, quality and significance determinations for riparian resources similarly remains unchanged. Therefore, this inventory analysis step is not applicable to the City's adoption of Water Master Plan.

The second step is determining a program to achieve Goal 5 based on "an analysis of the economic, social, environmental, and energy (ESEE) consequences that could result from a decision to allow, limit, or prohibit a conflicting use." OAR 660-023-0040. A "conflicting use" is defined by OAR 660-023-0010 to include "a land use, or other activity reasonably and customarily subject to land use regulations, that could adversely affect a significant Goal 5 resource." Identification of certain capital stormwater improvement projects proposed for construction within the Water Master Plan does not "allow, limit or prohibit a conflicting use" to a greater or lesser degree than if these projects were proposed before the

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[1] Further OAR 660-023-0250(4) provides that:

> "Consideration of a PAPA regarding a specific resource site, or regarding a specific provision of a Goal 5 implementing measure, does not require a local government to revise acknowledged inventories or other implementing measures, for the resource site or for other Goal 5 sites, that are not affected by the PAPA, regardless of whether such inventories or provisions were acknowledged under this rule or under OAR 660, division 16."

The only components of the City's land use plan or regulations that are germane for Goal 5 evaluation are the Water Master Plan. The City is not under any obligation to consider its existing plan or regulations, the level or extent of existing protections of riparian corridors, instream water and the habitat within rivers and creeks that are not subject to amendment.

Master Plan was adopted. Development of the Plan-identified projects must comply with all applicable plan and land use regulations just like private development would. In other words, where capital improvements are proposed within Natural Resource Overlay District regulated riparian setback areas, including the addition of any new impervious surface, compliance with OCMC 17.49 standard will be required. Any above ground water facility development within historic districts or on landmarks are reviewed for compliance with OCMC 17.40 Historic Overlay District and the Design Guidelines for New Construction. Therefore, adoption of the Water Master Plan does not "allow, limit or prohibit" a "conflicting use" to any greater or lesser degree than currently allowed, and therefore, no further analysis of ESEE consequences is necessary, and if applicable, Goal 5 is satisfied.

STATEWIDE PLANNING Goal 7:
To protect life and property from natural disasters and hazards.
Finding: Not Applicable. This proposal does not change any regulations related to natural hazards in Oregon City, including Geologic Hazard and floodplain overlay districts.

STATEWIDE PLANNING GOAL 8:
To satisfy the recreational needs of the citizens of the state and visitors, and, where appropriate, to provide for the siting of necessary recreational facilities including destination resorts.
Finding: Not Applicable. This proposal does not affect any parks or recreation facilities in Oregon City.

STATEWIDE PLANNING GOAL 9:
To provide adequate opportunities throughout the state for a variety of economic activities vital to the health, welfare, and prosperity of Oregon's citizens.
Finding: Complies as Proposed. The adoption of these standards will allow the City to approve new development in the area that contributes to economic vitality.

STATEWIDE PLANNING Goal 10:
To provide for the housing needs of citizens of the state.
Finding: Complies as Proposed. This proposal allows for greater housing opportunities by creating a clear and objective process for reviewing and approving water infrastructure as necessary to serve the development of housing.

STATEWIDE PLANNING GOAL 11:
To plan and develop a timely, orderly and efficient arrangement of public facilities and services to serve as a framework for urban and rural development.
Finding: Complies as Proposed. The Water Master Plan was created to serve the health, safety, education, welfare, and recreational needs of all Oregon City residents through the planning and provision of adequate public facilities. Public Facilities include, but are not limited to, pump stations, public service lines, reservoirs, pressure release valves, service laterals list all the components of the water distribution system.

This goal is implemented through the applicable Goals and Policies in Section 11 of the Oregon City Comprehensive Plan: Public Facilities. As stated in Section 11, the Master Plan is necessary to maintain compliance with Statewide Planning Goal 11, Public Facilities. Goal 11 requires that public facilities and services be provided in a timely, orderly, and efficient manner. The goal's central concept is that local governments should plan public services in accordance with the

community's needs as a whole rather than be forced to respond to individual developments as they occur. This includes stormwater service. As shown in the findings below, the proposed update of the Water Master Plan is consistent with Goal 11.1.

One of the primary purposes of the legislative Amendment is to update planned water infrastructure for developing areas considering topographic challenges to meet planned development densities and protect natural resources.. These updates will improve the efficient arrangement of public facilities to better serve the planned development framework within the Urban Growth Boundary, which includes the Park Place, South End and Thimble Creek Concept Plan areas.

STATEWIDE PLANNING GOAL 12:
To provide and encourage a safe, convenient and economic transportation system.
Finding: Not Applicable. The proposed amendments to the Water Master Plan will not impact or otherwise alter the City's planned transportation system in any way. This goal does not apply

STATEWIDE PLANNING GOAL 13: To conserve energy.
Land and uses developed on the land shall be managed and controlled so as to maximize the conservation of all forms of energy, based upon sound economic principles.
Finding: Complies as Proposed. This goal is implemented through the applicable Goals and Policies in Section 13 of the Oregon City Comprehensive Plan: Energy Conservation. The City promotes the efficient use of land and conservation of energy through its Comprehensive Plan and Zoning Code and through the implementation of public facility improvements and building codes. Higher density and mixed use zoning, land division, and site plan design standards promote more compact development patterns, and promote bicycling and walking instead of relying on the automobile for routine errands. New annexations are required to show that public utilities can be efficiently extended to new urban areas. Metro-approved Concept Plans are required prior to annexation to the City to assure that urban services and amenities will be developed in logical places as the community develops. The amendments to the water master plan assure that public facilities are efficiently used and that energy is conserved.

17.68.040 - Approval by the Commission. If the Planning Commission finds that the request or application for an amendment, or change, complies with the criteria of OCMC 17.68.020, it shall forward its findings and recommendation to the City Commission for action thereon by that body.

Finding: Not applicable. No Planning Commission recommendation will relate to OCMC 17.68.020 as no rezoning or annexation is occurring with this legislative application.

17.68.050 - Conditions.
In granting a change in zoning classification to any property, the Commission may attach such conditions and requirements to the zone change as the Commission deems necessary in the public interest and such conditions and restrictions shall thereafter apply to the zone change or map amendment.

Finding: Not applicable. No land is being rezoned as part of this legislative application.

Chapter 17.50 Administration and Procedures

17.50.050 – Pre-application conference.

A. Pre-application Conference. Prior to a Type II – IV or Legislative application, excluding Historic Review, being deemed complete, the applicant shall schedule and attend a pre-application conference with City staff to discuss the proposal, unless waived by the Community Development Director. The purpose of the pre-application conference is to provide an opportunity for staff to provide the applicant with information on the likely impacts, limitations, requirements, approval standards, fees and other information that may affect the proposal.

1. To schedule a pre-application conference, the applicant shall contact the Planning Division, submit the required materials, and pay the appropriate conference fee.

2. At a minimum, an applicant should submit a short narrative describing the proposal and a proposed site plan, drawn to a scale acceptable to the City, which identifies the proposed land uses, traffic circulation, and public rights-of-way and all other required plans.

3. The Planning Division shall provide the applicant(s) with the identity and contact persons for all affected neighborhood associations as well as a written summary of the pre-application conference.

B. A pre-application conference shall be valid for a period of six months from the date it is held. If no application is filed within six months of the conference or meeting, the applicant shall schedule and attend another conference before the City will accept a permit application. The Community Development Director may waive the pre-application requirement if, in the Director's opinion, the development has not changed significantly and the applicable municipal code or standards have not been significantly amended. In no case shall a pre-application conference be valid for more than one year.

C. Notwithstanding any representations by City staff at a pre-application conference, staff is not authorized to waive any requirements of this code, and any omission or failure by staff to recite to an applicant all relevant applicable land use requirements shall not constitute a waiver by the City of any standard or requirement.

Finding: Complies as Proposed. Public Works (applicant) attended a preapplication conference with Planning staff (PA 19-69) on December 3, 2019

17.50.055 - Neighborhood association meeting.

Neighborhood Association Meeting. The purpose of the meeting with the recognized neighborhood association is to inform the affected neighborhood association about the proposed development and to receive the preliminary responses and suggestions from the neighborhood association and the member residents.

A. Applicants applying for annexations, zone change, comprehensive plan amendments, conditional use, Planning Commission variances, subdivision, or site plan and design review (excluding minor site plan and design review), general development master plans or detailed development plans applications shall schedule and attend a meeting with the City-recognized neighborhood association in whose territory the application is proposed no earlier than one year prior to the date of application. Although not required for other projects than those identified above, a meeting with the neighborhood association is highly recommended.

B. The applicant shall request via email or regular mail a request to meet with the neighborhood association chair where the proposed development is located. The notice shall describe the proposed project. A copy of this notice shall also be provided to the chair of the Citizen Involvement Committee.

C. A meeting shall be scheduled within thirty days of the date that the notice is sent. A meeting may be scheduled later than thirty days if by mutual agreement of the applicant and the neighborhood association. If the neighborhood association does not want to, or cannot meet

within thirty days, the applicant shall host a meeting inviting the neighborhood association, Citizen Involvement Committee, and all property owners within three hundred feet to attend. This meeting shall not begin before six p.m. on a weekday or may be held on a weekend and shall occur within the neighborhood association boundaries or at a City facility.

D. If the neighborhood association is not currently recognized by the City, is inactive, or does not exist, the applicant shall request a meeting with the Citizen Involvement Committee.

E. To show compliance with this section, the applicant shall submit a copy of the email or mail notice to the neighborhood association and CIC chair, a sign-in sheet of meeting attendees, and a summary of issues discussed at the meeting. If the applicant held a separately noticed meeting, the applicant shall submit a copy of the meeting flyer, postcard or other correspondence used, and a summary of issues discussed at the meeting and submittal of these materials shall be required for a complete application.

Finding: Complies as Proposed: The applicant met with the Citizen Involvement Committee on June 6, 2020

17.50.070 - Completeness review and one hundred twenty-day rule.

C. Once the Community Development Director determines the application is complete enough to process, or the applicant refuses to submit any more information, the City shall declare the application complete. Pursuant to ORS 227.178, the City will reach a final decision on an application within one hundred twenty calendar days from the date that the application is determined to be or deemed complete unless the applicant agrees to suspend the one hundred twenty calendar day time line or unless State law provides otherwise. The one hundred twenty-day period, however, does not apply in the following situations:

1. *Any hearing continuance or other process delay requested by the applicant shall be deemed an extension or waiver, as appropriate, of the one hundred twenty-day period.*
2. *Any delay in the decision-making process necessitated because the applicant provided an incomplete set of mailing labels for the record property owners within three hundred feet of the subject property shall extend the one hundred twenty-day period for the amount of time required to correct the notice defect.*
3. *The one hundred twenty-day period does not apply to any application for a permit that is not wholly within the City's authority and control.*
4. *The one hundred twenty-day period does not apply to any application for an amendment to the City's comprehensive plan or land use regulations nor to any application for a permit, the approval of which depends upon a plan amendment.*

D. A one-hundred day period applies in place of the one-hundred-twenty day period for affordable housing projects where:

1. *The project includes five or more residential units, including assisted living facilities or group homes;*
2. *At least 50% of the residential units will be sold or rented to households with incomes equal to or less than 60% of the median family income for Clackamas County or for the state, whichever is greater; and*
3. *Development is subject to a covenant restricting the owner and successive owner from selling or renting any of the affordable units as housing that is not affordable for a period of 60 years from the date of the certificate of occupancy.*

E. The one hundred twenty-day period specified in OCMC 17.50.070.C or D may be extended for a specified period of time at the written request of the applicant. The total of all extensions may not exceed two hundred forty-five calendar days.

F. The approval standards that control the City's review and decision on a complete application are those which were in effect on the date the application was first submitted.

Finding: Complies as Proposed.
Not applicable. Legislative actions are not subject to this standard.

Exhibits

1. Applicant's Submittal
    a. Narrative
    b. Proposed Amendment to Water Master Plan (2020)
2. Water Master Plan (2012)
3. Public Comments
    a. Oregon City School District, Wes Rogers
    b. Clackamas River Water, Adam M. Bjornstedt, P.E. Chief Engineer
    c. December 7, 2020 Email from Adam M. Bjornstedt, P.E. Chief Engineer
4. The following meeting agendas, videos, staff report, and exhibits for this project are available for viewing at https://www.orcity.org/meetings and are part of the record.
    a. September 7, 2019: City Commission Work Session: Presentation of Water Distribution System CIP Update
    b. May 12, 2020 City Commission Work Session: Presentation of Water Master Plan Amendment – Service
    c. June 20, 2020 City Commission Meeting: Resolution 21-15 Water Service
    d. July 6, 2020 Citizen Involvement Committee Meeting: Presentation of WMP Amendment
5. Summer 2020 Trail News: Keep Your Water Flowing
6. Fall 2020 Trail News: Keep Your Water Flowing
7. Winter 2020 Trail News: Keep Your Water Flowing

CITY OF OREGON CITY LAND-USE
APPLICANT SUBMITTAL

FILE NO.:	**GLUA-19-00016** Amendment to Oregon City Water Master Plan
APPLICANT:	Oregon City Public Works Department John Lewis, P.E., Public Works Director Patty Nelson, P.E. Senior Engineer 625 Center Street, Oregon City, Oregon 97045
REPRESENTATIVE:	Murraysmith, Consulting Engineers 888 SW Fifth Avenue, Suite 1170 Portland, OR 97204
REQUEST:	Amendment to Oregon City Water Master Plan
LOCATION:	City-wide.

Background

In 2012, the Oregon City Water Master Plan was updated with the 2012 Water Distribution System Master Plan ("Water Master Plan") and is an Ancillary Document to the Oregon City Comprehensive Plan (2004). The purpose of the Water Master Plan is to identify existing water system deficiencies and required improvements, to analyze existing and future water demands and develop a capital improvement program (CIP) to meet these needs.

According to the 2004 Oregon City Comprehensive Plan (Introduction, "Implementing the Plan" Page 4, Exhibit 6): "Ancillary Plans are adopted by the City Commission for such things as parks and recreation, transportation systems, water facilities and sewer facilities. Usually prepared by City departments through public process, ancillary plans are approved by the City Planning Commission and adopted by the City Commission to provide operational guidance to City departments in planning for and carrying out city services. These plans are updated more frequently than the Comprehensive Plan."

The Oregon City Water Master Plan is a "public facilities plan", which is defined in the administrative rules implementing Goal 11, OAR 660-011-0005(1), and provides: "A public facility plan is a support document or documents to a comprehensive plan. The facility plan describes the water, sewer and transportation facilities which are to support the land uses designated in the appropriate acknowledged comprehensive plans which an urban growth boundary containing a population greater than 2,500.

Certain elements of the public facility plan also shall be adopted as part of the comprehensive plan, as specified in OAR 660-11-045."

Amendment to Water Master Plan: This Amendment, amends portions of the Water Master Plan as outlined in the "2012 Water Distribution System Master Plan Amendment, August 2020" by Murraysmith (attached). The Amendment has been identified as a change that requires approval of the Planning Commission and City Commission. When approved, the 2012 Water Distribution System Master Plan will be Amended as outlined in the "2012 Water Distribution System Master Plan Amendment, August 2020", attached herein, an ancillary plan to the Comprehensive Plan

A complete update of the Water Master Plan is not being completed at this time. Instead, the City seeks to amend the Water Master Plan, to reflect revised modeling and system analysis and resulting updated list of capital projects.

What is the purpose of the project?

In 2012 the Water Distribution System Master Plan ("Water Master Plan") was adopted including a Capital Improvement Plan (CIP) identifying projects over a 20-year planning horizon to satisfy growth, and water system operational and hydraulic criteria. In 2017, City staff identified several issues with the 2012 CIP related to operational and implementation challenges:

- **Transmission Main Reliability**: Aging system condition combined with high water pumping pressures during current peak demand from the Mountain View Booster Station to Boynton and Henrici Reservoirs, result in leaking pipes and increase risk of pipe breaks. As a result, the system operates at a reduced capacity, creating challenges to meet demands and maintaining fire protection.

- **Pressure Issues in System**: Customer feedback indicated pressure issues in the system that need to be addressed.

- **Future Growth Refinement:** Implementation challenges were realized with current plan, due to topography and development locations in concept plan areas. The hydrologic modeling and subsequent analysis do not change the growth assumptions for areas located within the Urban Growth Boundary, but rather the approach to distributing water lines to those areas.

To address these identified challenges and better meet the needs of current and future customers, City staff secured professional services to update the water system model and capital improvement plan. The updated model incorporated updated information since 2012, including current adopted design standards, consumption rates, growth rates, expansion of system since 2012, and system operating data. Updated modeling was then used to evaluate the water distribution system needs for the next 20

years. The outcome is an updated list of capital improvements needed to support the comprehensive planned development.

The Amendment to the 2012 Water Distribution System Master Plan will incorporate the updated information into the Water Master Plan. The Amendment was developed in accordance with the Oregon Administrative Rule (OAR) 660-011 which requires that "..a City or County shall develop and adopt a public facility plan for areas within the urban growth boundary containing a population greater than 2,500 person. The purpose of the plan is to help assure the urban development in such urban growth boundaries is guided and supported by the types and levels of urban facilities and services appropriate for the needs and requirements of the urban areas to be serviced, and that those facilities and services are provided in a timely, orderly and efficient arrangement..". The revisions made in the Amendment will improve the City's ability to meet OAR 660-011.

What are you proposing for adoption as part of this project?

The City of Oregon City is seeking adoption of an Amendment to the 2012 Water Distribution System Master Plan ("Water Master Plan"), to reflect current conditions and system needs. Elements of the Master Plan are still valid; therefore this Amendment will modify only portions of the Master Plan as noted below:

Amendment to Water Master Plan:

- *Add the attached document, 2012 Water Distribution System Master Plan Amendment ("Amendment"), dated August 2020 prepared by Murraysmith as* ***Appendix E: 2012 Water Distribution Master Plan Amendment, August 2020***

Amend the affected chapters amended, as noted below:

The following is a brief description of the affected chapters of the 2012 Water Master Plan, including description of change and what information is superseded in the affected chapters. Upon adoption, these changes will improve the city's ability to ensure the safe and adequate provision of water to existing and future customers within the urban growth boundary.

Chapter 3: Water Demand:

- **Description of Amendment:** The Amendment reflects updated demand forecasts reflecting actual growth rates since 2012 and updated population forecasts based on Metro/Clackamas County projections. Demand projections also consider updated water demand data, reflecting actual consumption rates. Methodology is consistent with 2012 Master Plan and uses current comprehensive plan and zoning designations, to estimate water consumption including adopted concept plans and zoning implementation for Beavercreek (Thimble Creek), South End and Park Place.

- ***Amendment to the Water Master Plan:*** *References to forecasted demands are superseded by this Amendment.*

Chapter 4: Water Distribution System Service Standards:

- **Description of Amendment:** Since the 2012 Water Master Plan, codes and standards have changed. The Amendment incorporates updates to standards resulting from these code and standard changes, including:
    - **Fire Flows:** Updated to align with recent revisions to the Oregon Fire Code
    - **Service Pressures:** Revised Minimum and Maximum service pressure criteria to reflect Oregon Plumbing Code requirements and industry standards, as well as City Operations input regarding acceptable minimums based on customer concerns.
    - **Storage Criteria:** Updated to meet current industry standard

- ***Amendment to the Water Master Plan:*** *References to fire flow requirements, service pressures and storage criteria should be superseded by the Amendment.*

Chapter 5: Hydraulic Model Update:

- **Description of Amendment:** Since 2012, system improvements and expansions have occurred consistent with the existing master plan. The Amendment includes an updated model reflecting system improvements since 2012, as well as incorporating updated data collected reflecting system operations and updated demand projections developed as part of this Amendment.

- ***Amendment to the Water Master Plan:*** *The Amendment updates the hydraulic model and therefore supersedes the 2012 water master plan model.*

Chapter 6: Existing Water Distribution System Evaluation:

- **Description of Amendment:** The water distribution system and design criteria have changed, as noted above, therefore the evaluation of the existing system has changed in the Amendment. Evaluation of the existing system was also expanded to include major maintenance items not captured in the 2012 Water Master Plan, but require a large capital outlay, such as reservoir coating and transmission main improvements. The updated hydraulic model and system operating information indicates the need to install pressure reducing valves (PRV) as well as transmission main and pump station improvements.

- ***Amendment to the Water Master Plan:*** *The Amendment provides an updated evaluation of the existing system and supersedes the 2012 system evaluation.*

Chapter 7: Future Water Distribution System Evaluation:

- **Description of Amendment:** As discussed above, the Amendment includes a new hydraulic model incorporating updated information since 2012, resulting in an updated evaluation of the future water system. Some key changes include looping of the water system to improve resiliency. This resulted in modification of size and location of some water lines. In addition,

water lines that are 8" or less in areas to be developed have been eliminated, since these costs are born by the developer and are not a capital improvement expense for the City. Changes in design criteria combined with an updated hydraulic model, modified storage needs and resulted in a size reduction of new reservoirs. Minor pipe location alignments and the reservoir location as identified in the concept plan areas are also reflected, informed by information gathered since 2012 regarding build out of the areas to accommodate topographical challenges and system needs.

The Amendment also reflects the City Commission decision to serve the Beavercreek (Thimble Creek) Concept plan area with City-owned infrastructure, independent of Clackamas River Water.

- ***Amendment of the Water Master Plan:*** *The Amendment provides an updated evaluation of the future water distribution system and supersedes the 2012 water master plan evaluation.*

Chapter 8: Recommended Capital Improvement Program:

- **Description of Amendment:** Updated modeling and evaluation of the existing and future water distribution system needs has generated an updated list of projects to be completed in the Capital Improvement Program including those projects discussed above. The Amendment is intended to provide an update of the projects and proposed implementation plan.

- ***Amendment of the Water Master Plan:*** *Amendment project list replaces the 2012 Water Master Plan project list. Implementation of the projects will be as set forth in the Capital Improvement Plan for the Water Distribution System, adopted by City Commission.*

Chapter 9: Water Distribution System Financing Plan:

- **Description of Amendment:** This Amendment does not change the sources of funding identified in the 2012 Water Master Plan. An updated rate study has been performed using the updated project list, however this is done outside of the comprehensive plan process and will be reviewed by the City Commission separately.

- ***Amendment of the Water Master Plan:*** *Proposed method of funding is not changed; however, project list is replaced by the project list in the Amendment.*

Consistency with Oregon City Comprehensive Plan

The 2004 Oregon City Comprehensive Plan calls for periodic, technical review of the Comprehensive Plan. Recommendations for updating the Comprehensive Plan should be presented to the Citizen Involvement Committee. The proposed Amendment to the Water Master Plan, an ancillary document to the Comp Plan, is considered a technical update to the Comprehensive Plan and was presented to the Citizens Involvement Committee on July 6, 2020.

In accordance with the requirements of the Comprehensive Plan, this technical review has considered:

1. ***Plan implementation process:*** This Amendment to the Water Master Plan, will be implemented consistent with the plan implementation process.

2. ***Adequacy of the Plan to guide land use actions, including an examination of trends****.:* This Amendment improves the City's ability to guide land use actions by providing an updated analysis of the water distribution system and resulting capital project list, which will help inform and guide land use actions.

3. ***Whether the Plan still reflects community needs, desires, attitudes, and conditions. This shall include changing demographic patterns and economics****: This Amendment is technical in nature specific to the water distribution system. It does not affect the Comprehensive Plan that affect demographics patterns or economics and should therefore still reflect community needs, desires, attitudes, and conditions.*

4. ***Addition of updated factual information including that made available to the City of regional, state and federal governmental agencies.:*** *Factual information updated as part of this Amendment, include water demand projections and hydraulic modeling of the system to support the comprehensive plan.*

Goal 11.1 Provision of Public Facilities

Serve the health, safety, education, welfare, and recreational needs of all Oregon City residents through the planning and provision of adequate public facilities.

Amendment Response: The Master Plan and Amendment are in compliance with Goal 11, Public Facilities, which requires that public facilities and services be provided in a timely, orderly, and efficient manner. The goal's central concept is that local government should plan public services in accordance with the community's needs as a whole, rather than be forced to respond to individual developments as they occur, including water service.

The Amendment reflects a number of updates that improve the City's ability to meet Goal 11. Specific updates include:

- Updating water demand projections
- Updates water distribution system service standards
- Updating hydraulic model and analysis of system needs
- Updated Capital Improvement Plan (CIP)

Comp Plan Policy, 11.1.1

Ensure adequate public funding for the following public facilities and services, if feasible: Water distribution

- **Amendment Response**: While the Amendment provides a new list of project, the funding sources are the same as those identified in the current Water Master Plan: Water Fund and System Development Charge Fund.

Comp Plan Policy 11.1.2

Provide public facilities and services consistent with the goals, policies and implementing measures of the Comprehensive Plan, if feasible.

- **Amendment Response**: The Amendment updates portions of the Master Plan, thereby improving the City's ability to implement public facilities consistent with the goals, policies and implementation of the Comprehensive Plan consistent with Policy 11.1.2.

Comp Plan Policy 11.1.3

Confine urban public facilities and services to the city limits except where allowed for safety and health reasons in accordance with state land-use planning goals and regulations. Facilities that serve the public will be centrally located and accessible, preferably by multiple modes of transportation.

- **Amendment Response:** The City's water distribution system and related facilities are located within the city limits. Storage and transmission facilities are identified outside the city limit and outside the UGB due to elevation requirements, but said facilities are for storage and supplying water to within the city limits. Interties to other jurisdictions water systems are located at various points around the city as allowed by state law. The water distribution facilities exist and are planned for in locations that are accessible by various modes of transportation.

Comp Plan Policy 11.1.4

Support development on underdeveloped or vacant buildable land within the city where public facilities and services are available or can be provided and where land-use compatibility can be found relative to the environment, zoning, and Comprehensive Plan goals.

- **Amendment Response**: The Amendment reflects updated hydraulic model and system analysis to support the development consistent with the planned comprehensive planned zoning,

inclusive of adopted concept planned area. An updated capital project list has been included in the Amendment showing system improvements to meet existing and future water system needs.

Comp Plan Policy 11.1.5

Design the extension or improvement of any major public facility and service to an area to complement other public facilities and services at uniform levels.

- **Amendment Response**: The Amendment includes updates to the water distribution model, supply and demand projects and an updated Capital Improvement Plan that identifies water system improvements needed to provide a uniform level of service to the planning area.

Comp Plan Policy 11.1.7

Develop and maintain a coordinated Capital Improvements Plan that provides a framework, schedule, prioritization, and cost estimate for the provision of public facilities and services within the City of Oregon City and its Urban Growth Boundary.

- **Amendment Response**: The Amendment provides an updated capital project list, which will replace the existing project list in the Water Master Plan. The CIP includes prioritization of projects, cost estimates and an implementation plan. The CIP includes system improvements needed to meet operational, capacity and development needs, as well as pipe replacement and facility rehabilitation.

Comp Plan Goal 11.3 Water Distribution

Seek the most efficient and economical means available for constructing, operating, and maintaining the City's water distribution system while protecting the environment and meeting state and federal standards for potable water systems.

Comp Plan Policy 11.3.1

Plan, operate and maintain the water distribution system for all current and anticipated city residents within its existing Urban Growth Boundary and plan strategically for future expansion areas.

- **Amendment Response**: The Amendment enhances the City's ability to plan, operate and maintain the water distribution system for all current and anticipated city residents within the UBG, by incorporating updated projections for water demand, reflecting current standards, updated hydraulic model, system analysis and updated capital project list.

Comp Plan Policy 11.3.2

Collaborate with South Fork Water Board to ensure that an adequate water supply system is maintained for residents. Coordinate with the South Fork Water Board, City of West Linn and Clackamas River Water to ensure that there is adequate regional storage capacity.

- **Amendment Response**: The Amendment provides updated and current storage capacity needs, developed from revised water demand projections and design standards and updated hydraulic modeling. In addition, it identifies interties to other distribution systems to provide water supply when needed to improve system resiliency.

Comp Plan Policy 11.3.3

Maintain adequate reservoir capacity to provide all equalization, operational, emergency and fire flow storage required for the City's distribution system.

- **Amendment Response**: A key component of the Amendment is an updated water distribution model which was calibrated with the system operation and updated to reflect updated projected demands. The Amendment includes updated reservoir capacity needs for the City to ensure adequate capacity to provide all equalization, operational, emergency and fire flow storage required for current and future distribution system needs. The Amendment also reflects the City Commission decision to provide service to the Beavercreek (Thimble Creek) area.

Comp Plan Policy 11.3.4

Adopt a progressive water rate structure that will encourage water conservation.

- **Amendment Response**: Water rate structure is addressed separately and not included in the existing Master Plan or Amendment.

City of Oregon City

2012 Water Distribution System Master Plan Amendment

August 2020

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Introduction

In 2012, the City of Oregon City (City) adopted the *Water Distribution System Master Plan* (2012 WDSMP) prepared by West Yost Associates, an ancillary document to the City's Comprehensive Plan and the Public Facilities Plan for the City's water distribution system as required by Oregon Administrative Rule (OAR) Chapter 660, Division 11, Public Facilities Planning. The 2012 WDSMP includes the Capital Improvement Program (CIP) which consists of a list of prioritized water distribution system projects and estimated costs were based on 2009 dollars. The CIP is a blueprint for forecasting capital expenditures and is one of the most important means of meeting the City's obligation towards community development and financial public facilities planning.

This document is an amendment to the 2012 WDSMP, developed primarily to provide an updated CIP in current dollars for implementation over a 20-year time frame, through 2040. In order to prepare a comprehensive update, elements of the 2012 WDSMP were either retained as the basis for updated analysis, revised and updated to current conditions, or replaced int heir entirety. A summary of the relationship between the original Chapters of the 2012 WDSMP and this Amendment is presented below:

2012 WDSMP Chapter	2020 Amendment
1. Introduction	Documents updates presented herein as a supplement to Chapter 1
2. Existing Water Distribution System	Retained as is, limited system modifications have occurred
3. Water Demand Analysis	Replaces this Chapter with current and forecasted demands through the year 2040
4. Water Distribution System Service Standards	Amends specific criteria for service pressures, fire flows, pump stations and storage
5. Hydraulic Model Update	Replaces this Chapter with comprehensive model update and calibration
6. Existing Water Distribution System Evaluation	Replaces this Chapter with updated analysis and findings
7. Future Water Distribution System Evaluation	Replaces this Chapter with updated analysis and findings
8. Recommended Capital Improvement Program	Replaces this Chapter with updated CIP based on new existing and future system evaluation
9. Water Distribution System Financing Plan	Replaced by analysis of water rates and system development charges (SDCs) by FCS Group (under separate cover)

This 2012 WDSMP Amendment has been developed in accordance with Oregon Administrative Rule (OAR) 660-011 which requires that "a city or county shall develop and adopt a public facility plan for areas within an urban growth boundary containing a population greater than 2,500

persons. The purpose of the plan is to help assure that urban development in such urban growth boundaries is guided and supported by types and levels of urban facilities and services appropriate for the needs and requirements of the urban areas to be serviced, and that those facilities and services are provided in a timely, orderly and efficient arrangement…"

Water Distribution Model

A steady-state hydraulic network model was used to evaluate the performance of the distribution system under existing and future demand conditions to identify deficiencies and evaluate adequacy of improvements. The model uses the Innovyze InfoWater software, and the EPANet hydraulic engine, to simulate system pressures and demands throughout the distribution system. The model was most recently updated and calibrated in 2017, as documented in the *Water Distribution Model Calibration Technical Memorandum (*Murraysmith, 2017, Appendix A).

System Supply and Demands

The South Fork Water Board (SFWB) supplies treated water to the City of Oregon City, the Clackamas River Water District (CRW), and the City of West Linn. Until recently, SFWB was the localized sole supply for all three providers. However, West Linn upgraded their connection with Lake Oswego-Tigard to access emergency supply from the Lake Oswego-Tigard Water Treatment Plant, completed in 2017. Additionally, CRW is extending supply from their own treatment through an on-going "Backbone" Project. The diversified supply will decrease the total demand on the SFWB system but will primarily not affect projected demands on the City system, or water wheeled through the City system. Therefore, for this analysis, it was assumed that SFWB would continue to supply all three providers without hydraulic deficiencies.

Currently, the City, West Linn, and CRW share supply via the SFWB 30-inch transmission line and the SFWB Division Street Pump Station, or the SFWB 42-inch transmission line and the City Hunter Avenue Pump Station. The supply system is shown in Figure 1 and described in the bullets below. Included in Appendix B is a hydraulic profile of the complete system. A looped connection between the SFWB 30-inch and 42-inch transmission lines was completed in December 2018 and is not reflected in either the figure or the descriptions. This project serves to bypass a leaking portion of the SFWB 30-inch transmission line near the SFWB Water Treatment Plant (WTP) and does not significantly affect system supply. The planning and modeling for this project are documented in the *Emergency Water Supply Analysis Technical Memorandum* (Murraysmith 2019) included in Appendix C.

- West Linn supply is located downstream of the SFWB Division Street Pump Station, directly off SFWB transmission lines, at Master Meter 3 (MM03). West Linn owns and operates their supply line between MM03 and the West Linn Bolton Reservoir. System demands for West Linn are modeled at the Bolton Reservoir.

- CRW demands are supplied via a master meter directly off SFWB infrastructure (MM02), wheeled through City infrastructure to master meters (MM08, MM09, MM11, MM12,

MM13), and directly off City infrastructure, without an intervening master meter. CRW customers supplied without intervening master meters are considered regular City customers, for the purposes of modeling system demands. CRW customers supplied through City infrastructure and via master meters are included as modeled demands at the meter location. Similarly, CRW customers supplied directly off the SFWB line are represented as a single demand at the location of the master meter.

- The City service area includes all areas within the City's Urban Growth Boundary (UGB) as shown in Figure 1 including 10 pressure zones. The City is supplied through both the SFWB 30-inch transmission line via the SFWB Division Street Pump Station, and through the SFWB 42-inch transmission lines via the Hunter Avenue Pump Station. Currently, CRW serves some areas within the City's UGB, including the Barlow Crest area and portions of the South End. These areas have been discussed in detail between the City and CRW in the *Joint Engineering Study Technical Memorandum* (Murraysmith 2018, Appendix D).

Demand Definition

The following demand conditions were used to evaluate system capacity.

- Average daily demand (ADD) is the total annual water volume used system-wide divided by 365 days per year.
- Maximum day demand (MDD) is the largest 24-hour water volume for a given year. In western Oregon, MDD usually occurs each year between July 1st and September 30th, referred to as the peak season.
- Peak hour demand (PHD) is estimated as the largest hour of demand on the peak use day.
- Fire flow demand is the flow rate required by the fire marshal to fight a fire at each hydrant. Demands are based on building size, material, and use. Fire flow demands are modeled in addition to MDD system demands.
- Equivalent Dwelling Units (EDUs) are used to quantify water demands for all forms of development in terms of typical water demand for single family residential units. Water demand per EDU is calculated as the total water demand for all single-family residential units in the system divided by the total number of single-family residential units.

Demand Summary

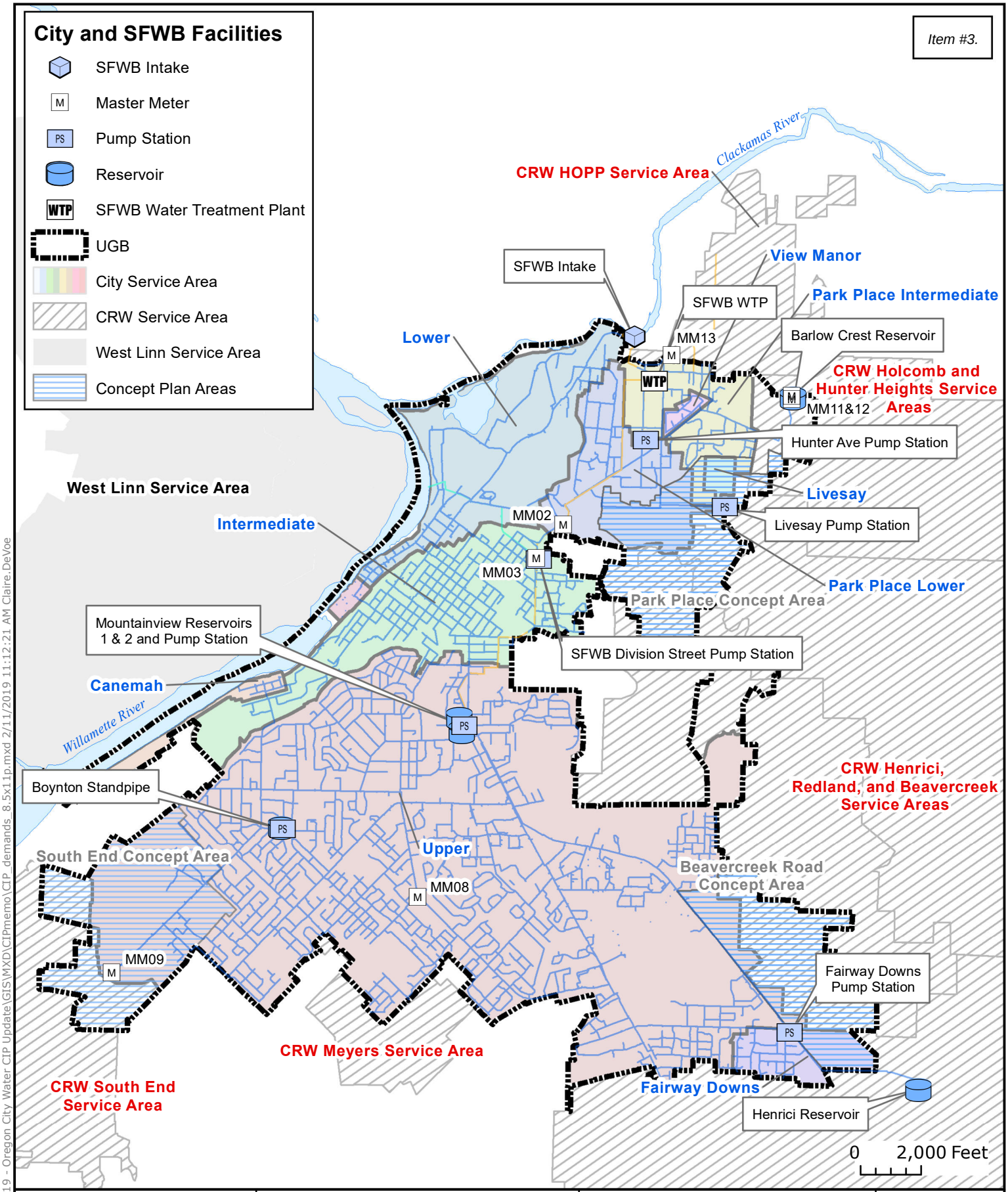
Demand projections were developed for Oregon City pressure zones and relevant master meters from individual water provider projections and are summarized in Tables 1 and 2. Demand projections include existing through the year 2040. The existing condition was approximated as the City's 2015 demands, as these were the most recent data available at the start of the CIP update process, and 2016 demands for West Linn and CRW.

City demands were calculated on a parcel level using Metro and Clackamas County household and employment projections (*Population Forecasts for Clackamas County Service Districts*, EcoNorthwest, 2016). EDUs were developed for each parcel based on residential, commercial, and industrial zoning classifications. Parcels were spatially assigned to the nearest model node within the same pressure zone and demands for each time period were calculated using 2012 WDSMP unit demands of 287 gallons per day per EDU (gpd/EDU). Water demand forecasts assume development occurs within the City's UGB and for the three concept plan areas as illustrated in Figure 1. These include the Park Place Concept Area, the South End Concept Area, and the Beavercreek Road Concept Area.

City MDD and PHD were calculated using peaking factors typical of similar systems in the region. Peaking factors of 2.3 for MDD:ADD and 2.0 for PHD:MDD were used.

CRW demands were distributed to master meter locations based on actual 2016 billing records and projected using a 1.5% per year growth rate, as presented in CRW's *Table 101.B South Storage Capacity Summary (1.5% Growth Forecast)* (CRW 2016, Appendix E).

West Linn demands were projected from actual 2016 billing records and the same 1.5% growth rate as used in CRW demand projections.



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OREGON CITY

City of Oregon City Water CIP Analysis

Figure 1 Study Area

August 2020 17-2119

Table 1
Oregon City ADD/MDD/PHD Existing through Year 2040 Conditions by Pressure Zone

Demand by Zone	ADD (mgd)					MDD (mgd)					PHD (mgd)				
Zone	EXST	2020	2025	2035	2040	EXST	2020	2025	2035	2040	EXST	2020	2025	2035	2040
Lower	0.2	0.3	0.4	0.5	0.6	0.5	0.8	1.0	1.2	1.3	1.0	1.6	1.9	2.4	2.5
Intermediate	0.5	0.5	0.5	0.6	0.6	1.2	1.2	1.2	1.3	1.4	2.3	2.4	2.4	2.6	2.7
Upper	2.3	2.7	2.9	3.4	3.5	5.4	6.2	6.8	7.9	8.2	10.5	12.1	13.3	15.5	16.0
Fairway Downs	0.02	0.03	0.03	0.04	0.04	0.05	0.06	0.07	0.08	0.1	0.1	0.1	0.1	0.2	0.2
Park Place Lower	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.6	0.7	0.8	0.9	1.1	1.2
Park Place Intermediate	0.1	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.5	0.5	0.6	0.8	0.8
Park Place Livesay	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.03	0.04	0.00	0.02	0.04	0.06	0.1
Park Place View Manor	0.04	0.04	0.04	0.04	0.05	0.10	0.10	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2
Canemah	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.05	0.06	0.06	0.06	0.07
Total	**3.4**	**3.9**	**4.3**	**5.1**	**5.2**	**7.9**	**9.1**	**10.0**	**11.7**	**12.1**	**15.4**	**17.8**	**19.5**	**22.9**	**23.7**

Notes:
1 ADD = average day demand; MDD = maximum day demand; PHD = peak hour demand; mgd = million gallons per day
2 EXST = Existing conditions reflecting 2015 data for the City pressure zone demands.

Table 2
CRW and West Linn Demands

Demand (meter)	ADD (mgd)					MDD (mgd)					PHD (mgd)				
Zone	EXST	2020	2025	2035	2040 to BO	EXST	2020	2025	2035	2040 to BO	EXST	2020	2025	2035	2040 to BO
West Linn Total - MM03	2.9	3.1	3.3	3.9	6.0	7.2	7.8	8.4	9.7	15.2	14.1	15.1	16.3	18.9	29.6
CRW Zones- MM02	1.3	1.4	1.5	1.7	2.6	3.3	3.5	3.8	4.4	6.9	6.4	6.9	7.4	8.6	13.4
Barlow Crest PS - MM12	0.2	0.2	0.3	0.3	0.5	0.7	0.8	0.8	1.0	1.5	1.4	1.5	1.7	1.9	3.0
HOPP Forsythe - MM13	0.02	0.02	0.02	0.02	0.04	0.05	0.05	0.05	0.06	0.10	0.09	0.1	0.1	0.1	0.2
Leland/Meyers - MM08	0.09	0.09	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.3	0.3	0.3	0.3	0.4	0.6
South End - MM09	0.04	0.04	0.04	0.05	0.07	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.4
CRW Metered Total	1.6	1.8	1.9	2.2	3.4	4.3	4.6	5.0	5.8	9.0	8.3	9.0	9.7	11.2	17.6

Notes:

1 BO = buildout; ADD = average day demand; MDD = maximum day demand; PHD = peak hour demand; mgd = million gallons per day

2 EXST = Existing conditions reflecting 2016 data for the West Linn and CRW demands.

3 Future buildout demands include growth as determined by each water service provider.

Design Criteria

System Pressures

Water systems are constrained by service pressures and pipe velocity. For typical water systems, the acceptable service pressure range under ADD operating conditions is 40 to 100 pounds per square inch (psi). Where mainline pressures exceed 80 psi, services must be equipped with individual pressure reducing valves (PRVs) to protect water heaters per the *Oregon Plumbing Specialty Code (Section 608.2, 2014)*. Many of the City's customers fall within this category. During a fire flow event or emergency, the minimum service pressure is 20 psi as required by *Oregon Health Authority, Drinking Water Program* (OAR 333.061.0050(8)(e)) regulations. Recommended service pressure criteria are summarized in **Table 3**.

Table 3
Recommended Service Pressure Criteria

Service Pressure Criterion	Pressure (psi)
Normal range, during ADD	50-100
Maximum without PRV	80
Minimum, during emergency or fire flow	20

The acceptable flow velocity under MDD conditions is less than 4 feet per second (fps) velocity. The system should also be able to provide fire flow at less than 10 fps. However, velocity criteria are secondary to pressure and fire flow requirements.

Fire Flow Demands

Fire flow demands within the City's system are assigned based on land use type and summarized in **Table 4**. Fire flow requirements are set by the fire marshal and are consistent with tables in **Appendix B** of the *Oregon Fire Code* (OFC, 2014).

Table 4
Required Fire Flow Summary

Land Use Type	Required Fire Flow (gallons per minute)[1]	Required Duration (hours)
Single Family and Duplex Residential <3,600 sq ft	1,000	2
Single Family and Duplex Residential >3,600 sq ft	1,500	2
Medium Density Residential, Neighborhood and Community Service (Commercial)	2,500	2
High Density Residential, Commercial, Industrial, and Institutional	3,000	3

Notes:

1 A minimum service pressure of 20 psi is required at all services throughout the system during all fire flow.

Facility Criteria

Pump stations to zones with gravity storage are required to supply MDD with the largest pump out of service (firm capacity). This standard applies to all pump stations with the exception of the Fairway Downs Pump Station, which currently pumps to a closed zone (no reservoir) and thus is required to provide adequate supply for MDD and fire flow. In the future, the Fairway Downs zone is expected to be served by a new reservoir, eliminating the additional pumping capacity requirements for fire flow.

Reservoirs storage is allocated into multiple components including emergency, fire, equalization, and operational. Emergency storage is based on the amount of risk a system is willing to accept and is intended for supply during a treatment plant outage, or other emergency. A typical volume for emergency storage is two times ADD. Reservoir storage for fire flow demands is required for the maximum combination of fire flow demand and fire flow duration within each pressure zone. For an entirely residential zone, this value is 180,000 gallons (1,500 gpm x 2 hours). Equalization storage is the volume differential between MDD and PHD. Sometimes a value of 0.25xADD is substituted for equalization in place of an exact volume. Finally, operational storage is available to limit pump cycling or to sustain system pressures. This is the volume of water typically cycled throughout the day while supply is off, or the water surface required to sustain minimum pressures within the pressure zone. **Table 5** lists the water system facility criteria used to evaluate the City's system.

Table 5
Water System Facility Criteria

Water Facility Type	Criteria
Pump Station to Gravity Storage	Firm capacity for MDD
Pump Station to Closed Zone	Firm capacity for MDD + fire flow
Reservoir Storage (sum of components)	Emergency = 2xADD Fire flow = maximum fire flow x duration within zone Equalization = 0.25xADD Operational = Based on zone specific HGL or Pump Cycling

System Evaluation

Distribution and Fire Flow Deficiencies

The system was evaluated at existing and future demands, based on the pressure design criteria presented in **Table 3** and the fire flow criteria presented in **Table 4**. The results of both analyses (existing and future) were similar.

