City of Sherwood Oregon

Home of the Tualatin River National Wildlife Refuge

RESOLUTION 2011-078

A RESOLUTION AUTHORIZING THE CITY MANAGER TO ENTER INTO AN INTERGOVERNMENTAL AGREEMENT (IGA) BETWEEN THE CITIES OF SHERWOOD AND WILSONVILLE REGARDING ADOPTION OF AN INTERIM WATER TREATMENT AND SUPPLY AGREEMENT INCLUDING A METHODOLOGY AND RELATED PROVISIONS FOR INTERIM WATER TREATMENT AND PRODUCTION RATES AND WHEELING RATES FOR PRODUCTION / DELIVERY OF WATER TO SHERWOOD FOLLOWING COMPLETION OF THE METER VAULT PROJECT AND CONTINUING UNTIL SEGMENT 3 OF THE 48 INCH TRANSMISSION LINE IS IN PLACE AND IS FULLY OPERATIONAL, AND THIS AGREEMENT IS REPLACED BY A PERMANENT WATER SUPPLY AGREEMENT BETWEEN THE PARTIES

WHEREAS, Sherwood and Wilsonville entered into a temporary water agreement per the terms outlined in Resolution 2011-005; and

WHEREAS, it is recognized by both parties that it is necessary to enter into this intergovernmental agreement, attached as Exhibit A, until completion of Segment 3; and

WHEREAS, the parties have the authority to enter into this agreement pursuant to their applicable charters, principals acts and ORS190.003 -190.030.

NOW, THEREFORE, THE CITY OF SHERWOOD RESOLVES AS FOLLOWS:

Section 1. The City Manager is authorized to enter into an Intergovernmental Agreement with the City of Wilsonville, attached as Exhibit A.

Section 2. This Resolution shall be effective upon its approval and adoption.

Duly passed by the City Council this 20th day of September 2011.

Keith S. Mays, Mayor

Attest:

Sylvia Murphy, CMC, City Recorder

AN INTERGOVERNMENTAL AGREEMENT BETWEEN THE CITIES OF SHERWOOD AND WILSONVILLE REGARDING ADOPTION OF AN INTERIM WATER TREATMENT AND SUPPLY AGREEMENT INCLUDING A METHODOLOGY AND RELATED PROVISIONS FOR INTERIM WATER TREATMENT AND PRODUCTION RATES AND WHEELING RATES FOR PRODUCTION/DELIVERY OF WATER TO SHERWOOD FOLLOWING COMPLETION OF THE METER VAULT PROJECT AND CONTINUING UNTIL SEGMENT 3 OF THE 48-INCH TRANSMISSION LINE IS IN PLACE AND IS FULLY OPERATIONAL, AND THIS AGREEMENT IS REPLACED BY A PERMANENT WATER SUPPLY AGREEMENT BETWEEN THE PARTIES

This Agreement ("Agreement") is made and entered into this ___ day of _____, 2011, by and between the City of Sherwood, an Oregon municipal corporation ("Sherwood"), and the City of Wilsonville, an Oregon municipal corporation ("Wilsonville"), referred to collectively as ("the Parties").

Recitals

The Parties agree upon the following Recitals:

A. WHEREAS, originally Tualatin Valley Water District ("TVWD") and Wilsonville partnered to construct and own undivided ownership shares in the Willamette River Water Treatment Plant ("WRWTP") and appurtenances thereto from the raw water intake in the Willamette River through Segment 1 of the finished water 63-inch water transmission line (Supply Facilities). The treatment plant portion of the WRWTP has a current designed capacity of 15 mgd. Subsequently, based on certain conditions Wilsonville consented to Sherwood's purchasing certain interests in the WRWTP Supply Facilities from TVWD's interests, which included a capacity purchase from TVWD of TVWD's 1/3 or 5 mgd of the 15 mgd capacity, while Wilsonville owns 2/3 or 10 mgd of WRWTP capacity. In addition, Wilsonville and TVWD own larger capacity interests in other appurtenant facilities.