Figure 2 highlights areas of high velocity and low pressures under existing MDD. For both existing and year 2040 conditions, low pressures are generally not an issue, although higher velocities can be seen in one of the parallel Molalla Avenue transmission mains near the Mountainview Site.

Figure 3 highlights available fire flow at existing MDD throughout the system. Based on minimum pressure and fire flow criteria, the system performs adequately with fire flow deficiencies generally isolated to small diameter or dead-end pipes. This is true for both existing and future demand scenarios, although these deficiencies are typically more extreme under future system demands.

The results of the existing MDD condition analysis are shown in Figures 2 and 3, as deficiencies visible under the existing condition remain localized to the same areas under future conditions.

The City operates many of its zones at the higher end of pressure recommendations (Figure 2). This places stress on distribution piping and increases risk of water losses. For new developments, distribution piping should be designed within the recommended pressure ranges including redundant PRVs where pressures are in excess of 80 psi. Individual PRVs owned and maintained by the property owner may be required to further reduce local distribution pressure.

City staff have expressed concerns about balancing supply and demand between the Henrici Reservoir and Boynton Standpipe. While filling the Henrici Reservoirs from the Mountainview Pump Station, the system experiences high pressures and increased water losses. Additional transmission capacity is required to improve supply to and from the Henrici Reservoir while maintaining pressures within recommended ranges and is documented in Appendix F, *Molalla Avenue Streetscape Concurrent Waterline Improvements* (Murraysmith, October 2018).

Reservoir Capacity Analysis

Reservoir storage is provided for four purposes: emergency supply, fire flow, equalization, and operations. The total distribution storage requirement is the sum of the components. An evaluation of reservoir storage was performed including a review of each component. Because some zones can be supplied by multiple reservoirs or supplemented by pump station capacity, the following assumptions were developed for the reservoir storage analysis:

- Barlow Crest Reservoir supplies Park Place Intermediate Zone, View Manor, Livesay, and CRW MM13 (Forsythe)
- Mountainview Reservoirs 1 & 2 supply the Lower Zone, Intermediate Zone, and Canemah
- Boynton & Henrici Reservoirs supply Upper Zone, Fairway Downs, CRW MM08 (Leland) and MM09 (South End)
- The Upper Zone storage deficiencies can be supplied by the excess storage in Mountainview Reservoirs 1 & 2 depending on adequate pumping capacity at the Mountainview Pump Station.
- Proposed reservoirs for the Beavercreek Road Concept Area (Fairway Downs Reservoir) and the Park Place Concept Area (Holly Lane Reservoir) were included in the analysis and sized for growth within their respective service areas.

- Many zones can be alternately supplied by either the Barlow Crest or Mountainview Reservoirs via control valves and PRVs which provides system redundancy. For the purposes of this analysis, demands from these zones were only assigned to one of the supplying reservoirs.

- SFWB Water Treatment Clear Well supplies the Park Place Lower Zone. As discussed in the SFWB *Water Master Plan* (2016), the 2 million-gallon (MG) clear well has adequate capacity for storage within the zone.

The reservoir storage analysis is presented in **Table 6**. A negative value in available storage represents the additional storage required.

Table 6
Reservoir Storage Calculations

Reservoir	Existing Storage (MG)	Total Storage Required (MG)					Available Storage (MG)				
		Existing	2020	2025	2035	2040	Existing	2020	2025	2035	2040
Barlow Crest	1.75	0.7	0.7	0.8	0.9	1.0	1.1	1.0	1.0	0.8	0.7
Mountainview	12.5	2.7	3.0	3.2	3.6	3.8	9.8	9.5	9.3	8.9	8.7
Henrici/Boynton[1]	4	6.7	7.7	8.4	9.8	10.5	-2.7	-3.7	-4.4	-5.8	-6.5
Holly Lane	0	na				0.5	na				
Fairway Downs	0	na				1.1	na				

Notes:
1 MG = millions of gallons, na = not applicable
2 Existing condition assumed to be 2015/2016 depending on data source.
3 Storage deficit shown in Henrici/Boynton by 2035 can be provided by the excess storage in the Mountainview Reservoirs, if the Mountainview Pump Station can meet the MDD demands of the Upper Zone and emergency power supply at the station is adequate for operation.

Through the 20-year time frame (2040), all zones have adequate storage. For the Upper and Fairway Downs Zones, this assumes that any storage deficiency is minimized by pumping capacity at the Mountainview Pump Station. For 2040, this results in 6.5 MG of emergency storage for the upper zones located in the Mountainview Reservoirs, which places additional risk on the City. Therefore, an additional 6.5 MG storage is recommended within the Upper Zone beyond the year 2040, the 20-year time frame. A future update of the 2012 WDSMP and this Amendment should include further evaluation of the need for this additional storage.

Pump Station Capacity Analysis

Two types of systems are considered in the pump station analysis. The first is an open system, with at least one reservoir that sets the hydraulic grade for the pressure zone. In an open system, the pump station firm capacity must be equal to or greater than MDD for the pressure zone(s) served by the pump station. The second is a closed system, which is a zone without a reservoir. In a closed

system, the pump station must be able to provide MDD + fire flow with the largest pump out of service.

Only the existing Fairway Downs Pump Station supplies a closed zone. With the development of the upper Beavercreek Road Concept Area, a new reservoir and pump station will be required. An open system will replace the existing closed system, and the reservoir will be sized to supply the fire flow needs of the expanded Fairway Downs Pressure Zone. As previously summarized, storage requirements in the Intermediate Zone and limitations in storage at Henrici/Boynton should be considered in sizing the Fairway Downs Reservoir and associated pump station.

As shown in **Table 7**, all existing pump stations meet system demands for the next 20 years through year 2040. Improvements to the Mountainview Pump Station firm capacity may be required beyond 2040 in conjunction with additional storage in the Upper Zone.

Table 7
Pump Station Capacity Calculations

Pump Station	Firm Capacity (GPM)	MDD (GPM)					Available Pumping Capacity (GPM)				
		Existing[4]	2020	2025	2035	2040	Existing[4]	2020	2025	2035	
Hunter Ave	1,800	800	850	900	1,100	1,250	1,000	950	900	700	550
Mountain-view[1]	8,000	3,900	4,500	4,950	5,800	6,300	4,100	3,500	3,050	2,200	1,700
Fairway Downs[2]	1,050	50	50	50	50	na	0	0	0	0	na
Holly Lane	na	na				100	na				
Fairway Downs[3]	na	na				250	na				

Notes:

GPM = gallons per minute, MDD = maximum day demand, na = not applicable

1 Mountainview Pump Station required to also have emergency power supply for MDD supply operations, as some emergency storage for the Upper Zones is located in the Mountainview Reservoirs.

2, 3 Existing Fairway Downs Pump Station to be decommissioned when development occurs and replaced by new Fairway Downs Pump Station. Existing station pumps to closed zone, therefore pumping capacity required at MDD + fire flow (1,000 gpm). Check valves from Upper Zone also available for fire flow in the zone. Additional fire flow demand not required for new pump station with gravity storage.

4 Existing condition assumed to be 2015/2016 depending on data source.

Figure 2
City of Oregon City
Static Pressure Analysis

SFWB Intake and WTP

Barlow Crest Reservoir and Pump Station

Hunter Ave Pump Station

SFWB Division Street Pump Station

Mountainview Reservoirs 1&2 and Pump Station

Boynton Standpipe

Fairway Downs Pump Station

Henrici Reservoir

PIPE VELOCITY
- < 4 fps
- 4 - 10 fps
- > 10 fps

STATIC PRESSURE
- < 20 psi
- 20 - 40 psi
- 40 - 80 psi
- 80 - 120 psi
- > 120 psi
- CRW MAINS
- UGB

PRESSURE ZONE
- CANEMAH DISTRICT
- FAIRWAY DOWNS
- INTERMEDIATE ZONE
- LOWER ZONE
- PAPER MILL ZONE
- PARK PLACE - INTERMEDIATE
- PARK PLACE - LIVESAY RD
- PARK PLACE - LOWER
- PARK PLACE - VIEW MANOR
- UPPER ZONE

Water Facilities
- SFWB, Intake
- SFWB, WTP
- Master Meter
- SFWB, Pump Station
- CRW, Pump Station
- CRW, Reservoir
- OC, Pump Station
- OC, Reservoir
- OC, PRV

Note: Figure shows existing MDD conditions of 8.44MGD. Buildout MDD demands did not significantly impact results therefore, this figure is representative of existing and buildout conditions.

0 2,000 4,000 Feet

N W E

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Figure 3
City of Oregon City
Available Fireflow

SFWB Intake and WTP

Barlow Crest Reservoir and Pump Station

Hunter Ave Pump Station

SFWB Division Street Pump Station

Mountainview Reservoirs 1&2 and Pump Station

Boynton Standpipe

Fairway Downs Pump Station

Henrici Reservoir

AVAILABLE FIREFLOW
- 0
- <1000
- 1000 - 1500
- 1500 - 3000
- >3000

WATER MAINS
- OREGON CITY
- SFWB
- WEST LINN
- CRW
- UGB

PRESSURE ZONE
- CANEMAH DISTRICT
- FAIRWAY DOWNS
- INTERMEDIATE ZONE
- LOWER ZONE
- PAPER MILL ZONE
- PARK PLACE - INTERMEDIATE
- PARK PLACE - LIVESAY RD
- PARK PLACE - LOWER
- PARK PLACE - VIEW MANOR
- UPPER ZONE

Water Facilities
- SFWB, Intake
- SFWB, WTP
- Master Meter
- SFWB, Pump Station
- CRW, Pump Station
- CRW, Reservoir
- OC, Pump Station
- OC, Reservoir
- OC, PRV

Note: Figure shows existing MDD conditions of 8.44MGD. Buildout MDD demands did not significantly impact results therefore, this figure is representative of existing and buildout conditions.

0 2,000 4,000 Feet

N W E

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Capital Improvement Program

Capital projects were developed based on deficiencies identified in the system evaluation and future year 2040 system demands including new growth areas. The Capital Improvement Program (CIP) is divided into three types of improvement projects: "Capacity and Operations," "Development and Growth," and "Repair and Replacement." Descriptions of these categories are defined below and further summarized in Table 8.

- Capacity and Operations - Projects are typically those to meet existing system demands, reservoir turnover, or to meet the needs of areas within the system that will require upsizing to provide for in-fill growth. Dead-end pipes with fire flow limitations where at least 500 gpm of fire flow is available were excluded from the capacity improvements.

- Development and Growth - Projects differ in that they are specifically targeted at new large development areas and are typically not required to supply existing demands.

- Repair and Replacement - Projects include both routine repair and replacement of pipes, pump replacement, reservoir maintenance, and PRV repair/replacement.

Table 8
Capital Improvement Program Projects

Improvement Type	Improvement Addresses:	Timing Trigger
Capacity and Operations	Capacity limitations and system operations	Mitigate projected deficiencies
Development and Growth	New development areas	Developer driven
Repair and Replacement	Routine maintenance on infrastructure and annual pipe replacement	Annual and cyclical investments based on infrastructure life cycle

Cost Assumptions

All project descriptions and cost estimates are consistent with Class 5 budget estimates, as established by the *American Association of Cost Engineers* (AACE). This preliminary estimate class is used for conceptual screening and assumes project definition maturity level below two percent. The expected accuracy range is -20 to -50 percent on the low end, and +30 to +100 percent on the high end. The cost estimates are consistent with the definition of OAR 660-011-0005(2) and OAR 660-011-035. Cost estimates are intended to be used as guidance in establishing funding requirements at the project planning level based on information available at the time of the estimate. Estimates exclude land acquisition, financing, inflation, and operations. Costs were developed in 2018 dollars with markups for contractor profits, overhead, engineering, and construction contingency. Since construction costs change periodically, an indexing method to adjust present estimates in the future is useful. The Engineering News-Record (ENR)

Construction Cost Index (CCI) is a commonly used index for this purpose. For purposes of future cost estimate updating; the August 2018 ENR CCI (20-city average) is 11124.

Joint Work with CRW and Neighboring Provider Upgrades

The City participates in joint infrastructure planning and supply discussions with regional water suppliers and distributers such as SFWB, CRW, Lake Oswego, and West Linn. Neighboring communities have recognized the benefits of collaborative planning and have worked together through Intergovernmental Agreements (IGAs) and joint projects like the South End supply line and Barlow Crest supply, to provide water to regional customers. This collaboration encourages purveyors to invest in essential facilities, without building redundant infrastructure. As communities develop, this collaboration will continue to be important to efficiently serve all customers. In addition, an increased focus on system interties has improved regional resiliency, in the event of a major failure at one or more of the water treatment plants within the region. Recent and anticipated system intertie investments include:

- CRW's Backbone Project to extend CRW WTP supply to CRW zones south of the Clackamas River.
- Continued operation and maintenance of City/CRW and SFWB/CRW interties.
- Operation and maintenance of the West Linn-Lake Oswego emergency connection booster station. This provides West Linn an alternate supply from the newly completed Lake Oswego–Tigard WTP upgrades, and improves regional resiliency through interconnections.

Improvements identified in the City CIP exclude analysis of alternatives related to major regional projects such as the CRW Backbone Project. The City will continue to explore opportunities for collaboration with neighboring providers at which time some of the City capital projects may be modified to account for a broader regional supply and/or distribution solution.

Improvement Descriptions

Capacity and Operations Projects

Capacity and operations projects were identified through model evaluations, discussions with City staff, and pump station/reservoir capacity reviews. These improvements are summarized for both the City and SFWB, although only the City improvements are included in the CIP.

SFWB Improvements

SFWB improvements identified in the *SFWB Water Master Plan* (CH2M and MWH, 2016) are required to maintain system operations, expand capacity, and address redundancy. These projects address limited capacity in the 30-inch SFWB supply line which causes operational difficulties at the Division Street Pump Station, and eventual capacity limitations in the rest of the SFWB system. A 42-inch connection on Cleveland St between the 30-inch and 42-inch SFWB supply lines

(referenced earlier in *System Supply and Demands*) was completed recently in December 2018. Key SFWB transmission improvements include:

- Increased transmission capacity between the WTP and the Mountainview Pump Station (upsizing the existing 30-inch line)
- Increased capacity at the Division Street Pump Station

Henrici Reservoir Operations

Based on existing transmission capacity, the City has difficulties keeping the Henrici Reservoir filled and the Boynton Standpipe from overflowing. Both reservoirs provide storage for the Upper Zone and are simultaneously filled by the Mountainview Pump Station. The Boynton Standpipe is centrally located while the Henrici Reservoir is located beyond the perimeter of the Upper Zone to the southeast. When the Mountainview Pump Station output is increased to fill the Henrici Reservoir, high pressure issues are seen near the pump station. This is especially problematic in summer months when the pump station must operate at a higher flow rate to keep up with Upper Zone demands.

Project constraints and opportunities include:

- Existing transmission main(s) in heavily trafficked Beavercreek Road
- Secondary transmission route(s) in backyards and other difficult to access locations
- Concurrent streetscape improvement project along Molalla Avenue
- Additional transmission and distribution requirements for growth including the expanded Fairway Downs Zone

After evaluating alternatives, a parallel transmission route was identified along Molalla Avenue, and a new transmission line was identified between Glen Oak Road and the Henrici Reservoir. The combined improvements provide additional capacity and improved transmission to and from the Henrici Reservoir. The projects will likely be constructed in multiple phases with the Molalla Avenue portion of the project constructed first to align with the streetscaping work. Both improvements are required to provide the full operational benefits. Table 9 presents a flow split analysis between Boynton and Henrici Reservoirs under existing ADD. Without improvements, approximately 67% of the available excess flow from the Mountain View Pump Station is conveyed to the Boynton Standpipe and 33% is conveyed to Henrici. With all improvements, the flow split is approximately 50% between the reservoirs.

Table 9
Reservoir Filling Rates - Mountainview to Henrici Transmission Upsizing

Scenario	Boynton Standpipe (gpm)[1]	Henrici Reservoir (gpm)[1]
No Improvements	4,200	2,100
Parallel Main on Molalla Ave	4,200	2,500
Upsize Beavercreek Transmission from Glen Oak Road to Henrici Reservoir	3,600	2,900
Both improvements: Parallel Main on Molalla Ave and Upsize Beavercreek Transmission	3,500	3,500

Note:
1 Filling rates during existing ADD, 2 pumps on at Mountainview Pump Station, reservoirs at low set points.

Development and Growth Projects

Development improvements were identified through a variety of means including discussions with the City and reviewing existing concept plans. Most projects include only the main line infrastructure required to serve the development areas, and do not include full distribution piping. Pipe layouts were based on either proposed street networks or additional studies, if available. Unless otherwise noted, development areas can be served by extending existing transmission and distribution piping.

Park Place Development

The Park Place Concept Area is located east of Oregon City and Highway 213, north and south along S Redland Road, and east and west along S Holly Lane. Portions of the area are currently served by CRW and development is described in the *Park Place Concept Plan* (2008). Proposed improvements for the area include pipe looping into the existing City system at the Park Place Intermediate and the Park Place Lower zones, a new 1.0MG reservoir and pump station, and intermediate PRV's.

Joint transmission along S Redland Road to CRW's Holly Lane and Redland Pump Stations has been discussed between the City and CRW. This is advantageous to both providers as it limits unnecessary parallel infrastructure, provides emergency connections between both systems and provides a secondary supply to the City via CRW.

Details of the pressure zone delineation for the Park Place Concept Area are presented in Table 10.

Table 10
Park Place Concept Area Supply

Location	Ground Elevation (ft)	HGL (ft)	Supply	Storage
East of Trail View Dr	>400	794	CRW via Barlow Crest PS	CRW Hunter Heights Reservoir
North of S Redland Rd	>310	549	New transmission piping from Park Place Intermediate	Barlow Crest Reservoir
North of S Redland Rd	200-310	430	PRV'd from Park Place Intermediate	Barlow Crest Reservoir
Along S Redland Rd	40-200	320	Master Meter from SFWB supply at Redland Rd and Anchor Way	SFWB WTP Clearwell
South of S Redland Rd	>200	350	New Park Place PS	New Holly Lane Reservoir

Beavercreek Road Development

The Beavercreek Road Concept Area is located within the existing UGB, northeast of Beavercreek Road. The area will require service to the City's Upper and Fairway Downs Zone pressure zones. The City and CRW have discussed service in this area extensively in the *Joint Engineering Study Technical Memorandum* (Appendix D) and the prior meetings leading up to that document. Various alternatives were explored, including joint construction of a reservoir to serve both CRW and the Fairway Downs Zone. City staff reviewed the alternative approaches with the City Commission and confirmed the City's desire to pursue development of City-owned infrastructure, independent of CRW, to serve the Beavercreek Road Concept Area within the UGB. The capital improvements presented in this 2012 WDSMP Amendment reflect this direction.

Pipe networks were based approximately on planned street alignments, as presented in the *Beavercreek Road Concept Plan* (Otak 2008). The Fairway Downs Zone is expected to serve areas above 480-feet elevation, within the UGB at a pressure zone hydraulic gradeline of 650-feet. Pumps will be sized to meet MDD demands, with additional peak hour or fire flow supply available from the new 1.75 MG reservoir.

Repair and Replacement Projects

Significant investment in infrastructure repair and replacement will be required as infrastructure reaches the end of its useful life. A Repair and Replacement Program is intended to apply proactive investment for reservoir coatings, PRV repair/replacement, pump station mechanical/electrical replacement, and pipeline repair/replacement. The program priorities are established based on

condition assessments with funding established based on standard life spans for facility types as shown in Table 11.

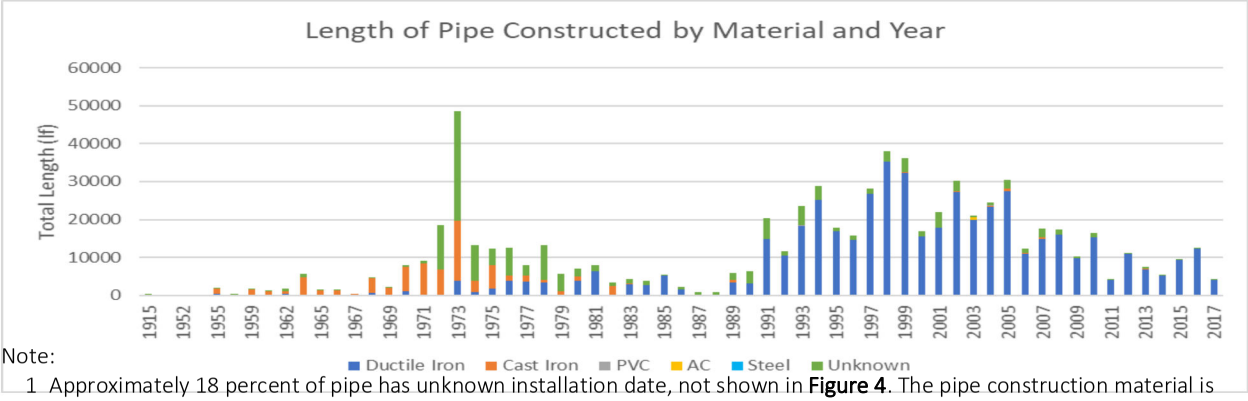
Table 11
Repair and Replacement Summary

Facility	Work Required	Frequency
Pipeline	Repair or Replacement	75 years
PRV	Inspection	Annual
	Major Rehabilitation and Rebuild	5 years
	Replacement	25 years
Reservoir – Steel	Exterior Overcoat	15 years
	Interior Removal and Recoat	30 years
	Exterior Removal and Recoat	30 years
Reservoir – Concrete	Minor Touch Up Rehabilitation	Annual
	Major Rehabilitation and Repairs	25 years
Pump Station - Mountainview	Pump, Mechanical & Electrical Replacements	10 years
Pump Station – Hunter Ave	Pump, Mechanical & Electrical Replacements	20 years
Pump Stations - Other	Pump, Mechanical & Electrical Replacements	20 years

Pipe Replacement

An evaluation was performed to identify the length of pipeline reaching the end of its useful life within the year 2035, 20-year planning horizon. An age distribution for piping was extracted from the City GIS and is presented in Figure 4. Pipe installations older than 75-years or with known leakage issues were identified for the 20-year planning horizon. This amounts to 90,000 linear-feet of pipe or approximately 4,500 linear-feet of pipe per year over 20-years as shown in Table 12. Specific pipe segments were identified for the 0 to 5-year time frame by City staff based on the known condition and leak issues. These include pipelines located along Main Street between 10th Street and 15th Street, between the Mountainview Reservoirs and Gaffney Lane to the south, crossing I-205 near the intersection of Agnes Avenue and Main Street, and those listed in the CIP Table 17 as an "Oregon City Operations – Small Waterline Replacement" project. Specific information on small water projects are also summarized in Appendix G.

Pipe Distribution by Age and Material



Note:

1 Approximately 18 percent of pipe has unknown installation date, not shown in **Figure 4**. The pipe construction material is approximately evenly split between Ductile Iron, Cast Iron, and Unknown. Installation dates were assumed evenly distributed over 50 years between 1943 and 1993.

Table 12
Pipe Replacement Projects

Timeframe	Length of Pipe for Repair and Replacement (linear-feet) [1]	Location Description
0 – 5 Years	29,000	Including but not limited to: - Main Street between 10th Street and 15th Street - Between Mountainview Reservoir and Gaffney Lane - I-205 crossing near Agnes Avenue and Main Street - OC Operations, Small Waterline Replacement Projects
6 – 10 Years	17,000	3,500 linear-feet per year based on pipe condition assessments
11 – 20 Years	43,000	4,500 linear-feet per year based on pipe condition assessments
TOTAL	**89,000**	

Notes:

1 Approximately 18-percent of pipe has unknown installation date. Assumed replacement of those pipes to be evenly distributed over 50 years.

Pressure Reducing Valve Station Rehabilitation, Repair, and Recommended Settings

~~Pressure Reducing Valve (PRV) stations are vital for supply to zones without gravity storage. The~~ PRVs should be inspected and maintained annually with major rehabilitation scheduled every 5 years, and replacement scheduled every 25 years. **Table 13.1** lists the approximate condition and

Table 13.1
Pressure Reducing Valve Rehabilitation Schedule

Pressure-Reducing Valve Station	Installation Year	Condition	Notes	Expected Rehabilitation and Rebuild (scheduled every 5 years)	Expected Replacement (scheduled every 25 years)
11th St & Washington St	1993	Fair / Dirty	Cleaning required	2021/2022	2026/2027
15th St & Madison St	2016	New		2021/2022	2041/2042
16th St & Division St	1971	Bad	Used to buffer intermediate zone from high pressures caused by the Division Street Pump Station. Small diameter valve inoperable.	Needs Replacement	2019/2020
18th St & Anchor Way	1992	Bad/Fair		Needs Replacement	2019/2020
3rd St & Bluff	2018	New		2023/2024	2043/2044
4th Ave & Jerome St	1958	Bad	Redundant to 3rd & Ganong, for high demand both PRVs required	Needs Replacement	2019/2020
5th Ave & Canemah	1958	Bad	Required to adequately supply Canemah Zone	Needs Replacement	2019/2020 and add power
99E & Main St	1997	Out of service	Abandon and remove the 99E and Main PRV Station, replace with pipe connection between the Paper Mill Zone and Lower Zone that results in eliminating the Paper Mill Zone and expands the Lower Zone (**Appendix H**)	NA	NA
Abernethy Rd & Redland Rd	1963	Bad	Required based on location and distance from redundant PRVs	Needs Replacement	2019/2020
Apperson Blvd & La Rae Rd	1999	Fair		2022/2023	2027/2028

Pressure-Reducing Valve Station	Installation Year	Condition	Notes	Expected Rehabilitation and Rebuild (scheduled every 5 years)	Expected Replacement (scheduled every 25 years)
Harley Ave & Forsythe Rd (North)	1988	Fair	Remove South PRV, reconfigure piping as needed for continued operation of North PRV. Relief valve settings need updating. Individual Customer PRV's required on service lines as needed for service pressures exceeding 70psi per City Standard.		2021/2022
Harley Ave & Forsythe Rd (South)	1973	Bad	Remove South PRV and coordinate project with improvements to North PRV as noted above.	Removal 2021/2022	Removal 2021/2022
Jennifer Estates	2002	Fair	Ground settling around vault.	2022/2023	2027/2028
Swan Ave & Holcomb Blvd	1999	Fair		2022/2023	2027/2028
View Manor	1999	Fair	Remove PRV with property redevelopment. Existing piping in poor condition – PRV settings updated to minimize pressure impacts on the local pipe.	Maintain until PRV removal with property redevelopment	Removal with redevelopment
3rd Ave & Ganong St	2008	Good		2028/2029	2033/2034
Hunter Ave Pump Station	1998	Good		2022/2023	2027/2028
East St & Maple St	2015	Good		2021/2022	2040/2041

Table 13.2 lists the valve diameters and settings for existing City PRVs. Photo documentation of PRV stations by the City is included in Appendix G. Additional analysis for redevelopment of the Paper Mill Zone and related PRV stations is provided in Appendix H, *Mill Redevelopment Water Distribution Analysis* (Murraysmith, 2018).

Table 13.2
Pressure Reducing Valve Recommended Settings

Pressure Reducing Valve Station	Valve 1 Size	Valve 2 Size	Valve 3 Size	Valve 1 Setting	Valve 2 Setting	Valve 3 Setting
11th St & Washington St[1]	3	10		67	58	
15th St & Madison St[1]	2	6		61	56	
16th St & Division St	1.252	6		na	100	
18th St & Anchor Way	4	8		53	48	
3rd St & Bluff[1]	3	8		42	39	
4th Ave & Jerome St	2	6		55	50	
5th Ave & Canemah	1.25	4		83	78	
99E & Main St			To be removed			
Abernethy Rd & Redland Rd[1]	4	8		102	97	
Apperson Blvd & La Rae Rd[1]	2	4	6	84	79	77
Harley Ave & Forsythe Rd (North)[1]	12			61		
Harley Ave & Forsythe Rd (South)			To be removed			
Jennifer Estates	4	8		51	46	
Swan Ave & Holcomb Blvd	4	8		65	55	
View Manor	4	8		40	35	
3rd Ave & Ganong St	2	6		79	79	
Hunter Ave Pump Station	3	6		45	51	
East St & Maple St	6			46		

Notes:
Updated PRV settings recommended in the *Mill Redevelopment Technical Memorandum* (Murraysmith, 2018) (Appendix H).
Valve is not currently functioning.

Facility Rehabilitation and Repair

The lifespan of system reservoirs and pump stations can be significantly increased if regular rehabilitation and repairs are made. It is recommended that regular maintenance on Oregon City's steel tanks (Barlow Crest, Boynton, and Henrici) include periodic exterior overcoats, and less frequent complete exterior and interior removal and recoat. Regular maintenance on the concrete tanks (Mountainview 1 & 2) is recommended to include frequent touch up and rehabilitation, and major repairs when needed. Costs for this rehabilitation are dependent on facility condition, age, material, and size. Table 14 includes an approximate schedule for rehabilitation of existing reservoirs. Table 15 includes an approximate schedule for safety and seismic upgrades, and suggested improvements. When new reservoirs are constructed, they will need to be added to the rehabilitation schedule.

Pump stations require annual inspection and maintenance with pump, mechanical, and electrical replacement generally every 20 years, with the exception being Mountainview pump station replacement schedule every 10 years. Costs for pump replacement depend on pump size and condition. **Table 16** includes an approximate schedule for pump station improvements.

Table 14
Reservoir Coating and Rehabilitation Schedule

Facility		Concrete	Steel		
Name	Construction/ Rehab Year	Major Repairs	Exterior Overcoat	Interior Removal and Recoat	Exterior Removal and Recoat
Barlow Crest	1999	-	2024	2024	2039
Mountainview 1	2007	2032	-	-	-
Mountainview 2	1952/2007[1]	2032	-	-	-
Boynton	1984	-	-	-	2028
Henrici	1994	-	2019/2020	2019/2020	2035

Notes:
1 Mountainview 2 built in 1916 and expanded in 1952, underwent seismic upgrades and rehabilitation in 2007.
2 Limited redundancy for Barlow Crest Reservoir means it is difficult to take offline. Coordination with CRW to PRV water from Hunter Heights
3 Biannual minor repairs for Concrete tanks, annual exterior touch-up for steel tanks. Assumed within O&M budget, separate from CIP budget.

Table 15
Reservoir Seismic and Safety Improvements

Facility	Seismic Analysis/Seismic Upgrades	Safety Upgrades
Barlow Crest	2019/2020	2024
Mountainview 1	-	-
Mountainview 2	-	2020
Boynton	2022/2023	-
Henrici	2019/2020	2019/2020

Table 16
Pump Station Rehabilitation and Maintenance Schedule

Pump Station	Pump Install Year	Replacement Year	Pump, Mechanical, and Electrical Rehab or Replacement
Hunter Ave	1999	2019/ 2022	Drives, PLC/ Pumps, SCADA electrical, transfer switch generator
Mountainview	2018	2023/ 2028	Drives/ Pumps, SCADA electrical
Fairway Downs	2018	NA	Pump station to be removed with Beavercreek Road Concept Area Development
Boynton	1984	Removal Project 2022	Remove pumps (non-operational), decommission pump station
Livesay	2012	NA	Decommission pump station when Park Place Concept Area Develops

Capital Improvement Program Summary

The capital projects are described in **Table 17,** "Capital Improvement Program" including project descriptions, priorities, and Class 5 costs estimates. Projects are illustrated in **Figure 5**. A summary of total CIP costs is presented in **Table 18**.

Table 17
Capital Improvement Program

Improvement Category	Project Type	MAP ID	Timeframe	Facility Type	Description	Length (lf)	Diameter (in)	Capacity	Cost Estimate[1]
Central Point	Development	1	Project recently completed by development	Pipe	New 8” looped distribution pipe along Skellenger/Orchard Grove area		8		Developer-constructed project
Leland McCord	Development	2		Pipe	New transmission along Leland Rd	1300	12		$370,000
	Development	3		Pipe	New distribution along McCord Rd	2,400	12		$681,500
	Operations (City/CRW)	4		Master Meter	Move the Master Meter, MM08, to the UGB and update CRW connection, timing based on development				$200,000
South End	Development	5		Pipe	New distribution within development - backbone only	19,000	12		$5,394,500
	Operations (City/CRW)	6		Master Meter	Move the Master Meter, MM09, to the UGB and update CRW connection, timing based on development				$200,000
Upper Zone	Development	7		Pipe	New distribution loop North of Beavercreek and South of Hilltop	2,200	12		$624,500
	Capacity	8	5-10	Pipe	Finish looping along Maplelane Road to increase transmission to existing area	1,600	12		$454,500
	Pipe Replacement	34	0-5	Pipe	Replace aging 16" piping near Molalla Ave (replacement size may be 12-inch or smaller if MAP ID 22 is implemented prior to MAP ID 34)	8,800	12 to 16-inch		$2,498,500
	Operations	37	0-5	PRV	New PRV on Newell Ct to manage high pressures				$200,000
Lower Zone	Capacity	9	0-5	Pipe	Upsize existing I-205 crossing to improve fire flow and distribution looping	700	12		$199,500
	Capacity	35	5-10	Pipe	Upsize existing piping on Abernethy Road for fire flow supply to Lower Zone	2,600	12		$738,000
	Pipe Replacement	36	0-5	Pipe	Replace aging pipe on Main between 10th and 15th	1,400	12		$397,500
Park Place Concept Area	Development	10	0-5	Pipe	Joint OC/CRW transmission from SFWB along Redland Rd for replacement of aging pipe and new transmission to Park Place Concept Area	6,900	24		$3,538,000
	Development	11		Pipe	Transmission at the Park Place Intermediate Level (above 310')	1,300	12		$370,000
	Development	12		Pipe	Transmission from the 16" Barlow Crest Transmission to PP Int Concept (above 310') - redundant transmission and adequate fire flow above 200'	2,600	12		$738,000
	Development	13		PRV	New PRV from 550' to 430' (supply to area between 200' and 310'). Note: Livesay Pump Station shall be removed with redevelopment of this area along S Livesay Rd				$200,000
	Development	14		Pipe	New 430' distribution piping (supply to area between 200' and 310')	1,700	12		$483,500
	Development	15		PRV	New PRV from 430' to 320' (alternate emergency supply and fire flow to PP Concept Area)				$200,000
	Development	16		Pipe	New 320' distribution piping (supply to area below 200')	6,200	12		$1,760,500
	Development	17		Pipe	Replace existing 320' distribution piping (supply to area below 200')	2,100	12		$597,000
	Development	18		Reservoir	New 350' Reservoir (supply to area above 110')			1MG	$2,000,000
	Development	19		Pump Station	New Pump Station from 320' to 350' (supply to area above 110')			100 GPM	$1,194,000
	Development	20		PRV	New PRV from 350' to 320' (emergency fire flow to PP Concept Area from new reservoir)				$200,000
	Development	21		Pipe	New 350' transmission and distribution (supply above 350' and transmission to new Holly Lane PS)	10,000	12		$2,839,000

Improvement Category	Project Type	MAP ID	Timeframe	Facility Type	Description	Length (lf)	Diameter (in)	Capacity	Cost Estimate[1]
Henrici Transmission Improvements	Capacity	22	5-10	Pipe	Parallel transmission line between Mountainview Reservoirs and Beavercreek Rd - Increase transmission to Henrici Reservoir	4,200	24		$2,153,500
	Capacity	23	0-5	Pipe	Parallel transmission line between Beavercreek Rd and Glen Oak Rd along Streetscape improvements - Increase transmission to Henrici Res	7,300	18		$2,963,000
	Capacity	24	0-5	Pipe	New crossing north of Glen Oak Rd from Molalla to OC Public Schools property - distribution for development, increase transmission to Henrici	2,600	12		$738,000
	Capacity	25	5-10	Pipe	OC HS crossing to Beavercreek Rd - Increase looping and transmission to Henrici	3,000	12		$852,000
	Capacity	26	0-5	Pipe	New parallel transmission between Fairway Downs and Henrici Reservoir	4,000	24		$2,051,500
Beavercreek Road Concept Area	Development	27		Pipe	New Upper Zone distribution - supply new development below 480', improve transmission	11,900	12		$3,379,500
	Development	28		Pipe	New Fairway Downs distribution - supply new development below 480'	13,700	12		$3,890,500
	Development	29		PRV	New PRV between Fairway Downs and Upper Zone - emergency fire flow				$200,000
	Development	30	0-5	Reservoir	New Fairway Downs Reservoir - supply new development			1.75 MG	$3,500,000
	Development	31	0-5	Pump Station	New Fairway Downs Pump Station - supply new development			250 GPM	$1,194,000
	Development	32	0-5	Pipe	New Fairway Downs Transmission - supply new development	5,000	16		$1,654,000
	Development	33	0-5	Pipe	Transfer existing Henrici transmission to Fairway Downs transmission - supply new development				$200,000
Oregon City Operations – Small Waterline Replacement List [2]	Pipe Replacement		0-5	Pipe	S. Center St from S. 2nd to 1st St	700	8		$134,000
	Pipe Replacement		0-5	Pipe	Barker Ave from South End Rd to Barker Rd	800	8		$154,500
	Pipe Replacement		0-5	Pipe	Warner-Parrott Rd from King Rd to Boynton St	1,100	12		$313,000
	Pipe Replacement		0-5	Pipe	Belle Ct and Glenwood Ct from Holmes Ln to Linn Ave	1,500	8		$288,500
	Pipe Replacement		0-5	Pipe	Valley View Dr from Park Dr to McCarver Ave	1,000	8		$192,000
	Pipe Replacement		0-5	Pipe	Canemah Ct from Canemah Rd to Telford Rd	1,700	8		$326,000
	Pipe Replacement		0-5	Pipe	Randall St from Canemah Rd to Hartke Lp	700	8		$134,000
	Pipe Replacement		0-5	Pipe	Hartke Lp and Alderwood Pl	3,700	8		$712,000
	Pipe Replacement		0-5	Pipe	Harrison St from 7th St to Division St	600	8		$115,000
	Pipe Replacement		0-5	Pipe	Division St from Harrison St to 13th/14th St	4,300	8		$827,000
	Pipe Replacement		0-5	Pipe	Division St from Anchor Way PRV Station to Davis Rd	1,300	8		$250,500
Maintenance and Repair Projects	Pipe Replacement		0-5	Pipe	Repair and Replacement Program	18,000	8-12		$3,699,000
			5-10	Pipe	Repair and Replacement Program	14,500	8-12		$2,996,500
			10-20	Pipe	Repair and Replacement Program	41,000	8-12		$8,033,500
	Facility Rehabilitation (PRV Rebuild and Replacement)		0-5	PRV Rebuild	11th St & Washington St, 15th St & Madison St, 3rd St & Bluff, Apperson Blvd & La Rae Rd, Jennifer Estates, Swan Ave & Holcomb Blvd, Hunter Ave Pump Station, East St & Maple St, View Manor – continue to schedule rehabilitation and rebuilds every 5 years until the PRV is removed with redevelopment, 99E & Main St – removal of PRV Station with re-zoning the Paper Mill Zone to the Lower Zone	10			$100,000

Improvement Category	Project Type	MAP ID	Timeframe	Facility Type	Description	Length (lf)	Diameter (in)	Capacity	Cost Estimate[1]
Maintenance and Repair Projects			0-5	PRV Replacement	16th St & Division St, 18th St & Anchor Way, 4th Ave & Jerome St, 5th Ave & Canemah, Abernethy Rd & Redland Rd, Harley Ave & Forsythe Rd (North) including removal of Harley Ave & Forsythe Rd (South)	6.5			$1,300,000
			5-10	PRV Rebuild	3rd Ave & Ganong St	1			$10,000
			5-10	PRV Replacement	11th St & Washington St, Apperson Blvd & La Rae Rd, Jennifer Estates, Swan Ave & Holcomb Blvd, Hunter Ave Pump Station	5			$1,000,000
	Facility Rehabilitation (Reservoir Coating/Rehab, Seismic/Safety)	Barlow Crest	0-5	Reservoir	Barlow Crest Reservoir- Exterior Overcoat				$722,000
		Barlow Crest	0-5	Reservoir	Barlow Crest Reservoir-Safety Upgrades				$100,000
		Barlow Crest	0-5	Reservoir	Barlow Crest Reservoir-Seismic Analysis/Seismic Upgrades[3]				$975,000
		Barlow Crest	0-5	Reservoir	Barlow Crest Reservoir-Steel Interior Removal and Recoat				$789,000
		Barlow Crest	10-20	Reservoir	Barlow Crest Reservoir-Steel Exterior Removal and Recoat				$1,059,000
		Boynton	0-5	Reservoir	Boynton Reservoir-Seismic Analysis/Seismic Upgrades (may require new reservoir)[3]				$975,000
		Boynton	5-10	Reservoir	Boynton Reservoir-Steel Exterior Removal and Recoat				$1,059,000
		Henrici	0-5	Reservoir	Henrici Reservoir- Exterior Overcoat				$722,000
		Henrici	0-5	Reservoir	Henrici Reservoir-Safety Upgrades				$100,000
		Henrici	0-5	Reservoir	Henrici Reservoir-Seismic Analysis/Seismic Upgrades[3]				$975,000
		Henrici	0-5	Reservoir	Henrici Reservoir-Steel Interior Removal and Recoat				$789,000
		Henrici	10-20	Reservoir	Henrici Reservoir-Steel Exterior Removal and Recoat				$1,059,000
		Mountainview	0-5	Reservoir	Mountainview 2 Reservoir-Safety Upgrades				$100,000
		Mountainview	10-20	Reservoir	Mountainview 1 Reservoir-Concrete Major Repairs				$200,000
		Mountainview	10-20	Reservoir	Mountainview 2 Reservoir-Concrete Major Repairs				$200,000
	Facility Rehabilitation (Pump Stations)	Hunter Ave	0-5	Pump Station	Hunter Ave PS - PLC, Pumps, drives, SCADA/ electrical, transfer switch generator				$375,000
		Mountainview	0-5	Pump Station	Mountainview PS - Drives				$95,000
		Mountainview	5-10	Pump Station	Mountainview PS - Pumps, SCADA/electrical				$380,000
	Facility Rehabilitation (Decommission)	Fairway Downs	timing based on development	Pump Station	Decommission				$50,000
		Boynton	0-5	Pump Station	Decommission				$50,000
		Livesay	timing based on development	Pump Station	Decommission				$50,000

Notes:

1 All project cost estimates are consistent with Class 5 budget estimates, as established by the *American Association of Cost Engineers* (AACE). This preliminary estimate class is used for conceptual screening and assumes project definition maturity level below two percent. The expected accuracy range is -20 to -50 percent on the low end, and +30 to +100 percent on the high end. The cost estimates are consistent with the definition of OAR 660-011-0005(2) and OAR 660-011-035. Cost estimates are intended to be used as guidance in establishing funding requirements at the project planning level based on information available at the time of the estimate. Estimates exclude land acquisition, financing, inflation, and operations. Costs were developed in 2018 dollars with markups for contractor profits, overhead, engineering, and construction contingency.

2 Oregon City Operations – Small Waterline Replacement Projects not shown on CIP map.

3 Seismic upgrade costs are placeholders. Additional evaluations required to refine cost estimates, risk, and improvement strategies for reservoir seismic improvements.

Table 18
Total Water CIP Summary Costs

Year	Development, Capacity & Operations Costs[1]	Pipe Replacement Costs[1]	Facility Rehabilitation Costs[1]	Total CIP Project Costs[1]
0 – 5 Years	$19,134,000	$7,145,500	$8,167,000	$34,446,500
5 – 10 Years	$4,198,000	$2,996,500	$1,390,000	$8,584,500
10 – 20 Years	$-	$8,033,500	$3,577,000	$11,610,500
SUBTOTAL	**$23,332,000**	**$18,175,500**	**$13,134,000**	**$54,641,500**
Time Based on Development	$25,522,500	$-	$100,000	$25,622,500
TOTAL	**$48,854,500**	**$18,175,500**	**$13,234,000**	**$80,264,000**

Notes:

1 All project cost estimates are consistent with Class 5 budget estimates, as established by the *American Association of Cost Engineers* (AACE). This preliminary estimate class is used for conceptual screening and assumes project definition maturity level below two percent. The expected accuracy range is -20 to -50 percent on the low end, and +30 to +100 percent on the high end. The cost estimates are consistent with the definition of OAR 660-011-0005(2) and OAR 660-011-035. Cost estimates are intended to be used as guidance in establishing funding requirements at the project planning level based on information available at the time of the estimate. Estimates exclude land acquisition, financing, inflation, and operations. Costs were developed in 2018 dollars with markups for contractor profits, overhead, engineering, and construction contingency.

SFWB Intake and WTP

Barlow Crest Pump Station and Reservoir (1.75MG, 549' OF)

Hunter Ave Pump Station

SFWB Division Street Pump Station

New Holly Lane Pump Station and PRV

New Holly Lane Reservoir (1.0MG, 350' OF)

Mountainview Pump Station and Reservoirs 1 & 2 (2.0 & 10.5MG, 490' OF)

Boynton Standpipe (2.0MG, 592' OF)

Fairway Downs Pump Station

Henrici Reservoir (2.0MG, 592' OF)

New Fairway Downs Pump Station

New Fairway Downs Reservoir (1.75MG, 650' OF)

MM01 MM02 MM08 MM09

Clackamas River

Tualatin River

WILLAMETTE FALLS

0 2,000 4,000 Feet

City of Oregon City Water CIP Analysis

Figure 5 CIP Projects

PRESSURE ZONE
- Canemah
- Fairway Downs
- Intermediate
- Lower
- Paper Mill
- Park Place - Intermediate
- Park Place - Livesay
- Park Place - Lower
- Park Place - View Manor
- Upper

CIP Facilities
- PRV
- Tank
- Pump Station
- Emergency PRV

Existing Facilities
- Intake
- Master Meter
- PRV
- Pump Station
- Reservoir
- WTP
- Abandon Pump Station

- CIP Projects
- OC Water Mains
- CRW Water Mains
- SFWB Water Mains
- UGB
- taxlots

August 2020 17-2119

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murraysmith

Appendix

APPENDIX A
WATER DISTRIBUTION MODEL CALIBRATION TECHNICAL MEMORANDUM, MURRAYSMITH

Technical Memorandum
Water Distribution Model Calibration
Oregon City, Oregon

Date: June 20, 2017

Project: 16-1915

To: Jon Archibald
City of Oregon City

From: Shad Roundy, PE
Sven MacAller, EIT
Murraysmith

Re: City of Oregon City, Water Distribution Model Calibration

Model Calibration

Model calibration is performed to ensure that results of model simulations reflect what is happening in a real-world system and involves adjusting model parameters to match field data. For a water distribution system, hydraulic models attempt to reflect flow and pressure within the system by adjusting parameters such as pipe geometry, friction coefficients, demand distribution, boundary conditions, and operational parameters.