B. WHEREAS, Sherwood and Wilsonville entered into agreements whereby Wilsonville had constructed or would construct and Sherwood would purchase capacity in Segments 2, 4, and 5A of 48-inch diameter water transmission lines within Wilsonville, which in

conjunction with the WRWTP and other facilities will jointly serve both cities with a permanent potable water supply. All these segments are now constructed and capacity purchased under the terms of the agreements. Together these already constructed transmission facilities are 8,183 lf in length and represent a present joint investment of $7,313,838. Sherwood and Wilsonville each own 1/2 of the capacity of Segment 2. Sherwood owns 2/3 of the capacity of Segments 4 and 5A, while Wilsonville owns the remaining 1/3 capacity of each.

C. WHEREAS, Sherwood has constructed and owns 18,000 lf of 48-inch diameter transmission (Segments 6-9) from a point connecting to the Tooze Road Meter Vault described herein and continuing to a recently constructed Sherwood Reservoir (Snyder Park - 4 mgd capacity) which is also owned by the City of Sherwood. The cost of the construction of these Sherwood transmission facilities, not including the cost of the Snyder Park Reservoir, is estimated to be in excess of $11,630,000. Completion of construction of these transmission segments had been estimated to occur in the spring of 2011 by Emery and Son's (Emery), Sherwood's General Contractor. Actual completion occurred in December 2010. In order for Sherwood to accept these new transmission facilities, the facilities needed to be pressure tested and flushed, and then maintained and refreshed with a required maximum amount of potable water (400 gpm). The source of this water is from the WRWTP and the Water Distribution System of the City of Wilsonville. A Temporary Water Supply Agreement was negotiated between the parties for the 400 gpm water supply to permit pressure testing, flushing, and line maintenance. An Agreement reflecting those negotiations was adopted by the Parties on January 11, 2011.

D. WHEREAS, it has been long recognized and agreed to by the Parties that full use of the collectively owned 48-inch transmission linkage between the WRWTP and the City of Sherwood will not occur until the 2500 lf of Segment 3 48-inch diameter transmission is constructed by Wilsonville. This transmission project is a part of a significantly larger project involving the extension of Kinsman Road from Barber Road to Boeckman Road, and the allied construction of sanitary and storm lines. This Project also requires substantial Environmental Permitting because it traverses wetlands, a FEMA established Floodway/Flood Plain, Bonneville Power Administration (BPA) transmission line, and acquisition of property interest from private

property owners. Presently completion of Segment 3 is estimated by Wilsonville to occur in 2014, but the Parties recognize this is a soft estimate given the permitting and acquisition issues stated above. However, late developments indicate the possibility of discrete permitting and construction of this transmission line segment, separate from the other portions of the overall project. The Parties are working collectively and in good faith to achieve that result. This Project is now proceeding through Preliminary Design and Engineering prior to beginning formal regulatory permitting. The Parties will separately negotiate terms of an Agreement wherein Sherwood would front the costs relating to the water transmission portion of this Project subject to Wilsonville reimbursement of its share of water transmission project costs.

E. WHEREAS, the Parties have also negotiated successfully the design and proposed construction of the Tooze Road Meter Vault facility and appurtenant small segment of 48-inch diameter transmission line (Segment 5B), collectively referred to as the Meter Vault Project. The Meter Vault Project will link previously constructed Transmission Segments 5A and 6, provide required metering and flow control facilities for water flowing to Sherwood, and house pressure reducing valves and transmission lines to serve existing and planned Wilsonville's distribution and reservoir systems. The Parties adopted an Agreement authorizing the construction of these improvements on January 11, 2011. Current estimated total project costs are $1,296,030 net of Sherwood's construction of a 24-inch water line as discussed below and an authorized change order with Emery estimated to be approximately $50,000. Completion of the Meter Vault Project is anticipated in September 2011. Sherwood has agreed to advance funding of its proportionate share of the Project, as well as advance funding and construction of the extension of a Wilsonville 24-inch diameter transmission line which will be a wholly owned Wilsonville component of this Project. The specific terms of this Project are the subject of the Tooze Road Meter Vault Agreement and the aforementioned Temporary Water Supply Agreement referred to in these recitals.