The required level of model accuracy can vary by type and size of the water system including system operations. Ultimately, model accuracy depends on the quality of data used to populate the model and the quality of the data that has been collected in the field. Boundary conditions such as pressure reducing valve (PRV) settings, pump operation, and reservoir levels are critical.

Oregon City Field Tests

For calibration of the Oregon City Distribution System, 22 fire flow tests were conducted to collect field data. These tests were distributed throughout the system and at least one was performed in each pressure zone except Jennifer Estates and Paper Mill. The Jennifer Estates zone had not been identified at the time the calibration plan was developed and the Paper Mill zone does not currently serve any customers. Fire flow tests were conducted between January 5th 2016 and

January 30th 2016 including both a static pressure reading and a flow and residual pressure reading. Boundary condition data including reservoir level and pump operation was collected during the fire flow testing period and was used for the model calibration effort. Model calibration confidence levels were evaluated using the criteria shown in Table 1.

The model calibration process has two steps. The first component of model calibration is to match field-measured static pressure with model simulated pressure. Demand distribution, system connectivity, service elevations, and reservoir water surface elevations are verified during the static model calibration.

Table 1
Calibration Confidence

Confidence Level	Static Test Percent Error	Residual Fire Flow Pressure Difference
High	0 – 5%	≤10 psi
Medium	5 – 10%	10-20 psi
Low	> 10%	>20 psi

The second component of calibration utilizes fire flow tests to verify pipe diameters, system connectivity, friction coefficients, and pump operations. Fire flow testing consists of recording static pressure at a hydrant and then "stressing" the system by flowing an adjacent hydrant. While the adjacent hydrant is flowing, residual pressure is measured at the first hydrant to determine the pressure drop. Boundary condition data, such as reservoir levels and pump on/off status, must also be known to accurately model the system conditions during the time of the flow test. The recorded time of each fire hydrant flow test was used to collect boundary condition information from the City's system supervisory control and data acquisition (SCADA) system.

Calibration Results

For static pressure calibration, error is measured as a percent pressure difference between model results and results measured in the field. A negative sign (-) indicates that the model pressure is lower than the field test, and a positive sign indicates that the model is over estimating pressure compared to test data. The static tests for the Oregon City distribution system calibrated between 3 and 5-percent of field measured values resulting in a high level of accuracy. A summary of the static test calibration results is shown in Table 2 and Figure 1.

Fire flow tests are used to simulate pressure drops within the system due to high demands. Calibration results for these tests are expressed as a difference in the pressure drop recorded in the field and the modeled system. For example, if field results show a pre-flow test pressure of

100 psi and 80 psi during the fire flow test, the pressure drop is 20 psi. If the model also shows 100 psi as a static condition and 85 psi during the fire flow test, the modeled pressure drop is 15 psi. The differential between these two pressure drops (5 psi) is the "Residual Fire Flow Pressure Difference". A negative sign on the "Residual Fire Flow Pressure Difference" indicates that the model is overpredicting the pressure drop caused by the fire flow test, while a positive sign indicates that the model is underpredicting the pressure drop. Overpredicting the pressure drop is preferred as it adds conservatism to the model. Because the reported result is based on comparing pressure drop as opposed to actual pressure, any error in the static calibration is not carried over to the fire flow calibration.

As with the static pressure, the fire flow tests calibrated to a high confidence level. All pressure differentials are within a 10-psi range (17 tests are within 5 psi and 5 tests are between 5 and 7 psi). A summary of the fire flow test calibration results is shown in Table 2 and Figure 2.

Calibration Notes

Pressure Reducing Valves

The Oregon City Distribution system is relatively complex with numerous pressure zones, PRVs, pump stations, and reservoirs. The system is sensitive to operational settings at these facilities. PRV settings were initialized from the City's master plan document and may not reflect the current operational settings. Several PRV settings were modified slightly in the model to improve model calibration. These changes were done only after exhausting other potential operational settings (reservoir levels, pump settings) and after adjusting pipe friction coefficients. PRV settings were changed at the 5th and Canemah, Abernathy and Redland, and Harley and Forsythe PRV stations within a 5-psi range of those reported in the master plan.

View Manor is served by a single PRV and is a small, closed pressure zone. Based on static and fire flow tests, the initial setting of 100 psi at the PRV was unrealistic as only 38 psi was measured during the static test and 30 psi during the fire flow test. The initial setting of 100 psi was reduced to 39 psi for the model calibration.

The Canemah pressure zone is served by two PRVs at 3rd and Ganong, and 4th and Jerome. During fire flow testing, both PRVs should open to supply water demand. The 3rd and Ganong PRV station is on a 2-inch line, while the 4th and Jerome station is on a 6-inch line. Using the initial PRV settings, the zone was served primarily by the 3rd and Ganong station and there was significant headloss in the 2-inch pipe resulting in modeled pressure drop significantly higher than what was recorded during fire flow testing. This was an indication that more flow was entering via the 6-inch line and the 4th and Jerome PRV station. In order to increase flow through the 4th and Jerome PRV, the setting was changed to allow the PRV to open at a higher pressure. The final settings used in the calibration at the 4th and Jerome PRV station were 65 and 70 psi for the large and small PRVs respectively (master plan settings indicated 50 and 65 psi settings).

Fairway Downs Pressure Zone

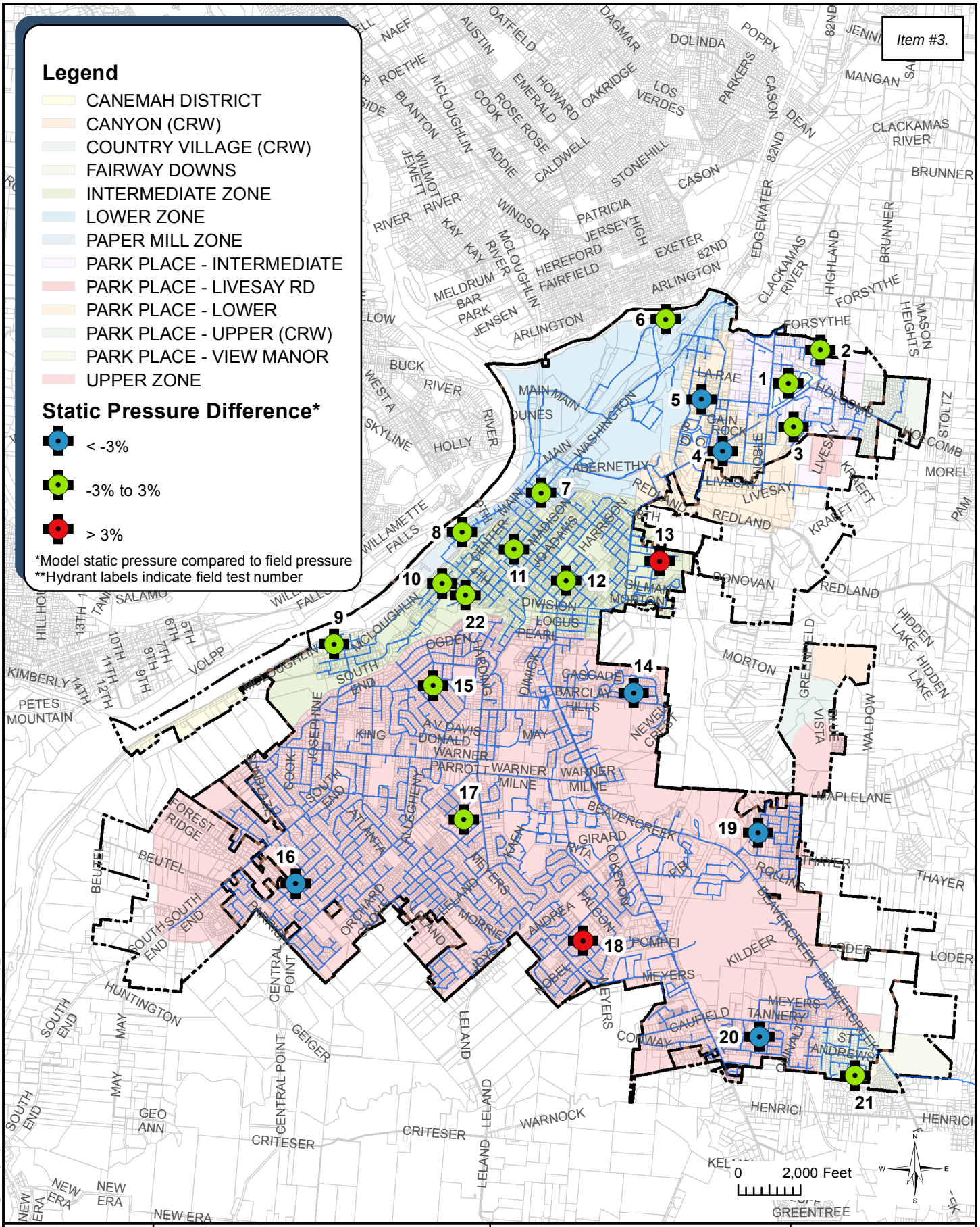
The Fairway Downs pressure zone is served by the Fairway Downs Pump Station and a check valve that bypasses the pump station and supplies water from the Upper Zone. City staff reported that during this flow test the pumps were operating at a diminished capacity (approximately 850 gpm total) and the check valve opened. In the model, the pressure drop from the fire flow test could not be replicated with the check valve open, even if all pumps were off. A good calibration was achieved using only pump 1 and 2, both at approximately 85% capacity and the check valve closed. This discrepancy indicates that there is either significant additional headloss in the check valve that is not replicated in the model or significant headloss in the piping within the pressure zone. When using the model to evaluate this pressure zone, care should be taken with regard to pump and check valve operation and further investigation of pumping capacity and check valve operation may be required.

Division Street Pump Station

Adjacent to the Division Street Pump Station there is a valve that recirculates water from the discharge side to the suction side of the pump station. This operational scheme is implemented to ensure adequate pressure to supply the CRW demand and the suction side pressure demands of the 16th and Division Street Pump Station. This operation is somewhat unique and should be considered when using the model for system evaluation. There may be a more efficient operational scheme that could be implemented in the future.

Table 2
Calibration Results

Test	Pressure Zone	Static Test Percent Error	Residual Fire Flow Pressure Difference
1	PP View Manor	-1%	1.5
2	PP Intermediate	-2%	0.8
3	PP Intermediate	-1%	3.4
4	PP Lower	-5%	6.4
5	PP Lower	-4%	3.3
6	Lower	-2%	6.9
7	Lower	-2%	2.2
8	Lower	0%	-2.7
9	Canemah	1%	-2.8
10	Intermediate	0%	5.2
11	Intermediate	1%	-1.7
12	Intermediate	-2%	-3.2
13	Intermediate	3%	-7.0
22	Intermediate	1%	-3.3
14	Upper	-5%	-1.8
15	Upper	2%	2.2
16	Upper	-5%	0.7
17	Upper	-3%	-1.3
18	Upper	4%	-7.1
19	Upper	-3%	2.3
20	Upper	-4%	-3.3

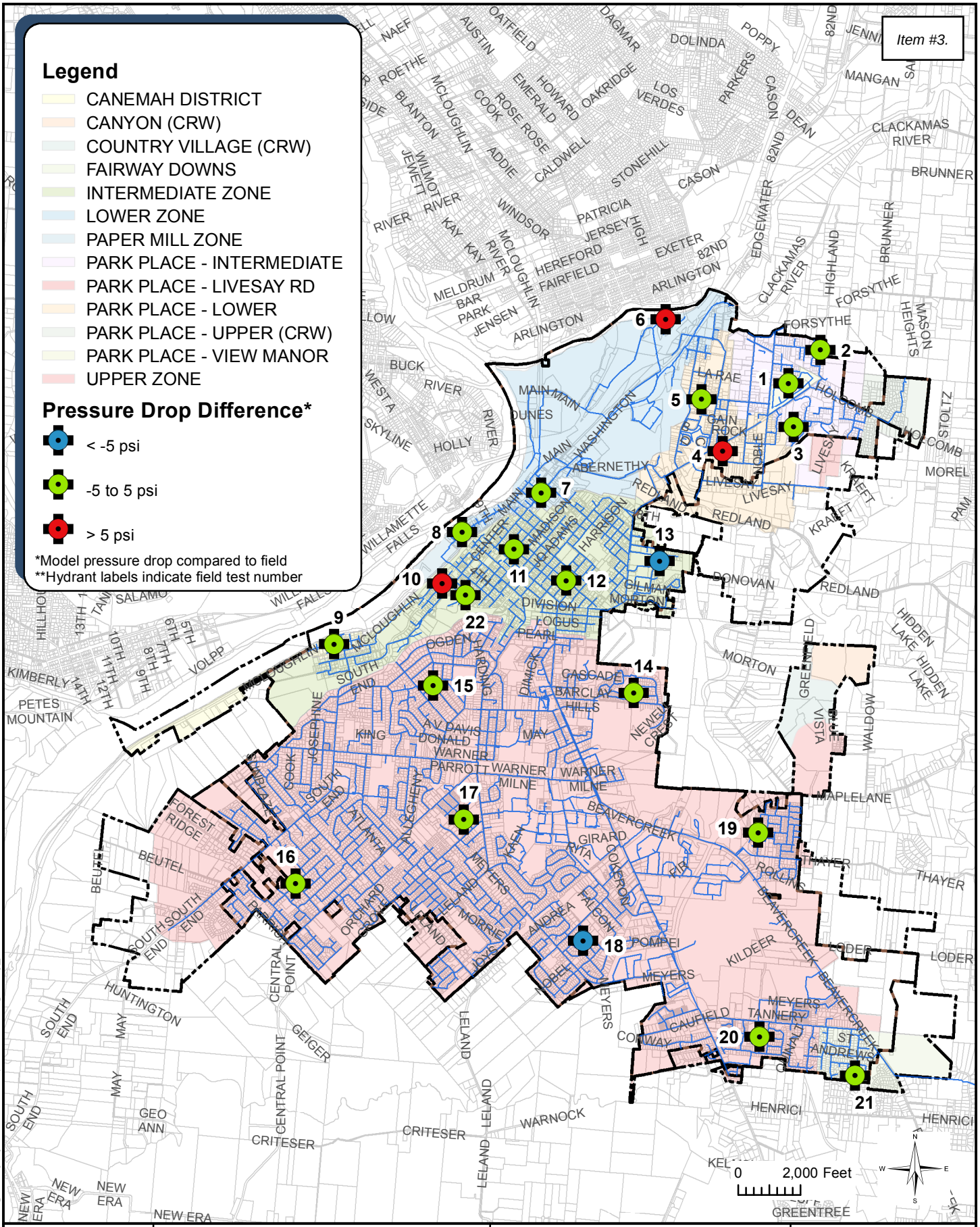


murraysmith

City of Oregon City Hydraulic Model Update

Figure 1 Calibration Results Static Pressure

May 2017 16-1915



murraysmith	**City of Oregon City Hydraulic Model Update**	**Figure 2 Calibration Results Fireflow Tests**	
May 2017	16-1915		

APPENDIX B
HYDRAULIC PROFILES

Figure B1
Existing Combined SFWB/Oregon City/Clackamas River Water Hydraulic Schematic

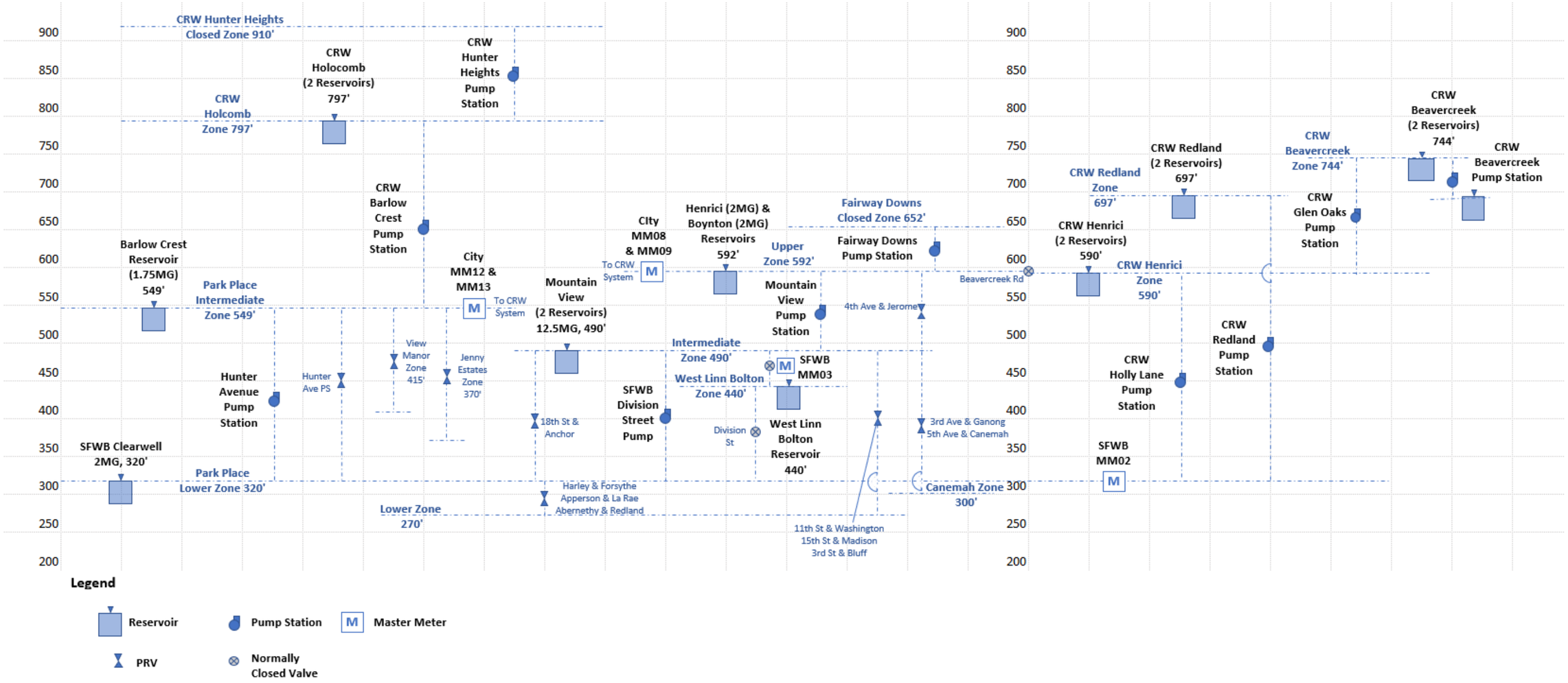
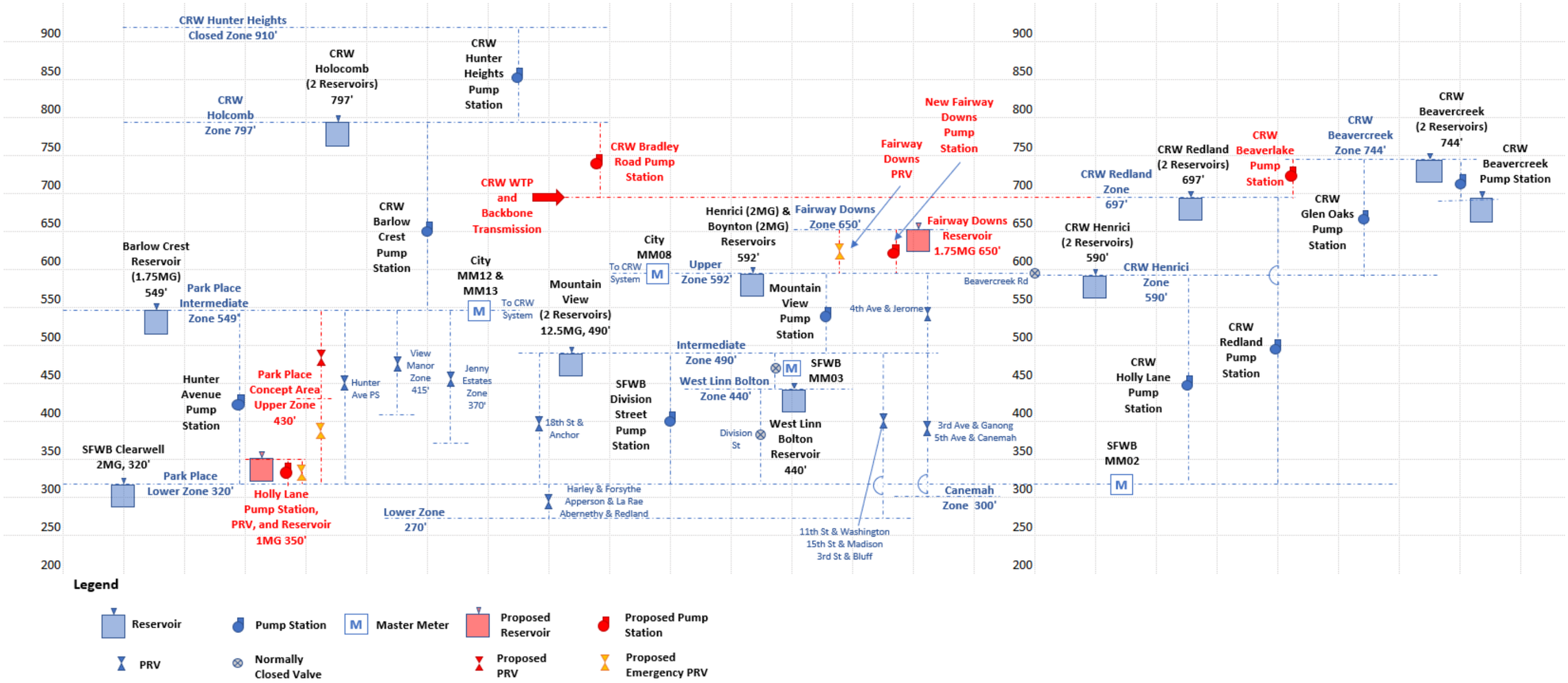


Figure B2
Proposed Combined SFWB/Oregon City/Clackamas River Water Hydraulic Schematic



APPENDIX C
EMERGENCY WATER SUPPLY ANALYSIS TECHNICAL MEMORANDUM, MURRAYSMITH

Technical Memorandum

Date: February 25, 2019

Project: Oregon City Water Distribution System CIP Update (17-2119)

To: Mr. Martin Montalvo
Aleta Froman-Goodrich, PE
City of Oregon City

From: Shad Roundy, PE
Claire DeVoe, EIT
Murraysmith

Re: Emergency Water Supply Analysis

Introduction

The City of Oregon City (City) is in the process of updating its Capital Improvement Program (CIP) developed in the Water System Master Plan (WMP, 2012). Amendment No. 1 to the CIP Update includes documentation of emergency water supply operations. Specifically, the emergency water supply may be required if the South Fork Water Board (SFWB) 30-inch main on Quail Ct and Hiram Ave is out of operation due to repair and during completion of a 42-inch pipeline capital improvement project on Cleveland Street planned for November 2018. This technical memorandum documents the findings and recommendations of the Emergency Water Supply Analysis.

Existing Conditions

SFWB Supply and Transmission

The SFWB supplies treated drinking water to the City of Oregon City, the Clackamas River Water District (CRW) south of the Clackamas River, and the City of West Linn. Two transmission lines supply water from the SFWB Water Treatment Plant (WTP): a 30-inch line to City and CRW master meters and the Division Street Pump Station, and a 42-inch line to the Hunter Ave Pump Station.

As described in the SFWB Water Master Plan (2016), the 30-inch line may be undersized by 2021. To increase transmission capacity, the CIP includes a 42-inch connection along Cleveland Road between the existing 42- and 30-inch lines. In late August 2018, an existing leak in the 30-inch supply main intensified. In response, the SFWB and the City installed dewatering pumps. According to the City, the situation has stabilized, but there are concerns the entire line may fail,

if any attempts are made at repairs. Therefore, the City and SFWB have accelerated the process for the 42-inch connection.

West Linn Intertie Upgrades

In 2015, the City of West Linn improved its Lake Oswego Booster Station Intertie by installing two new 2,200 gallons per minute (gpm) pumps. These improvements came partly in response to the Lake Oswego – Tigard WTP expansion on the Clackamas River. This intertie is expected to be available for emergency supply.

SFWB Supply Limitations

This analysis focuses on three SFWB supply interruption scenarios:

1. Only the 30-inch line is out of service:
   a. Prior to the completion of the connection of the new 42-inch line on Cleveland Street, a failure in the 30-inch line eliminates supply to the Division Street Pump Station, without affecting the 42-inch supply to Hunter Ave.
   b. The 42-inch connection is successfully constructed, and installation requires the 30-inch line to be shut off for the duration of the final connection.
2. The SFWB WTP is completely offline and both the 30-inch and 42-inch lines are unable to provide water supply. The Division Street Pump Station is also not operable.

Under the first scenario, the City, CRW, and West Linn pressure zones supplied by the 30-inch line will either need to use alternate supply or rely on emergency storage. Under the second scenario, CRW and the City are assumed to rely on emergency storage, while West Linn uses alternate supply from Lake Oswego. The second scenario assumes that excess capacity from the Lake Oswego intertie can optionally supply CRW and the City through a back feed to the Park Place Lower Zone and the suction side of the Division Street Pump Station from the West Linn Bolton Reservoir. Pressure zone supply under all scenarios for Oregon City, CRW, and West Linn are listed in Table 1 and highlighted in Figure 1.

SFWB Supply Operations and Service Interruption

The SFWB Clear Well controls system pressure in the 30-inch and 42-inch transmission mains including suction side pressures at the Division Street and Hunter Ave Pump Stations. When the Clear Well water surface drops below a set point, a transfer valve (day/night valve) at the Division Street Pump Station opens to supply system demands and pressure from the Mountainview Reservoirs to customers supplied directly off the transmission mains. Excess head from the Mountainview Reservoirs is eliminated via an orifice plate at the valve with differential head regulated by the Clear Well water surface.

The supply interruptions described in this Emergency Plan, are different than when the WTP Clear Well is nominally offline and the Mountainview Reservoirs supply the system via the transfer valve.

During the emergency supply interruptions, the Clear Well is unavailable to regulate pressure and the transfer valve should remain closed to eliminate risk of over pressurizing the system.

During closure of the transfer valve, some services directly off the transmission mains will be without water including 27 CRW customers downstream of the CRW Redland and Anchor Way Master Meter (MM02). To avoid water service interruptions during the emergency shutdown, a new pressure reducing valve (PRV) is required at the CRW Holly Lane Pump Station to provide emergency supply from the CRW Henrici Reservoir to these customers.

Table 1
Pressure Zone Supply Alternatives

SFWB Supply Scenario	System	Alternate Supply	Emergency Storage	Normal Operations
Scenario 1: Pressure Zones Affected by 30-inch Outage including near-term 42-inch pipeline connection	Oregon City	Park Place Lower, Lower, Livesay	Intermediate, Canemah, Upper, Fairway Downs, Paper Mill	Park Place Intermediate, View Manor, Jennifer Estates
	CRW		Redland, Henrici, Beavercreek Zones and South End and Leland/Meyers Master Meters	Hunter Heights, Holcomb (City's Park Place Upper), HOPP Master Meter
	West Linn	All Zones		
Scenario 2: Pressure Zones Affected by Complete SFWB Outage	Oregon City	See note 1	All Zones	
	CRW	See note 1	All Zones	
	West Linn	All Zones (from Lake Oswego)		

Notes
1 Optional supply from Lake Oswego. Excess capacity from the Lake Oswego intertie can augment supply to CRW and the City through a back feed to the Park Place Lower Zone and the suction side of the Division Street Pump Station from the West Linn Bolton Reservoir. Valving requires field verification and emergency operations require testing.

Scenario 1: 30-inch Supply Line Outage

Under this scenario, the 30-inch transmission main is off-line, and the 42-inch transmission main continues normal operation. Therefore, the goal of any operational change is to utilize the 42-inch line and minimize demands on the Mountainview Reservoirs. These changes include:

- Shut down of the Division Street Pump Station to eliminate supply from SFWB to the Mountainview and Bolton Reservoirs. The transfer valve at the Division Street Pump Station should be closed to ensure that the Mountainview Reservoir transmission main is isolated from suction side supply piping at the Division Street Pump Station.
- West Linn to utilize the booster station intertie with Lake Oswego and close the supply from SFWB and the Mountainview Reservoirs at the automated ball valve vault located between the Division Street Pump Station and the Bolton Reservoir.
- CRW to shut off their Redland and Holly Lane Pump Stations. CRW to rely on emergency storage in their Redland, Henrici, and Beavercreek Reservoirs for zones normally supplied via MM02. A new PRV is required at the Holly Lane Pump Station to serve 27 customers adjacent to MM02.
- Oregon City to close distribution bypass pressure reducing valves (PRVs) providing supply from the Mountainview Reservoirs to zones capable of being supplied by the 42-inch line. Fire flow PRVs remain open with existing settings to passively provide fire flow demands. The updated PRV settings are listed in **Table 2** including closure of bypass PRVs at 18th & Anchor Way, 3rd & Bluff, 11th & Washington, and 15th & Madison. Fire flow PRV settings are not modified.

This scenario is useful for the near-term project to connect the new 42-inch pipeline on Cleveland Street to both the 42-inch transmission main and the 30-inch transmission main. During the connection, the 30-inch transmission main will be drained and out of service, while the 42-inch main will remain in service. The following elements should be field verified prior to connection:

- A butterfly valve and tee on the 42-inch main near Cleveland Street and Hunter Ave. The intended construction plan is to open the existing butterfly valve after pressure tests and bacterial testing are complete. A short segment of pipe will be constructed to connect the existing "CLOSED" butterfly valve to the new 42-inch piping.

Scenario 2: Complete SFWB Outage

Under this scenario, both the 30-inch and 42-inch lines are off-line. Therefore, the goal of the any operational change is to balance water stored in reservoirs with system demands. These changes include:

- Shut down of the Division Street Pump Station to eliminate supply from SFWB to the Mountainview and Bolton Reservoirs. The transfer valve at the Division Street Pump Station should be closed to ensure that the Mountainview Reservoir transmission main is isolated from suction side supply piping at the Division Street Pump Station.

- Shut down of the Hunter Ave Pump Station to eliminate supply from SFWB 42-inch to Barlow Crest and Hunter Heights Reservoirs.
- West Linn to utilize the booster station intertie with Lake Oswego and close the supply from SFWB and the Mountainview Reservoirs at the automated ball valve vault located between the Division Street Pump Station and the Bolton Reservoir.
- CRW to shut off their Redland, Holly Lane, and Barlow Crest Pump Stations. CRW to rely on emergency storage from their reservoirs in all zones.
- Oregon City to modify PRV settings and operations, providing supply from the Barlow Crest Reservoir to zones capable of being supplied by the Mountainview Reservoirs as listed in Table 2 including closure of the bypass PRV at Hunter Ave Pump Station and a slight adjustment to the Hunter Ave Pump Station fire flow PRV.
- Note that PRV isolation of the Park Place Lower and Lower Zones from the Mountainview Reservoirs is not recommended for this scenario since the Barlow Crest Reservoir supply is more limiting than the Mountainview Reservoir supply with the existing 42-inch supply line to Hunter Avenue Pump Station unavailable.

Analysis and Findings

Assumptions

The following assumptions were made for all system analysis:

- System analysis was performed under wintertime Average Day Demands (ADD), conservatively estimated at 75% of ADD and verified with 2016 master meter records.
- It was assumed all reservoirs would be filled prior to the start of work and a 20% factor of safety was assumed, limiting available storage to 80% of reservoir capacity.
- Only gravity storage was available for supply.
- All interzone pumps and PRVs were assumed operational, except where specifically listed. Therefore, pressure zones could be grouped by limiting reservoir or supply including: Oregon City Mountainview, Oregon City Barlow Crest, CRW Hunter Heights, and CRW MM02.

The analysis consisted of a calculation of supply duration available in the reservoir groups, a system pressure check in Oregon City under the updated supply scenario, and a fire flow pressure check in Oregon City under the updated supply scenario.

System Pressures and Supply Availability

Under both limited SFWB supply scenarios described in the prior section, the City can maintain adequate pressures in all zones. Pressures vary by less than 3 pounds per square inch (psi) between SFWB supply scenarios during winter time demands, therefore only Scenario 1 is presented in Figure 2. Reservoir supply duration varies between scenarios and zones and is presented in Table 3. These calculations assume that the City will continue wheeling water to CRW's master meters at South End, Meyers, and HOPP, in addition to the assumptions listed

earlier in this document. Approximately 4 days of emergency storage is available in the Oregon City system. If the Mountainview Reservoirs are not isolated from the Park Place and Park Place Lower Zones, the available storage in the Oregon City system reduces to less than 4 days.

Approximately 3 days of emergency storage is available in the CRW system with all reservoirs operations. However, it should be noted that the one of the CRW Redland Reservoirs is temporarily off-line (as of October 2018) affecting near-term emergency storage availability by approximately 50-percent in the Redland zone (see *SFWB Hydraulics – Catastrophic Failure: Emergency Water Main Repair Modeling*, Carrollo, 2018).

Fire flow Availability

If a fire occurs during limited SFWB operations, no additional changes need to be made to system operations. PRVs should be set so that fire flows will be available, even if the distribution bypass PRV is closed. It should be understood, however, that fighting a fire will significantly impact emergency storage and decrease the total time the system can operate without water shortages.

Figure 3 presents the fire flow available throughout the City's system under both Scenario 1 and Scenario 2 of reduced SFWB supply.

Table 2
PRV Settings for SFWB Supply Alternatives

PRV Station	Scenario 1: Operation under 30-inch Failure & 42-inch Connection	Scenario 2: Complete SFWB Outage	Distribution Bypass or Main Valve Setting (psi)				Fire flow Valve Setting (psi)			
			Diameter (in)	Existing	30-in Failure	Complete Outage	Diameter (in)	Existing	30-in Failure	Complete Outage
18th & Anchor Way	Closed for distribution, open during fire flow in Lower or Park Place Lower	Required for distribution and fire flow to Park Place Lower and Livesay	4	53	CLOSE	NC	8	48	NC	NC
3rd & Bluff	Closed for distribution, open during fire flow in Lower Zone	Supply to Lower, available for fire flow	3	42	CLOSE	NC	10	39	NC	NC
11th & Washington			3	67	CLOSE	NC	10	58	NC	NC
15th & Madison[2]			6	56	CLOSE	NC	6	51	NC	NC
Hunter Ave Pump Station PRV	Required for distribution and fire flow supply to Park Place Lower and Lower	Closed for distribution, available for fire flow	3	45	NC	CLOSE	6	51	NC	48

Notes:

1. NC = No change from existing settings required.
2. Additional 1.25-inch PRV also closed during Scenario 1.

Table 3
Emergency Storage Supply Availability Under Limited SFWB Supply Scenarios

SFWB Supply Scenario	Storage System/Zones	Total Storage (MG)	Available Storage (MG)	System Demands (GPM)	Available Supply (Days)
Scenario 1: Pressure Zones Affected by the 30-inch Outage	Oregon City/ Mountainview	16.5	12.1	1,898	4.4
	CRW/ MM02	3.8	3.0	651	3.2
Scenario 2: Pressure Zones Affected by Complete SFWB Outage	Oregon City/ Mountainview	16.5	12.1	2,208	3.8 – 4.8 (see note 9)
	Oregon City/ Barlow Crest	1.8	1.4	120	8.1
	CRW/ Hunter Heights	1.2	1.0	135	4.9
	CRW/ MM02	3.8	3.0	651	3.2 – 4.2 (see note 9)

Notes:

1. All tanks assumed initially full and operational. Available storage assumed to be 80% of full storage and available by gravity – Boynton Standpipe limited to minimum elevation of Henrici Reservoir at 20% full.
2. Demands at 75% of ADD. All CRW demands wheeled through Oregon City (HOPP area, South End, Leland/Meyers, and Joint User Customers) continued supply at 75% ADD. No supply to West Linn.
3. All interzone pump stations assumed operational, except where specifically shut off.
4. For scenario 1, Oregon City Mountainview Zones include Upper, Fairway Downs, Intermediate, and Canemah. For Scenario 2, additional zones include Lower and Park Place Lower and Livesay.
5. CRW MM02 Zones include Redland, Henrici, and Beavercreek. All reservoirs assumed operational. Available supply will be reduced from what is shown in the table when one of the Redland Reservoirs is offline.
6. Oregon City Barlow Crest Zones include Park Place Intermediate, Park Place View Manor, and Park Place Jenny Estates.
7. CRW Hunter Heights Zones include Hunter Heights and Holcomb (including the City customers in the Barlow Crest area).
8. For Scenario 2, Mountainview Reservoirs supply the Park Place Lower and Lower Zones to preserve supply in the Barlow Crest Reservoir. Without isolating Barlow Crest, the controlling emergency supply reduces to approximately 2 days within the Barlow Crest service area.
9. Additional supply from the booster station intertie with Lake Oswego may augment supply to CRW and the City through a back feed to the Park Place Lower Zone and the suction side of the Division Street Pump Station from the West Linn Bolton Reservoir. Valving requires field verification and emergency operations require testing. The higher-end supply times assume up to 700 gpm of excess capacity are provided by the Lake Oswego intertie to supplement storage.

Alternate Supply Analysis

Given the limited time available for supply shut down and the unpredictability of the construction process, alternate supply and distribution were explored from CRW and Lake Oswego via West Linn.

Supply from CRW's WTP may be an option for emergency supply once Phase I of the Backbone Project is completed and interties to Oregon City are established. The Backbone Project extends

transmission piping from the CRW WTP on the north side of the Clackamas to customers south of the Clackamas. Existing connections along the Backbone path were reviewed for a potential supply from the CRW zones supplied by the 42-inch to the CRW zones supplied by the 30-inch and indirectly, the Mountainview Reservoirs. However, available piping is 4-inch diameter and adequate connections are not currently available. Once the Backbone Project is complete, potential intertie locations may be located at the Barlow Crest Reservoir, CRW's Redland and Anchor Way master meter, or along Beavercreek Road. The Backbone Project and associated interties will not be implemented in time to address near-term emergency supply associated with the near-term SFWB pipe break and 42-inch pipeline improvement.

Alternate supply may be available from the Lake Oswego – Tigard WTP, via the Lake Oswego Emergency Booster Station and through West Linn's Bolton Pressure Zone to the Mountain View Reservoirs. Initial review of the system and pump curves for the emergency pump station indicate approximately 225 ft of total dynamic head (TDH) with two pumps operating. This is adequate head to pump from the Emergency Booster Station to the Mountain View Reservoirs. Based on winter-time demands, the pump station would operate almost continuously throughout the day. Two scenarios were considered:

(1) In the first scenario, the West Linn distribution piping and valving are not isolated. Maximum pressures exceed 170 psi and may affect two-thirds to three quarters of the zone.

(2) In the second scenario, portions of the West Linn distribution piping are isolated to serve as a transmission main. Maximum pressures exceed 170 psi, but only affect one-third of the zone (see Figure 4).

Because the affected customers in the Bolton Pressure Zone may not have individual PRVs to handle pressures greater than 100 psi and the distribution piping is aging with potential leakage concerns, the alternate supply scenario from the Lake Oswego Booster Station to the Mountainview Reservoirs is not recommended.

A third alternative was considered late in the emergency supply analysis. Additional supply from the booster station intertie with Lake Oswego may augment supply to CRW and the City through a back feed to the Park Place Lower Zone and the suction side of the Division Street Pump Station from the West Linn Bolton Reservoir. This operation does not affect pressures in the West Linn system. Valving requires field verification and emergency operations require testing. Excess capacity from the intertie booster may be limited after demands are supplied to West Linn during peak demand hours of the day. The benefit of the back feed from the Bolton Reservoir is to help refill City and CRW reservoirs normally supplied from the SFWB Clearwell during low demand hours of the day. The reservoir refill occurs through the Division Street Pump Station for the City and the Holly Lane and Redland Pump Stations for CRW.

Future Connections

Additional interconnects to the CRW system after the construction of the CRW backbone project may be explored. A secondary supply south of the Clackamas River greatly increases system resiliency and improves service to CRW, Oregon City, and West Linn customers. The backbone project will not be available for the immediate risks of the 30-inch leak and the 42-inch pipe connection associated with Scenario 1.

Recommendations

The following steps are recommended procedures for implementation of Scenario 1 and Scenario 2 operations. The steps should be field verified (including valve IDs) and tested prior to implementation.

During testing and implementation, all valve operations must be performed slowly to minimize the risk of water hammer and pressure transients. Prior to draining system pipelines, air/vacuum combination release valves should be identified and inspected for functionality to avoid damage from pressure transients. Draining should occur slowly to minimize risks of vacuum pressures.

Scenario 1: 30-inch Supply Line Outage

- Coordinate with the City of West Linn to change supply to the Bolton Reservoir
    - Fill the Bolton Reservoir via the Division Street Pump Station
    - Close the automated ball valve at vault between the Division Street Pump Station and the Bolton Reservoir. The valve is located near 17th on Division (Valve 50253/320, ID to be field verified)
    - Coordinate with Lake Oswego to utilize the emergency booster station for supply of the Bolton Reservoir and Bolton Pressure Zone

- Fill all City and CRW reservoirs nominally supplied by the 30-inch line prior to isolating the leak. These reservoirs include:
    - City Mountainview
    - City Henrici
    - City Boynton
    - CRW Redland
    - CRW Henrici
    - CRW Beavercreek

- Isolate the leak and close valves
    - Shut off the Division Street Pump Station
    - Verify transfer valve closure between Mountainview Reservoirs transmission main and 30-inch supply line at the Division Street Pump Station
    - Close the 16-inch gate valve located at MM01 - the City supply from the 30-inch to the Park Place Lower zone, at Hiram and Cleveland (Valve 50307/374)

  - Shut off the CRW Redland and Holly Lane Pump Stations
  - Close the 14-inch CRW line at MM02, Redland and Anchor – the CRW supply from the 30-inch to Redland, Henrici, and Beavercreek. To avoid water service interruptions during the emergency shutdown, a new PRV is required at the CRW Holly Lane Pump Station to provide emergency supply from the CRW Henrici Reservoir to customers adjacent to MM02.
  - Isolate the leak by closing adjacent valving on the 30-inch line
- Close the bypass PRVs at the following locations per recommendations listed in Table 2, to minimize demands on the Mountainview Reservoirs. Maintain fire flow valves at existing settings.
  - 18th & Anchor PRV Station
  - 3rd & Bluff PRV Station
  - 11th & Washington PRV Station
  - 15th & Madison PRV Station

- Fire watch – During the supply alternative, maintain a fire watch. It is strongly encouraged not to open valves unless necessary. If a fire occurs, valve opening between the CRW and Oregon City systems will serve to balance reservoir water supply and support fire flow durations. The valve operations are not required to supply fire flow demands initially and therefore, all valves should be operated slowly and with care to avoid water hammer and pressure transients.

Scenario 1 is useful for the near-term project to connect the new 42-inch pipeline on Cleveland Street to both the 42-inch transmission main and the 30-inch transmission main. During the connection, the 30-inch transmission main will be drained and out of service, while the 42-inch main will remain in service. The following elements should be field verified prior to connection:

- A butterfly valve and tee on the 42-inch main near Cleveland Street and Hunter Ave. The intended construction plan is to open the existing butterfly valve after pressure tests and bacterial testing are complete. A short segment of pipe will be constructed to connect the existing "CLOSED" butterfly valve to the new 42-inch piping.

Scenario 2: Complete SFWB Outage

- Coordinate with the City of West Linn to change supply to the Bolton Reservoir
  - Fill the Bolton Reservoir via the Division Street Pump Station
  - Close the automated ball valve at vault between the Division Street Pump Station and the Bolton Reservoir. The valve is located near 17th on Division (Valve 50253/320, ID to be field verified)
  - Coordinate with Lake Oswego to utilize the emergency booster station for supply of the Bolton Reservoir and Bolton Pressure Zone

- Fill all City and CRW reservoirs. These reservoirs include:
  - City Mountainview

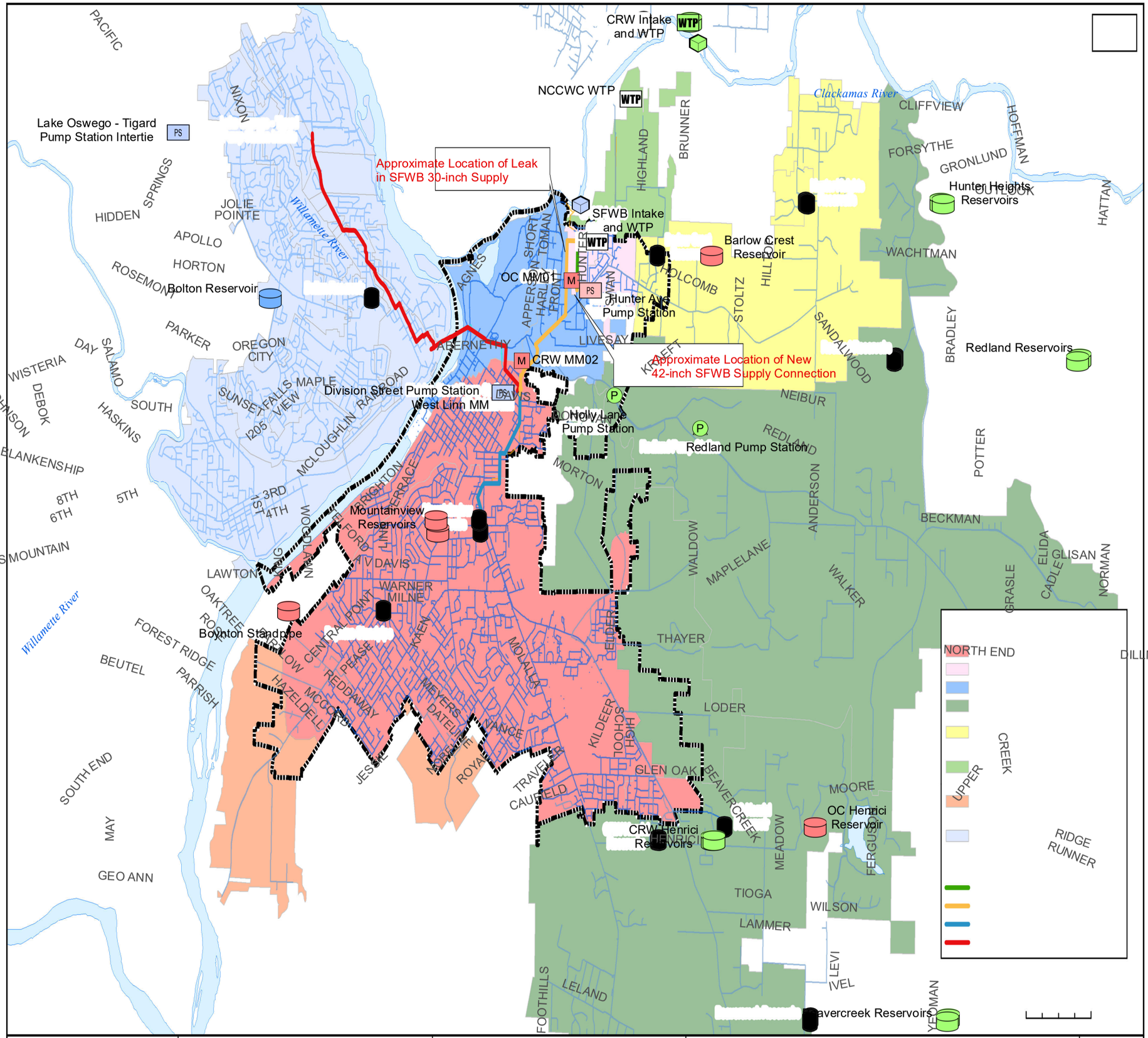
  - City Henrici
  - City Boynton
  - City Barlow Crest
  - CRW Redland
  - CRW Henrici
  - CRW Beavercreek
  - CRW Hunter Heights

- Isolate the CRW, West Linn, and Oregon City systems
  - Shut off the Division Street Pump Station
  - Verify transfer valve closure between Mountainview Reservoirs transmission main and 30-inch supply line at the Division Street Pump Station
  - Close the 16-inch gate valve located at MM01 - the City supply from the 30-inch to the Park Place Lower zone, at Hiram and Cleveland (Valve 50307/374)
  - Shut off the Barlow Crest Pump Station (CRW supply to Holcomb/Hunter Ave)
  - Shut off the CRW Redland and Holly Lane Pump Stations
  - Close the 14-inch CRW line at MM02, Redland and Anchor – the CRW supply from the 30-inch to Redland, Henrici, and Beavercreek. To avoid water service interruptions during the emergency shutdown, a new PRV is required at the CRW Holly Lane Pump Station to provide emergency supply from the CRW Henrici Reservoir to customers adjacent to MM02.
  - Shut off the Hunter Ave Pump Station
  - Close Hunter Avenue bypass PRV and adjust fire flow PRV to less than 48 psi

- Fire watch – During the supply alternative, maintain a fire watch. It is strongly encouraged not to open valves unless necessary. If a fire occurs, valve opening between the CRW and Oregon City systems will serve to balance reservoir water supply and support fire flow durations. The valve operations are not required to supply fire flow demands initially and therefore, all valves should be operated slowly and with care to avoid water hammer and pressure transients.