F. WHEREAS, the unanticipated early completion of Segments 6-9 of 48-inch diameter transmission by Sherwood in December 2010 and the estimated completion of the Tooze Road Meter Vault in September 2011 left a short but very important period (this period has been extended to no earlier than October 1, 2011 because of Sherwood's contract with the

Portland Water Bureau (PWB) for interruptible water when temporary water supply to Sherwood in an amount not to exceed 400 gpm will be required as explained in Recital C above). The Parties developed a way to provide temporary water supply during this period by the advance construction by Sherwood of a 24-inch diameter transmission line extension. This transmission line extension previously was a part of the Meter Vault Project, referenced in Recital E above, to serve Wilsonville permanently with potable water through the Tooze Road Meter Vault. All required real property has been acquired by Wilsonville for the construction of the Tooze Road Meter Vault and this line extension and its connection to Sherwood's Segment 6 transmission line. Sherwood proposed to construct these facilities by means of a change order to its Segment 6 contract with Emery and to pay for the redesign associated with advancing the 24-inch line extension and to front costs for this Project subject to reimbursement of Wilsonville's share through credits against future temporary and interim water sales to Sherwood. The specific terms of this Project are contained in the Temporary Water Supply Agreement between the Parties. Sherwood subsequently executed a change order for the Project in the amount $276,000. Total project costs are estimated to be $308,000. The project is 99% completed. It is anticipated by the Parties that these change order improvements will be in place and operational well before October 1, 2011.

G. WHEREAS, the Parties have negotiated this Interim Water Supply Agreement, which will involve temporary wheeling of surplus water to Sherwood of up to 2.5 mgd of WRWTP potable water through jointly owned Sherwood and Wilsonville transmission lines and also partially through Wilsonville existing distribution lines until such time as Segment 3 is completed and on line. The Parties commissioned Montgomery Watson Harza, Inc. ("MWH") to perform a hydraulic capacity analysis of current WRWTP and Wilsonville facility capacity to ensure that the 2.5 mgd is currently available through the distribution system in addition to Wilsonville's ongoing and projected needs. MWH completed this analysis on February 22, 2011 and concluded that ample capacity was available to accomplish this. A copy of this hydraulic capacity analysis is attached hereto as Exhibit A and incorporated herein by reference. The Parties also contracted with the Galardi Rothstein Group to develop and recommend a methodology and estimated rates of interim water treatment and production and associated

wheeling rates for production/delivery of water to Sherwood following completion of the Meter Vault Project described above and continuing until Segment 3 of the jointly owned 48-inch transmission line is in place and operational. The Final Interim Water Production and Delivery Rate analysis is attached as Exhibit B and incorporated herein by reference. These and related matters are the subject of this Agreement between the parties.

H. WHEREAS, Sherwood and Wilsonville agree to the terms of Interim Water Supply, including the methodology and estimates of Interim Water Treatment and Production Rates and Wheeling Rates, and related matters as set forth in this Agreement.

I. WHEREAS, it is recognized by the Parties that it is necessary to enter into this Intergovernmental Cooperative Agreement through ORS Chapter 190 to provide for the adoption of an Interim Water Supply Agreement, including a methodology and estimates of interim water treatment and wheeling rates, and related provisions.

J. WHEREAS, the Parties have the authority to enter into this Agreement pursuant to their applicable charters, principal acts, and ORS 190.003 – 190.030.

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. Recitals. The recitals set forth above are incorporated by reference and made a part of this Agreement.

2. Consideration. In consideration of the terms and conditions set forth below, the Parties enter into this Agreement.

3. Term. The effective term of this Agreement shall be the later of October 1, 2011 or the date of the completion and operation of the Tooze Road Meter Vault Project and appurtenant facilities more particularly described in the Meter Vault Project agreement previously executed by the Parties on January 11, 2011. The Parties agree to exercise due diligence and good faith efforts to conclude negotiations regarding a Segment 3 IGA by October 15, 2011 This Agreement shall then continue until it is replaced by a Permanent Water Supply

Agreement between the Parties at a time after completion and fully operational status of Segment 3 is achieved.

4. Purpose and Framework. As described in the Recitals of this Agreement, the purpose of the Agreement is to set out the terms between the parties whereby Sherwood will receive an Interim Supply of water not to exceed a peak demand of 2.5 mgd. Peak demand is generally during the months of June through September. The Parties share ownership of 15 mgd of the capacity of the water treatment and production of the WRWTP. Wilsonville owns 10 mgd of the capacity and Sherwood owns the remaining 5 mgd through its purchase from TVWD. During the term of this Agreement, it is estimated that joint average daily demand by the Parties during the Interim Period will not exceed 4.75 mgd, with Wilsonville receiving 2.80 mgd and Sherwood 1.67 mgd. It is estimated that joint peak use by the Parties during the Interim Period will not exceed 12.5 mgd, with WV receiving 10 mgd and Sherwood 2.5 mgd. The Projected Water Production of the WRWTP and estimated respective water usage of the parties is set out more specifically in Table 1 of Exhibit B.