Note: Additional emergency supply to the City and CRW systems may be available from the booster station intertie with Lake Oswego to the Park Place Lower Zone and the suction side of the Division Street Pump Station from the West Linn Bolton Reservoir during low demand hours of the day. Valving requires field verification and emergency operations require testing.

Cc: South Fork Water Board, West Linn, Clackamas River Water, Lake Oswego


CRW Intake and WTP
NCCWC WTP
Clackamas River
Lake Oswego - Tigard Pump Station Intertie
Approximate Location of Leak in SFWB 30-inch Supply
SFWB Intake and WTP
Barlow Crest Reservoir
Hunter Heights Reservoirs
OC MM01
Hunter Ave Pump Station
Bolton Reservoir
Willamette River
CRW MM02
Approximate Location of New 42-inch SFWB Supply Connection
Redland Reservoirs
Division Street Pump Station
West Linn MM
Holly Lane Pump Station
Redland Pump Station
Mountainview Reservoirs
Boynton Standpipe
OC Henrici Reservoir
CRW Henrici Reservoirs
Beavercreek Reservoirs
NORTH END
UPPER CREEK
RIDGE RUNNER
Water Facilities
Reservoir
Pump Station
Master Meter
PRV
Intake
WTP
City of Oregon City Water CIP Analysis
Figure 1: SFWB Regional Supply Limitation

Scenario 1: Isolate 30-inch Leak

Scenario 1: Close 18th & Anchor Way Bypass PRV

Scenario 1: Close 15th & Madison Bypass PRV

Scenario 1: Close 11th & Washington Bypass PRV

Scenario 1: Close 3rd & Bluff Bypass PRV

Scenario 2: Close CRW Supply via Barlow Crest Pump Station

Scenario 2: Close Bypass PRV at Hunter Ave Pump Station Adjust Fire Flow PRV setting

Both Scenarios: Close CRW MM02 Supply

Both Scenarios: Shut down Holly Lane Pump Station New PRV required at pump station to supply customers immediately downstream of MM02

Both Scenarios: Shut down Redland Pump Station

Both Scenarios: Shutdown Division Street Pump Station and Close Transfer Valve

Both Scenarios: Close West Linn Supply Ball Valve; Coordinate with Lake Oswego for Emergency Booster Station supply to Bolton Pressure Zone

SFWB Intake

MM13

SFWB WTP

Barlow Crest Reservoir and Pump Station

MM12

MM01

Hunter Ave Pump Station

MM02

MM05

Division Street Pump Station

Mountainview Reservoirs and Pump Station

MM06

Boynton Standpipe and Pump Station

MM08

MM09

CRW Hunter Heights Reservoirs

CRW Redland Reservoirs

Fairway Downs Pump Station

Henrici Reservoir

CRW Henrici Reservoirs

Note: Water facility color denotes ownership:
Red - Oregon City
Green - CRW
Blue - Other

0 2,000 4,000 Feet

Model Water Mains
CRW Water Mains
OC City Limits
UGB

Static Pressure (PSI)
< 25
25 - 40
40 - 80
80 - 100
> 100

Water Facilities
Reservoir
Pump Station
Master Meter
PRV
Intake
WTP

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City of Oregon City Water CIP Analysis

Figure 2: SFWB Supply Limitation Static Pressure

October 2018 17-2119

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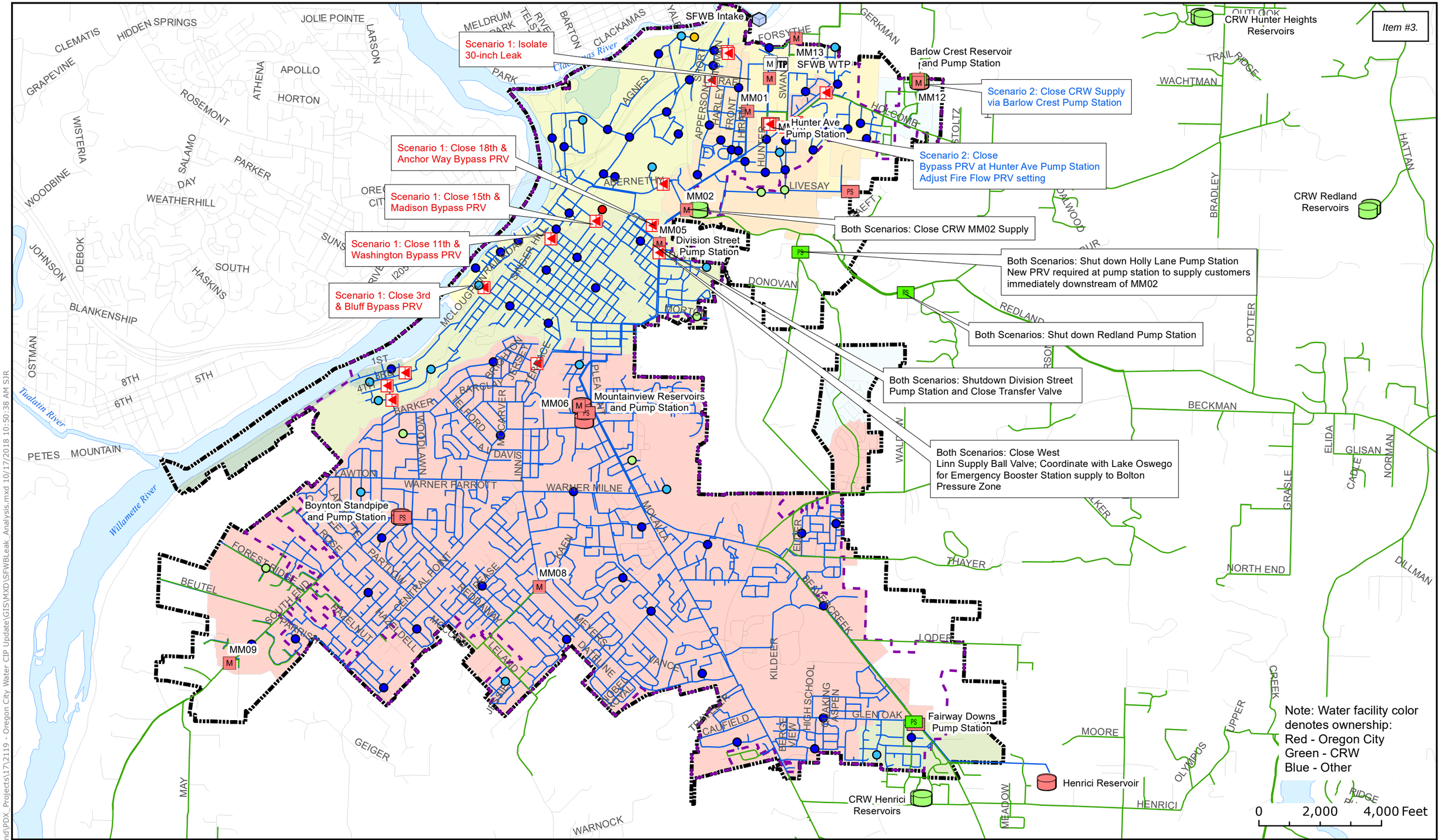

City of Oregon City Water CIP Analysis

Figure 3: SFWB Supply Limitation Fireflow Availability

Model Water Mains
CRW Water Mains
OC City Limits
UGB

Available Fireflow (GPM)
< 500
500 - 1000
1000 - 1500
1500 - 3000
> 3000

Water Facilities
Reservoir
Pump Station
Master Meter
PRV
Intake
WTP

October 2018 17-2119

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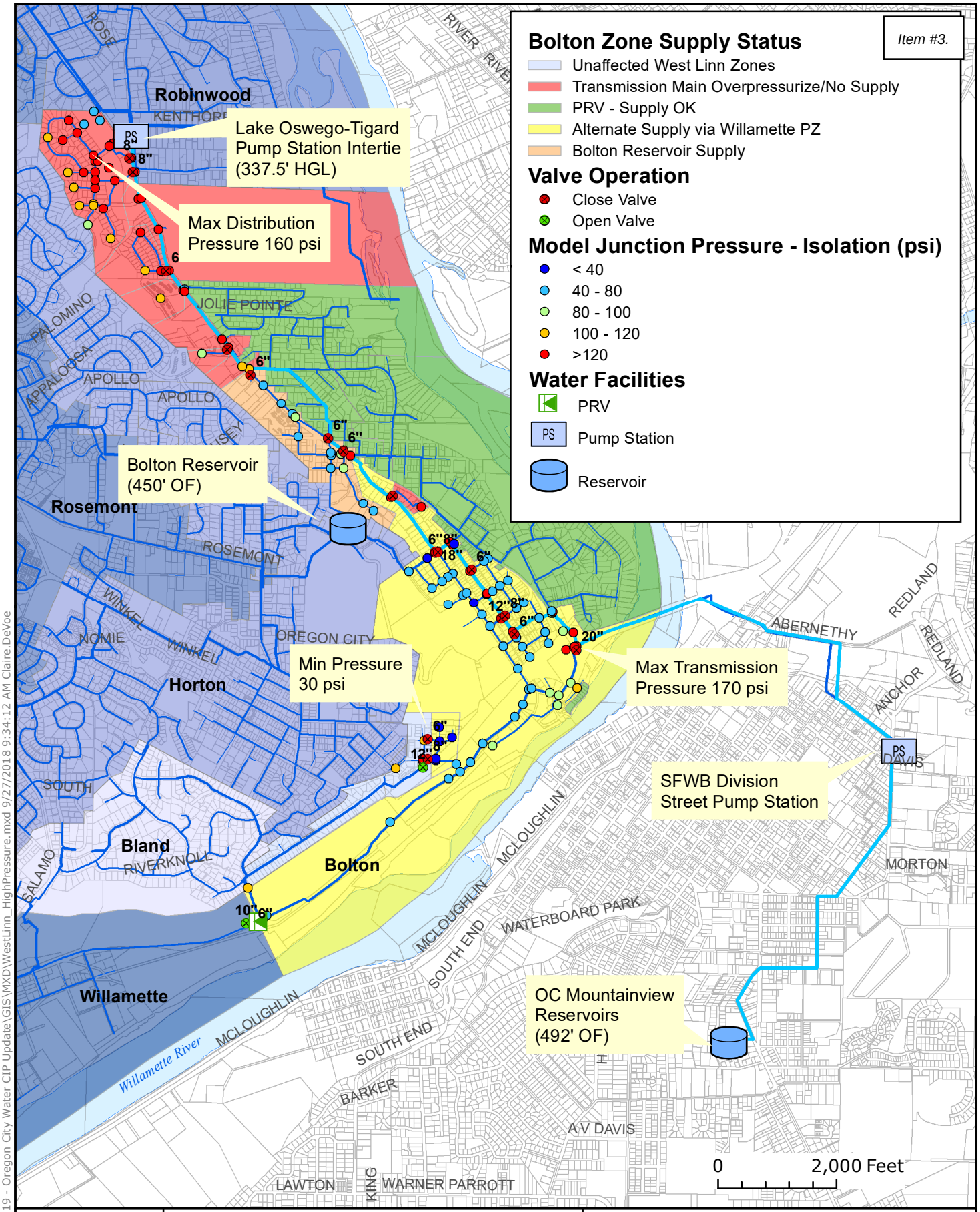

Figure 4:
SFWB Supply Main Failure
Alternate Supply Analysis

Lake Oswego-Tigard Supply
West Linn Pressures
Transmission Isola

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APPENDIX D
JOINT ENGINEERING STUDY TECHNICAL MEMORANDUM, MURRAYSMITH

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Technical Memorandum

Date: June 11, 2018

Project: 16-1922

To: Mr. Martin Montalvo – Operations Manager
Ms. Aleta Froman-Goodrich, PE – City Engineer
City of Oregon City

Mr. Bob George, PE – Chief Engineer
Clackamas River Water District

From: Brian Ginter, PE
Mike Carr, PE
Claire DeVoe
Murraysmith

Re: Clackamas River Water / City of Oregon City Joint Engineering Analysis
Water Service Dual interest Area Technical Analysis

Purpose

Clackamas River Water (CRW) and the City of Oregon City (City) are engaged in discussions with the goal of defining their adjoining service area boundaries for existing and future conditions to provide more efficient and economic water service to all customers. Murraysmith was selected by both providers to perform the engineering analysis and facilitate discussions between the two water providers.

The purpose of this white paper is to develop a framework for defining current and long-term service area boundaries, orderly service transfers, and infrastructure management through a study of current dual interest areas and overlapping service identified by the providers. This report will:

- Present the historical events regarding boundary realignment
- Identify typical dual interests present between service providers
- Document the identified water service dual interest focus areas
- Propose individual or policy-based solutions for each dual interest area
- Develop an approach to guide future dual interest resolution
- Provide an action plan for the next steps

This report also fulfills the study requirements set forth in the May 2014 Settlement Agreement between CRW and the City.

Introduction

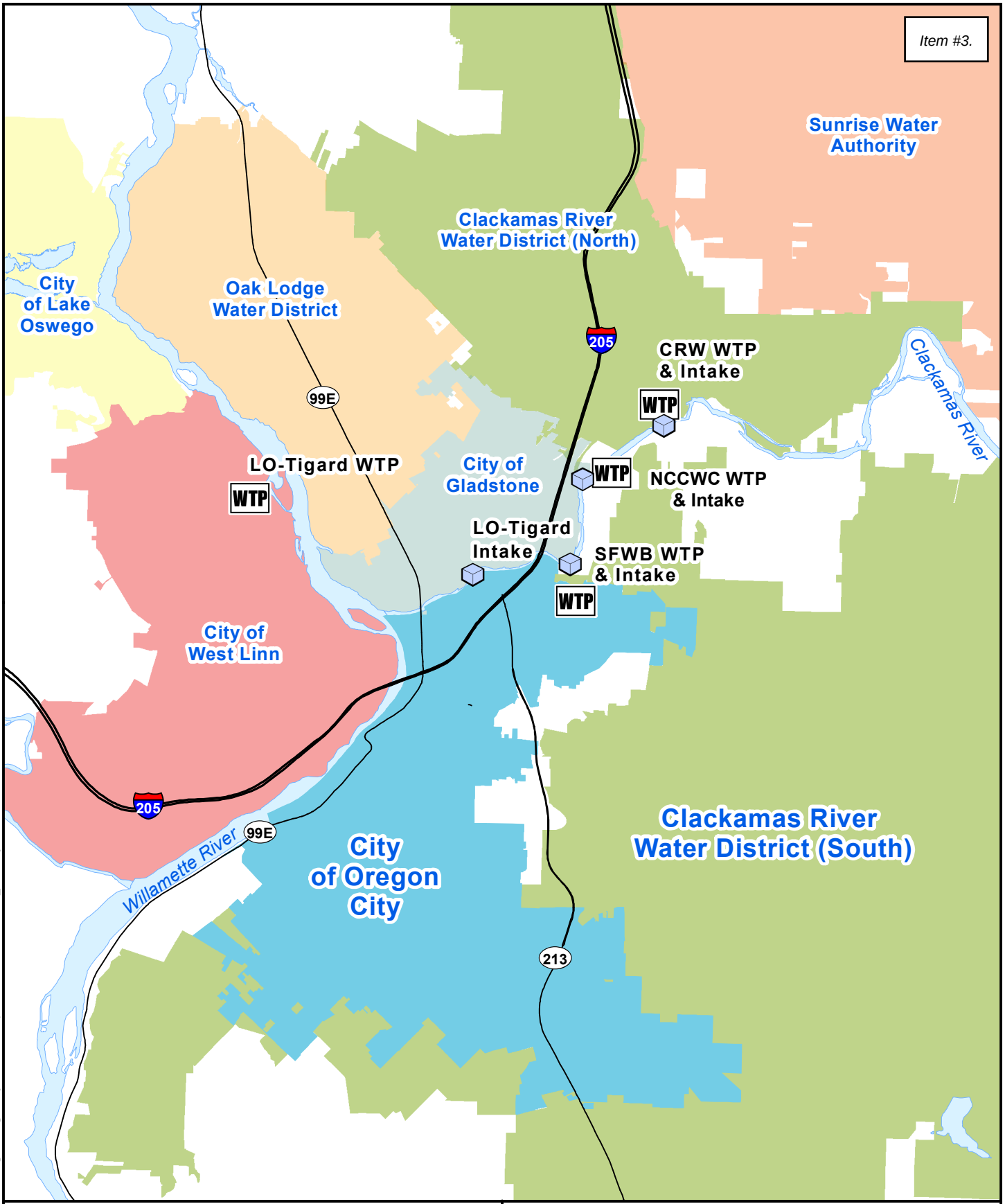
The Clackamas River is the primary water source for municipal water supply to Oregon City and the surrounding urban and semi-urban areas, as illustrated in **Figure 1**. Three separate Water Treatment Plants (WTPs) along the river supply six different water providers, including the City and CRW (**Table 1**).

Table 1
Water Treatment Facilities along the Clackamas River

Water Treatment Plant	South Fork Water Board WTP	North Clackamas County Water Commission WTP	Clackamas River Water WTP
Water Provider Served	Oregon City	Sunrise Water Authority	Clackamas River Water (North)
	West Linn	Gladstone	Sunrise Water Authority
	Clackamas River Water (South)	Oak Lodge Water District	

Historically, these water providers have coexisted and provided service to separate areas. Cities generally supplied the urban centers and water districts or water authorities have served the semi-urban areas both within and outside the Metro Urban Growth Boundary (UGB). With development and subsequent UGB expansion cities can legally serve areas that were once limited to water district or water authority service. Under ORS 222.520 to 222.580, a city may annex and withdraw territory, and assume facilities, from special districts if the facilities are non-essential to the operation of the remaining district water system. This same rule does not apply to water authorities – their service areas are protected and cannot be withdrawn by cities.

This study is the result of a legal dispute over the right to withdraw territory between Oregon City and CRW. As a municipal corporation, the City provides water service to residents within city limits and some areas within the UGB, but is limited in its ability to serve customers outside the UGB. CRW, a domestic water supply district organized under ORS 264, borders the City to the north, south, and east and primarily serves customers within unincorporated Clackamas County outside the UGB, as well as customers within the city limits and the UGB.



City of Oregon City
Clackamas River Water District
City of Gladstone
City of Lake Oswego
Oak Lodge Water District
Sunrise Water Authority
City of West Linn

Major Roads
Water Intake
Oregon City UGB
WTP Water Treatment Plant

N
1 inch = 6,000 feet

Oregon City - Clackamas River Water Joint Engineering Study

Figure 1
Vicinity Map

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In November of 2013, CRW and Sunrise Water Authority (SWA) approved Ordinance 03-2013 and Resolution 2013-02 respectively (collectively known as the 190 Agreement) to form the Clackamas Regional Water Supply Commission (CRWSC). CRW and SWA created the CRWSC to oversee the efficient supply of domestic water services within the two water providers' service areas. The City and South Fork Water Board (SFWB) were concerned the 190 Agreement would extend SWA boundary protection rights under ORS 450.987 as a Water Authority to CRW, thus limiting the City's right to annex and withdraw CRW territory.

In December of 2013, the City and SFWB filed an appeal to the Land Use Board of Appeals (LUBA) stating that the creation of the CRWSC infringed on the City's expansion rights and constituted material harm to the City and SFWB. This appeal led to discussions between CRW and the City regarding the goals of the CRWSC. In May 2014, a Settlement Agreement was signed by the City and CRW calling for this engineering study to provide direction for existing and future disputes.

This study is focused only on service provision dual interests between Oregon City and CRW. For the remainder of this study, areas and service providers north of the Clackamas River and west of the Willamette River will be ignored.

Dual interest Characterization

Neither party disputes the City's right to annex and withdraw CRW territory. Rather it is how prior annexations and withdrawals have occurred that is the primary driver of dual interest. The agreements for service transitions are outdated or do not address the current challenges, which has led to irregular policies and an uncertainty in long-term service provider boundaries. This uncertainty has led to CRW's reluctance to invest in areas that might soon be taken by the City, animosity over the condition of existing infrastructure in areas that are eligible for annexation, and a general short-term perspective on coordinated planning. The lack of a clear plan has at times resulted in annexation without withdrawal of territory resulting in continued uncertainty for both water providers related to long-term service requirements. All compiled, this has meant customers of both providers have seen failing infrastructure, frequent road repairs, higher costs, and a lack of clarity regarding long term service. As annexations and withdrawals are becoming more and more frequent, and in order to efficiently and effectively plan for the long-term service to all customers in the area, the parties concluded that a formalized process should be developed that is acceptable to both water providers.

Remuneration for Assets

Typically, urbanization and city expansion occurs where there is no existing public water service provider. However, CRW already provides water service to much of the semi-urban area surrounding the City. When the City expands service into these area, existing CRW infrastructure, often with remaining useful life, might be present, however the infrastructure may be inadequate by City standards. This creates a potential source of dual interest between the two water providers associated with:

- CRW's willingness to invest in the renewal or replacement of aging infrastructure that may ultimately be withdrawn by the City;

- The City's desire to efficiently transfer service to City rate payers without constructing redundant facilities; and

- Identification of critical infrastructure that must remain within CRW's ownership for continued water service to CRW customers.

In order to address these sources of dual interest, both water providers have acknowledged the need to develop a fair and objective remuneration policy that encourages coordinated planning and equitable, long-term focused investment in infrastructure development and renewal.

Reduce Isolated CRW Service Areas

When newly annexed areas are inconsistently withdrawn, isolated pockets of CRW customers are created within City service area. To supply these customers, either parallel and redundant infrastructure must be constructed and maintained, or the City must wheel water through their infrastructure to supply CRW infrastructure and customers. Traditionally, the latter has been chosen and facilitated in two ways – as a master meter connection or as Joint Users. These two mechanisms are detailed below:

- Master Meters: Master meters cleanly divide two systems and retain infrastructure maintenance responsibility with the system paying for the water by recording the totalized flow through a single supply point. They can supply entire pressure zones or a limited area such as a single road. Typically, master meters are used in areas that are not predicted to transition soon, or where a significant number of customers are served in the receiving system.

- Joint Users: Joint users are CRW customers that are supplied through City, CRW, or jointly owned infrastructure without an intervening master meter. Joint Users are not ideal in that the supplying system must take on a significant amount of risk if the receiving system does not adequately maintain its pipes but certain conditions such as system looping, or a limited number of customers, prevent the use of master meters.

Master meters and Joint Users are both integral solutions to serving isolated customers. The problem arises when these short-term solutions are selected without thought to long-term service goals.

For long term service, the simplest technical solution is often annexation and withdrawal of CRW service areas. However, political motives and a reluctance to be included in city limits stalls this type of solution. The City currently has a policy (Oregon City Municipal Code 13.04.260B) to charge 1.5 times the retail rates for service to customers outside of city limits. This policy may discourage orderly transition of service in the interest of protecting the customer as Master Metered or Joint User customers currently only pay their system's nominal rate.

The inconsistent application of master meters and Joint Users, the lack of certainty regarding annexation and withdrawal of territory, and the economic consequences for both water providers and customers require the development of an approach to isolated service that can be consistently and fairly applied.

Water Service Provider Goals

The consultant team met individually with CRW and City staff to understand both providers' goals (without the influence of the other provider). The following goals that influence each water providers' definition of success in this study were identified in the discussions.

- Joint Engineering Study Goals for Both Providers
    - The City and the CRW are both committed to providing high quality potable water service to customers at reasonable rates.
    - Both providers recognize the benefits of continued collaboration to provide seamless service to dual interest area customers that may be transferred, but each also recognizes their first duty is to customers within their own long-term service areas.
    - Both providers desire certainty of long-term water service area boundaries to inform ongoing system development and renewal/replacement capital investment.
    - Both providers are amenable to wheeled water from the other purveyor's WTP in cases where a higher level of service could be provided more economically and long-term agreements are in place to support investments needed to achieve and maintain the level of service.
    - Both providers recognize the value of interconnected systems with redundant emergency supply and are committed to working together with neighboring water providers to minimize impacts on customers during emergencies as well as periods of growth and transition.
- City Specific Goals
    - The City wants to be the water service provider to existing and future annexed City residents and businesses.
    - The City is part owner of SFWB, and therefore prefers to supply the City's customers with water sourced from the SFWB WTP, thereby serving he City's ultimate service area and customers. This results in better utilization of excess capacity at the WTP, higher certainty and control of water supply, control over water supply costs, control over planning and implementation of capacity expansions, etc.

- CRW Specific Goals
    - CRW prefers to supply the district's customers with water sourced from the CRW WTP as this results in better utilization of excess capacity at the WTP, higher certainty and control of water supply, control over water supply costs, control over planning and implementation of capacity expansions, etc.

Keeping these goals in mind, existing dual interests and solutions to key areas identified during scoping will be explored in the next section.

Study Area

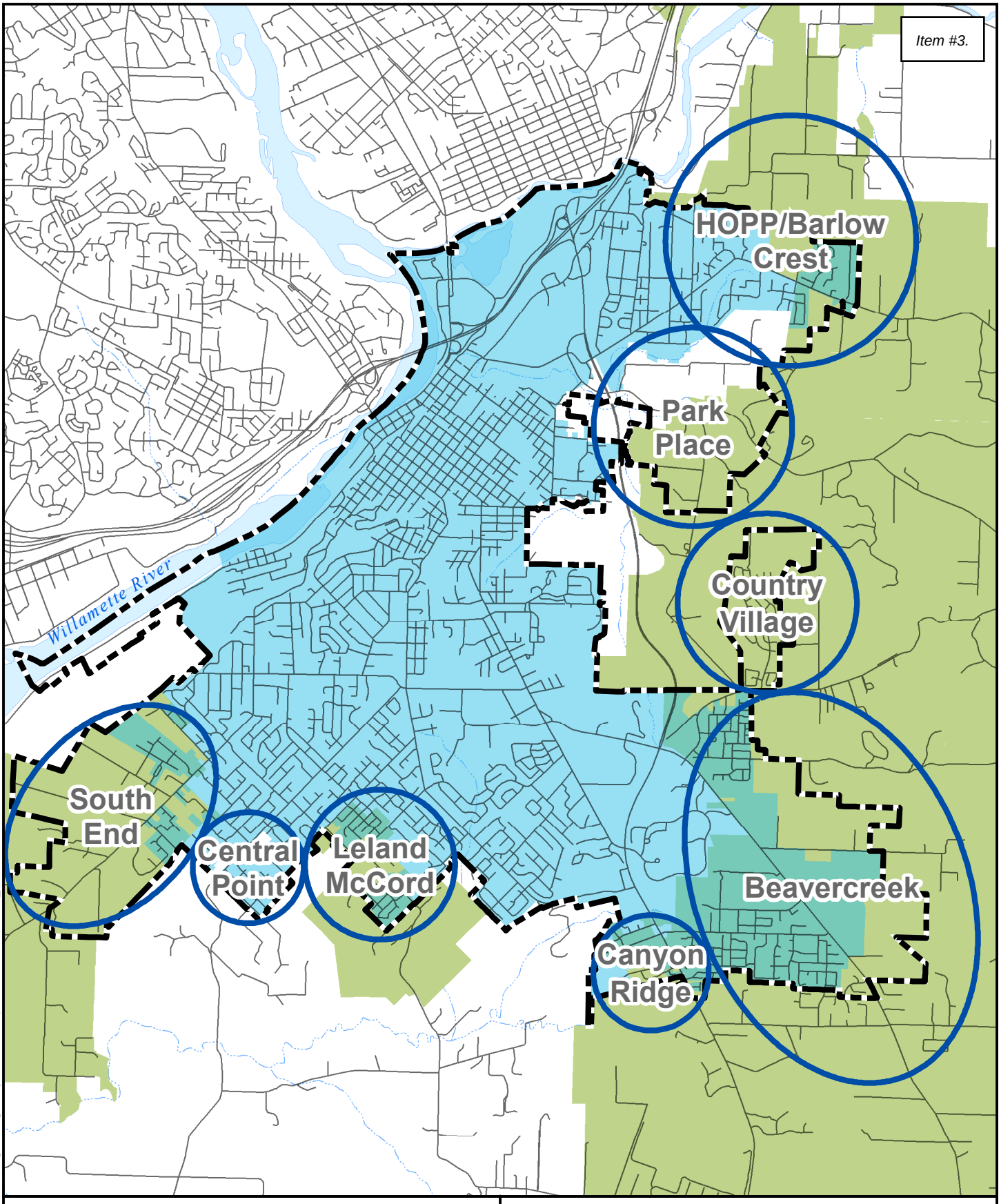
Figures 2A and 2B highlights the overall study area of this white paper and identifies the individual focus areas discussed in detail later in this section. Study dual interest areas are generally located near the Oregon City city limits or the edge of the UGB, where annexation and withdrawals occur.

Focus Areas:

- South End
- Central Point
- Canyon Ridge
- Leland McCord
- Country Village
- Beavercreek
    - Beavercreek Concept Plan
    - Fairway Downs
    - Thayer and Loder Roads
    - Henrici Ridge
    - Park Place
- HOPP/Barlow Crest

Study Area Discussion

The following section details existing conditions, dual interests, and proposed solutions for each study area. While specific solutions are unique, the general goals described in the previous section helped drive a common approach to the solution process.



Urban Growth Boundary (UGB)
Oregon City City Limits
Clackamas River Water District Boundary
Areas of Overlap
Focus Area
Road
River

N

1 inch = 4,000 feet

Oregon City - Clackamas River Water Joint Engineering Study

Figure 2A
Study Area

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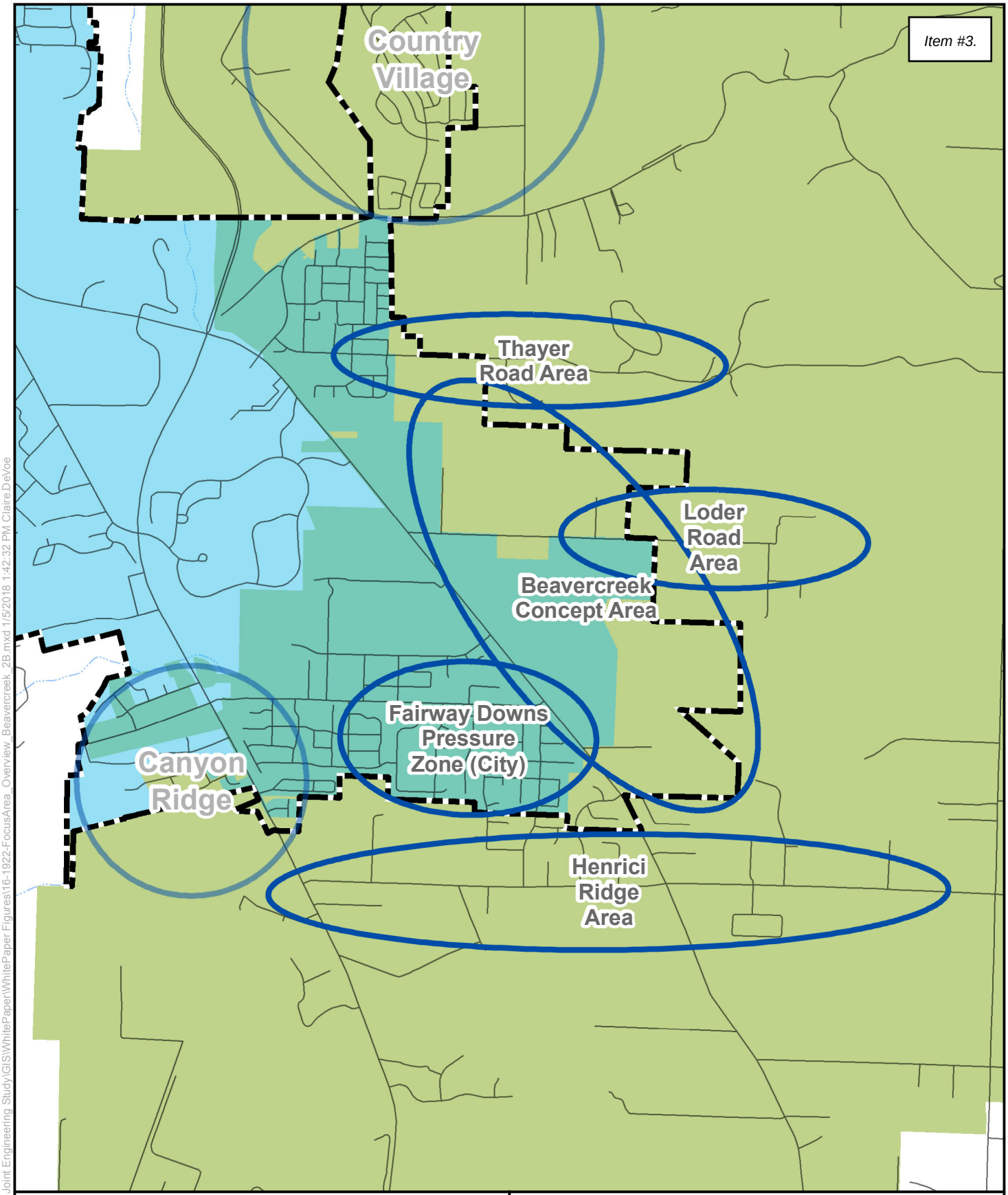

Urban Growth Boundary (UGB)
Oregon City City Limits
Clackamas River Water District Boundary
Areas of Overlap
Focus Area
Beavercreek Areas
Road
River

N

1 inch = 2,000 feet

Oregon City - Clackamas River Water Joint Engineering Study

Figure 2B
Study Area - Beavercreek

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January 2018

16-1922

Comments Regarding Mapping

The figures in this section present the existing and proposed service conditions in the focus areas. Existing infrastructure is color coded: dark blue represents City ownership, green CRW ownership, light blue joint ownership, and yellow SFWB or other ownership. Taxlots currently served by CRW are highlighted in colors representing either their existing or future service category. City taxlots have not been highlighted because there is assumed to be no change of service at the individual customer scale. Future conditions maps are only presented if deemed necessary and are intended to be used as a guide for long-term service; intermediate steps may be necessary to achieve this configuration and other alternatives may be preferred, based on actual timing and character of annexation and urban development. Finally, all mapping is limited by the accuracy of the data provided by the City and CRW. Best efforts have been made to resolve lingering inaccuracies but due to ongoing service transitions and the nature of two separate system databases, some inaccuracies are likely.

South End

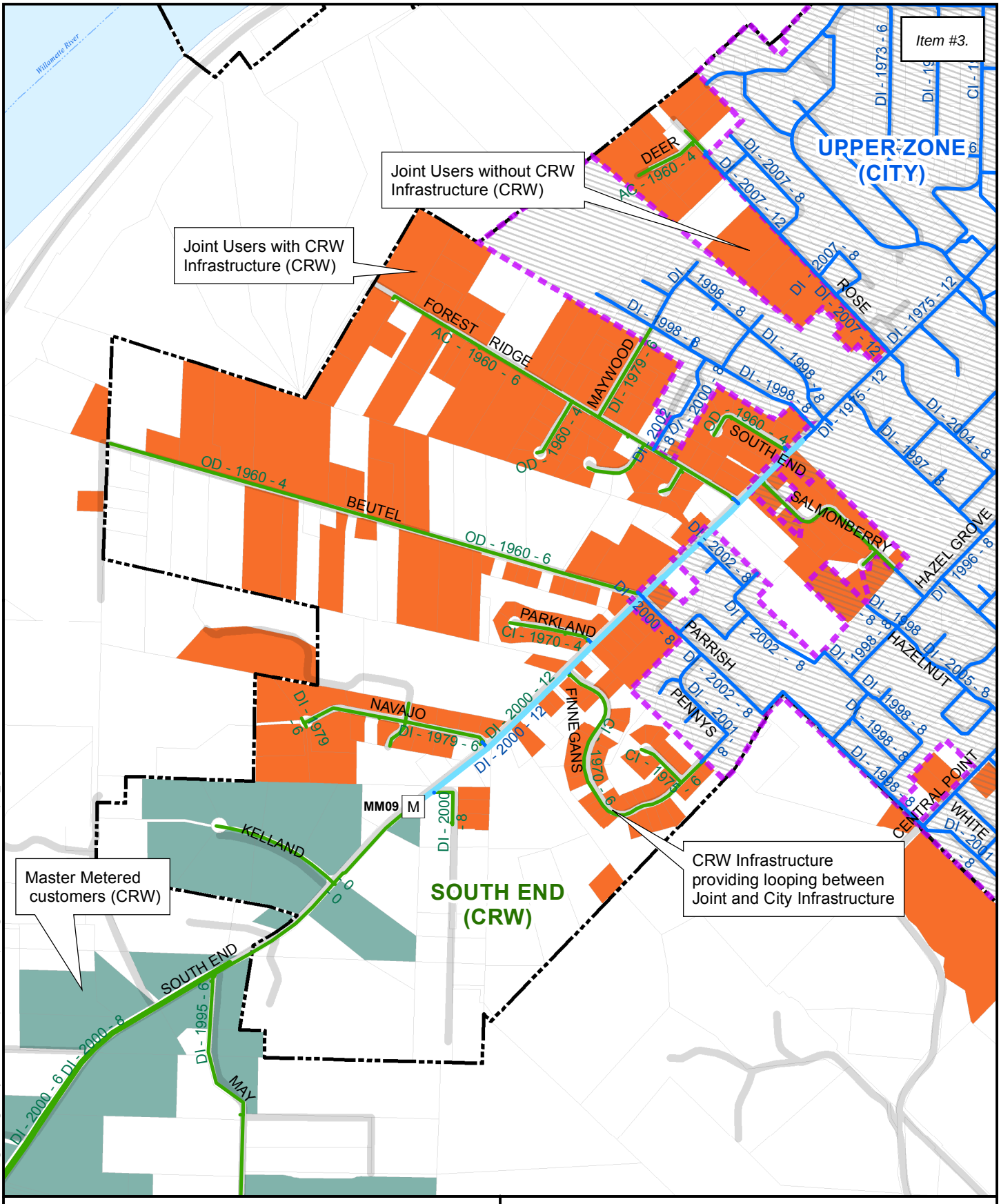
The South End Concept Area is a prime example of dual interests that arise when service transitions occur without a long-term service plan. As the City developed, the geopolitical boundary and service area expanded south into CRW service areas, effectively isolating the CRW South End Area from the rest of the CRW system. Additionally, City annexation occurred at the individual taxlot level, resulting in an inconsistent patchwork of City and CRW service areas and infrastructure. Both providers will continue to collaborate to develop a long-term solution in this area. In this study, the existing condition will be explained and key areas of agreement will be noted, but a finalized solution and transition phasing was not developed.

Most customers in the South End Area are served via a jointly-owned 12-inch diameter transmission main in South End Road and supplied with water wheeled through the City system from the SFWB WTP. CRW customers south of Impala Way are master metered, while north of Impala Way CRW and City mains are served as City customers and CRW joint users. Figure 3 presents the existing system infrastructure and service provider for taxlots currently served by CRW in the South End area.

Both providers have recognized the need for a consistent approach to service and infrastructure transitions in South End. To achieve this goal, policy-level agreements are required, including:

- A remuneration methodology and agreement for the transfer of infrastructure assets
- An updated cost-assignment for installation and maintenance of shared and interfacing (master meter) infrastructure
- A methodology and agreement of triggers for the transfer of service area
- A methodology and agreement for wheeled service (master meter or Joint User status) and development of a wheeling charge

Each of these policy level agreements will continue to appear throughout the discussions of the dual interest areas and are explained in greater detail in the Typical Dual interest/Solutions section



UGB
City Limits
Joint
CRW
City
SFWB

Current Service
Master Meter
Joint User

N

1 inch = 1,000 feet

Oregon City - Clackamas River Water Joint Engineering Study

Figure 3 - Existing South End

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(page 19 of this report). Given the complexity of the South End area water service boundary overlap and uncertainty of future development timing and character, a specific plan for service transfers and infrastructure/territory withdrawal was not developed. A general understanding that the City will ultimately annex and withdraw all territory within the UGB was agreed upon.

Resolution: Ongoing collaborative communication and planning will be required; service agreements (especially Joint User) addressing ongoing leak detection and mitigation.

Central Point

The Central Point area is an example of incomplete annexation and withdrawal. Existing infrastructure in the area is entirely City owned and CRW customers are classified as Joint User served via City mains. **Figure 4** illustrates the existing service configuration in Central Point.

Both providers agreed that given the lack of CRW infrastructure and the adjacent City service area, the City should provide service to all customers in this area. Recently, local development has been the primary driver of provider transitions, and additional efforts should be made to complete all transitions in the near future. There may be a few remaining taxlots outside the present UGB that will necessitate Joint User service, but within the UGB, all efforts should be made to withdraw these customers. One specific issue that will need to be addressed is the City's policy (Oregon City Municipal Code 13.04.260B) for water service outside the City limits. Currently, these customers pay 1.5 times the City retail rate.

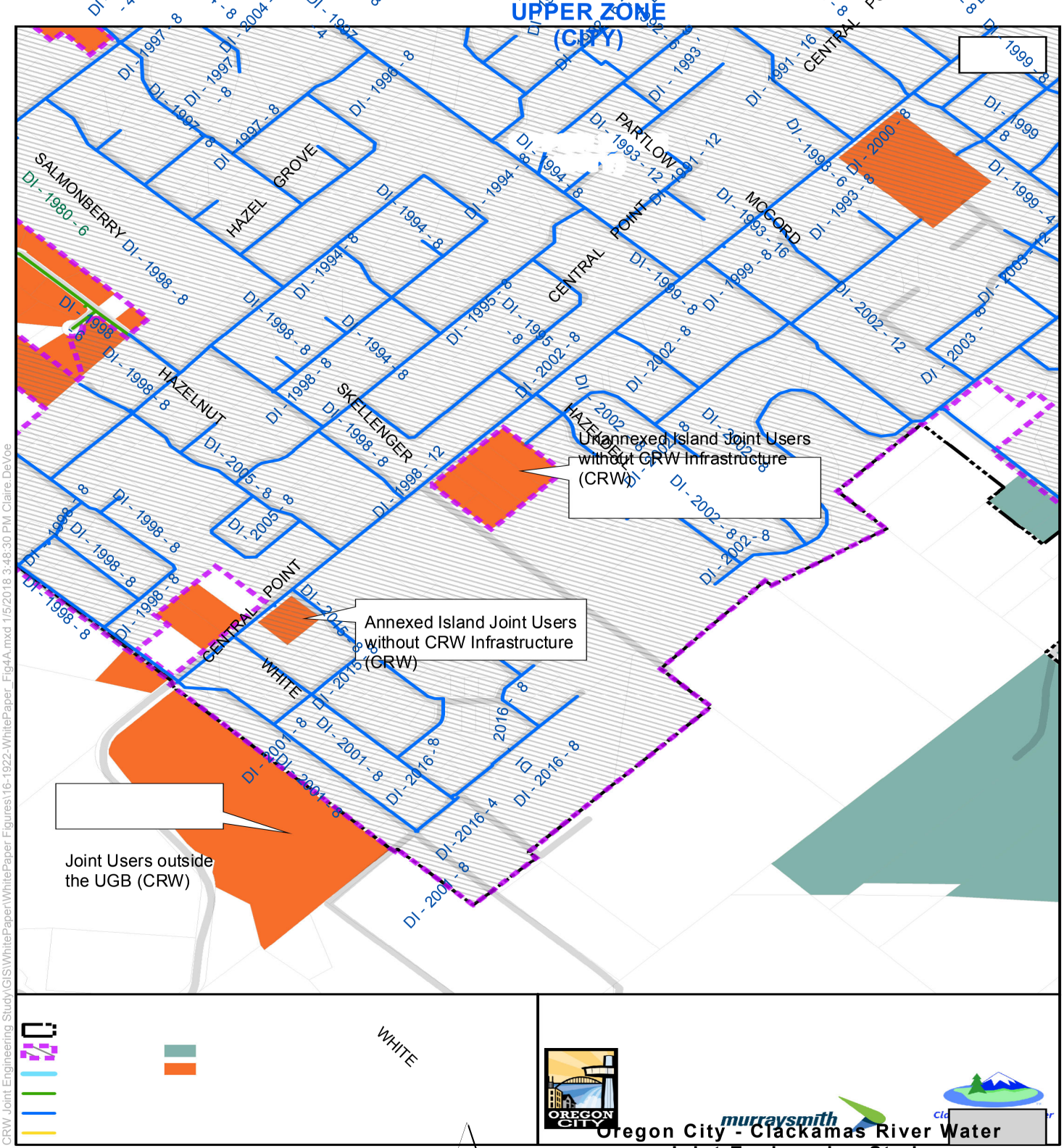
Resolution: All customers within the UGB to be withdrawn by the City; Joint Users remain outside the UGB; City to pursue current extraterritorial service policy change.