The Parties have previously contracted with MWH to perform a hydraulic capacity analysis of WRWTP, jointly owned Wilsonville Sherwood facilities, and Wilsonville facilities which analysis determined that there is ample current capacity to meet the water requirements set forth in this Agreement. The Parties are jointly relying on that assessment and opinion. The MWH hydraulic capacity analysis is set out in Exhibit A and incorporated herein by reference.

The Parties also contracted with the Galardi Rothstein Group to develop and recommend a methodology and estimated rates of interim water treatment and production and associated wheeling rates for the production/delivery of WRWTP water to Sherwood following completion of the Meter Vault Project described above and continuing until Segment 3 of the jointly owned 48 inch transmission is in place and fully operational. The Final Interim Water Production and Delivery Rate Analysis (hereinafter referred to as the "Interim Rate Analysis") is attached as Exhibit B and incorporated herein by reference. The Parties have approved this study as the basis for water rates for Sherwood and Wilsonville during the Interim Period. The operational

implementation structure of the Interim Rate Analysis is set forth more definitely in the following Section.

5. Operational Implementation Structure of the Interim Rate Analysis. The Interim Rate Analysis described above establishes a methodology for treatment and production of potable water and estimated rates for Sherwood and for Wilsonville. The methodology and the resultant rates are based upon estimated costs for production and treatment as well as respective water consumption levels of the Parties for each year or partial year of the Interim Period. In contrast, the wheeling rates are applicable only to Sherwood as they reflect a charge for temporary wheeling through a portion of the Wilsonville distribution system. There is a separate methodology for the computation of that rate based upon estimated Sherwood peak usage during each year of the Interim Period. The Interim Rate Analysis establishes an estimated treatment and production rate for the first year of the Interim Period based upon estimated costs for the treatment and production of water for that year and upon a five year average of past usage by Wilsonville, and by estimated limited usage during the Interim Period by Sherwood assuming continued partial supply from Sherwood ground water resources and other sources of supply. The estimated rate for the first year is $1.24/ccf. The wheeling rate for Sherwood based upon anticipated peak usage by Sherwood of 2.5 mgd is $.045/ccf.

At the end of each fiscal year, there will be a true up of rates for treatment and production based on respective actual water usage of the Parties and actual treatment and production costs, and for wheeling, upon the actual peak water demand by Sherwood. The rate true up will occur in conjunction with the process set forth in the Operation and Maintenance Contract among Wilsonville, TVWD, and Veolia Water North America (Veolia) for a report of actual costs for treatment and water production by Veolia which are due no later than August 1 of each year. The first year of the Interim Period will be foreshortened as the first year of the Interim Period will commence no earlier than October 1, 2011. It will end on June 30, 2012 so as to track with the fiscal year term of the Wilsonville, TVWD, and Veolia Operation and Maintenance (O&M) Agreement. Subsequent years may also be foreshortened contingent upon the date of termination of the Interim Period. Wilsonville and Sherwood will deliver their respective water consumption

figures to Galardi Rothstein no later than July 15 following June 30 of each year of the Interim Period.

Galardi Rothstein will calculate actual treatment and production rates for the Parties based upon actual costs of treatment and production and respective water usage for the preceding year, and for Sherwood, wheeling charges based upon peak usage for the preceding year. Galardi Rothstein will prepare a Report setting forth their conclusions in this regard no later than September 1 of each year. The Parties have 30 days to present comment or rebuttal. If there remains disagreement by a Party as to the Final Rates as determined by Galardi Rothstein, the Dispute Resolution provisions of this Agreement are the sole remedy available to the Parties. The final true up of rates for a given year shall be reflected by a rate credit or debit to the respective Parties in the succeeding rate year. The cost of the services of Galardi Rothstein in the true up process shall be shared equally by the parties.

6. Future Good Faith Negotiations among the Parties. By this Agreement Sherwood assumes a new relationship and responsibilities to the WRWTP and to Wilsonville and TVWD. The Accord Agreement executed between Wilsonville and TVWD on 19 June 2001 at Section 8.1 acknowledges the intent of both Wilsonville and TVWD in the future "...to cooperate with the other in reaching accord in the future including, but not limited to, financing for future costs and expenses." That time has now come to implement this process, not because of TVWD's use of WRWTP water but because Sherwood, through TVWD, has invoked its use. In keeping with the previous agreements entered into by the parties and the conditions agreed upon therein for the consent provided by Wilsonville to the purchase by Sherwood from TVWD as recited above, Wilsonville and Sherwood pledge their good faith efforts to work among themselves and TVWD to reach a fair and equitable resolution of these matters. IGAs for Segment 2, 3, 4, 5, 5A and the Meter Vault separately deal with O&M of the jointly owned supply facilities not covered by this Agreement.

7. Dispute/Attorneys Fees. If a dispute arises between the Parties regarding breach of this Agreement or interpretation of any term of this Agreement, the Parties shall first attempt to resolve the dispute by negotiation, followed by mediation and arbitration.

Step One: The respective City Managers of the Parties or their designees are designated to negotiate on behalf of the Party each represents. If the dispute is resolved at this Step One, there shall be a written determination of such resolution, signed by each Party's Manager and ratified by each governing body, if required by the governing body, which shall be binding upon the Parties. Step One will be deemed complete when a Party delivers notice in writing to the other Parties that the Party desires to proceed to Step Two.

Step Two: If the dispute cannot be resolved within 10 days at Step One, or earlier after written notice given by a party, the Parties shall submit the matter to non-binding mediation by a professional engineer with demonstrated substantial experience in the design, construction and operation of complex municipal treatment, transmission, distribution, and storage systems. The Parties shall attempt to agree on a mediator. If they cannot agree, the Parties shall request a list of five mediators from an entity or firm experienced in providing engineering mediation services who do not have an existing professional relationship with either Party. The Parties will mutually agree upon a mediator from the list provided. Any common costs of mediation shall be borne equally by the Parties who shall each bear their own costs and fees. If the issue(s) is resolved at this Step Two, a written determination of such resolution shall be signed by each Manager and approved by their respective governing bodies, if necessary.

Step Three: If mediation does not resolve the issue within 45 days of submission of the issue to mediation, the matter will be referred to binding arbitration by a panel of three arbitrators who are professional engineers with demonstrated substantial experience in the design, construction and operation of complex municipal treatment, transmission, distribution, and storage systems. One arbitrator will be chosen by each Party and those two arbitrators chosen will choose a third arbitrator. No panel member may have an on-going professional relationship to either Party. The arbitration panel will reasonably endeavor to reach a decision on the dispute within 60 days of its submission to the panel. The decision shall be binding on both Parties and there shall be no right of further appeal. The prevailing Party shall be entitled to its reasonable attorneys fees as shall be awarded by the arbitration panel.

8. Breach. If a Party defaults under the terms of this Agreement, then upon twenty 20 days written notice, the defaulting Party shall undertake steps to commence cure of the breach within a reasonable time, depending on the circumstances. In the event there is a dispute over the amount to be paid, the undisputed amount shall be paid immediately and the Agreement shall not be in default while the solution to the disputed payment portion is resolved under Section 7. The Parties understand and agree that water service is critical to each Party's customers and that monetary damages may be an insufficient remedy considering the infrastructure involved. Therefore, the Parties expressly agree that equitable remedies such as injunction or specific performance are specifically contemplated and allowed by this Agreement.

9. Notices. Notices regarding operation, maintenance, repair, replacement, breach, termination, renewal or other issues shall be deemed sufficient if deposited in the United States Mail, First Class, postage prepaid, addressed to the Parties as follows:

City Manager
City of Sherwood
22560 SW Pine Street
Sherwood, OR 97140

City Manager
City of Wilsonville
29799 SW Town Center Loop E
Wilsonville, OR 97070

10. Insurance and Indemnity. To the full extent permitted by law, each Party agrees to indemnify and hold harmless the other, its counsel, officers, employees, and agents from any and all claims, demands, damages, actions, or other harm caused by the sole negligence or intentional acts of that Party, including any attorneys fees or other costs of defense. Further, independent of the indemnity obligation, and as may be allowed under law, each Party agrees to maintain general liability insurance in an amount not less than Oregon Tort Claim limits applicable to public agencies as set forth in ORS 30.260 – 30.300.