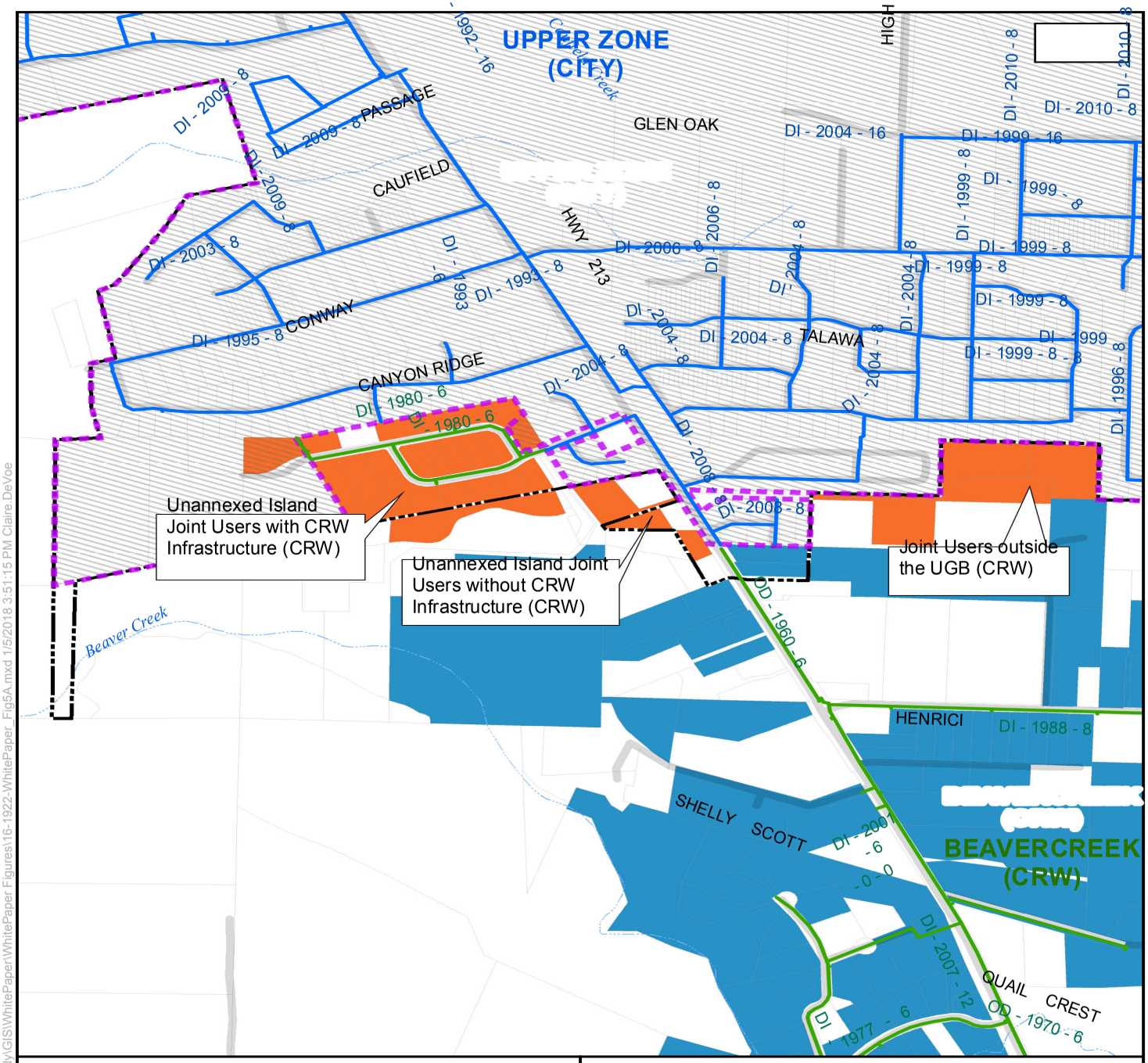
Canyon Ridge

The Canyon Ridge area is another example of a CRW service area completely reliant on City supply, although without an intervening master meter. Existing service is provided by CRW through the Joint User agreement via CRW distribution mains in Canyon Ridge Drive and City mains in Molalla Avenue. Canyon Ridge customers are primarily single family homes within the UGB and outside of city limits while others CRW customers are large lots outside the UGB. **Figure 5** shows the current service configuration in Canyon Ridge.

City development west of Canyon Ridge is expected to require looping to the CRW main in Canyon Ridge Drive. To maintain service area continuity and minimize the need for redundant infrastructure, the City should annex and withdraw all CRW customers and infrastructure within the UGB. Taxlots outside the UGB will necessarily remain CRW Joint Use customers served from City mains. East of Molalla Ave these areas are Urban Reserve while west of Molalla customers are Rural Reserve and as such cannot be considered for UGB expansion for several decades, if ever.

Resolution: City to withdraw customers and infrastructure within the UGB; Joint Users remain outside the UGB; City to pursue current extraterritorial service policy change.


UPPER ZONE
(CITY)
Unannexed Island Joint Users without CRW Infrastructure (CRW)
Annexed Island Joint Users without CRW Infrastructure (CRW)
Joint Users outside the UGB (CRW)
SALMONBERRY
HAZEL GROVE
HAZELNUT
SKELLENGER
CENTRAL POINT
PARTLOW
MCCORD
WHITE
UGB
Current Service
N
Oregon City - Clackamas River Water
Joint Engineering Study
Figure 4 - Existing



UGB

Current Service

N

Oregon City - Clackamas River Water Joint Engineering Study

Figure 5 - Existing

Leland McCord

The Leland McCord area is similar to the South End area in that supply to CRW customers is entirely dependent on water wheeled through the City system. The City supplies water to a master meter at the intersection of Leland and Meyers Road. CRW and City mains run parallel in Leland Road to just south of Kalal Court, beyond which CRW mains continue in Leland past the UGB. Additional City development and infrastructure has continued along the south-east edge of the UGB, further isolating CRW service area. Figure 6A shows the existing infrastructure and service boundaries in the Leland McCord area.

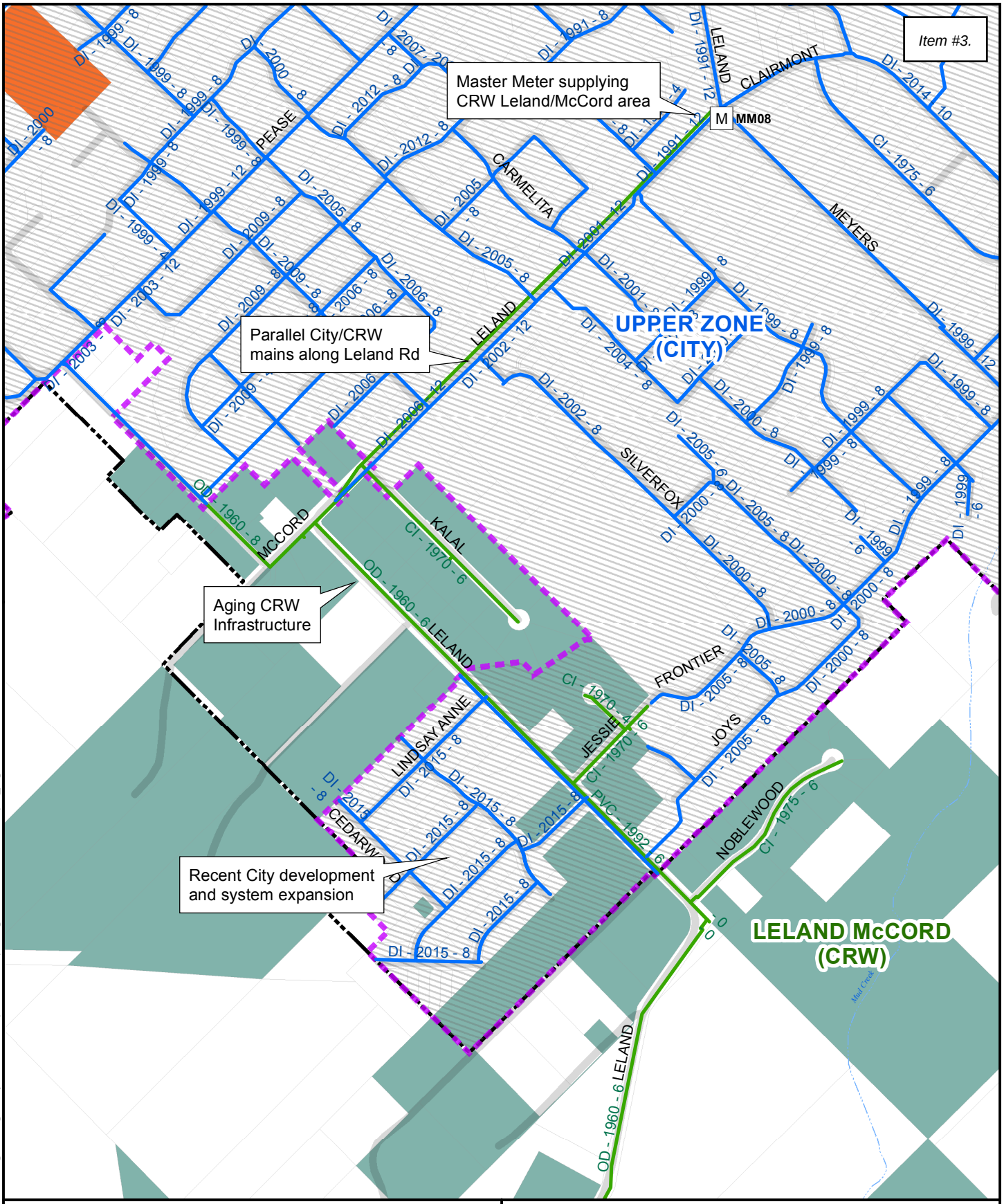
Following the logic used for South End and Central Point, the City should serve customers in the Leland McCord area within the UGB. A master meter should be installed at the UGB to serve remaining CRW customers outside the UGB from the existing CRW distribution main. Figure 6B shows the long-term resulting infrastructure and customer configuration after transfers.

Recent City development south of Jessie Ave to the UGB has extended City infrastructure to the point where looping through the CRW service areas is required and will necessitate either redundant infrastructure or infrastructure withdrawal. However, most of the CRW infrastructure is failing 1960's steel pipe which the City will not withdraw from the district. Both parties prefer to minimize the construction of unnecessary parallel infrastructure. CRW, however, is reluctant to replace the mains without guaranteed return on investment while the City is unwilling to accept the immediate risk by withdrawing the failing infrastructure. Development of a remuneration policy for infrastructure withdrawal would minimize investment in parallel infrastructure, and incentivize system renewal in dual interest areas to the benefit of both City and CRW customers.

Resolution: Continued collaboration; eventual transition to City service within UGB with development; Master meter for customers outside the UGB; City to pursue current extraterritorial service policy change; collaboration for replacement of Leland Road and McCord Road CRW mains applying the remuneration methodology.

Country Village

Country Village is unique in that it is an area served by CRW with limited drivers for development already within the UGB. The area is served by CRW from a single critical transmission main that is not eligible for City withdrawal. This CRW transmission main is the primary supply main from the CRW Holly Lane Pump Station to the CRW owned Henrici Reservoirs, feeding SFWB wholesale water to CRW's Henrici and Beavercreek pressure zones. Because the main is vital to the CRW transmission network, a redundant line would be necessary for the City to annex, withdraw, and provide service. Figure 7 illustrates the focus area, key infrastructure, and service areas.



UGB
City Limits
Joint
CRW
City
SFWB

Current Service
Master Meter
Joint User

N
1 inch = 600 feet

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Figure 6A - Existing Leland McCord

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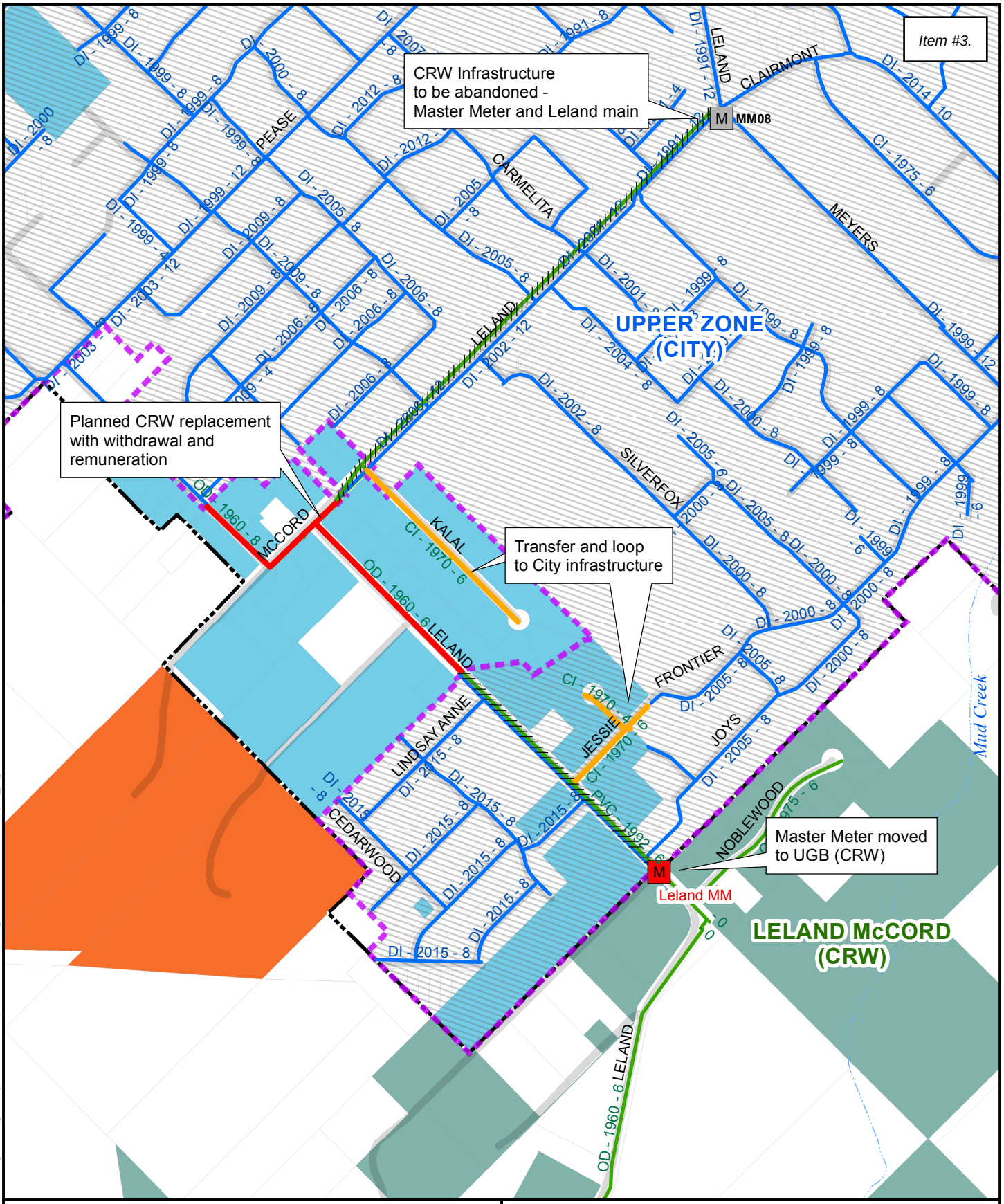

Future Service

- Master Metered
- Joint User
- City
- UGB
- City Limits

- Joint
- CRW
- City
- SFWB
- Transfer
- New Main
- Abandon

N

1 inch = 600 feet

Oregon City - Clackamas River Water Joint Engineering Study

Figure 6B - Future Leland McCord

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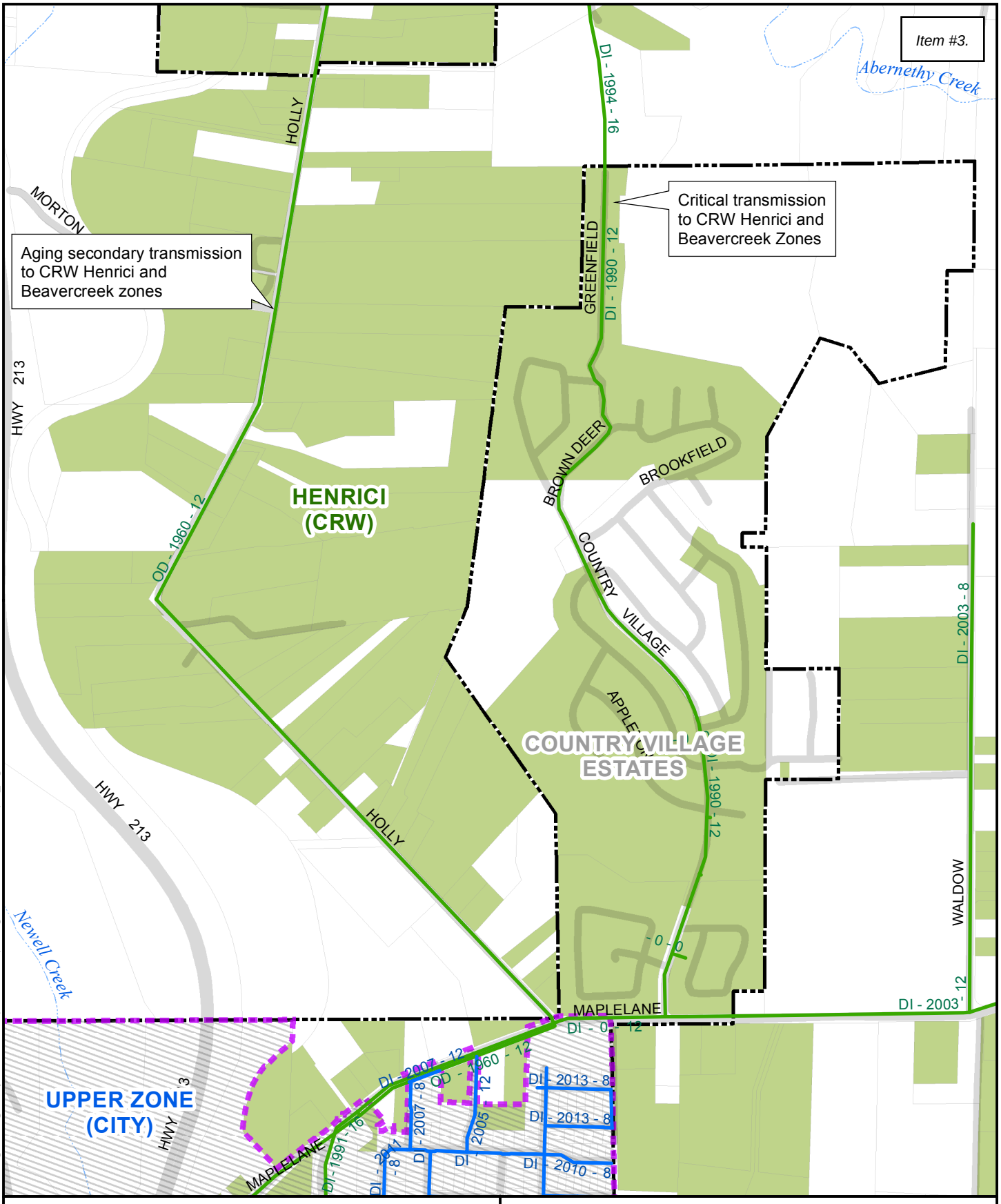

UGB
City Limits
Joint
CRW
City
SFWB

Current Service
Henrici

N

1 inch = 750 feet

Oregon City - Clackamas River Water Joint Engineering Study

Figure 7 - Existing Country Village

OREGON CITY

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Additionally, the area is not adjacent to other City service and there is minimal development expected between Country Village Estates and City service areas. Although customers are within the UGB, CRW should continue to serve existing and future customers in the area, until such a time that the City has either built out infrastructure to serve the area or redevelopment requires annexation and extension of other City services to the area.

Resolution: No change from present service arrangement.

Beavercreek and Surrounding Areas

Service to the Beavercreek area affects recommendations for both City and CRW service areas including the City's Beavercreek Concept Area, the City's Upper Zone, the City's Fairway Downs Zone, CRW's Beavercreek Zone, CRW's Henrici Zone, the Henrici Ridge Area, and the City's Park Place Concept Area. Because the Beavercreek area is so highly linked to both systems, an opportunity to minimize redundant existing and future facilities, and potentially provide additional flexibility and resiliency to both systems, is present if both providers agree to the development of jointly owned facilities.

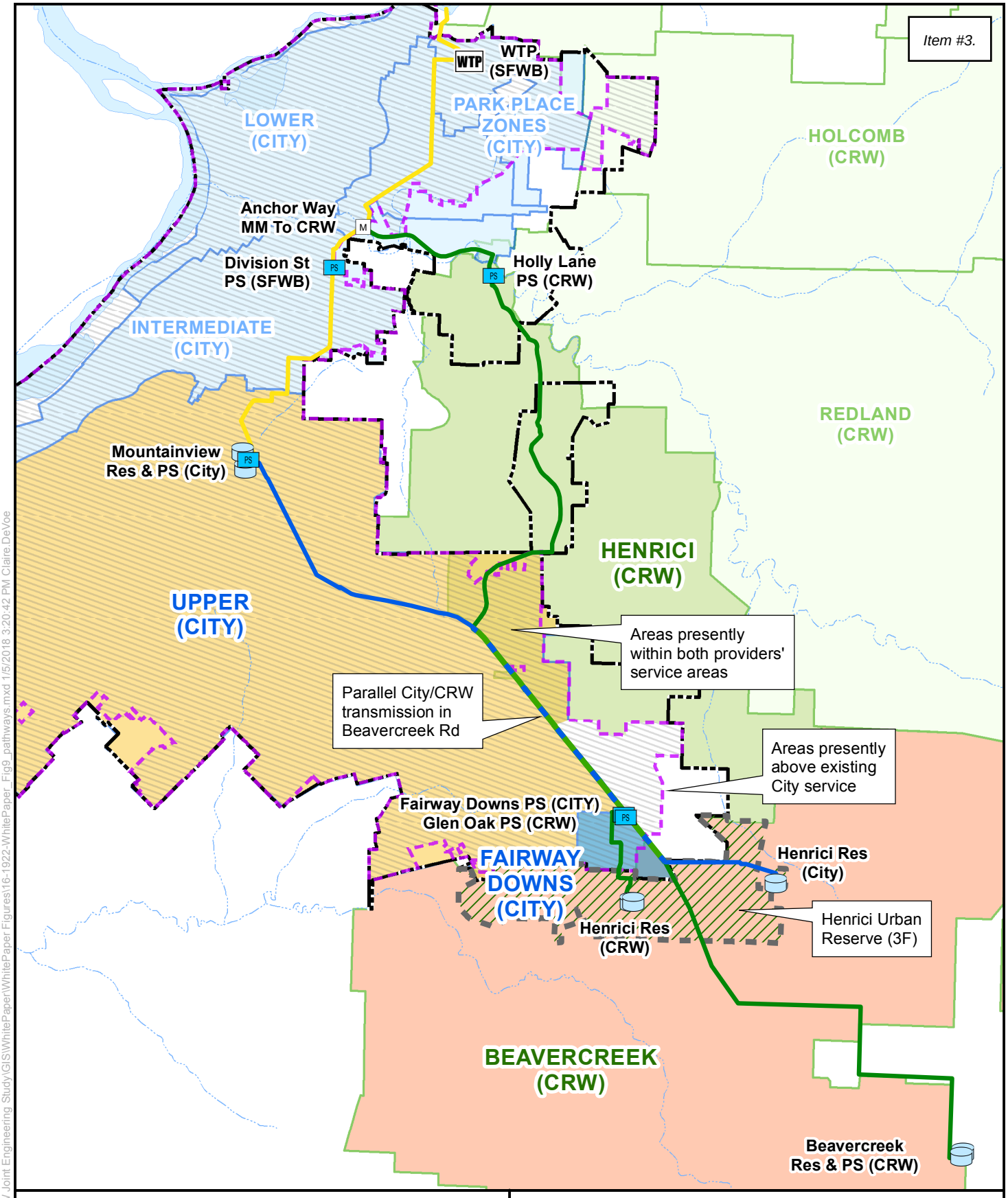
Existing Service

Currently, CRW and the City have essentially duplicate pressure zones at similar hydraulic grades serving partially redundant areas: CRW's Henrici zone (590 ft reservoir overflow) and the City's Upper zone (592 ft). The City's Upper Zone serves most of the southern part of the City within the UGB while CRW's Henrici Zone serves areas outside the UGB and provides some overlapping service along the eastern limits of the UGB.

Because of these essentially redundant zones, there are two separate pathways for water to reach an HGL of 590 ft. Within the City's system, water can be pumped from the SFWB WTP via the SFWB Division Street Pump Station to the City's Intermediate Zone (490 ft), then via the City's Mountainview Pump Station to the City's Upper Zone and City Henrici Reservoir (592 ft). Within CRW's system, water can be delivered from the SFWB WTP through the Anchor Way master meter, then pumped via the CRW Holly Lane Pump Station to the CRW Henrici Zone and CRW Henrici Reservoirs (590 ft). Two interties exist between the two systems at the 590 ft level, and could allow for supply in either direction.

Both systems also provide service to elevations requiring hydraulic grades greater than 590 ft. The City serves the closed Fairway Downs Pressure Zone (652 ft) via the Fairway Downs Pump Station. Supply to this zone is provided by the City's Upper Zone. CRW serves the Beavercreek Pressure Zone (744 ft) via the Glen Oak Pump Station. Supply to this zone is provided by CRW's Henrici Zone.

Figure 8 illustrates the configuration of existing infrastructure serving the Beavercreek area and associated service areas.



UGB
City Limits
CRW
City
SFWB
Parallel City/CRW

PRESSURE ZONES
City
CRW

N

1 inch = 3,750 feet

Oregon City - Clackamas River Water Joint Engineering Study

FIGURE 8 - EXISTING BEAVERCREEK

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Expected Development

Development is expected in the Beavercreek area, although there is uncertainty over timing and extent. Within the UGB and north of Beavercreek Road, the City's Beavercreek Concept Plan calls for a mixed-use neighborhood. This development is expected to be served primarily by the City's Upper zone, and elevations above 480-ft (approximately south of Loder Road) will require a hydraulic grade similar to the City's existing Fairway Downs zone. However, the City's existing Fairway Downs Pump Station does not have capacity for this expansion and additional investment will be required to serve this area.

Continued development is expected in the CRW service areas outside the UGB, with the added confusion of possible service area withdrawal within the development timeframe. This is especially key for the Henrici Ridge area, which is currently designated as Urban Reserve and will be among the areas next considered for UGB expansion. When that occurs, City service to the area (to be consistent with service area goals) would require an even higher hydraulic grade than the City's Fairway Downs zone.

To meet the developing needs of the Beavercreek area, additional storage and transmission facilities will be required for both the City and CRW. Both providers have independently developed alternatives for service to the area, and through extensive discussions, we have developed a shared infrastructure alternative that may be more cost effective and in-line with the providers' goals set forth earlier in this report.

Demand and Storage Characterization

Existing and buildout demands and storage capacities for applicable CRW and City service areas were calculated and are presented in Table 2. For this analysis, storage needs for the existing pressure zones serving elevations in the Beavercreek area and the pressure zones supplying these zones were evaluated. Service area transfers likely to occur were included in buildout figures. Based on these estimates, the City will need to build additional storage at the City's Upper zone elevation and CRW will require additional storage at the CRW Beavercreek zone level. A summary of key assumptions for this analysis follows:

- Since the existing City Fairway Downs zone does not have existing storage, the *Existing Average Day Demand* (ADD) of this zone is included in the City Upper zone demands for the purposes of calculating existing storage needs. This also applies to demands for the CRW areas served from master meters at South End and Leland.

- *Build-out Average Day Demand* is based on recent planning documents and future service area boundaries described in this report. A comprehensive analysis of City and CRW pressure zone boundaries and a refined estimate of build-out development needs has not been completed. This analysis is intended to provide an order of magnitude estimate of storage volume needs for the purpose of evaluating alternatives.

- *Total Available Storage* is based on the volume of storage currently serving each pressure zone. For the City's Upper Zone, the 2010 Water System Master Plan considers the full volume of the City's Mountain View Reservoir No. 1, which provides suction supply to the City's Mountain View Pump Station serving the Upper zone, to be available storage for the Upper zone. This assumption should be verified before final decisions regarding City Upper zone storage needs are made, as it could result in a change to the long-term storage need in the Upper zone.

- *Existing Storage Need* and *Build-out Storage Need* are the sum of the three components of water system storage – equalizing, fire suppression and emergency – as defined in each water provider's Water System Master Plan. These volumes are calculated based on the zone's existing and build-out demand projection.

- *Existing Available Capacity* and *Build-out Available Capacity* are calculated as the difference between the *Total Available Storage* and *Existing (or Build-out) Storage Need* for the zone. A negative value represents a capacity deficit.

Table 2
Beavercreek Area Demands and Storage Capacity

	Existing Average Day Demand (MGD)	Build-out Average Day Demand (MGD)	Total Available Storage (MG)	Existing Storage Need (MG)	Existing Storage Surplus (MG)	Build-out Storage Need (MG)	Buildout Storage Surplus (MG)
City Upper	2.9	5.5	14.5	9.1	5.4	16.5	-2.0
City Fairway Downs	--	0.6	--	--	--	1.8	-1.8
CRW Henrici	0.2	0.2	1.5	0.6	0.9	0.6	0.9
CRW Beavercreek	0.6	1.7	2.0	1.8	0.2	4.7	-2.7

Notes:

1. MG = Million Gallons; MGD = Million Gallons per Day

The individual and shared infrastructure alternatives will need to address these storage requirements to be considered viable. **Table 3** presents a summary of each alternative and planning level cost estimates for service to the Beavercreek Area. More detailed descriptions of each alternative are given in the following sections.

Table 3
Supply Alternatives to the Beavercreek Area

	City Independent Infrastructure Alternative			CRW Independent Infrastructure Alternative			Shared Infrastructure Alternative			Preliminary Buildout Cost Sharing	
	Item	Size	Total Cost[1]	Item	Size	Total Cost[2]	Item	Size	Total Cost[3]	City Cost	CRW Cost
Pump Stations	Fairway Downs Improvements		100,000	Beaver Lake	3MGD	1,700,000	New Station at the City's Henrici Site	3MGD	1,700,000	500,000	1,200,000
Reservoirs	Beavercreek	2 MG	4,000,000	Beavercreek Elevated	3.5 MG	7,000,000	Beavercreek Elevated	2x2.75 MG	11,000,000	4,000,000	7,000,000
Transmission	Fairway Downs Pump Station to New Reservoir	16-inch 10,750 lf	3,400,000	Grasle Road	12-inch 13,480 lf	3,200,000	New Pump Station to Beavercreek Reservoirs	12-inch 3,200 lf	800,000	200,000	500,000
	Total		$ 7,500,000	Total		$ 11,900,000	Total		$ 13,500,000	$ 4,700,000	$ 8,700,000
									Cost decrease:	37%	27%

Notes:

1. City costs updated from 2013 City Technical Memo
2. CRW costs updated from 2015 Backbone Project Memo
3. Unit costs for shared infrastructure solution – reservoir 2$/gal; Pipe 20$/in-lf
4. Joint costs consistent with CRW pump station cost, study unit costs
5. Cost division based on buildout demand for pump station and transmission piping, storage requirements for elevated reservoirs

The values presented are only planning level estimates and need to be verified prior to development of infrastructure designs. In particular, the capacity of existing City Upper Zone and CRW Henrici zone transmission piping to supply the expanded Beavercreek service area at build-out will need to be confirmed as additional transmission improvements to address existing deficiencies may have a significant impact on cost estimates.

A. City Service to Beavercreek Concept Area and Fairway Downs

In the Oregon City Technical Memorandum dated November 5, 2013, the City presented three options to serve the Beavercreek area within the UGB. Based on our understanding that CRW does not have excess capacity in the existing CRW Beavercreek Reservoirs, two of the three options are infeasible. The remaining option for the City would be to build a new 2 MG Beavercreek Reservoir with a 16-inch diameter transmission main and improve the existing Fairway Downs Pump Station (City Independent Infrastructure Alternative in Table 3).

Additional costs and political investment would be incurred during the land acquisition and permitting process. The City does not currently own property for a reservoir at the proper elevation. This is a significant hurdle, and should not be disregarded.

While the City has planned for service within the existing UGB, the planning does not provide adequate pressures for the Henrici Ridge area that is currently designated as Urban Reserve. If this alternative is selected, the City will need to consider capital costs for additional infrastructure to serve this higher elevation area once development occurs.

B. CRW Service to Beavercreek Pressure Zone and Fairway Downs

CRW's current planning for improved service to their Beavercreek pressure zone is part of the larger CRW Backbone Project. Overall, the project is designed to improve system connectivity and transmit water from the CRW WTP to CRW service areas south of the Clackamas River. Phase 1 of the Backbone Project is currently in various stages of design and construction and will transmit water to the Redland Reservoirs and associated pressure zone. Phase 2 would construct transmission and pumping improvements to transmit water from the Redlands Reservoirs south to the Henrici and Beavercreek pressure zones as well as north to the Holcomb pressure zone (CRW Independent Infrastructure Alternative in Table 3).

Phase 2 currently plans for service to the entire existing Beavercreek pressure zone. However, it is probable that some of this area will eventually be City territory and supplied by the City, rendering some of the Phase 2 facilities oversized and unused with remaining useful life. CRW cost estimates in Table 3 were updated similarly to City estimates, and storage capacity in the elevated tank was decreased to reflect the volume required to serve CRW customers to buildout.

C. Shared Infrastructure to Serve the Beavercreek Area

Typical of dual interests between the City and CRW, planning in the Beavercreek area has been limited by boundaries that are subject to change. It is expected that the lifespan of infrastructure built now will extend beyond the lifespan of the current UGB. Opportunity to develop shared infrastructure to serve both providers' customers and facilitate transfer of service area without construction of parallel redundant infrastructure is a goal of this study. Already, the City and CRW serve similar elevations from their Henrici Reservoirs. Emergency interties exist between the two systems and additional overlap of service and infrastructure is expected with continued development if coordination does not occur.

To optimize the use of existing infrastructure, one possible alternative would be a new pump station at the City's Henrici Reservoir to replace CRW's Glen Oak Pump Station, new transmission main along Henrici Road to increase the capacity of CRW's existing transmission to CRW's Beavercreek Reservoirs, and two new elevated tanks at the existing CRW Beavercreek Reservoir site for additional storage for both providers (Shared Infrastructure Alternative in Table 3). A PRV and meter could be installed at the existing City Fairway Downs Pump Station to supply the City's expanded Fairway Downs zone.

Benefits of Shared Infrastructure Development

Shared infrastructure will allow for greater flexibility with construction phasing, minimize the land acquisitions required, provide redundant supply pathways, reinforce emergency supply pathways

and allow for future infrastructure consolidation. Other potential benefits include minimizing operational & maintenance costs and future infrastructure renewal needs.

Given the uncertainty of development timing, shared infrastructure could be built in stages, with existing facilities providing supply until upgrades are required. The shared Beavercreek Reservoirs could be built one at a time, allowing for future demolition of the existing ground level tank to provide a site for the second elevated tank. The CRW Glen Oak Pump Station can continue to be used to supply the Beavercreek zone as is, until the new shared Henrici Pump Station is completed. When the UGB is expanded and/or CRW areas are annexed by the City, shared infrastructure would simplify the transition process because independent infrastructure service to the area would require significant parallel and costly redundant facilities throughout the area. Ultimately, with a shared solution there will be opportunity to decommission aging redundant facilities when the cost to maintain these facilities exceeds their value as backup infrastructure. This is specifically true for the City's existing Fairway Downs Pump Station, CRW's Henrici Reservoir and CRW's Glen Oak Pump Station.

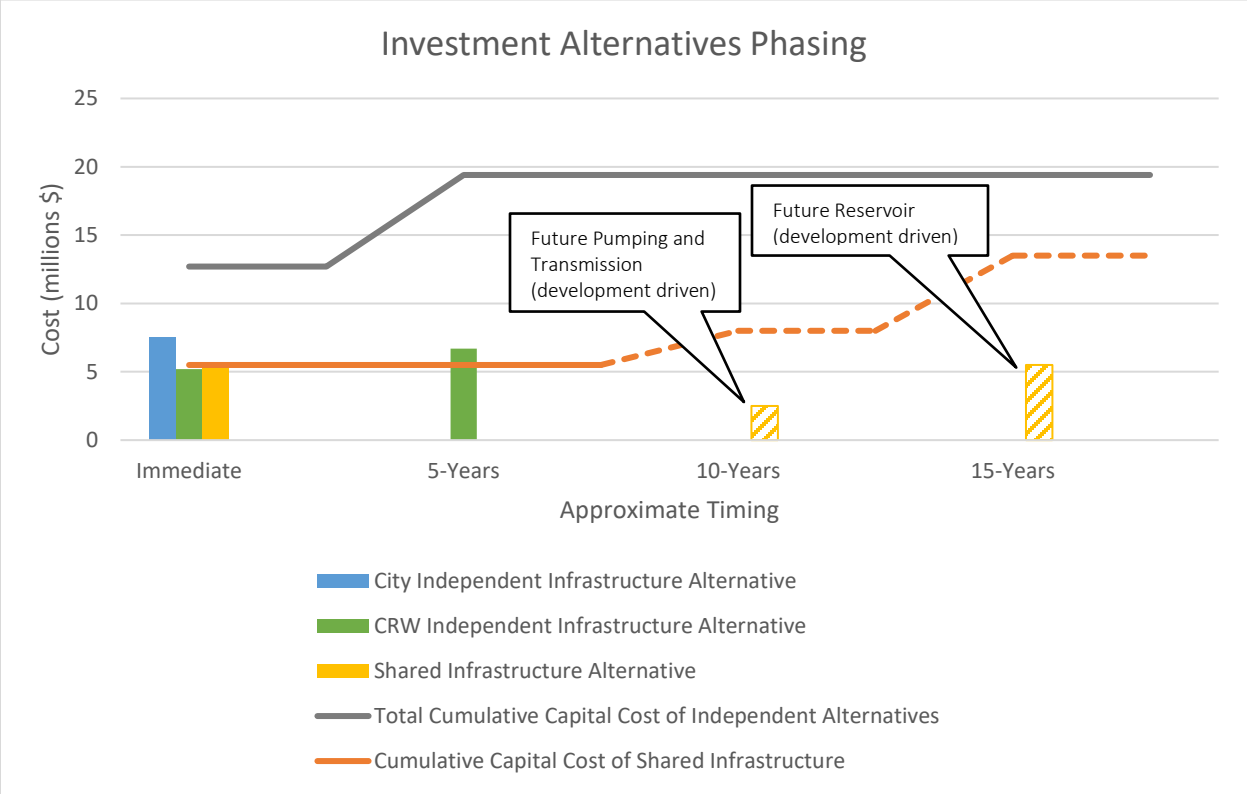
Figure 9 illustrates the capital cost over time of the individual and shared infrastructure alternatives. The shared infrastructure alternative is based on a potential phasing schedule, with the first reservoir built immediately, the transmission and pump station built in 10 years, and the second reservoir built in 15 years. These dates are conceptual to illustrate the potential phasing opportunity and are dependent on development of the City's Beavercreek concept plan area. The individual alternatives must be built within the next 5 years, if not sooner, with limited flexibility for shifts in development timing.

Utilizing existing infrastructure will minimize both monetary and political cost of additional land acquisition for new infrastructure siting. The City's Henrici Reservoir site has capacity for both a new pump station and additional reservoir, if deemed necessary in the future. CRW's Beavercreek site has capacity for at least one additional reservoir, with a second reservoir potentially able to be built at the site of the existing ground level tank.

The shared infrastructure alternative will also provide redundant pathways for service and emergency supply to the Beavercreek and Fairway Downs zones. Given recent emphasis on seismic resiliency this redundancy aligns with resiliency goals. The primary supply via the SFWB Division Street Pump Station and the City's Mountainview Pump Station have adequate supply for normal service. The secondary supply via the master meter at Redland and Anchor Way, the CRW Holly Lane Pump Station, and the emergency intertie between the City and CRW at Beavercreek provides redundancy not necessarily guaranteed in independent infrastructure alternatives.

Another benefit of a shared infrastructure alternative is the potential for continued consolidation of redundant and aging infrastructure. As the system is served today, the City and CRW have redundant pressure zones at the 590 HGL. Four tanks, (two CRW and two City-owned), serve this zone, although none of the tanks currently meet updated seismic standards and some are approaching the end of their useful lives. A shared infrastructure solution lays the groundwork for continued development of efficient infrastructure investment through partnership.

Figure 9
Infrastructure Investment Phasing Alternatives



Service Transitions in Affected Areas

Within each pressure zone, there are additional specific areas that will be affected more than others by the solutions to serve the Beavercreek Area.

Thayer and Loder Roads:

At present, CRW supplies customers along Thayer and Loder Roads via CRW distribution mains branching from the CRW transmission line along Beavercreek Road. Both mains begin within city limits and extend outside the UGB. In both cases, areas within the UGB are part of the City's Beavercreek Concept Area and should be annexed and withdrawn by the City. The City will then need to connect the existing CRW mains in each road to the City transmission main in Beavercreek Road. This will transition supply from the CRW Henrici zone to the City's Upper zone. At the UGB, master meters or Joint User status may be negotiated to supply remaining CRW customers outside the UGB.

Henrici Ridge:

Henrici Ridge is the area just south of the UGB along Henrici Road that cannot be served by the City's existing grades. As an Urban Reserve area, it is expected to eventually be annexed into the UGB and City service. If the shared infrastructure alternative is not selected, future service by the City to this area will require significant investment in parallel infrastructure.

Park Place Concept Area:

The Park Place area is located entirely within the UGB and outside of city limits. The area, currently served by CRW, is supplied from SFWB via the Redland and Anchor Way Master Meter and pumped up to higher pressures by the Holly Lane or the Redland Pump Stations (see Figure 10A). Until urban development occurs, the area should be served as is.

The 2008 Park Place Concept Plan calls for a City distribution network starting south of Ogden Middle School and connecting north to existing City distribution mains along Holcomb Boulevard. A reservoir at Holly Lane and Morton Road is proposed to provide additional storage.

Given the limited number of existing services, it is recommended that the providers plan for future City service to the entire Park Place area. CRW will need to maintain transmission from the existing Anchor Way MM through Park Place to reach CRW's Holly Lane and Redland Road Pump Stations. Some existing CRW transmission infrastructure through this area is aging and will need to be replaced. It is suggested both providers fund a shared transmission main from the master meter to Holly Lane.

Existing CRW infrastructure is critical for CRW supply from the SFWB supply at Master Meter 02 to the CRW system. As such, the only water mains that may be eligible for withdrawal and remuneration are a portion of the CRW 12-inch diameter steel main in Holly Lane, extending south from CRW's Holly Lane Pump Station to the UGB, and a CRW 12-inch diameter ductile iron main in Donovan Road that serves the middle school. The possible shared improvement along Redland Ave would require relocating the Anchor Way Master Meter to Holly Lane (which would become a City to CRW master meter) and would replace aging infrastructure and serve the common needs of both utilities – water transmission backbone piping in Redland Road between Anchor Way and the UGB.

Figure 10B illustrates the proposed future service area and infrastructure withdrawals.