11. Succession. This Agreement shall be binding upon any successors to the respective Parties, which through merger, consolidation or other means, including a lawful transfer by Sherwood to the Willamette River Water Coalition ("WRWC"), succeeds to the water supply treatment and distribution and transmission functions of that Party. No transfer to a private, nonpublic entity is permissible without the consent of both parties.

12. Amendment. The terms of this Agreement may be amended or supplemented by mutual agreement of the Parties. Any amendment or supplement shall be in writing and shall refer specifically to this Agreement, and which shall be executed by the Parties.

13. Good Faith and Cooperation. The Parties agree and represent to each other good faith, complete cooperation, and due diligence in the performance in all obligations of the Parties pursuant to this Agreement.

14. Governing Law. This Agreement is governed by the laws of the State of Oregon.

15. Counterparts. This Agreement may be signed in two counterparts, each of which shall be deemed as an original and, when taken together, shall constitute one and the same agreement.

16. Instruments of Further Assurance. From time to time, at the request of either Party, each Party shall, without further consideration, execute and deliver such further instruments and shall take such further action as may be reasonably required to fully effectuate the purposes of this Agreement.

17. Severability. In case any one or more of the provisions contained in this Agreement shall be judicially deemed invalid, illegal, or unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions contained herein shall not in any way be affected or impaired thereby.

IN WITNESS WHEREOF, the Parties have, pursuant to official action of their respective governing bodies duly authorizing the same, caused their respective officers to execute this Agreement on their behalf.

CITY OF SHERWOOD

An Oregon municipal corporation

_____
City Manager

_____
City Recorder

APPROVED AS TO FORM

_____
City Attorney

CITY OF WILSONVILLE

An Oregon municipal corporation

_____
City Manager

_____
City Recorder

APPROVED AS TO FORM

_____
City Attorney

MWH

TECHNICAL MEMORANDUM

Project:	City of Wilsonville, OR Water Model Update
Subject:	Hydraulic Analysis – Update Task 1 and Task 2
Prepared For:	Eric Mende, P.E., CFM, City of Wilsonville
Prepared By:	Brenna Mannion
Reviewed By:	Christopher Michalos Corie Peterson
Date:	August 5, 2011

WATER SYSTEM HYDRAULIC MODEL UPDATE

The City of Wilsonville (the City) contracted MWH to update the Wilsonville potable water system hydraulic model that will be detailed in this technical memorandum. The existing model was previously developed by MWH using MWH Soft's H2ONet Analyzer software.

MWH's Technical Memorandum (TM), dated February 22, 2011 summarized the results of the previous updated hydraulic model runs, and this memorandum is an update to that work. The model was developed to deliver 5 MGD to the City of Sherwood and 10 MGD to the City of Wilsonville from the Willamette River Water Treatment Plant (WRWTP). The purpose of the previous model was to document the demand and distribution system updates made to the Wilsonville hydraulic model and provide the City with a revised hydraulic analysis based on the updated model. The model was specifically used to verify that the Hydraulic Criteria 1 and 2 as defined below will continuously be met when supplying a range of Wilsonville and City of Sherwood demands:

Criteria 1: The City of Wilsonville's water distribution system must be able to provide a minimum Hydraulic Grade Line (HGL) of 390 feet at the connection point to the City of Sherwood transmission pipeline at the intersection of Tooze Road and Westfall Road without negatively impacting the City of Wilsonville's ability to meet its local demands. The required HGL of 390 feet is based on information provided by the City of Sherwood's consultant (MSA, Inc.).

Criteria 2: The City of Wilsonville water distribution system must be hydraulically balanced and allow for normal operation of the Elligsen reservoir. Under Peak day conditions (the modeled flow scenario), the reservoir should remain full or shall be filling off of the system pressure. For the scenarios to be acceptable, the reservoirs should not be draining into the system. If a reservoir

is draining during a peak day demand scenario, then the existing pump capacity was considered inadequate.

The purpose of this technical memorandum is to modify the Sherwood connection system updates made to the Wilsonville hydraulic model and provide the City with a revised hydraulic analysis based on the updated model. These updates are the transmission main from Tooze Road to the Snyder Park Reservoir and the change of the future Pressure Relief Valves (PRV's) at Tooze Road to Flow Control Valves (FCV's). The model was specifically used to verify that the Hydraulic Criteria 1 and 2 as defined above will continuously be met when supplying a range of Wilsonville and City of Sherwood demands.