In order to accommodate the phased development of the Park Place area, the City should develop a detailed Park Place water service master plan to include:

- Confirmed siting, configuration, and capacity of future storage identified as the proposed Holly Lane Reservoir
- Confirmed water main sizing and backbone transmission facilities to serve the Lower Park Place pressure zone, including SFWB transmission main connections and pressure reduced supply from the Intermediate Park Place pressure zone

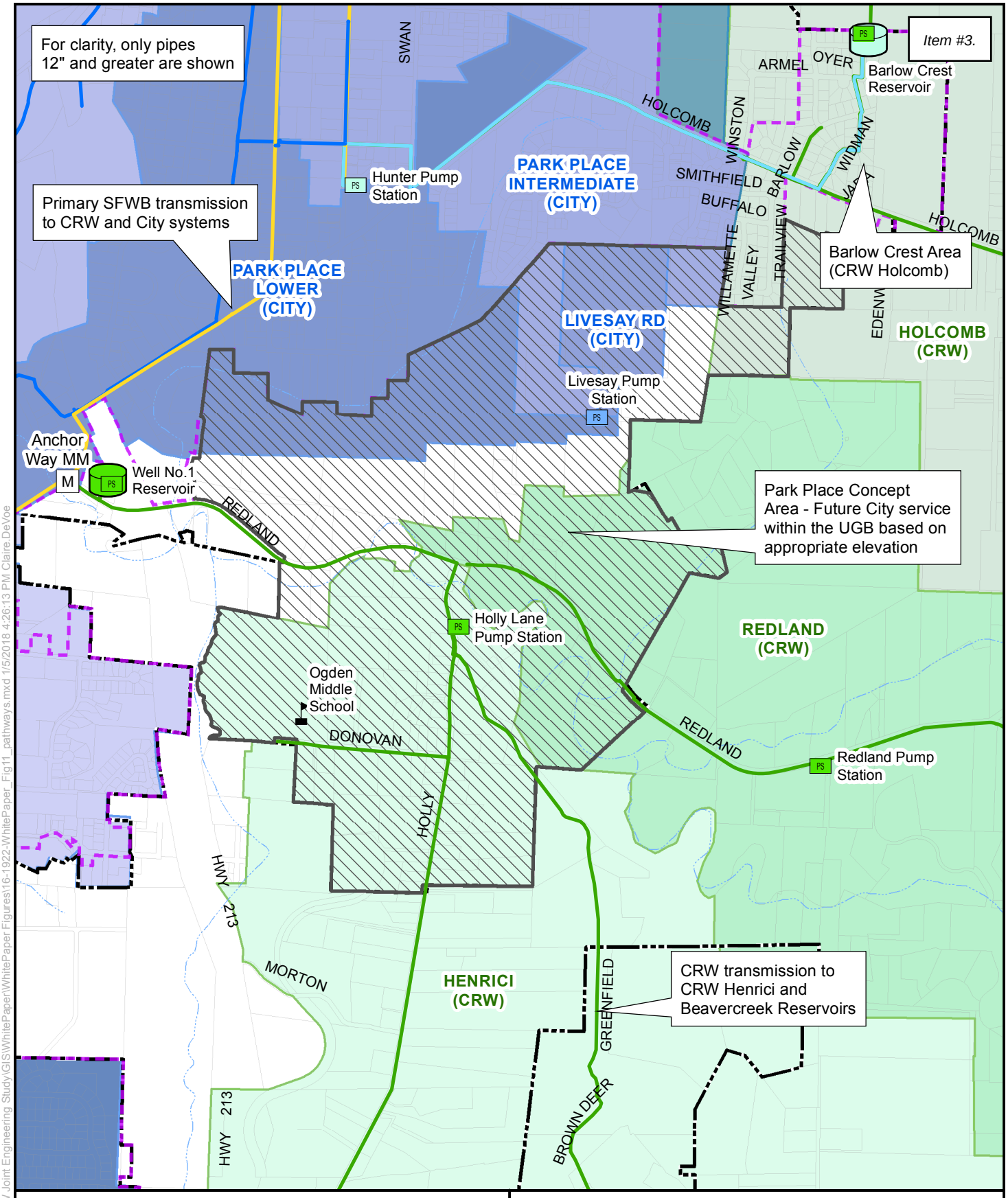


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FIGURE 10A - EXISTING PARK PLACE

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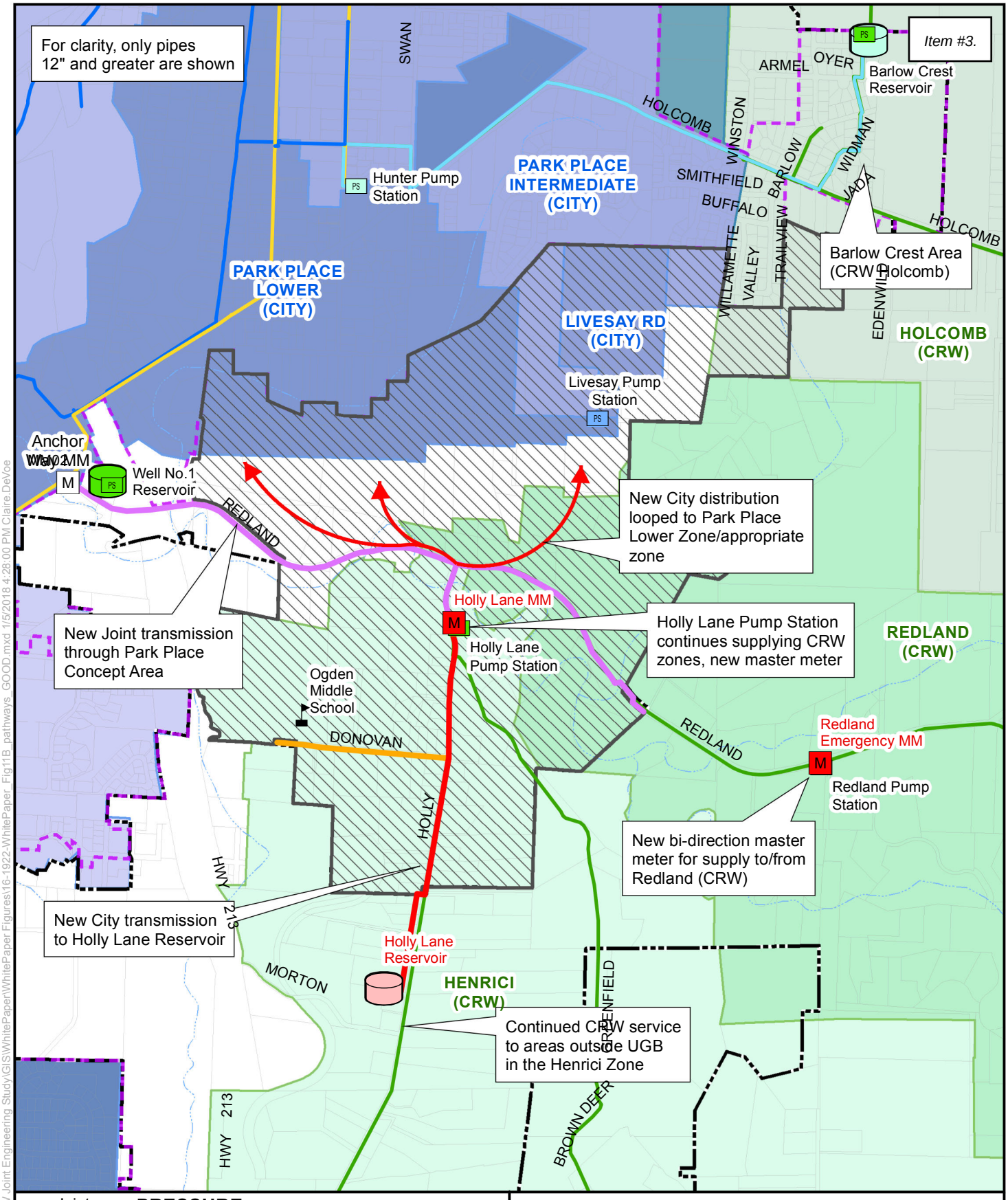

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FIGURE 10B - FUTURE PARK PLACE

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- Coordination with CRW to determine if new shared transmission in Redland Road is feasible and to determine if potential withdrawal of mains between Holly Lane and the UGB is feasible and desirable.

These studies will inform how infrastructure develops in the near-term and will support CRW development of additional infrastructure to provide limited service until annexation and withdrawal occurs with the full development of the City water system facilities to provide service.

Resolution: Continued discussions regarding shared storage and transmission infrastructure in the Beavercreek and Park Place areas; Partial developer driven transfers and potential master meter relocation to the UGB

HOPP/Barlow Crest

The Holcomb-Outlook-Park Place focus area includes the CRW Holcomb-Barlow master metered zone, the CRW Holcomb pressure zone, and City service areas near Holcomb Road. Existing service to the HOPP area was set up under the 1998 HOPP Agreement which terminates in the year 2028, and includes jointly owned facilities and transmission mains. Presently, the SFWB WTP is the sole water supplier to the area. **Figure 11** illustrates the focus area, critical facilities, and customer designations.

North of the City, the CRW Holcomb-Barlow zone is served via multiple master meters from the City's Park Place Intermediate zone. This area is not expected to develop in the near future and should continue to be served as is via master metering.

Similarly, within the existing City service area, City customers should continue to be served without change.

The main point of dual interest in the HOPP area is the CRW/City interface at Barlow Crest. The CRW Holcomb pressure zone (797-ft HGL) is currently supplied with SFWB sourced water wheeled through jointly funded infrastructure from the SFWB WTP to the jointly owned Barlow Crest Reservoir (549-ft overflow). The CRW Barlow Crest Pump Station pumps from the jointly owned Barlow Crest Reservoir to the CRW Hunter Heights Reservoirs (797-ft overflow) which provide gravity supply to the CRW Holcomb pressure zone.

Much of the CRW Holcomb zone located within the UGB has been annexed into the city limits. However, the City does not have the existing infrastructure to provide service to this area as the Barlow Crest Pump Station is an essential facility for CRW's supply to the Hunter Heights Reservoir which serves CRW's Holcomb pressure zone both inside and outside the UGB.

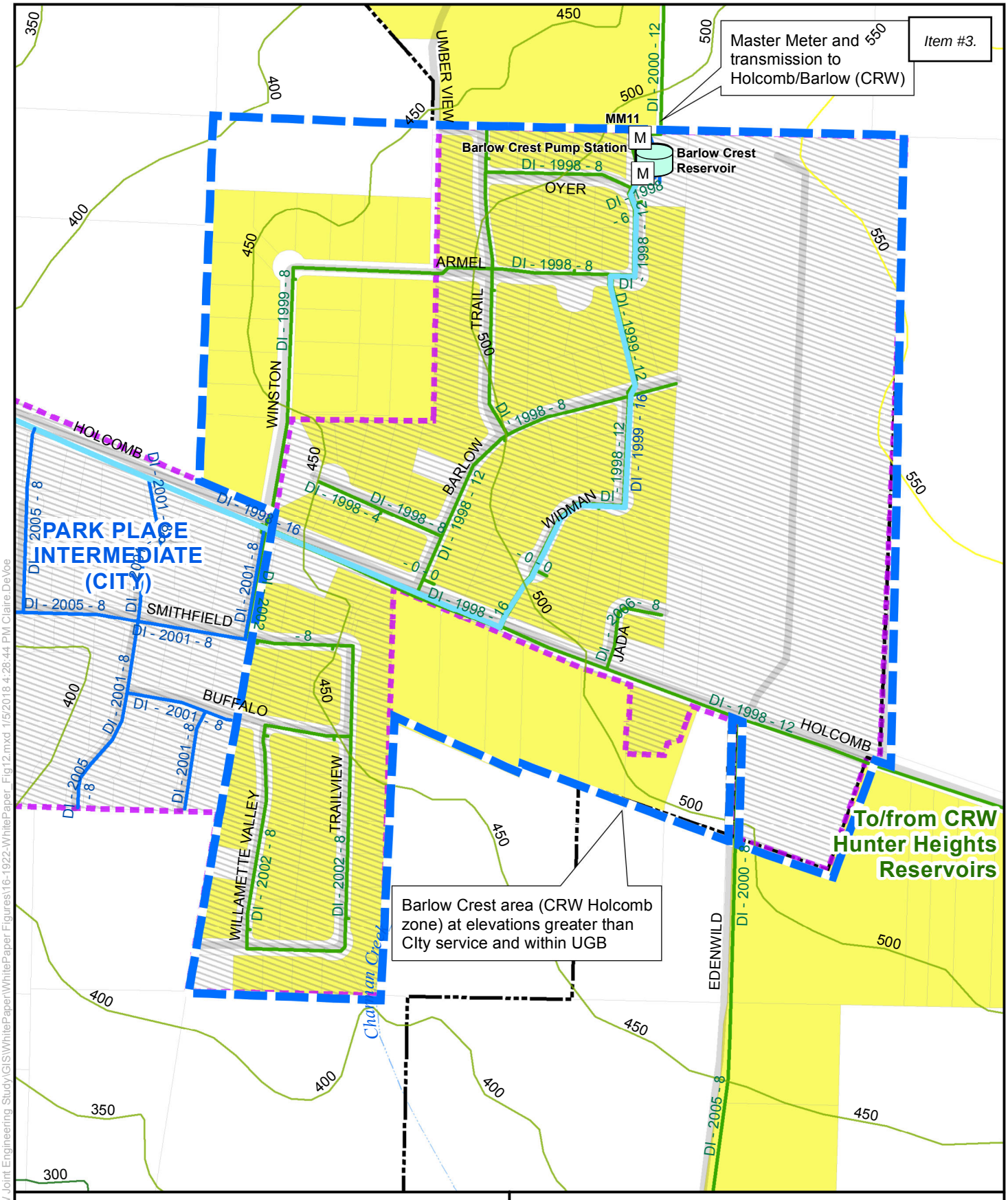

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Figure 11
HOPP/Barlow Crest

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Additionally, the CRW Backbone Project Phase 2 is proposed to include a new pump station and transmission facilities to boost water from the CRW Redland pressure zone to the Holcomb pressure zone/Hunter Heights Reservoir. This will provide a second supply route and water source to the Barlow Crest pressure zone. These improvements will allow CRW to supply the Holcomb zone from CRW's WTP.

Given the current understanding of the CRW Backbone Project, existing infrastructure, and the goals outlined in this white paper, there are two alternatives to consider:

A) Continued service as is, recognizing the City will continue to annex the land within the UGB but will not withdraw the territory from CRW. CRW would remain the service provider for the entire Holcomb pressure zone area inside and outside the UGB serving customers above an elevation of approximately 450 feet. The Phase 2 Backbone Project improvements would provide a second feed to the Holcomb pressure zone, allowing for a second source, the CRW WTP, to supply this area. The primary advantage of this option is that infrastructure and master meters are already in place to continue service as is for areas above an elevation of 450 feet. The primary disadvantage is that this alternative is not consistent with the goal of City service within the UGB, where feasible.

B) The City continues to annex and withdraw territory within the UGB and the associated distribution piping. An additional master meter would be installed at the UGB to deduct City supplied Holcomb pressure zone demand from the total supply from the CRW's Barlow Crest Pump Station. If improvements identified in the Phase 2 Backbone Project area constructed, future supply could be provided by CRW from either the CRW Barlow Crest Pump Station or the future CRW Bradley Road Pump Station with master metering to totalize the demand of the City area in the joint Holcomb pressure zone inside the UGB. This option would most effectively meet the goal of aligning service area boundaries with associated geo-political boundaries. However, it creates a complicated master metering and water wheeling arrangement.

Alternative A is recommended as it does not require the construction of additional master metering infrastructure, and minimizes disruption to existing rate payers. It is also compatible with the CRW Backbone Project as all water supply impacts are to CRW customers only.

In order to facilitate City management of sewer service, including the ability to take action in the event of non-payment by a customer, an agreement between the two agencies should be developed similar to the existing agreement between CRW and the City of Milwaukie.

Resolution: No change from the existing condition; development of a billing and customer shut off agreement

Typical Dual interests/Solutions

This section outlines proposed policy-level criteria for service area and infrastructure transfer.

Annexation and Withdrawal

Areas under consideration for withdrawal should meet the following criteria:

- Located within the UGB. Areas located within city limits should be given highest priority for withdrawal from the district, if possible.
- Adjacent to existing city limits. Priority should be given to CRW areas surrounded by City service area.
- Priority should be given to areas currently receiving additional City services such as sewer, etc.

The City and CRW will need to collaborate for the development of a plan and typical procedure for implementing service transfers once areas have been identified for withdrawal.

Infrastructure Remuneration

A remuneration policy should be developed to encourage proper maintenance and replacement of aging infrastructure and to encourage sizing to meet long-term needs regardless of the future water service provider ownership. The economic analysis was completed as part of this project and addresses the specific financial elements and further detail the parameters of the policy.

Master Meters and Joint Users

Master meters are required when water is supplied through wheeling and meets one or more of the following criteria:

- The service area crosses the UGB at which point a meter would be placed at the UGB
- The total length of pipe past the meter is greater than 1,000 lf
- The service area is not predicted to be withdrawn by the other provider in the near future.

Master meters are preferable to joint user customers when infrastructure reliability is questionable, proven through leak history and/or obsolete pipe material.

Joint User Customers should only be allowed where:

- The provider whose service boundary they reside within cannot supply the customer with water from their infrastructure
- AND the number of customers does not warrant the cost of a master meter

In these limited cases, Joint User is the only way to reasonably serve these customers. As an example, customers outside the UGB and served via private service lines off City mains (located within the UGB) must be Joint User because there is no justification for the City to extend service beyond the UGB.

In addition, a formal supply agreement between CRW and SFWB should be developed to address ongoing master metered supply to CRW.

Jointly Developed Infrastructure

Jointly developed infrastructure should continue to be encouraged where applicable to minimize redundant facilities and encourage future collaboration.

Summary of Customer and Infrastructure Withdrawal Potential

Table 4 illustrates the maximum number of the existing customers and length of water main infrastructure in each focus area, potentially eligible for withdrawal by the City from CRW if the recommendations and agreed strategies presented in the study area are executed. These areas are illustrated graphically in Figure 12. Table 5 summarizes the total number of customers and the share of CRW's south system demand that could be withdrawn through this process.

Additional Action Items

The following action items will require additional study and are recommended to conclude the dual interest resolution process. It is suggested that all action items will be completed within a year of this study, although certain items are dependent on the completion of others.

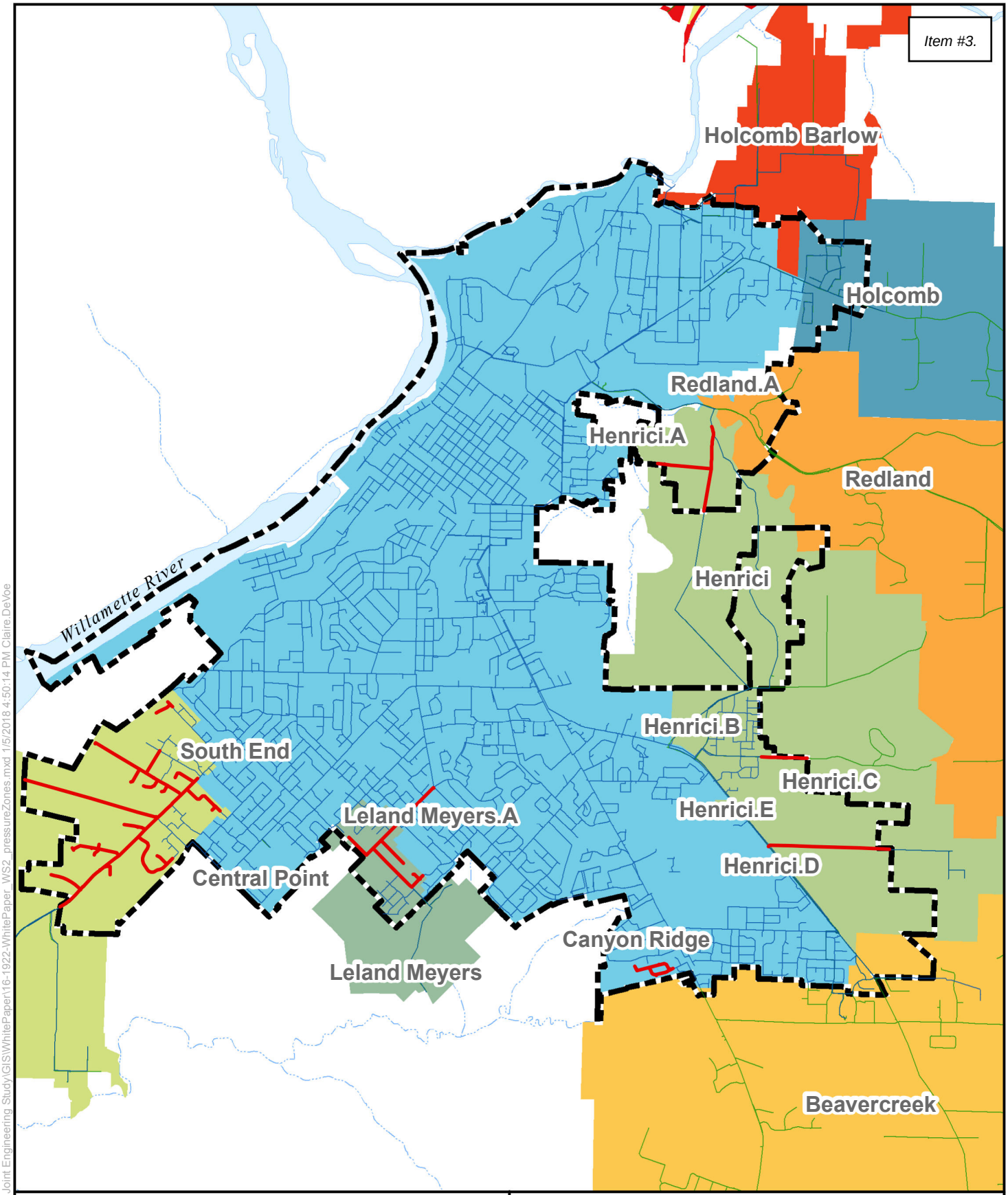
- Adopt a Remuneration Policy as outlines in the Remuneration Methodology TM (FCS Group, 2018).
- Adopt an updated, stand-alone Joint User Agreement
- Perform and adopt the findings of a Wheeling Charge Study to determine fair City and CRW rates for Joint User or Master Metered customers based on a defensible methodology such as cost of service
- Develop a water supply agreement for supply from SFWB to CRW
- Develop process for systematic transitions of service with communication to customers

Throughout this process, certain areas have been identified where mapping of service provider transition has not been completed. A common mapping convention and agreed schedule for updates should be coordinated, to include:

- Consistent and agreed upon Joint User properties
- Accurate service area boundaries
- Shared GIS data that avoids duplication by mapping of the other provider's infrastructure

Summary

As urban areas expand, boundary disputes as typified by the dual interests between Oregon City and Clackamas River Water become ever more common. The two water providers have a long history of working together to develop creative solutions to address the unique challenges they face. Formalizing this process in a common framework, rather than a rigid set of specific solutions, ensures common goals lead the process, and not individual opinions or short term changes in priorities. Developing methodologies and strategies that adapt to unique situations is more important for long-term cooperation and dual interest resolution. It is the goal of this study to provide a framework for Oregon City and Clackamas River Water to continue to efficiently provide high quality water to current and future customers for years to come, and minimizes conflict or misunderstanding.



Urban Growth Boundary (UGB)
City of Oregon City
Clackamas River Water District
Water Mains
Potential Transfers
River

N

1 inch = 4,000 feet

Oregon City - Clackamas River Water Joint Engineering Study

Figure 12 - Potential Customer & Infrastructure Transfers

OREGON CITY

murraysmith

G:\PDX_Projects\161922 - OC CRW Joint Engineering Study\GIS\WhitePaper\16-1922-WhitePaper_WS2_pressureZones.mxd 1/5/2018 4:50:14 PM Claire.DeVoe

January 2018

16-1922

Table 4
Summary of Dual interest Areas by CRW Pressure Zone

Dual interest Area	HGL	Description	Potential Customer Transfers	CRW South Customer Count	CRW South Infrastructure Transfer (lf)
Holcomb-Barlow	549	Master metered from OC Park Place Intermediate Zone (Barlow Crest Res.)	No change	72	
Holcomb	797	Master metered from Barlow Crest Pump Station	No change	726	
Hunter Heights	910	Pumped up from CRW Holcomb	No change	70	
Redland	697	Master metered from Anchor Way and pumped via Redland PS		1082	
Redland.A			Development triggered transfers within Park Place Concept Area	8	
Henrici	590	Master metered from Anchor Way and pumped via Holly Lane PS		262	
Henrici.A			Development triggered transfers within Park Place Concept Area	46	2600’ 12" 1960 OD; 1650’ 12" 2004 DI
Henrici.B			Transfers within expanding development north of Thayer Road	14	
Henrici.C			Customer transfers along Thayer Road within UGB	7	1400’ 12" 2003 DI
Henrici.D			Customer transfers along Loder Road within UGB	21	3700’ 8" 1988 DI
Henrici.E			Additional Henrici Pressure Zone potential transfers	6	
Beavercreek	744	Pumped from CRW Henrici via Glen Oak PS	No change	1389	
Canyon Ridge	592	Joint Users supplied directly from OC Upper Zone		8	

Dual interest Area	HGL	Description	Potential Customer Transfers	CRW South Customer Count	CRW South Infrastructure Transfer (lf)
Canyon Ridge.A			Customer transfers within UGB	21	2200’ 6" 1980 DI
Leland Meyers	592	Master metered from OC Upper Zone		33	
Leland Meyers.A			Customer transfers within UGB	59	1650’ 6" 1960 OD; 3650’ 8" 1960 OD; 250’ 4" CI 1970; 1450’ 6" 1970 CI
Central Point	592	Joint Users supplied directly from OC Upper Zone		2	
Central Point.A			Joint User customer transfer within UGB	9	
South End	592	Master metered and Joint Users supplied directly from OC Upper Zone	TBD based on future development potential	334*	3500' 4-6'' 1960 AC; 5500' 4-6'' 1960 OD; 1000' 8'' 1966 DI; 4000' 4-6'' 1970's CI; 4050' 6'' 1980's DI; 650' 8'' 2000 DI; 6050' 12'' 2001 DI**

*Total CRW South End customer count within the UGB

**4100 lf of water main constructed as a joint project with a cost sharing agreement

Table 5
Summary of Potential Transfers

	Customer Count	Existing Water Mains (lf)	Existing Reimbursable Water Wains (lf)	2016 Demand (gpd)	Percent of Demand
Total CRW-South	4,170	679,000		1,212,250	100%
Possible Transfers Excluding South End	190	18,500	6,750	48,500	4%
South End Transfers	330	24,750	6,750	83,500	7%
Total Possible Transfers	530	43,250	13,500	131,750	11%
Remaining CRW within UGB	210	14,500		141,750	12%

APPENDIX E
TABLE 10.1B SOUTH STORAGE CAPACITY SUMMARY (1.5% GROWTH FORECAST), CRW

Table 101.A -Revised

Revised - 2/16/2017

North Storage Capacity Summary (1.5% growth forecast)

152nd Reservoir Storage Reduced from 5mg to 4mg

Site	Year	EDU's	ADD	MDD	Largest Fire Flow	Reservoir Storage Calculations			Required Storage	Available Storage	Existing Storage (Deficit) or Surplus
						Equalization	Fire storage	Emergency Storage			
Otty	2015		1.59	3.02	5,000	0.76	1.20	3.18	5.14	6.54	1.41
	2020		1.69	3.21	5,000	0.80	1.20	3.20	5.20	6.54	1.34
	2025		1.82	3.46	5,000	0.87	1.20	3.64	5.71	6.54	0.84
	2030		1.96	3.73	5,000	0.93	1.20	3.92	6.05	6.54	0.49
	2035		2.11	4.02	5,000	1.01	1.20	4.22	6.43	6.54	0.12
	2054		2.81	5.34	5,000	1.34	1.20	5.62	8.16	6.54	-1.62
Mather	2015		2.25	4.28	5,000	1.07	1.20	4.50	6.77	10	3.23
	2020		2.39	4.54	5,000	1.14	1.20	4.78	7.12	10	2.89
	2025		2.58	4.89	5,000	1.22	1.20	5.16	7.58	10	2.42
	2030		2.78	5.27	5,000	1.32	1.20	5.56	8.08	10	1.92
	2035		2.99	5.68	5,000	1.42	1.20	5.98	8.60	10	1.40
	2054		3.98	7.56	5,000	1.89	1.20	7.96	11.05	10	-1.05
152nd Windswept HWY 224/Carver	2016		0.13	0.25	5,000	0.06	0.00	0.26	0.32	4	3.68
	2019		0.15	0.29	5,000	0.07	0.00	0.3	0.37	4	3.63
	2024		0.17	0.32	5,000	0.08	0.00	0.34	0.42	4	3.58
	2029		0.19	0.36	5,000	0.09	0.00	0.38	0.47	4	3.53
	2034		0.21	0.39	5,000	0.10	0.00	0.42	0.52	4	3.48
	2054		0.21	0.39	5,000	0.10	0.00	0.42	0.52	4	3.48
Mather & 152nd Storage Combined	2015/16								7.09	14	6.91
	2019								7.49	14	6.51
	2024								8.00	14	6.00
	2029								8.55	14	5.45
	2034								9.12	14	4.88
	2054								11.57	14	2.43

Note 1. Equalization storage - 25 percent of maximum (peak) day demand (MDD)

Note 2. Fire Storage - Largest fire flow demand for each service level multiplied by the duration of that flow. See Table B105.2 Minimum Required Fire-flow and Flow Duration for Buildings

Note 3. Emergency Storage - volume allocated for providing water during periods when normal supply is interrupted is calculated to be twice the District's Average Day Demand (ADD)

Note 4. Demands based on 1.5% growth forecast

Note 5. 152nd Reservoir available storage (CRW) does not include SWA clearwell storage volume

Note 6. Fire storage for the Windswept HWY 224/Caver site (pressure zone) rely on Mather Reservoir for fire storage

Table 101.B

South Storage Capacity Summary (1.5% growth forecast)

site	Year	EDU's	ADD	MDD	Largest Fire Flow	Reservoir Storage Calculations			Required Storage	Available Storage	Existing Storage (Deficit) or Surplus
						Equalization	Fire storage	Emergency Storage			
Holcomb & Hunter Heights	2014		0.25	0.69	1,500	0.17	0.18	0.50	0.85	1.20	0.35
	2019		0.27	0.74	1,500	0.19	0.18	0.54	0.91	1.20	0.30
	2024		0.29	0.80	1,500	0.20	0.18	0.58	0.96	1.20	0.24
	2029		0.31	0.86	1,500	0.22	0.18	0.62	1.02	1.20	0.19
	2034		0.33	0.93	1,500	0.23	0.18	0.66	1.07	1.20	0.13
	2054		0.45	1.26	1,500	0.32	0.18	0.90	1.40	1.20	(0.20)
Redland (.75MG / new 1.25 MG)	2014		0.41	1.15	1,500	0.28	0.18	0.82	1.28	1.05	(0.23)
	2019		0.44	1.24	1,500	0.31	0.18	0.88	1.37	2.00	0.63
	2024		0.48	1.33	1,500	0.33	0.18	0.96	1.47	2.00	0.53
	2029		0.51	1.44	1,500	0.36	0.18	1.02	1.56	2.00	0.44
	2034		0.55	1.55	1,500	0.39	0.18	1.10	1.67	2.00	0.33
	2054		0.75	2.09	1,500	0.52	0.18	1.50	2.20	2.00	(0.20)
Henrici	2014		0.19	0.53	1,500	0.13	0.18	0.38	0.69	1.55	0.86
	2019		0.20	0.57	1,500	0.14	0.18	0.40	0.72	1.55	0.83
	2024		0.22	0.62	1,500	0.16	0.18	0.44	0.78	1.55	0.78
	2029		0.24	0.67	1,500	0.17	0.18	0.48	0.83	1.55	0.72
	2034		0.26	0.72	1,500	0.18	0.18	0.52	0.88	1.55	0.67
	2054		0.35	0.97	1,500	0.24	0.18	0.70	1.12	1.55	0.43
Beavercreek	2014		0.61	1.72	1,500	0.43	0.18	1.22	1.83	1.20	(0.63)
	2019		0.66	1.86	1,500	0.47	0.18	1.32	1.97	1.20	(0.77)
	2024		0.71	2.00	1,500	0.50	0.18	1.42	2.10	1.20	(0.90)
	2029		0.77	2.16	1,500	0.54	0.18	1.54	2.26	1.20	(1.06)
	2034		0.83	2.32	1,500	0.58	0.18	1.66	2.42	1.20	(1.22)
	2054		1.12	3.14	1,500	0.79	0.18	2.24	3.21	1.20	(2.01)

Note 1. Equalization storage - 25 percent of maximum (peak) day demand (MDD)

Note 2. Fire Storage - Largest fire flow demand for each service level multiplied by the duration of that flow. See Table B105.2 Minimum Required Fire-flow and Flow Duration for Buildings

Note 3. Emergency Storage - volume allocated for providing water during periods when normal supply is interrupted is calculated to be twice the District's Average Day Demand (ADD)

Note 4. Demands based on 1.5% growth forecast

Note 5. Redland storage volumes changed to 2 mg in year 2019 to incorporate Backbone Redland Reservoir 1.25mg and demolition of Reservoir No. 1 (.3mg). Reservoir No.2 (.75mg).

APPENDIX F
MOLLALLA AVENUE STREETSCAPE CONCURRENT WATERLINE IMPROVEMENTS TECHNICAL MEMORANDUM, MURRAYSMITH

Technical Memorandum

Date: February 25, 2019

Project: Oregon City Water Distribution System Capital Improvement Program Update

To: Aleta Froman-Goodrich, PE
City of Oregon City

From: Shad Roundy, PE
Claire DeVoe, EIT
Murraysmith

Re: Molalla Ave Streetscape Concurrent Waterline Improvements

Introduction

The City of Oregon City (City) is currently working on an update of its water distribution system Capital Improvement Program (CIP). Simultaneously, the City is proceeding with design on the Molalla Avenue Streetscape Project which includes improvements along Molalla Avenue from Beavercreek Road to the intersection with Highway 213. This document is intended to document the purpose and cost of the Molalla Avenue project prior to completion of the updated CIP.

The Molalla Avenue project is intended to minimize existing Upper Zone over-pressurization and balance supply and demand between the Henrici Reservoir and the Boynton Standpipe. Additionally, the project is required to serve future growth within the City. The Molalla Avenue project is a portion of a larger set of capital projects to improve system capacity and operations. Other associated projects include the following:

- Parallel transmission line from the Mountainview Pump Station to Beavercreek Avenue
- Parallel transmission line from Beavercreek Ave to Glen Oak Road (along the Streetscape Project to Sebastian Way)
- Improved looping and upsized transmission between Highway 213 and Beavercreek Road, north of Glen Oak Road
- Upsized transmission between Glen Oak Road and the Henrici Reservoir

The Molalla Avenue project and other capital projects are presented in Figure 1.

Project Background and Summary

The South Fork Water Board (SFWB) supplies the City's Mountainview Reservoirs with treated water via a 30-inch supply main and the Division Street Pump Station. The City's Mountainview Pump Station in turn supplies Henrici Reservoir and the Boynton Standpipe. These tanks set the hydraulic Grade Line (HGL) in the Upper Zone. The tanks also act as suction supply for the Fairway Downs Pump Station, which supplies a small, closed zone near the Henrici Reservoir.

Growth is expected in the Upper and Fairway Downs Zones as described in the Beavercreek Concept Plan. This growth will require extension of Upper Zone distribution, and the construction of a new pump station and reservoir to replace the existing Fairway Downs Pump Station and extend the existing Fairway Downs Zone.

Under current conditions, the City has difficulties keeping the Henrici Reservoir filled and the Boynton Standpipe from overflowing. The Boynton Standpipe is centrally located while the Henrici Tank is located southeast of the system. When flow from the Mountainview Pump Station is increased to fill the Henrici Reservoir, high pressure issues are experienced by customers near the pump station. This is especially problematic in summer months when the pump station must operate at a higher flow rate to keep up with Upper Zone demands. This problem is expected to increase as the Mountainview Pump Station is expected to operate at higher flow rates to keep up with growth related demands.

An evaluation of the supply from the Henrici Reservoir and the Boynton Standpipe was performed with and without capital improvements as presented in Table 1. Prior to improvement, demands are distributed at a 67/33-percent split with the majority of demand supplied through the Boyton Standpipe. The improved system, which includes the Molalla Avenue project, results in an improved flow split of 50/50-percent between the reservoir and standpipe.

Table 1
Reservoir Filling Rates – Boyton Standpipe and Henrici Reservoir

Scenario	Boynton Standpipe (gpm)	Henrici Reservoir (gpm)
No Improvements	4,200	2,100
Only add Parallel Main on Molalla Ave	4,200	2,500
Only upsize Beavercreek Transmission from Glen Oak Road to Henrici Reservoir	3,600	2,900
Both improvements: Parallel Main on Molalla Ave and Upsize Beavercreek Transmission	3,500	3,500

1. 2015 ADD demands, 2 pumps on at Mountainview Pump Station, reservoirs at low set points.
2. Parallel main sizing evaluated between 12-inch and 24-inch. Improvements on Molalla Avenue between Beaver Creek Road and Glen Oak Road are recommended at 18-inch sizing.

Demands in the Upper Pressure Zone, Fairway Downs Pressure Zone, and CRW Master Meters 8&9 can be used to determine the ratio of the Molalla Avenue project serving existing and future

customers. These demands for existing and future time frames are summarized in Table 2. The ratio of existing to future services by 2035 is estimated at 68-percent existing and 32-percent future. The ratio of existing to future services by buildout is estimated at 42-percent existing and 58-percent future.

Table 2
Existing and Future Demand Summary and Ratios Associated with Molalla Avenue Project

Pressure Zone or Master Meter	Existing Average Day Demand	2035 Average Day Demand	Buildout Average Day Demand
Upper	1,600	2,370	3,860
Fairway Downs	20	20	40
CRW Master Meters 8 & 9	80	110	180
TOTAL	1,700	2,510	4,080

Demands in gallons per minute.

Preliminary costs were estimated for the Molalla Avenue project for the CIP update as summarized below. Cost estimates represent a Class 5 budget estimate in 2018 dollars, as established by the American Association of Cost Engineers. This preliminary estimate class is used for conceptual screening and assumes project definition maturity level below two percent. The expected accuracy range is -20 to -50 percent on the low end, and +50 to +100 percent on the high end, meaning the actual cost should fall in the range of 50 percent below the estimate to 100 percent above the estimate.

- Project cost estimate for 18-inch pipeline on Molalla Avenue at approximately 4,200 linear feet
- Cost estimates include labor, materials, and markups
- Cost estimates exclude land or right-of-way acquisition
- Markups include 40-percent for engineering, overhead, and contractor profits
- Markups include 30-percent for construction contingency
- Total project cost is estimated at $1.7 million ($407 per linear foot)

murraysmith

OREGON CITY

City of Oregon City
Molalla Ave Streetscape
CIP Project Impacts

Mountainview Reservoirs and Pump Station

Existing Boynton Standpipe and Pump Station

Existing Fairway Downs Pump Station

Proposed Fairway Downs Pump Station

Existing Henrici Reservoir

Proposed Fairway Downs Reservoir

Text

CIP PROJECTS

- Parallel Transmission along Streetscape
- Mountainview to Henrici Transmission Projects
- Other CIP Projects
- Pump Station
- Reservoir

EXISTING WATER MAINS

- Oregon City
- SFWB
- West Linn
- UGB

PRESSURE ZONE

- Canemah
- Fairway Downs
- Intermediate
- Lower
- Paper mill
- Park Place Intermediate
- Park Place Livesay
- Park Place Lower
- Park Place View Manor
- Upper

FIGURE 1

0 1,250 2,500 Feet

N W E

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October 2018 17-2119

APPENDIX G
SMALL WATERLINE REPLACEMENT PROJECTS & PRV PHOTO DOCUMENTATION, OREGON CITY

Updated 12/30/2018 for PW Ops Higher Priority List for Small Water Pipeline Replacement Project List For Projects Originally Listed in

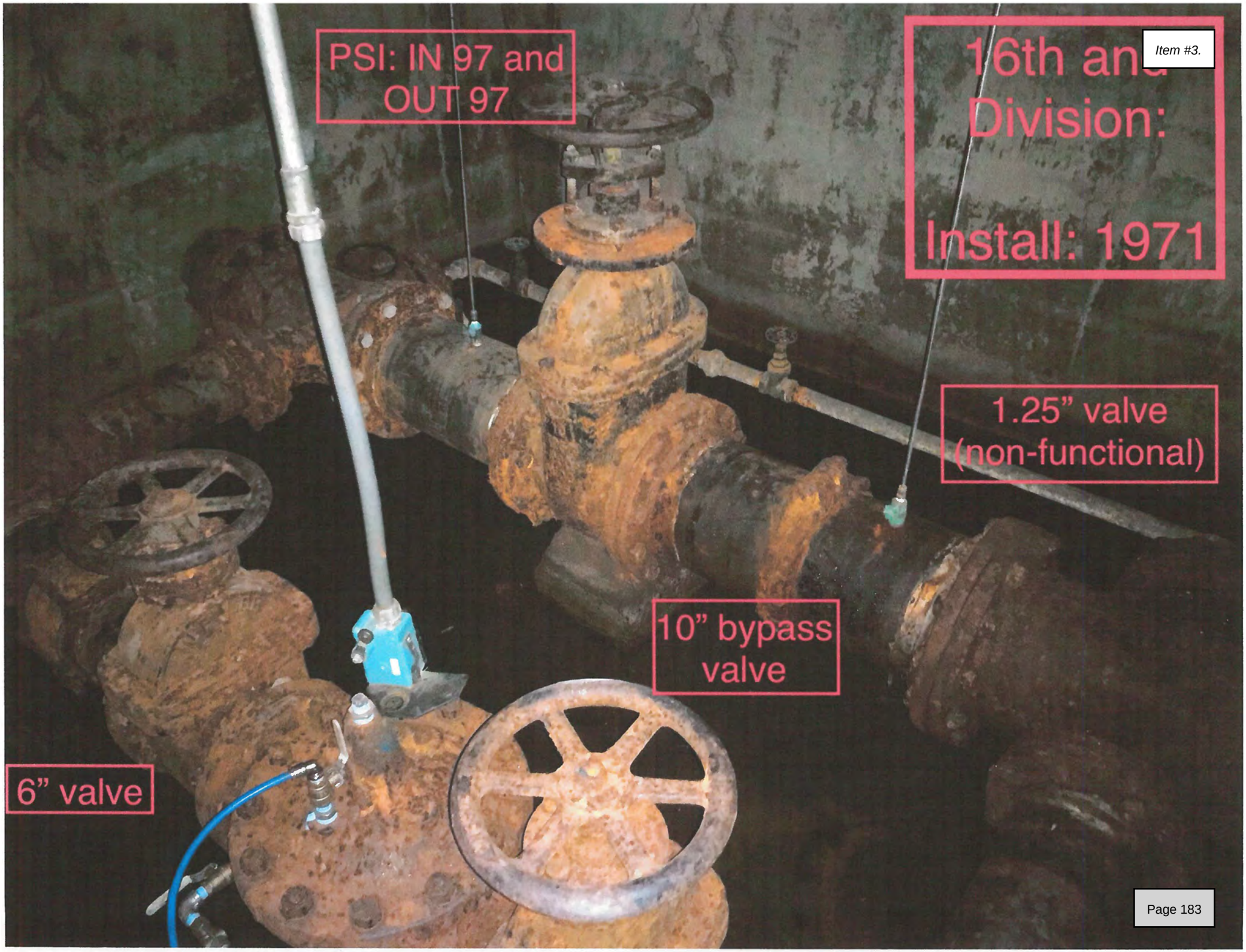
#	Project Location	Project Area Beginning	Project Area End	Existing Diameter	Proposed Diameter *[1]*	Length	Unit Construction Cost *[2]*	Total Construction Cost	CIP Cost (w/ Mark Up) [3]
	Street Name	*Street Name*	*Street Name*	*(in)*	*(in)*	*(ft)*	*($/ft)*	*($)*	*($)*
1	S. Center St	S. 2nd	1st St	6	8	700	$140	$98,000	**$150,500**
2	Barker Ave	South End Rd	Barker Rd	6	8	800	$140	$112,000	**$172,000**
3	Warner-Parrott Rd	King Rd	Boynton St	10	12	1100	$200	$220,000	**$337,900**
4	Belle Ct and Glenwood Ct	Holmes Ln	Linn Ave	6	8	1500	$140	$210,000	**$322,600**
5	Valley View Dr	Park Dr	McCarver Ave	4	8	1000	$140	$140,000	**$215,000**
6	Canemah Ct	Canemah Rd	Telford Rd	6	8	1700	$140	$238,000	**$365,600**
7	Randall St	Canemah Rd	Hartke Lp	6	8	700	$140	$98,000	**$150,500**
8	Hartke Lp and Alderwood Pl			6	8	3700	$140	$518,000	**$795,600**
9	Harrison St	7th St	Division St	6	8	600	$140	$84,000	**$129,000**
10	Division St	Harrison St	13th/14th St	6	8	4300	$140	$602,000	**$924,700**
11	Division St	Anchor Way PRV Station	Davis Rd	6	8	1300	$140	$182,000	**$279,600**
	Total					17400		$2,502,000	**$3,843,100**

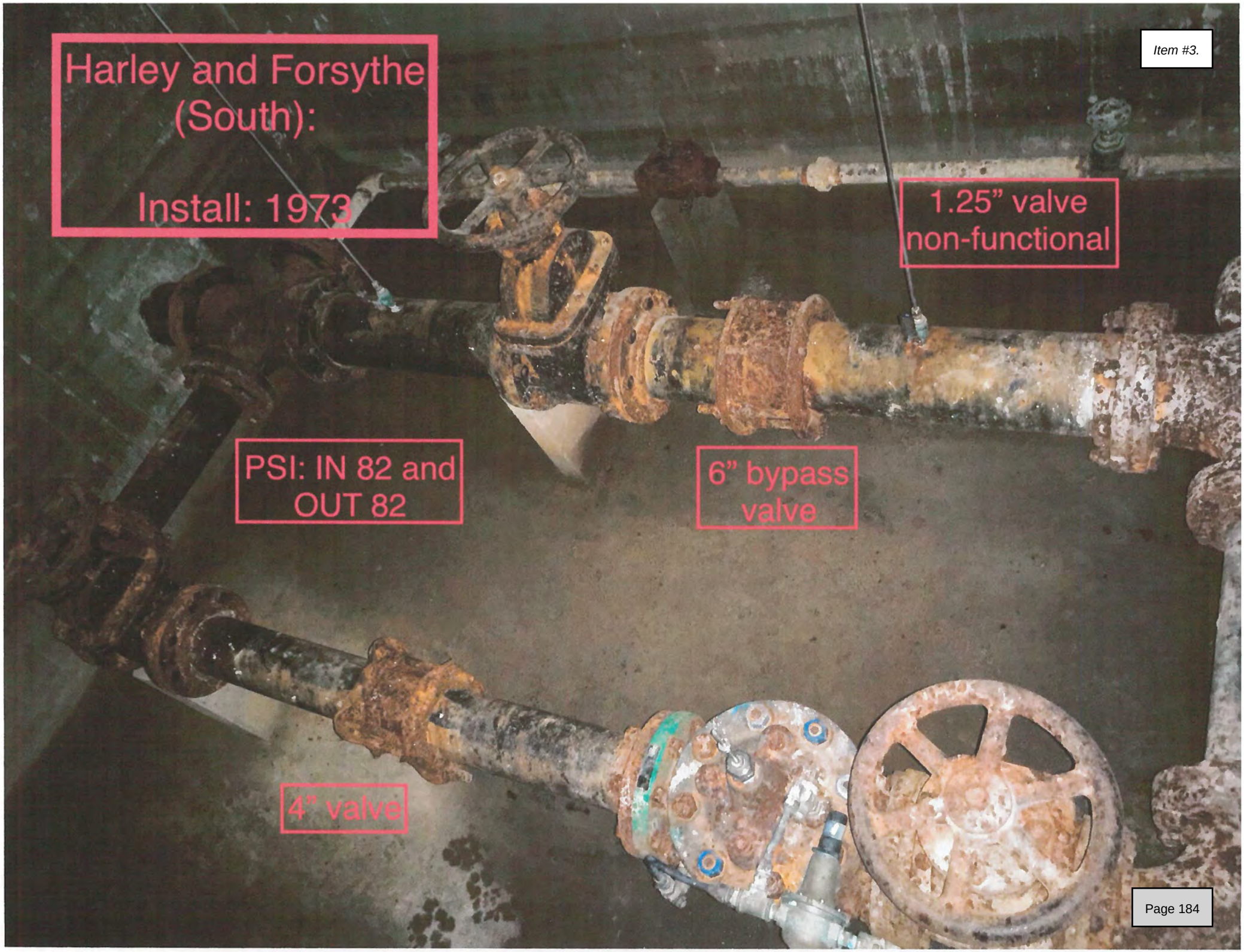
NOTES:

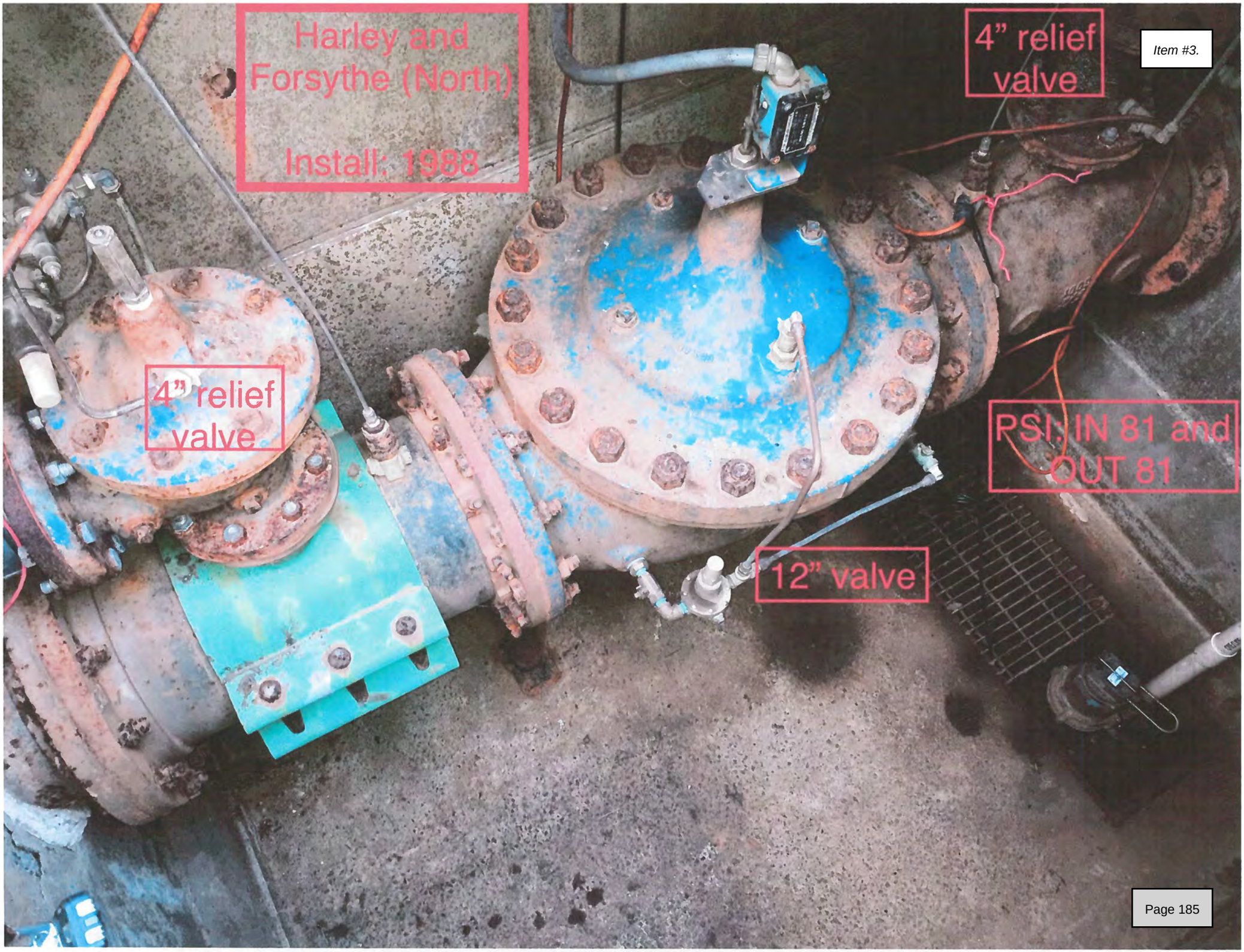
[1] Proposed pipe diameters are matching the existing diameter, 8-Inch Minimum.

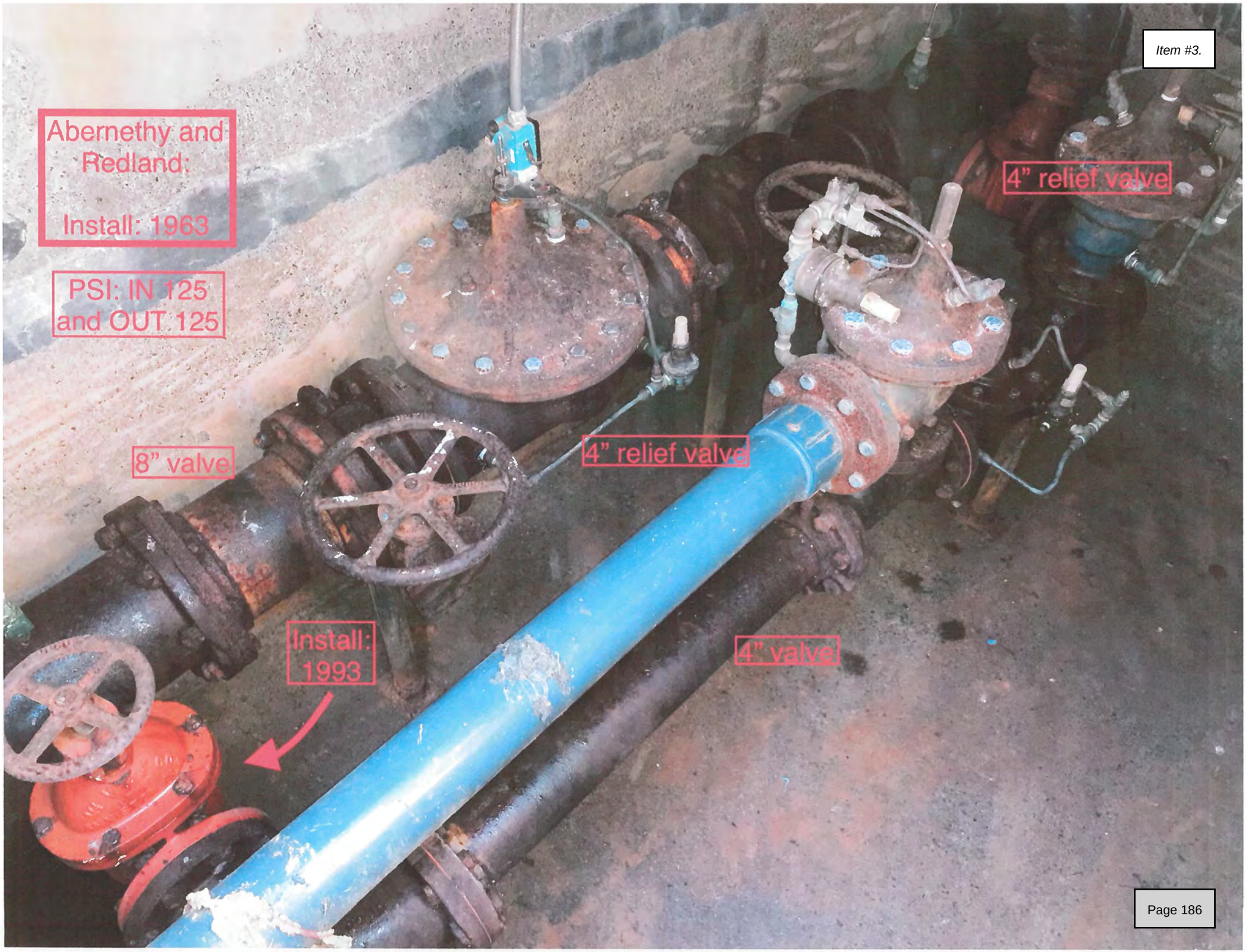
[2] Unit Construction Costs are based on units costs included in the 2012 Water Master Plan for developed areas.

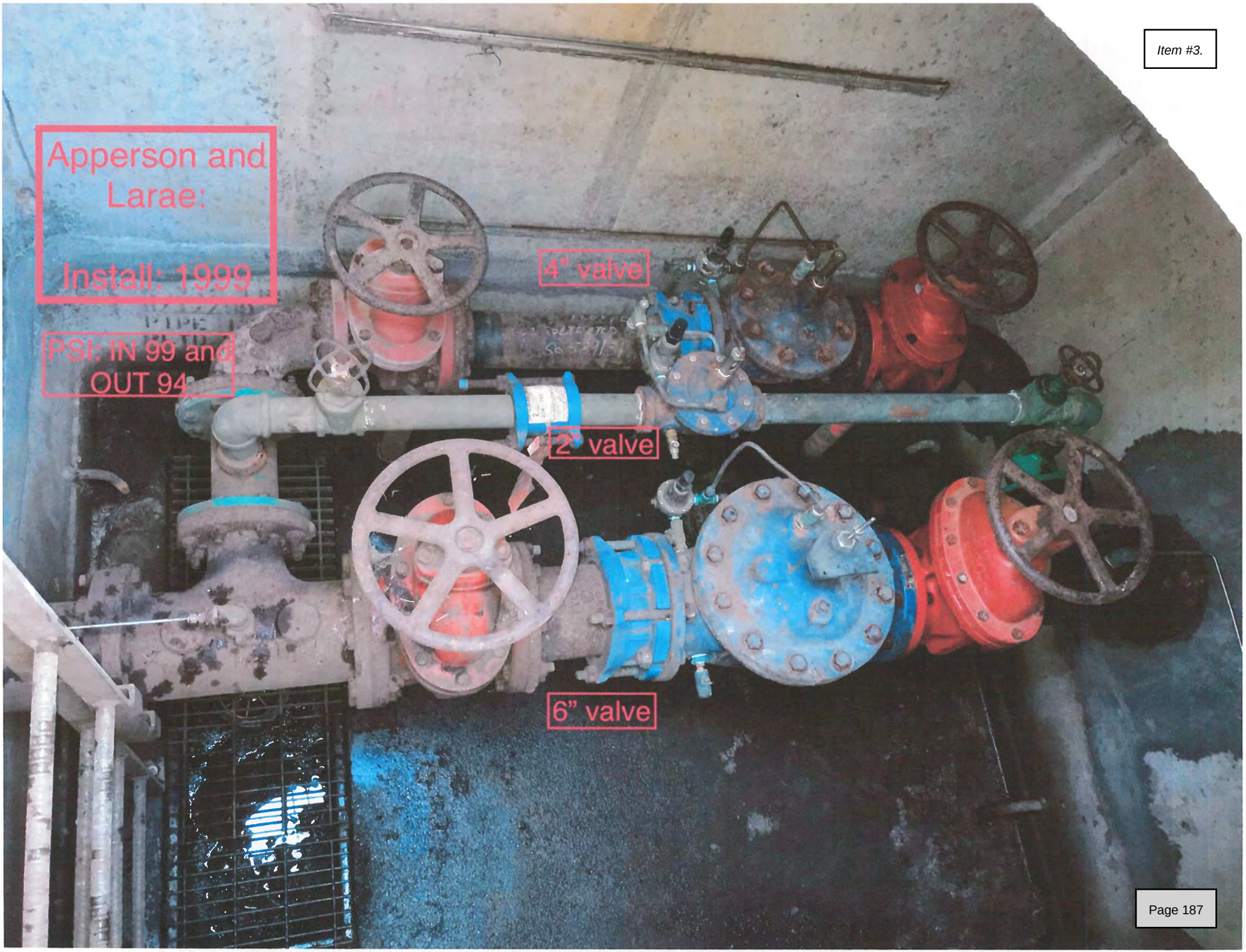
[3] CIP Cost includes a 20% contingency, 10% design engineering, 10% construction engineering, and 8% administration cost allowance in accordance with Appendix D and then rounded to the nearest $100.


PSI: IN 97 and OUT 97
16th and Division:
Install: 1971
1.25” valve (non-functional)
10” bypass valve
6” valve

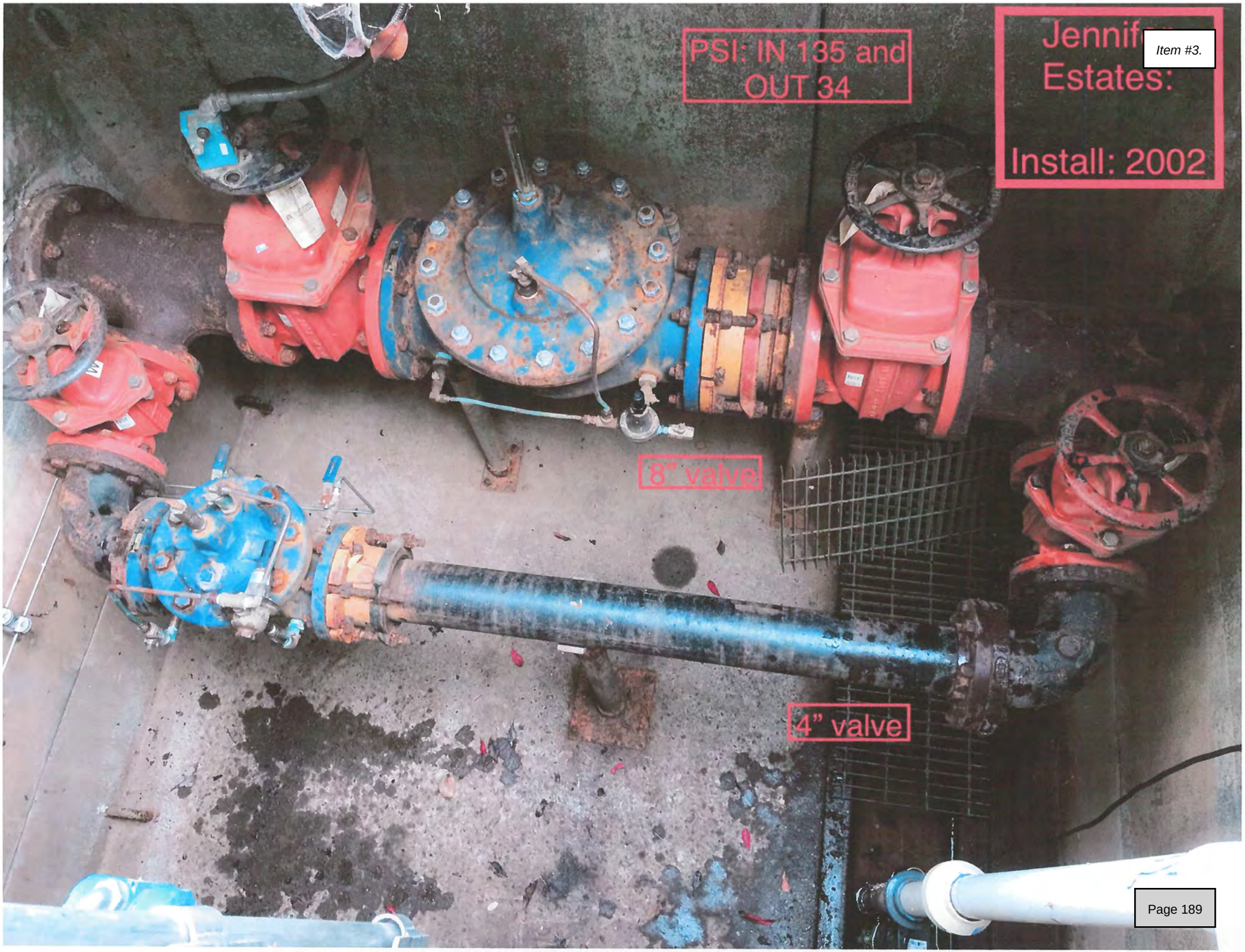

Harley and Forsythe (South):
Install: 1973
1.25” valve non-functional
PSI: IN 82 and OUT 82
6” bypass valve
4” valve

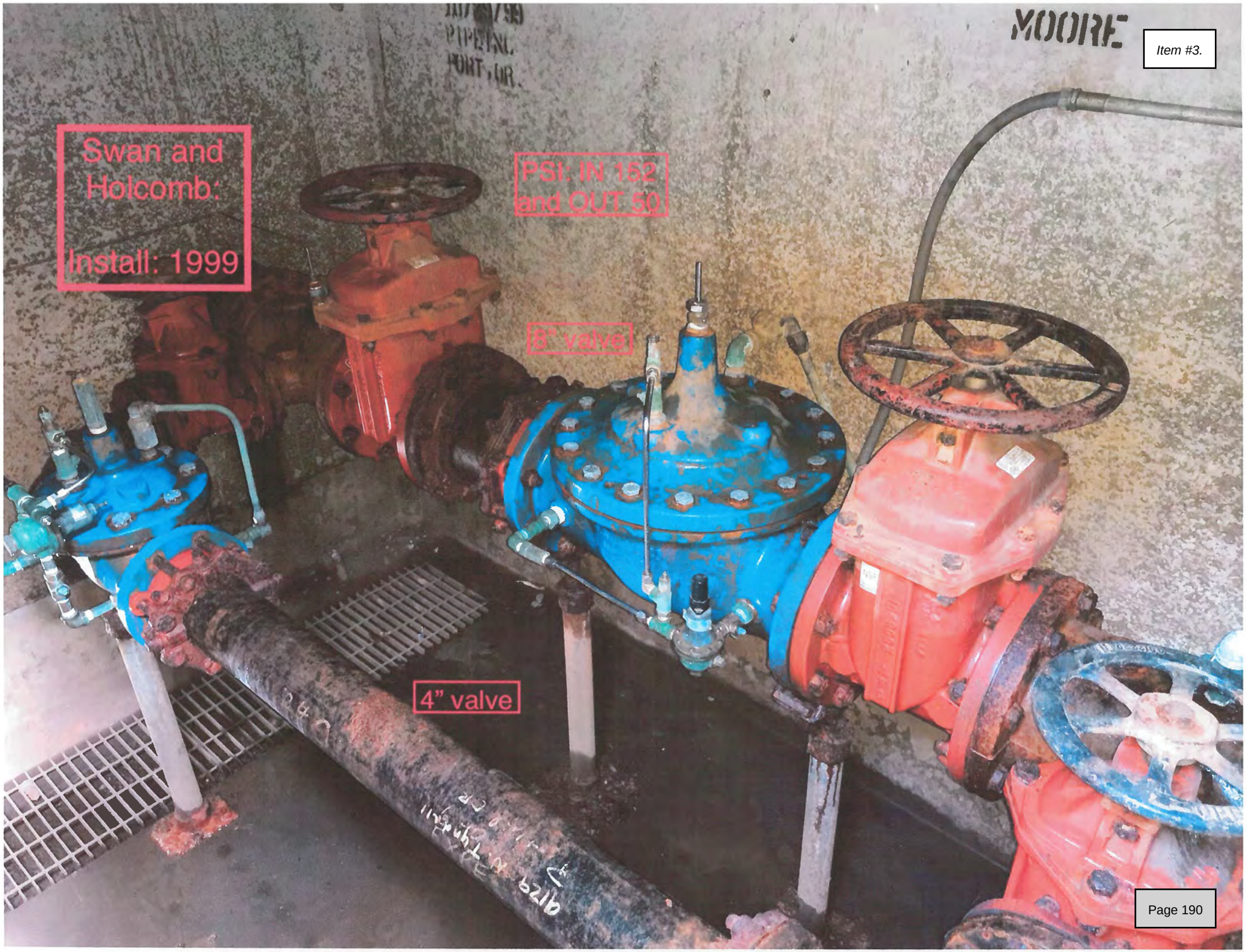

Harley and Forsythe (North)
Install: 1988
4" relief valve
4" relief valve
PSI: IN 81 and OUT 81
12" valve


Abernethy and Redland:
Install: 1963
PSI: IN 125 and OUT 125
4" relief valve
8" valve
4" relief valve
Install: 1993
4" valve

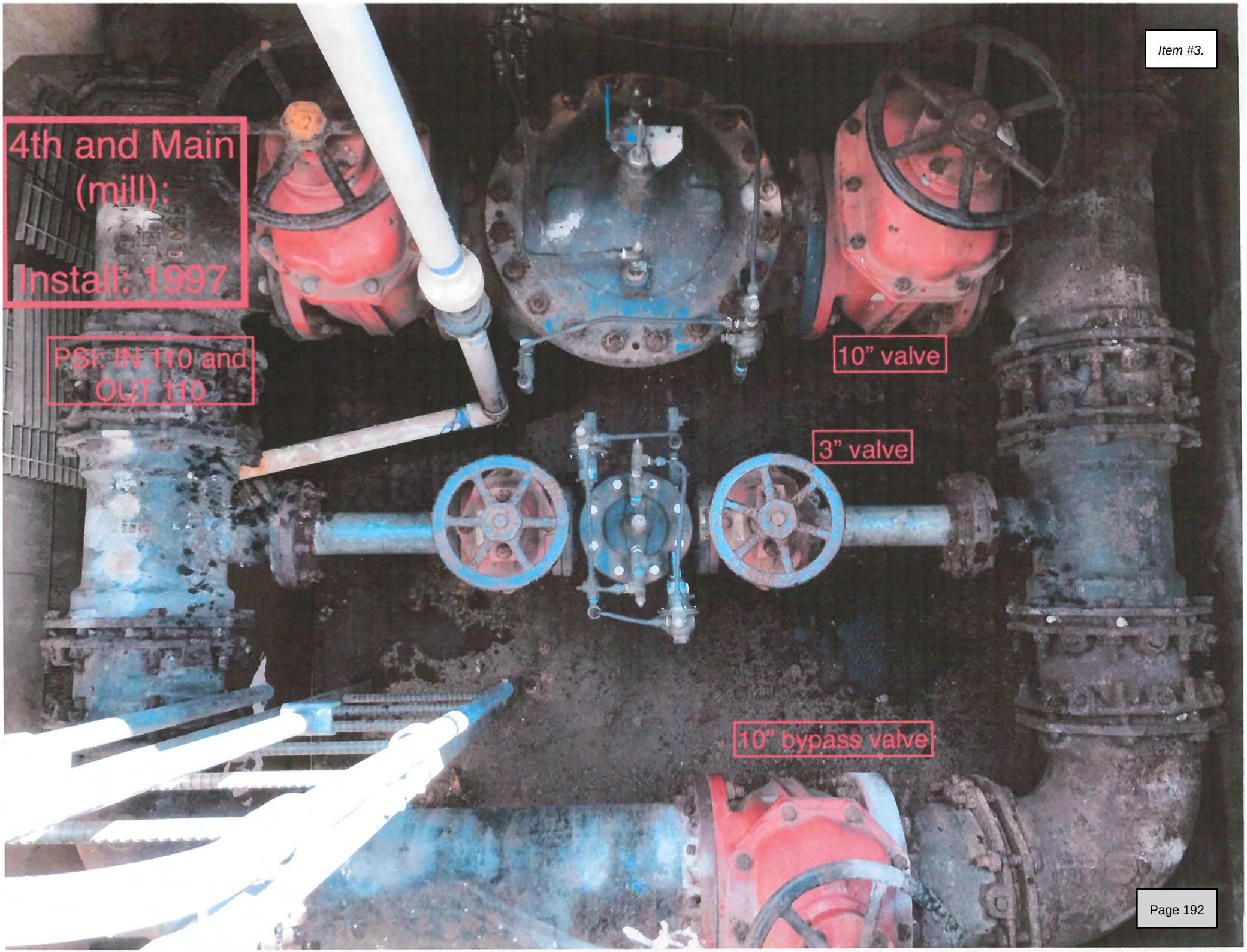

Apperson and Larae:
Install: 1999
PSI: IN 99 and OUT 94
4" valve
2" valve
6" valve

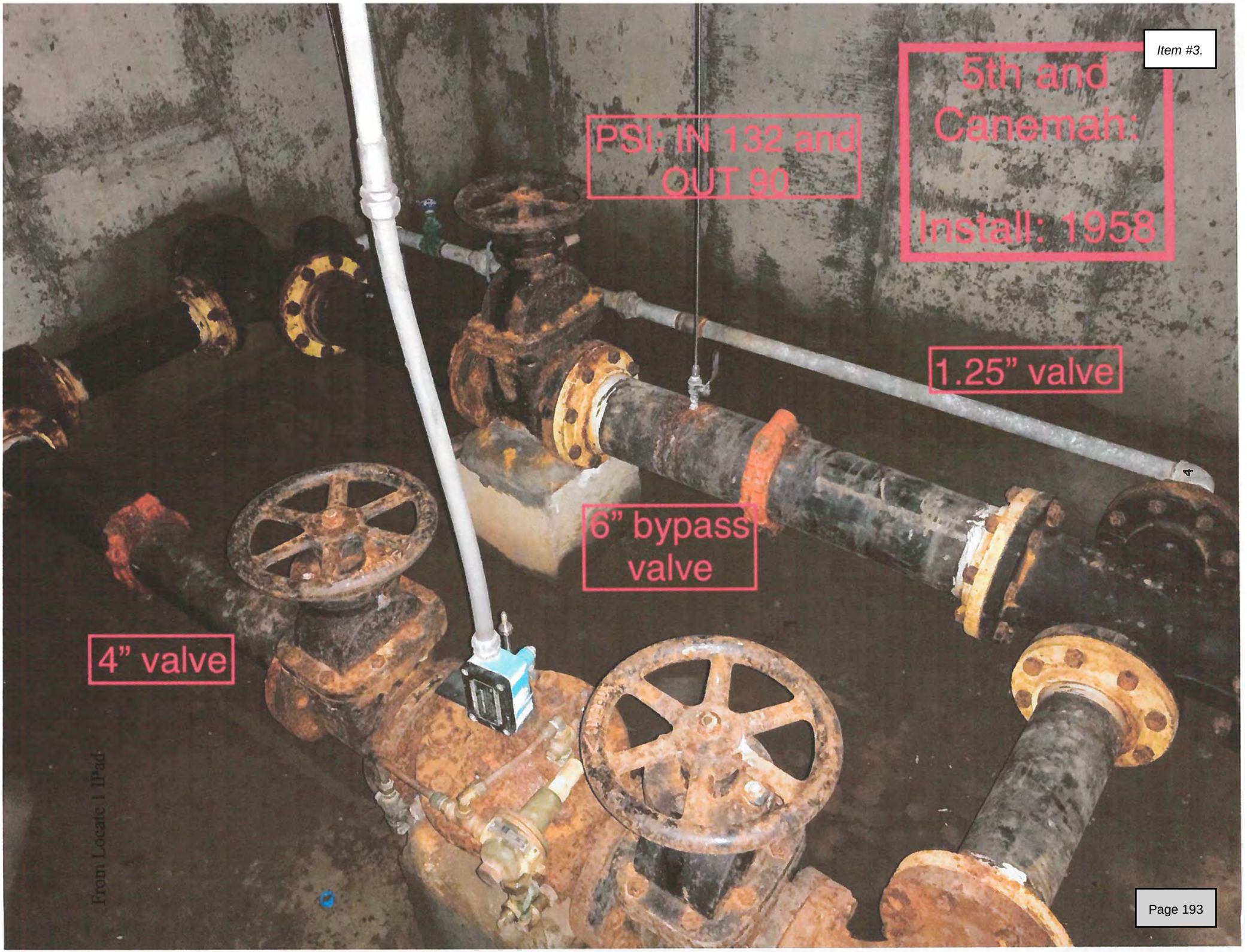

Hunter Pump Station:
Install: 1998
6" valve
PSI: IN 152 and OUT 52
3" valve


PSI: IN 135 and OUT 34
Jennif
Estates:
Install: 2002
8" valve
4" valve

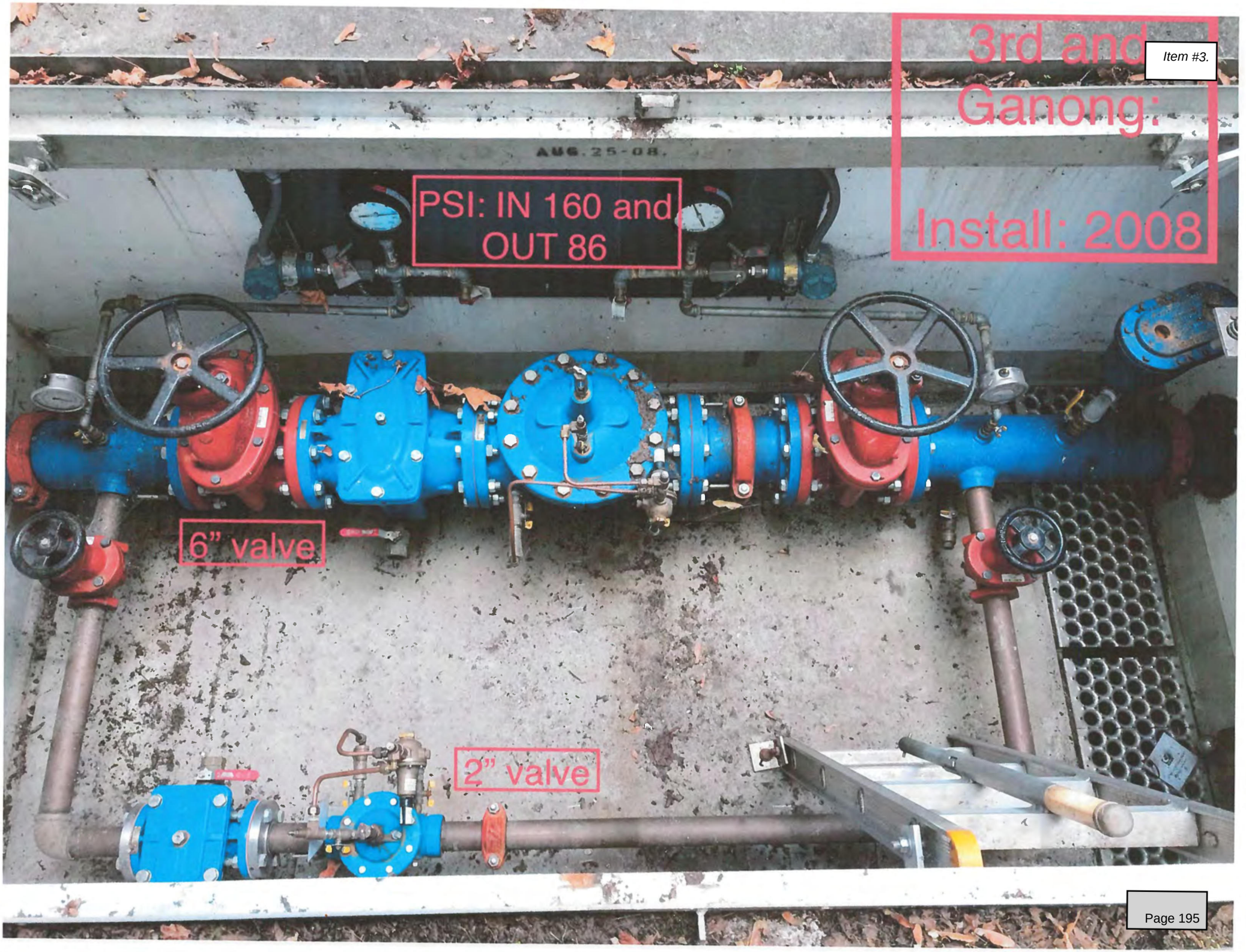

MOORE
Swan and Holcomb:
Install: 1999
PSI: IN 152 and OUT 50
8" valve
4" valve

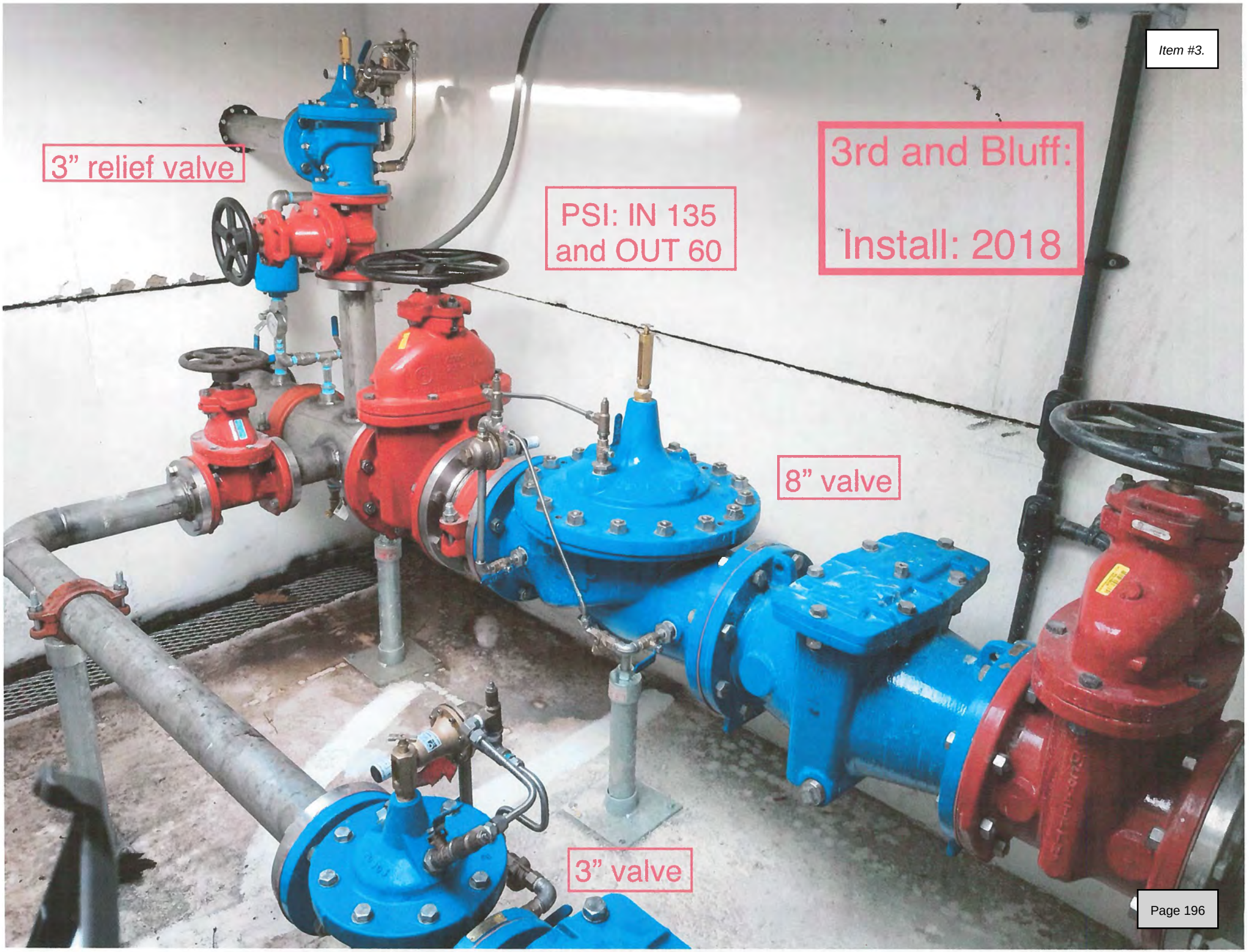

View Manor:
Install: 1999
PSI: IN 99
and OUT 32
8" valve
4" valve

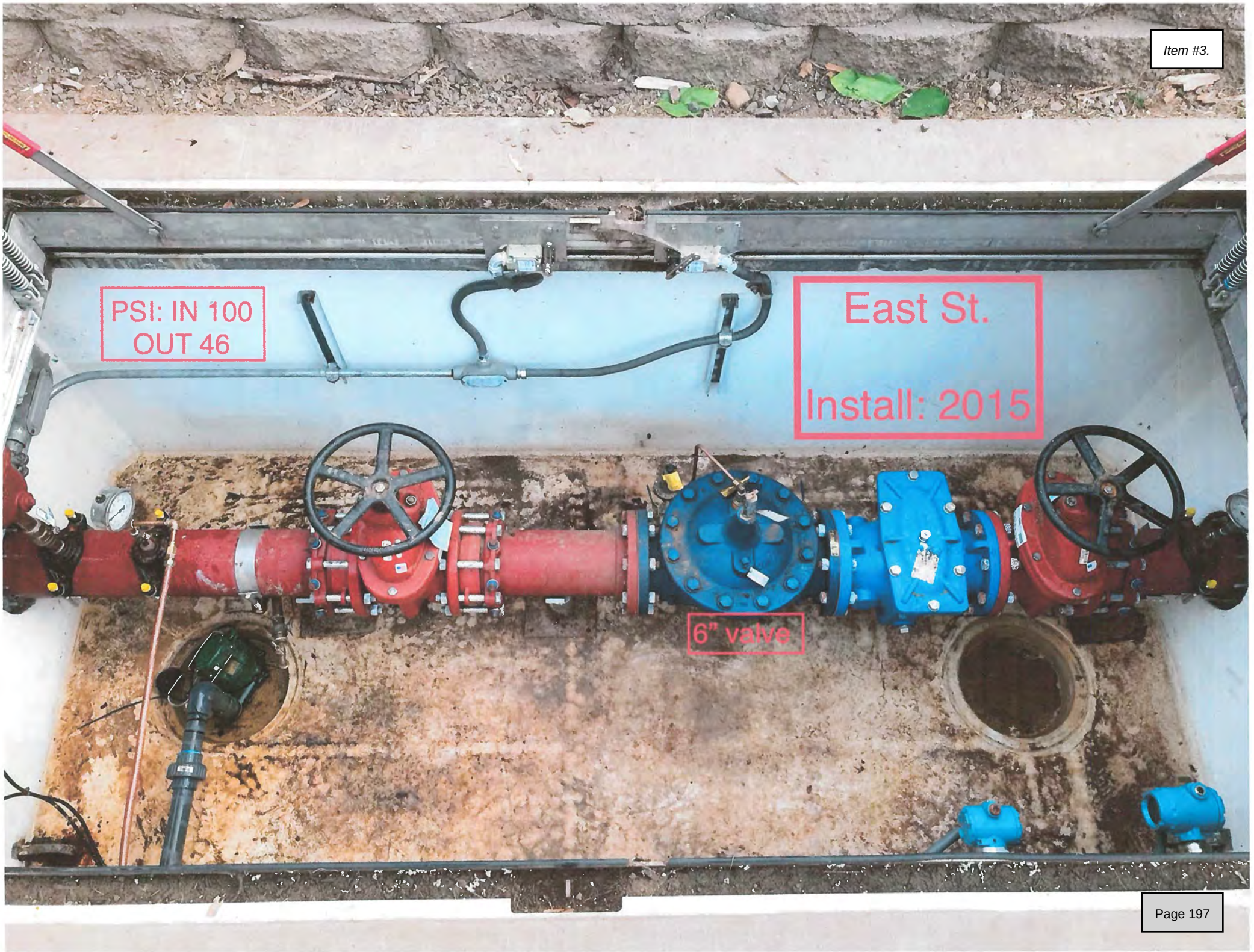

4th and Main (mill):
Install: 1997
PSI: IN 110 and OUT 110
10” valve
3” valve
10” bypass valve

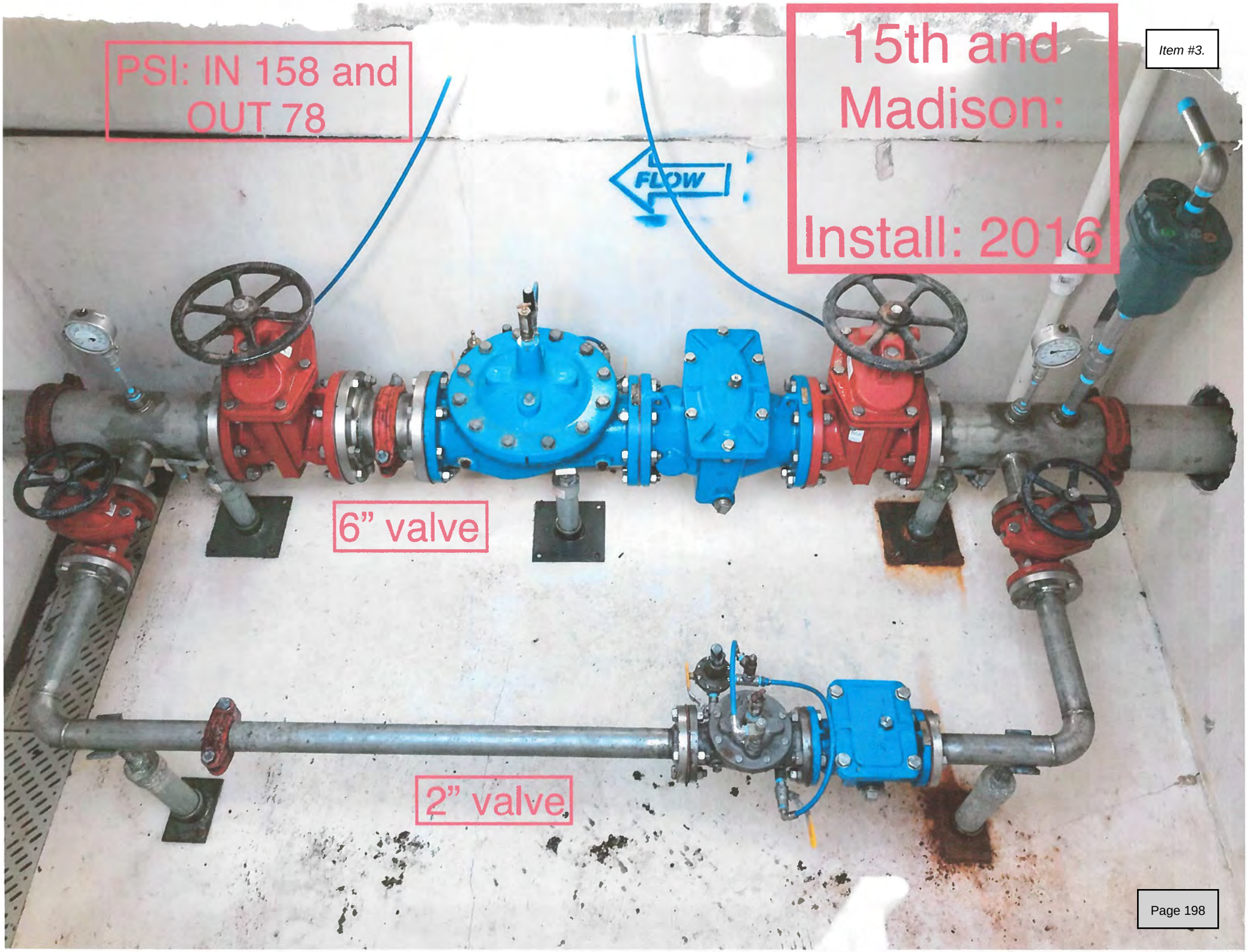

PSI: IN 132 and OUT 90
5th and Canemah:
Install: 1958
1.25" valve
6" bypass valve
4" valve
From Locate | IPad

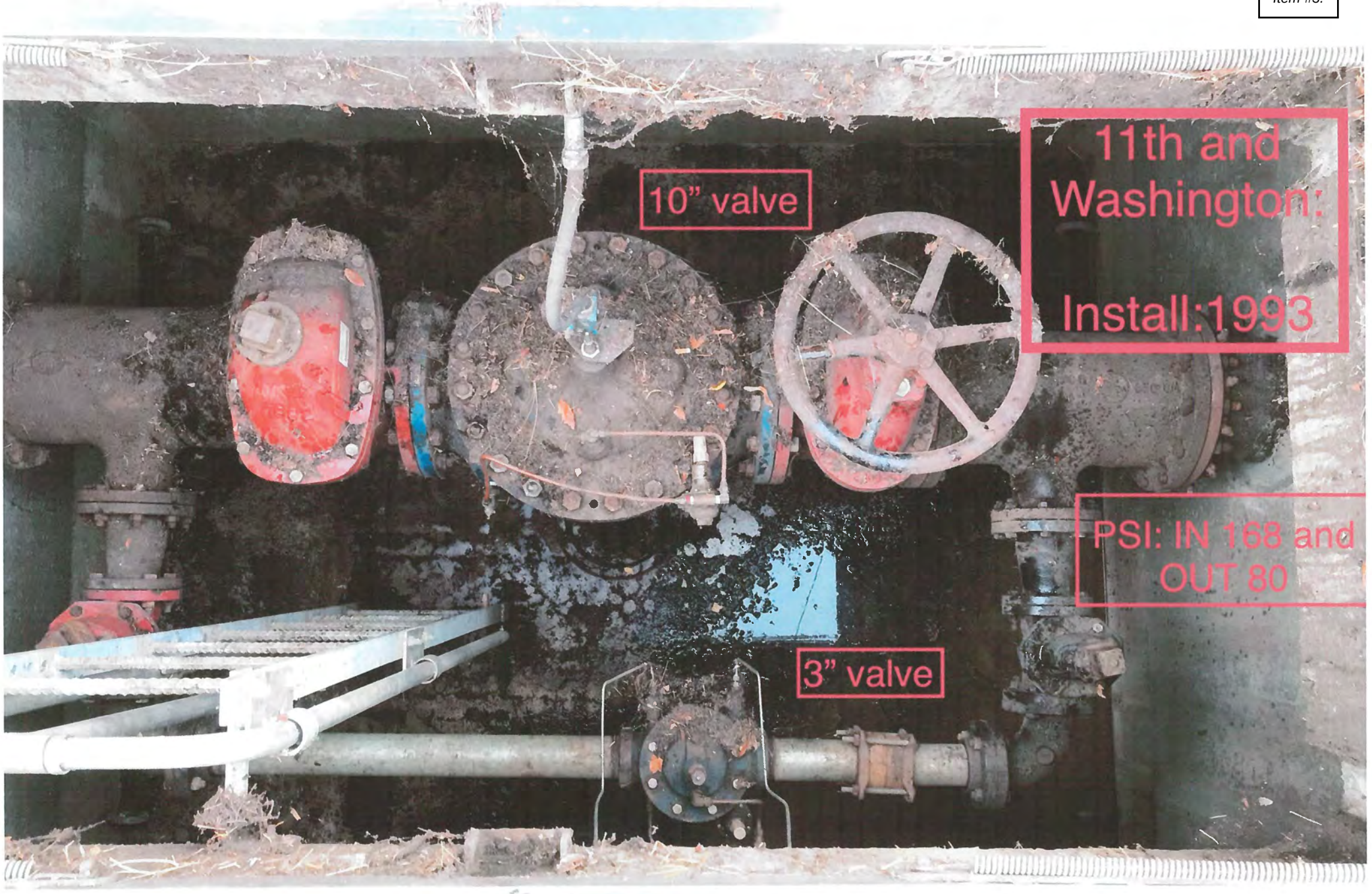

4th and Jerome:
Install: 1958
6" valve
2" valve
PSI: IN 135 and 52 OUT

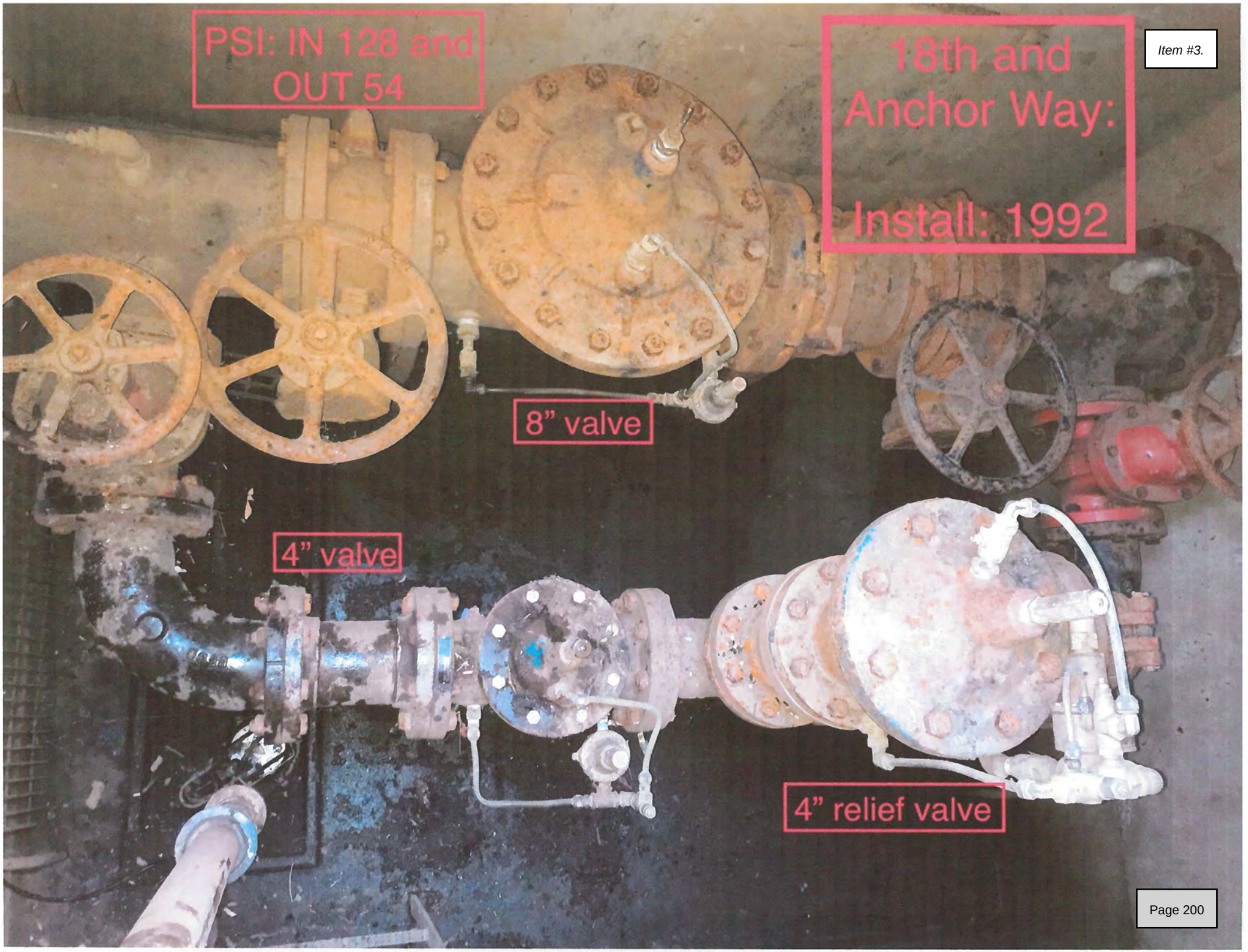

3rd and Ganong:
Install: 2008
PSI: IN 160 and OUT 86
6" valve
2" valve


3” relief valve
PSI: IN 135
and OUT 60
3rd and Bluff:
Install: 2018
8” valve
3” valve


PSI: IN 100
OUT 46
East St.
Install: 2015
6" valve


PSI: IN 158 and OUT 78
FLOW
15th and Madison:
Install: 2016
6” valve
2” valve


10” valve
11th and Washington:
Install:1993
PSI: IN 168 and OUT 80
3” valve


PSI: IN 128 and OUT 54
18th and Anchor Way:
Install: 1992
8” valve
4” valve
4” relief valve

APPENDIX H
MILL REDEVELOPMENT WATER DISTRIBUTION ANALYSIS TECHNICAL MEMORANDUM, MURRAYSMITH

murraysmith

Technical Memorandum

Date: January 18, 2018

Project: Oregon City Water Distribution System Capital Improvement Program Update

To: Aleta Froman-Goodrich, PE
City of Oregon City

From: Shad Roundy, PE
Natalie Jennings, PE
Murraysmith

Re: Mill Redevelopment Water Distribution Analysis

Background Information

The City of Oregon City (City) is evaluating expansion of the water distribution system to accommodate commercial redevelopment along the Willamette River, in the Paper Mill Zone. The development area and preliminary pipeline configuration are shown in Figure 1. The Paper Mill Zone is supplied through two pressure reducing valve (PRV) stations located at 3rd and Bluff and 99 E & Main. This technical memorandum documents recommended modifications to PRV stations to combine the Paper Mill Zone and the Lower Zone. Additionally, local pipeline sizing recommendations are provided to supply domestic and fire flow demands to the Mill Redevelopment Area.