MODEL ASSUMPTIONS

The following assumptions were used in the analysis:

- The City of Sherwood will connect to the transmission pipeline within the City of Wilsonville via a pipeline at the intersection of Tooze Road and Westfall Road. City of Sherwood will require a minimum HGL of 390 feet at this connection point to allow adequate flow to its Snyder Park reservoir.

- The supply to the City of Sherwood is represented in the model:

    - For Scenarios 1 & 2 as a demand on Junction 4042.
    - For Scenarios 3 &4 as a fixed head reservoir with a head of 408.5 ft. [Finished floor elevation = 383.5 ft. (from the MSA Site Piping Plan Sheet C-4) and a Maximum Water Elevation of 25 ft.]

- The pumps at the Elligsen pump station are not in operation during the hydraulic simulation.

- The Elligsen reservoirs are assumed to be nearly full with a Water Surface Level (WSL) of 396.7 feet. The maximum WSL is 400.0.

- The clearwell at the WRWTP was assumed to have a water surface elevation of 119 feet.

PIPE NETWORK & MODEL JUNCTIONS

Updating the modeled pipe network was the first task performed. Key high and low elevations along the transmission pipeline to Sherwood were modeled as junctions along this pipeline. All pipe information came from the "Waterline Schedule D Plan and Profile" sheets from MSA dated June 2009.

New pipes were assigned an identifier (ID) according to the current scheme for the Wilsonville Model. Each pipe was given an ID starting with "WL" followed by a numeric number. New junctions were also added to the current H2ONet model. New junctions were given a sequential number starting at 4000.

Hazen-William C-factors, which represent pipe roughness, were assigned to all new pipes added to the model. A value of 140 was assigned to all new pipes, which represents a new, smooth pipe. No minor-loss values were assigned to the new pipes. These values are consistent with new pipes previously added to the model. The existing model pipe C-factors were not changed.

BASE MODEL PIPING/DEMAND SCENARIOS

No demand assignments were changed in this modeling task.

FUTURE PIPING/DEMAND SCENARIOS

The model was also updated to include future water system improvement projects. The future water systems improvements were categorized into the following three categories:

i) An Average Day Demand (ADD) of 5.0 MGD for Sherwood was applied at the Synder Reservoir connection and an ADD of 10.0 MGD was applied to the Wilsonville distribution system by scaling up the base model demands. Water is delivered to the Sherwood connection through the existing Wilsonville distribution system using existing 18-inch diameter distribution mains off of the lower section of the 48-inch diameter transmission main. The Kinsman extension and the West Side Reservoir were not included in this future scenario analysis.

   Under this scenario three high service duty pumps are running to produce the required flow of 15 MGD. The smaller jockey pump is not running.

ii) An ADD of 5.0 MGD for Sherwood was applied at the Synder Park Reservoir connection and an ADD of 10.0 MGD was applied to the Wilsonville distribution system by scaling up the base model demands. Water is delivered to the Sherwood connection through the completed 48-inch diameter transmission line. The Kinsman extension and the West Side Reservoir along with the two future FCVs were included for the analysis. The PCV is located at Kinsman/Boeckman Road crossing, and at FCV's at Tooze Road/Westfall Road crossing. The Tooze Road/Westfall Road crossing FCV vault will house two FCVs, one on the transmission line to the West Side reservoir (FCV-1) and one on the Sherwood transmission line (FCV-2).

   Under this scenario it is assumed that three new duty pumps are running in addition to the existing three duty pumps to produce the required flow of 15 MGD. The smaller jockey pump is not running under this scenario.

iii) Same as above but only the existing three duty pumps are running to produce the 15 MGD flow.

For the revised base case model run, the future pipes are inactive and are not considered a part of the modeled network.

ANALYSIS RESULTS

A summary of model results is provided below in Table 1. A brief description of results and recommendations follow the table.