Demand Summary

To evaluate the system capacity, domestic demand conditions were analyzed for average day demand (ADD), maximum day demand (MDD), and peak hour demand (PHD). Fire flow demands were evaluated during MDD including, 3,500 gallon-per-minute (gpm) and 5,000 gpm fire flow requirements.

The City's water demand data is summarized in the *Water Distribution System Master Plan* (West Yost, 2012) by service type and largest user for the full distribution system. Future demands in the Mill Redevelopment Area were developed by applying unit demands to number of dwelling units, square footage of office and retail space, or number of hotel rooms as shown in Table 1.

PARK PLACE - INTERMEDIATE

Harley & Foresythe (PRV12)

Harley & Foresythe (PRV11)

Apperson & La Rae (PRV10)

LOWER ZONE

Abernethy & Redland (PRV9)

PARK PLACE - LOWER

15th & Madison (PRV2)

11th and Washington(PRV1)

INTERMEDIATE ZONE

99E & Main - Paper Mill (PRV8)

PAPER MILL ZONE

3rd & Bluff (PRV5)

0 2,000 4,000 Feet

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN,

murraysmith

OREGON CITY

City of Oregon City
Water Distribution System

Legend

- PRVs
- Existing Pipes
- Mill Redevelopment Piping

N W E S

Mill Redevelopment Area
Proposed Piping and
New Combined Lower Zone

January 2018 17-2119

G:\PDX_Projects\17\2119 - Oregon City Water CIP Update\GIS\Mill Redevelopment Results\Mill Redevelopment Figures\Figure 1.mxd 1/18/2018 3:45:41 PM SJR

Table 1
Water Demands by Type

Category	Unit	Number of Units, Rooms, or Square Feet	Unit Demand (gpm)	Total Demand (gpm)
Residential	dwelling unit	240	0.14	35
Office Space	1,000 Sq. Ft.	436	0.08	36
Retail Space	1,000 Sq. Ft.	119	0.08	10
Hotel	Rooms	115	0.07	9
			Total	90

Maximum day and peak hour demands for the Mill Redevelopment Area are estimated using the historical peaking factors from the master plan, established by the dividing max day by average day for MDD:ADD, and peak hour by average day for PHD:ADD, as shown in Table 2.

Table 2
Peaking Factors

Unit	Peaking Factor
MDD:ADD	2.3
PHD:ADD	4.5

Table 3 summarizes the demands in the proposed Mill Redevelopment Area, and the new, combined, Paper Mill/Lower Pressure zone.

Table 3
Water Demands by Zone

Demand	Mill Redevelopment Area[1]	Paper Mill and Lower Zones Combined
ADD	98 gpm	272 gpm
MDD	225 gpm	626 gpm
PHD	440gpm	1,225 gpm

[1] Includes existing demands in addition to the Mill Redevelopment demands.

Design Criteria

This section presents the planning and analysis criteria used to analyze performance of the City water distribution system. Criteria are presented in Table 4 for distribution system piping, service pressures, and recommended fire flow. Performance guidelines are based on a review of State requirements, American Water Works Association (AWWA) acceptable practice guidelines, and *Recommended Standards for Water Works, Ten States Standards (Great* Lakes – Upper Mississippi River Board of State and Provincial Public Heal and Environmental Managers, 2012).

Service Pressures

The desired service pressure range under ADD and normal operating conditions is 40 to 80 pounds per square inch (psi). The maximum 80 psi service pressure limit is required by the *Oregon Plumbing Specialty Code* (OPSC) 608.2. If mainline pressures exceed 80 psi, service connections should be equipped with individual PRVs.

Distribution Piping

In general, distribution flow velocities should not exceed 10 feet-per-second (fps) under the PHD conditions and drop below 3.5 fps under normal demand conditions. The minimum pipe size is 8-inch diameter for new permanently dead ended residential water mains and primary feeder mains in residential areas, however areas with large fire flow demands will require larger pipe diameters.

Fire Flow

The amount of water recommended for fire suppression purposes is typically associated with the local building type or land use of a specific location within the distribution system. Fire flow recommendations are typically much greater in magnitude than the MDD in any local area. Adequate hydraulic capacity for these potentially large fire flow demands controls pipe sizing and system operation.

During a fire flow event or emergency, the minimum service pressure is 20 psi as required by Oregon Health Authority, Drinking Water Services, and OAR 333-061-0025(7). The system should be capable of providing fire flow capacity while simultaneously delivering MDD and maintaining 20 psi throughout the distribution system. The system should meet this criterion with operational storage depleted and firm pumping capacity.

Two fire flow scenarios were requested by the City for evaluation in the Mill Redevelopment Area including 5,000 gpm and 3,500 gpm fire flow demands.

Table 4
Water System Performance Criteria

System Facility	Evaluation Criterion	Value	Design Standard/Guideline
Service Pressure	Normal Range (ADD Conditions)	40-80 psi	AWWA M32
	Maximum without individual PRV	80 psi	AWWA M32, Oregon Plumbing Specialty Code, Section 608.2
	Minimum, during MDD with Fire Flow	20 psi	AWWA M32, OAR 333-061
	Minimum, during PHD	75% of normal, not less than 40 psi	Murraysmith recommended, AWWA M32
	Velocity during PHD	Not to exceed 10 fps	AWWA M32

Distribution Piping	Minimum Pipe Diameter	8-inch recommended for fire flow, except in short mains without fire service	Industry Standard
Required Fire Flow and Duration	Single Family Residential	1,500 gpm for 2 hours	2014 Oregon Fire Code, Scenario 1: Requested by Oregon City
	Medium Density Residential, Commercial	3,000 gpm for 3 hours	
	Public, Industrial	3,500 gpm for 3 hours	
	Public, Industrial	5,000 gpm for 3 hours	Scenario 2: Requested by Oregon City

System Evaluation

Two types of infrastructure improvements are needed to service the proposed Mill Redevelopment Area including modifications to existing PRV stations, and new water lines.

Pressure Reducing Valve Stations

Current PRV settings in both the Paper Mill Zone and Lower Zone result in high pressures exceeding the 80-psi maximum requirement. Additionally, complete isolation of the Paper Mill Zone is unnecessary, as the elevations in this zone are similar to the adjacent Lower Zone. Recommendations to modify PRV stations include the following:

- A reduction in PRV settings for all PRV stations between the Intermediate Zone and the Paper Mill/Lower Zones to maintain maximum pressure below 120 psi and reduce risk of leakage. Recommended settings are provided in Table 5. Individual building PRVs are still required within the pressure zones.

- Combine the Paper Mill and Lower Zones by abandoning the 99E and Main PRV station. A pipe connection routing around the PRV station is required to maintain looped service.

Table 5
Recommended PRV Settings

Valve Name	Valve #	Valve 1 Size	Valve 2 Size	Valve 3 Size	Valve 1 Setting	Valve 2 Setting	Valve 3 Setting	Priority Opening
11th & Washington	1	3	10		67	58		1
15th & Madison	2	1.25	6	10	61	56	51	4
Abernathy & Redland	9	4	8		102	97		3
Apperson & La Rae	10	2	4	6	84	79	77	5
Harley & Forsythe (south)	11	1.5	4		71	66		2
Harley & Forsythe (north)	12	1.5	12		66	61		7
3rd & Bluff	5	3	10		42	39		6
99E & Main	8	3	10		abandon	abandon		n/a

Water Line Improvements

Water line improvements are required to serve the Mill Redevelopment Area. Improvements are focused on upsizing and extension of the pipeline on the proposed roadway running southwest to northeast through the center of the Mill Redevelopment Area. This improvement route eliminates pipeline improvements adjacent to the 3rd and Bluff PRV station and the associated 10-inch piping along the cliff face on Highway 99E that was recently replaced in the Hwy 99E Bluff Waterline Replacement Project. The existing section under the adjacent highway and railroad are also preserved.

To supply a 5,000 gpm fire flow, the pipe size on proposed roadway running southwest to northeast through the center of the Mill Redevelopment Area is recommended at 14-inch diameter with dead-end piping of 16-inches as shown in Figure 2. To supply a 3,500 gpm fire flow, the pipe size is recommended at 12-inch diameter with dead-end piping of 14-inches as shown in Figure 3.

The City's InfoWater hydraulic model was used to evaluate system capacity and size improvements. Figures showing pressure results for the pipe sizing and PRV analysis are provided in Appendix A.

Figure 2
Proposed Water Line Alignments in Mill Redevelopment Area 5,000 gpm Fire Flow

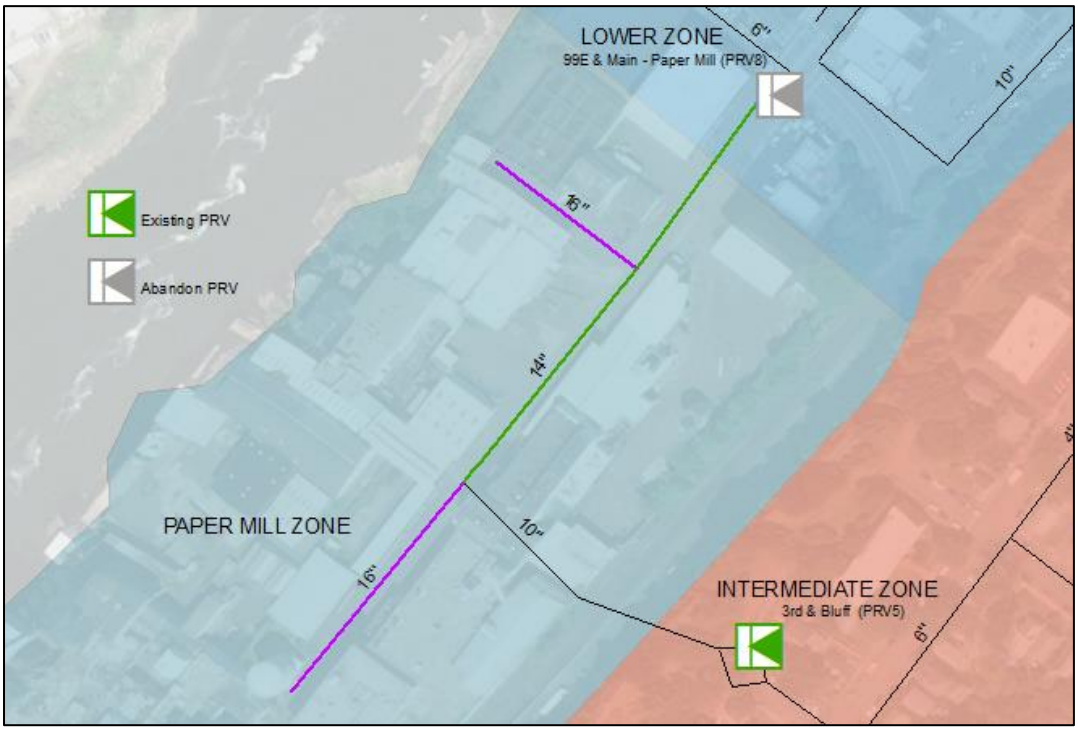
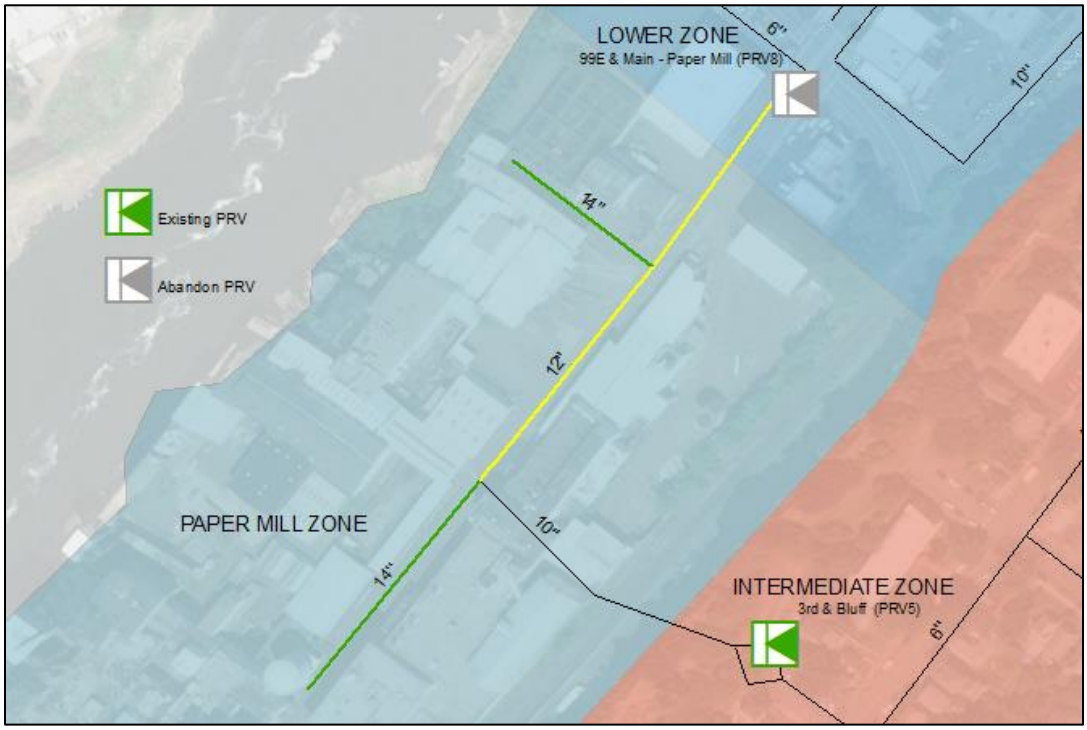


Figure 3
Proposed Water Line Alignments in Mill Redevelopment Area 3,500 gpm Fire Flow



Summary of Recommendations

Development can occur as desired by the City in the Mill Redevelopment Area. Several PRV and piping changes are needed to achieve design criteria specified herein, including combining two pressure zones. Specific changes within the zone include:

- Combination of the Paper Mill Zone and Lower Zone
- Abandonment of the PRV on 99E & Main
- Construction of new mains in the Mill Redevelopment Area
- Adjustments of PRV settings in PRV stations to the new Combined Paper Mill/Lower Zone

SJR:ncj

Appendix A

The City InfoWater hydraulic model was used to perform model simulations for domestic and fire flow demands and evaluate system pressures and velocities. The simulation results are summarized in the following figures.

Figure A1 – Average Day Demand

Figure A2 – Peak Hour Demand

Figure A3 – Maximum Day Demand + 3,500 gpm Fire Flow

Figure A4 – Maximum Day Demand + 5,000 gpm Fire Flow

Figure A1
Results: ADD

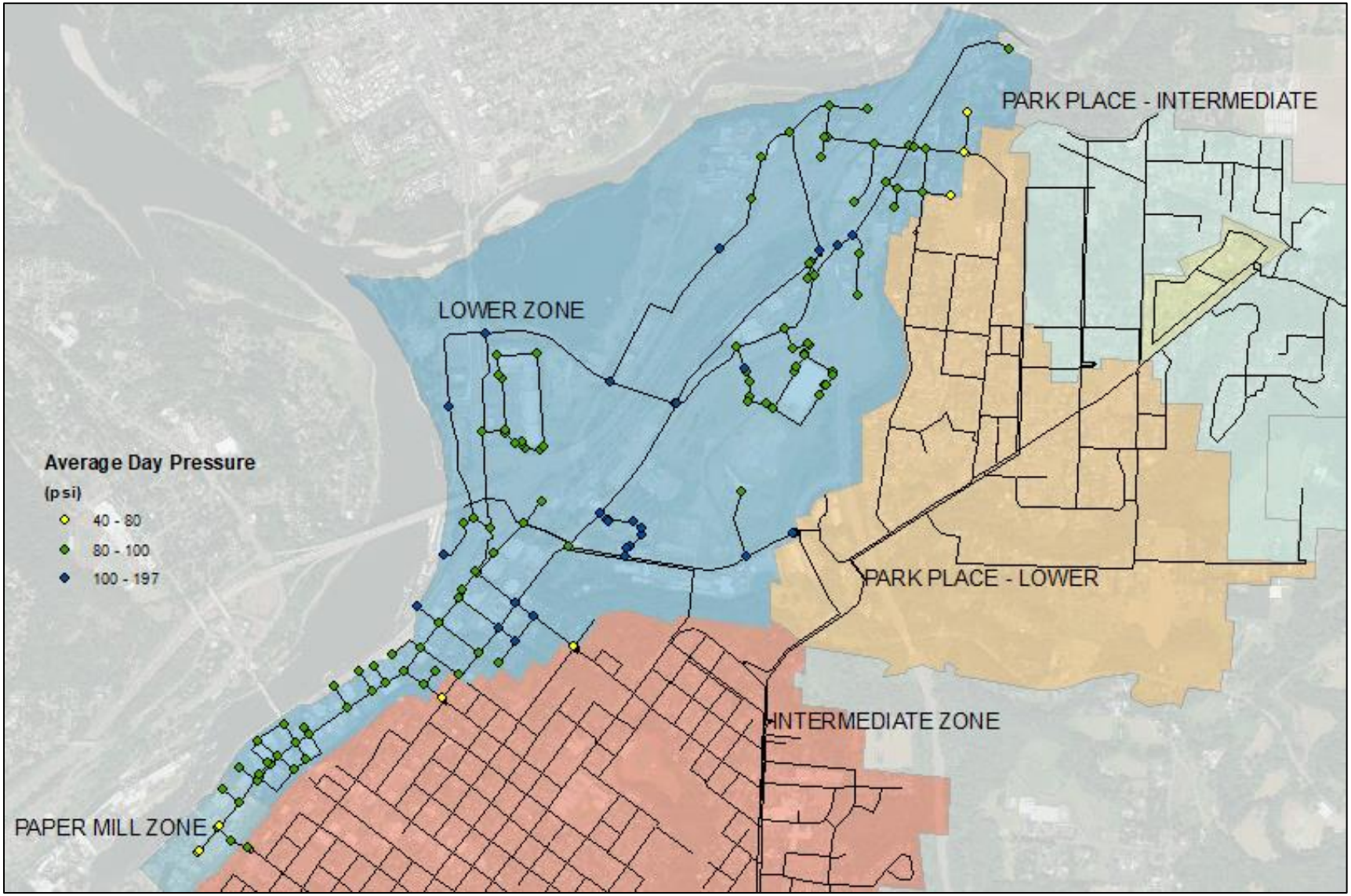


Figure A2
Results: PHD

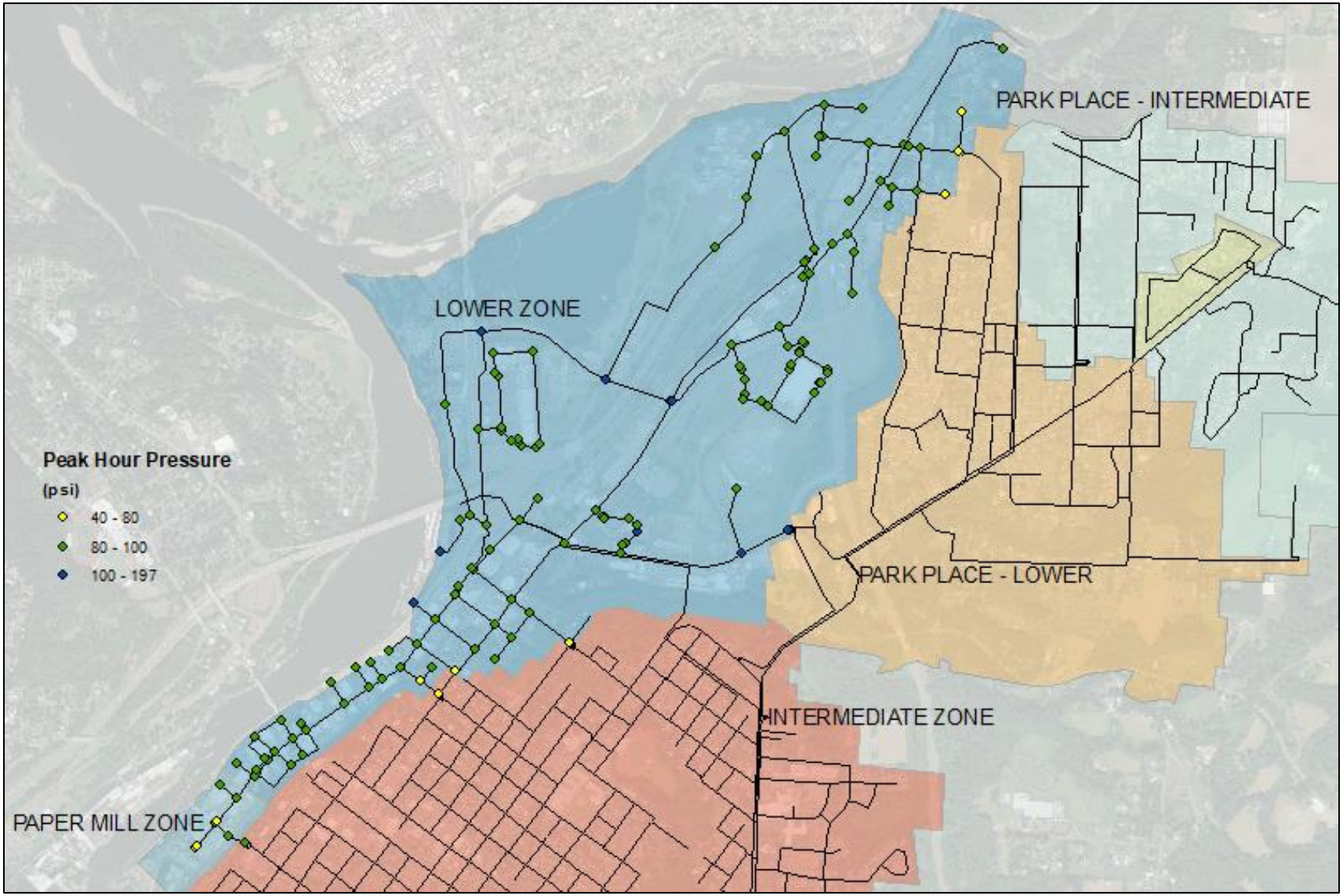


Figure A3
Results: MDD +3,500 gpm Fire Flow

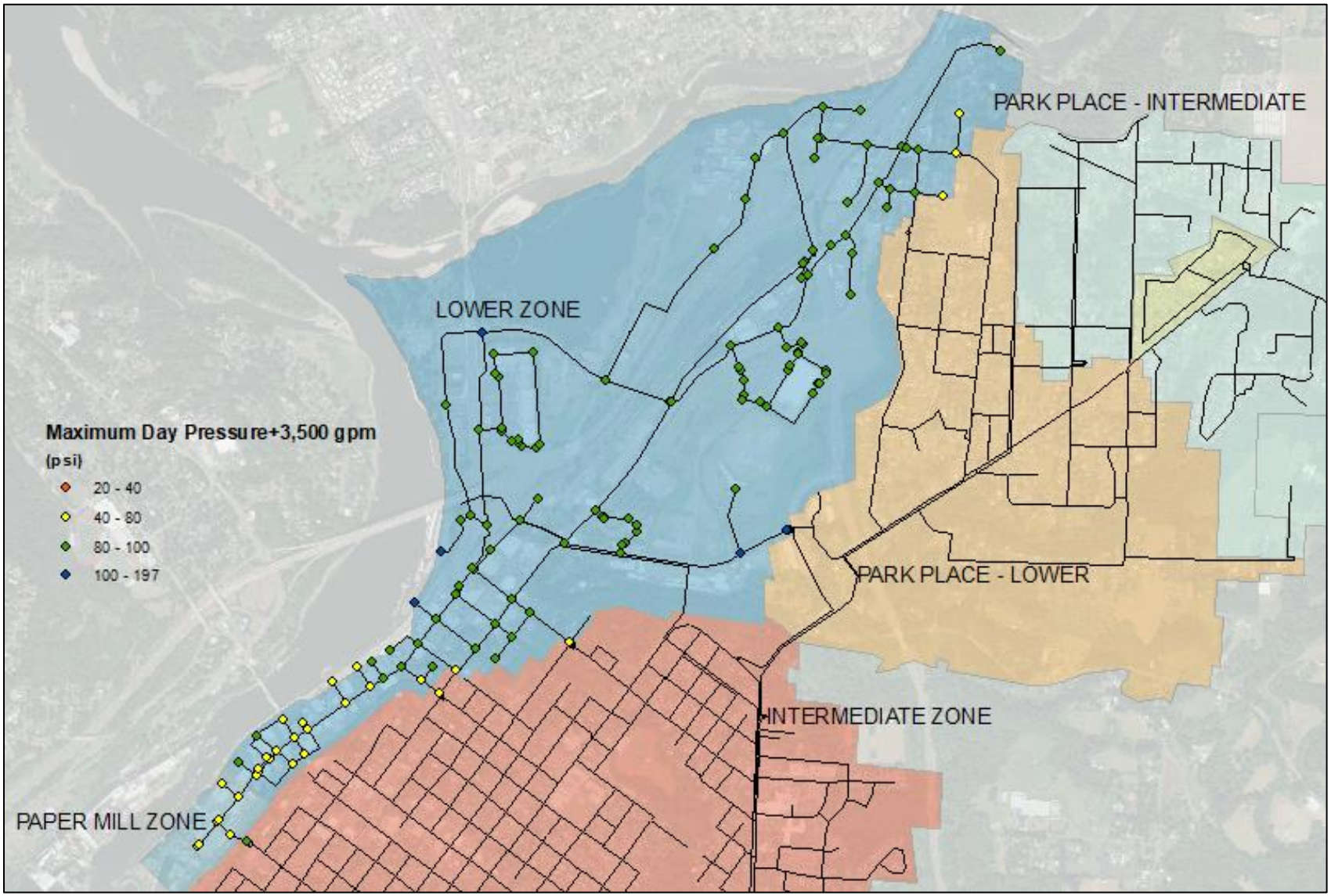
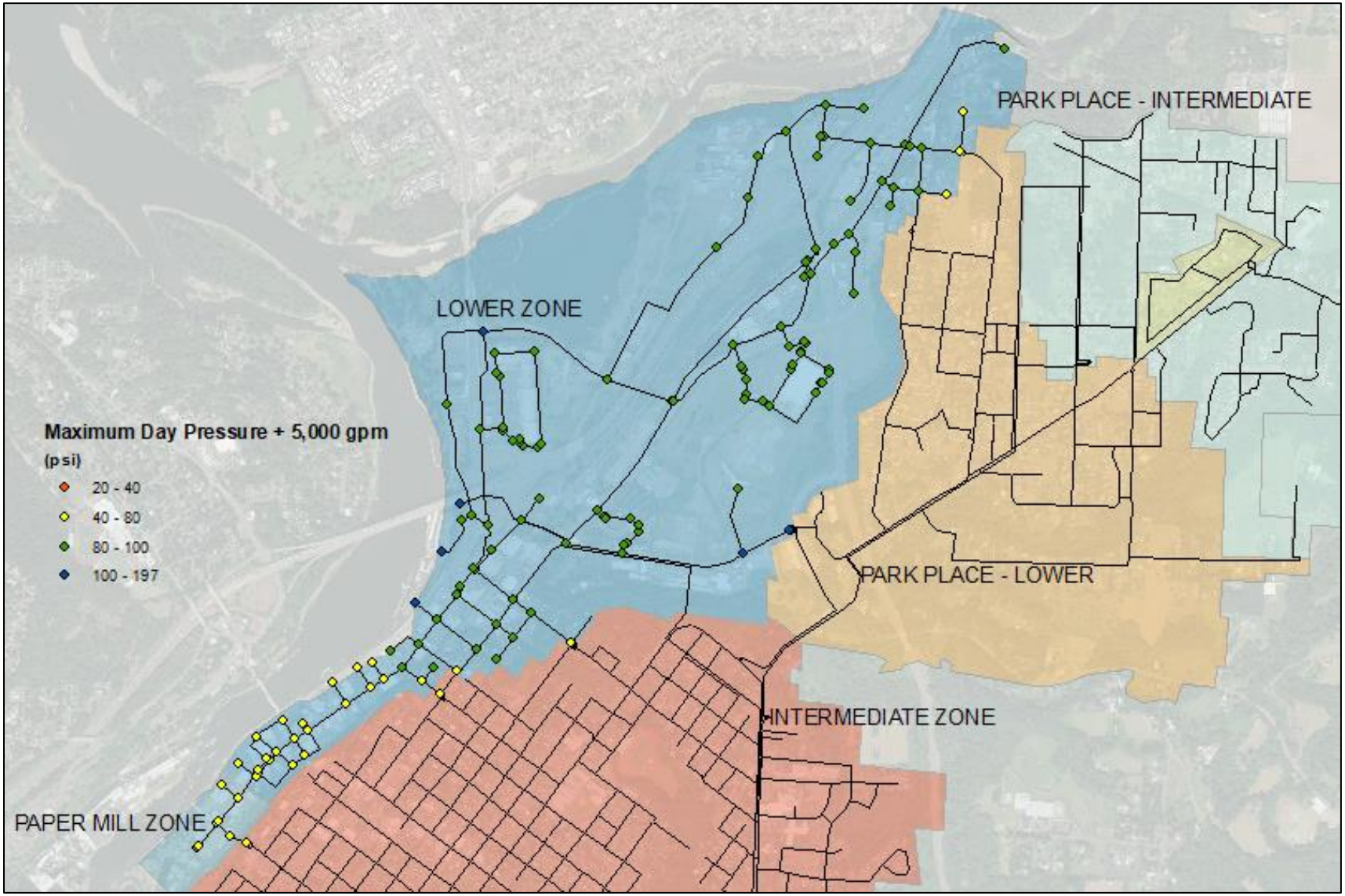
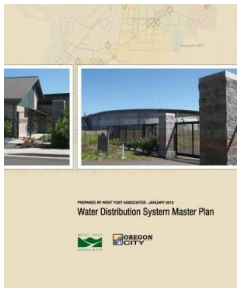


Figure A4
Results: MDD +5,000 gpm Fire Flow





Oregon City's Water Distribution System Master Plan (Water Master Plan) was adopted in February, 2012, and is available on line.

The 2012 **Water Master Plan** presents the results of the water distribution system planning effort conducted for the City of Oregon City. The plan summarizes the components of the existing water distribution system, analyzes local water demand patterns, evaluates the performance of the water system with respect to critical service standards, identifies the improvements necessary to remedy system deficiencies and accommodate future growth. Based on this analysis, the study recommends specific projects for inclusion in the water distribution system Capital Improvement Program (CIP). These projects will ensure that the water distribution system continues to provide adequate and reliable service to the City. Finally, the master plan presents a financing plan that will facilitate successful implementation of the recommended CIP.

OREGON CITY

Community Development – Planning

698 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

LAND USE TRANSMITTAL

DISTRIBUTION OF APPLICATION

- Building Official
- Development Services
- Public Works Operations
- City Engineer
- Public Works Director
- Parks Manager
- Community Services Director
- Police
- Economic Development Manager
- Traffic Engineer
- Natural Resource Committee
- City Manager's Office
- Oregon City Neighborhood Associations
- Clackamas County Transportation
- Clackamas County Planning
- Clackamas Fire District #1
- ODOT – Division Review
- Oregon City School District
- Oregon Department of Fish and Wildlife (ODFW)
- Tri-Met
- Metro
- PGE
- South Fork Water Board
- Hamlet of Beavercreek
- Holcomb Outlook CPO
- Central Point / Leland Road / New Era CPO
- Other – See Email List

HEARING DATE:	City Commission Hearing: December 14, 2020
HEARING BODY:	___Staff Review; _____PC; _____HRB; __X___CC
FILE # & TYPE:	GLUA-19-0002: LEG 19-0001, LEG 19-0005 Stormwater
PROJECT FILE:	https://www.orcity.org/planning/project/glua-19-0-00016-leg-19-00002-amendments-water-master-plan
PLANNER:	Christina Robertson-Gardiner, Senior Planner, 503-496-1564, crobertson@orcity.org
APPLICANT:	Oregon City
OWNER:	Oregon City
REQUEST:	Amendments to the Water Master Plan
LOCATION:	City-Wide

Please send your comments to crobertson@orcity.org by November 30, 2020 to be added to the staff report.

This application material is referred to you for your information, study and official comments. If extra copies are required, please contact the Planning Department. Your recommendations and suggestions will be used to guide the Planning staff when reviewing this proposal. If you wish to have your comments considered and incorporated into the staff report, please return the attached copy of this form to facilitate the processing of this application and insure prompt consideration of your recommendations. Please check the appropriate spaces below.

__XX__ The proposal does not conflict with our interests.
____ The proposal conflicts with our interests for the reasons attached.
____ The proposal would not conflict our interests if the changes noted below are included.

Signed Wes Rogers

Comments:

OREGON CITY

Community Development – Planning

698 Warner Parrott Road | Oregon City OR 97045
Ph (503) 722-3789 | Fax (503) 722-3880

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____ The proposal does not conflict with our interests.
____ The proposal conflicts with our interests for the reasons attached.
_X_ The proposal would not conflict with our interests if the changes noted below are included.

Signed [signature] 10-29-2020

Comments: ***See attached.*** [SENT VIA EMAIL 10-29-2020]

Clackamas River Water

October 29, 2020

City of Oregon City
ATTN: (Via Email)- Christina Robertson-Gardiner; cc: Patty Nelson

RE: GLUA-19-0002, Amendments to the Water Master Plan

As noted on the cover transmittal sheet, the proposed amendment to the City's Water Master Plan would not conflict with the interests of Clackamas River Water (CRW) if the following changes are noted/included:

- CRW may have infrastructure in these areas that is needed to continue to serve parts of the District outside of these areas. Therefore, note that such infrastructure (such as water transmission mains) shall remain the property of CRW regardless of the planning actions taken by the City, in accordance with State statute and the 2018 Joint Engineering Study between the City and CRW.
- Where applicable, infrastructure eligible for reimbursement shall follow the terms of the Remuneration Agreement between the City and CRW.
- If the City intends to construct water infrastructure to serve properties in certain areas still in CRW's service area, the District asks that the City follow established procedures for withdrawal of these areas as outlined by statute.
- CRW infrastructure may exist in certain areas that can currently, or with minor modification, serve properties in some of these areas. CRW remains willing to serve those customers that remain within our boundaries in a manner that can help the City accomplish Goal 11.3 of its Comprehensive Plan ("Water Distribution").
- For further information and clarification, please reference the attached letter dated June 2, 2020, which was previously sent to the City.

CRW welcomes continued discussions with Oregon City regarding coordinated planning for the most cost-effective delivery of water to our customers and citizens. Thank you for the opportunity to provide comment.

Adam M. Bjornstedt, P.E., Chief Engineer
Clackamas River Water

Attachment: Letter dated 6/2/2020 addressing City Resolution 20-15

CC: Todd Heidgerken, CRW

Clackamas River Water

June 2, 2020

Mayor Holladay and Oregon City Commissioners
PO Box 3040
Oregon City, OR 97045
Sent via email to recorderteam@orcity.org

RE: Resolution No. 20-15

Mr. Mayor and Commissioners,

On behalf of Clackamas River Water, I write to provide the following information as you consider adoption of Resolution No. 20-15. It is our understanding from the staff report, reviewing the recording of the May 12 work session and the language contained in the resolution, that it is the intent of the City of Oregon City to be the sole water provider for the Beavercreek Road (Thimble Creek) Concept Area. State statutes are in place to allow cities like Oregon City to become the water service provider for property that has been annexed and then withdrawn from the Clackamas River Water District. Absent a withdrawal by the City, the area continues to be part of the District. Although the area of focus has been annexed by the City, the City has not taken the steps it must take to withdraw that territory from Clackamas River Water. We ask your consideration of the following points:

Clackamas River Water requests that if the City is prepared to be the water service provider, that the process outlined in state statute be followed. This means that if the City is prepared to provide water service to the area, our request is that the area be withdrawn. This simple request is being made to allow for an orderly transition of existing service and proper water planning of the area between Clackamas River Water and the City of Oregon City.

Clackamas River Water has been the identified water provider for some of the area included in the Beavercreek Road (Thimble Creek) Concept Area for many decades. Although the City has annexed the area, much of the area discussed during the May 12 work session has not yet been withdrawn from Clackamas River Water. Since this withdrawal process has not happened, Clackamas River Water continues to be responsible for planning and providing water service to the area. An obvious way to address this issue would be for the City to complete the process and withdraw the area to become the identified water provider. Absent this action, Clackamas River Water will continue to have the duty to serve this area.

Clackamas River Water is not trying to compete with Oregon City to serve the area. It is unfortunate that it has been suggested that Clackamas River Water is attempting to compete to serve the area. As noted above, Clackamas River Water has only asked that if Oregon City is ready and willing to serve the area, that the withdrawal process be followed. This is not a competition; it is simply a request to the City to follow the process set out in statute. Our intent has been to provide water service to Clackamas River

Water customers, some of which, we recognize, may eventually be served by Oregon City once areas have been annexed and withdrawn.

Clackamas River Water has the infrastructure in place to serve the area. With minor improvements, Clackamas River Water can serve the anticipated development in the southern portion of the Beavercreek Road (Thimble Creek) Concept Area. The list of Clackamas River Water improvements indicated in the staff report would not be needed to serve the anticipated development in the southern portion. Development in this area could be served with water without time delay and with only minor improvements.

Clackamas River Water and Oregon City have successful examples of cooperating to provide water service where City infrastructure does not exist. The HOPP (Holcomb, Outlook and Park Place) Agreement is an example were Clackamas River Water and Oregon City worked together to provide service to an area within the City where the City did not have water infrastructure to provide service. There is no reason a similar agreement could not be crafted to allow for the efficient and cost-effective water service to portions of the Beavercreek Road (Thimble Creek) Concept Area.

As you consider the adoption of Resolution No. 20-15 and take steps to provide water service to the Beavercreek Road (Thimble Creek) Concept Area, we would ask that you do this in a manner that is consistent with state statutes. Withdrawal of the area by Oregon City will leave no question about which entity is to provide water service. Absent this action, Clackamas River Water will have a duty to continue to serve the area as it is designated until such time that the City is prepared to complete the withdrawal process.

Thank you for your consideration.

Sincerely,

Todd Heidgerken
General Manager

cc John Lewis
Patty Nelson

From: Adam Bjornstedt
To: Christina Robertson-Gardiner; Patty Nelson
Cc: Adam Bjornstedt
Subject: RE: WMP Amendment - CRW Comments - Clarification request
Date: Monday, December 7, 2020 11:27:03 AM

Please consider this as a clarifying response to CRW's 10/29/2020 letter addressing Oregon City's proposed water master plan amendments. In that letter, the first bullet describes the need to consider existing CRW water infrastructure that is necessary to serve other areas of the District. The comments therein included a reference to the 2018 Joint Engineering Study and state statute. Please note that the reference to the Joint Engineering Study was for information purposes only, since the Study includes some definition and discussion of existing water infrastructure. As long as any action by the City in implementing its Master Plan is done in accordance with state statute, including where existing District water infrastructure exists, CRW takes no exception. The other bullet points of the 10/29/2020 letter remain as written, for the City's consideration.

Respectfully submitted,

Adam M. Bjornstedt, P.E.
Chief Engineer

Clackamas River Water
16770 SE 82nd Drive | Office: 503.722.9246
Clackamas, OR 97015-2439 | Cell: 503-729-1600
www.crwater.com

Note- I can best be reached via email at abjornstedt@crwater.com or cell phone at 503-729-1600.

From: Christina Robertson-Gardiner <crobertson@orcity.org>
Sent: Monday, December 7, 2020 11:11 AM
To: Patty Nelson <pnelson@orcity.org>; Adam Bjornstedt <abjornstedt@crwater.com>

Subject: RE: WMP Amendment - CRW Comments - Clarification request

Patty and Adam,

I will add this email exchange into the record for the agenda that is going out today. However, as this is such a sensitive topic for the City Commission, I would recommend that CRW send a clarifying email to be added to the record for at the Planning Commission hearing on 12.14 if that works for both of you.

What's your Vision for Oregon City?
Christina Robertson-Gardiner, AICP, Senior Planner
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COVID-19 (Coronavirus) Information

*The City of Oregon City is open for business and continues to offer services and programs online and virtually. Some City facilities are open to the public, find current openings **here,** we encourage visitors to wear a mask, practice physical distancing, and reschedule in-person visits if you are feeling unwell. The City has installed additional shielding and is providing hand sanitizer as well as occupancy limits to ensure our staff and visitors have a safe, no touch experience. Our goal is to be responsive to our community throughout this pandemic; we appreciate your understanding and cooperation.*

From: Patty Nelson <pnelson@orcity.org>
Sent: Monday, December 7, 2020 10:57 AM
To: Adam Bjornstedt <abjornstedt@crwater.com>; Christina Robertson-Gardiner <crobertson@orcity.org>
Subject: RE: WMP Amendment - CRW Comments - Clarification request

Christina – Can you please advise if you need something formal from CRW regarding the reference to 2018 Joint Engineering Study. See below

---

From: Adam Bjornstedt <abjornstedt@crwater.com>
Sent: Monday, December 7, 2020 10:54 AM

To: Patty Nelson <pnelson@orcity.org>
Subject: RE: WMP Amendment - CRW Comments - Clarification request

I guess I'm not sure why any edit needs to be made. It's just a general reference- wasn't meant to be something that would hold some sort of legal weight to it. Do we really need to send a statement?

Adam

From: Patty Nelson <pnelson@orcity.org>
Sent: Monday, December 7, 2020 10:50 AM
To: Adam Bjornstedt <abjornstedt@crwater.com>
Subject: RE: WMP Amendment - CRW Comments - Clarification request

Adam – I confirmed with Christina that it would be best if you could send something today to delete that reference in CRW response – that would be best.

Is that possible?

From: Patty Nelson
Sent: Monday, December 7, 2020 10:47 AM
To: Adam Bjornstedt <abjornstedt@crwater.com>
Subject: RE: WMP Amendment - CRW Comments - Clarification request

That is what I was thinking.

I wonder if a redaction of the reference to changes noted needs to be made to delete reference to "2018 Joint Engineering Study between the City and CRW"??

I have an inquiry into Christina in Planning.

From: Adam Bjornstedt <abjornstedt@crwater.com>
Sent: Monday, December 7, 2020 10:02 AM
To: Patty Nelson <pnelson@orcity.org>
Subject: RE: WMP Amendment - CRW Comments - Clarification request

Hi Patty,

Our reference to the JES was simply to capture that the issue of existing infrastructure was partly covered in the "discussion" which led to the study's report. As long as the Remuneration Agreement

and state statute are followed, I don't think you need to specifically mention the study in your commission report.

Adam

From: Patty Nelson <pnelson@orcity.org>
Sent: Monday, December 7, 2020 9:50 AM
To: Adam Bjornstedt <abjornstedt@crwater.com>
Subject: WMP Amendment - CRW Comments - Clarification request

Adam- More specifically here is the comment I am referring to and asking for clarification:

> The amendment would not conflict with the interests of Clackamas River Water (CRW) if the following changes are noted/included:
>
> CRW may have infrastructure in these areas that is needed to continue to serve parts of the District outside of these areas. Therefore, note that such infrastructure (such as water 3transmission mains) shall remain the property of CRW regardless of the planning actions taken by the City, in accordance with State statute and the 2018 Joint Engineering Study between the City and CRW

The remuneration agreement covers infrastructure transfers and compensation. State statute outlines the process. What in the 2018 Joint Engineering Study is CRW referencing here? Is this a left over from the letter to the Commission when we had our resolution regarding service?

M. Patty Nelson, P.E.

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to wear a mask, practice physical distancing, and reschedule in-person visits if you are feeling unwell.

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