Table 1 – Summary of Model Results

Scenario	Meets Criteria – 1	Meets Criteria – 2	Notes	HGL at WRWTP Plant (Junction ID - BP_WTPV)	HGL at Tooze Road /City of Sherwood Connection (Junction ID - 3756)	Snyder Park Reservoir (Junction ID - 4042)
Scenario 1 (Baseline): With Existing pipeline network with existing PRVs. 3.11 MGD to the City of Wilsonville and 2.5 MGD to the City of Sherwood	Yes	Yes	Total Supplied: 5401.0 gpm Total Demand: 3898.6 gpm Total Stored: 1501.2 gpm Tank CLEVEL is emptying at 45.0 ft Tank ELLIGSENA is filling at 51.0 ft Tank ELLIGSENB is filling at 46.70 ft	528.8 ft	402.4 ft	402.0 ft
Scenario 2: Without Kinsman Road Extension, Westside Reservoir and New PRVs. With 10 MGD to the City of Wilsonville and 5 MGD to City of Sherwood	Yes	Yes	Total Supplied: 14674.8 gpm Total Demand: 10416.2 gpm Total Stored: 3620.3 gpm Tank CLEVEL is emptying at 45.0 ft Tank ELLIGSENA is filling at 51.0 ft Tank ELLIGSENB is filling at 46.7 ft	452.2 ft	419.0 ft	417.6 ft
Scenario 3: With Kinsman Road Extension, Westside Reservoir and New PRV and FCV's. With 10 MGD to the City of Wilsonville and 5 MGD to City of Sherwood. 6 pumps on.	Yes	Yes	Total Supplied: 17273.6 gpm Total Demand: 6943.95 gpm Total Stored: 10503.6 gpm Tank CLEVEL is emptying at 45.0 ft Tank ELLIGSENA is filling at 51.0 ft Tank ELLIGSENB is filling at 46.7 ft Tank T5004 is filling at 21.6 ft	524.3 ft	519.9 ft	408.5 ft

Scenario 4: With Kinsman Road Extension, Westside Reservoir and New PRV and FCV's. With 10 MGD to the City of Wilsonville and 5 MGD to City of Sherwood. Only Existing Pumps on.	Yes	Yes	Total Supplied: 14674.76.0 gpm Total Demand: 6943.95 gpm Total Stored: 7730.8 gpm Tank CLEVEL is emptying at 45.0 ft Tank ELLIGSENA is filling at 51.0 ft Tank ELLIGSENB is filling at 46.7 ft Tank T5004 is filling at 21.6 ft	453.5 ft	409.1 ft	408.5 ft

Tank CLEVEL: Level C Tank located north and east of the I-5/Elligsen Road Interchange
ElligsenA/ElligsenB: Tanks located on Elligsen Road at pump station

A summary of the PRV pressure results and high service pump flow rate and head results from each scenario run are presented in Table 2.

Table 2: Summary of PRV and High Service Pump Results

Scenario	Scenario 1 (Baseline): With existing pipeline network with existing PRVs. 3.11 MGD to the City and 2.5 MGD to the City of Sherwood		Scenario 2: Without Kinsman Road Extension, Westside Reservoir and New PRVs. With 10 MGD to the City and 5 MGD to City of Sherwood		Scenario 3: With Kinsman Road Extension, Westside Reservoir and New PRVs. With 10 MGD to the City and 5 MGD to City of Sherwood All pumps.		Scenario 4: With Kinsman Road Extension, Westside Reservoir and New PRVs. With 10 MGD to the City and 5 MGD to City of Sherwood Existing Pumps	
PRV Locations (ID)	**US Pressure (psi)**	**DS Pressure (psi)**	**US Pressure (psi)**	**DS Pressure (psi)**	**US Pressure (psi)**	**DS Pressure (psi)**	**US Pressure (psi)**	**DS Pressure (psi)**
SW Wilsonville Rd PRV (C)	168.44	117.7	135.7	126.2	166.3	151.9	135.7	126.2
Kinsman/Barber Rd PRV (D)	166.3	113.3	133.1	124.4	163.5	150.1	133.1	124.4
Boeckman Rd PRV (E)	N/A	N/A	N/A	N/A	161.3	141.5	131.1	148.7
Tooze Rd / City of Sherwood PRV-1 to West Side reservoir	N/A	N/A	N/A	N/A	121.3	68.9	91.2	68.9
Tooze Rd / City of Sherwood PRV-2 to Snyder Park Reservoir	N/A	N/A	N/A	N/A	121.3	73.3	91.2	73.3
High Service Pump (HSP)	**Pump Flow Rate (gpm)**	**TDH (ft)**	**Pump Flow Rate (gpm)**	**TDH (ft)**	**Pump Flow Rate (gpm)**	**TDH (ft)**	**Pump Flow Rate (gpm)**	**TDH (ft)**
HSP # 1	2689.3	410.4	4814.9	336.3	2854.8	406	4814.9	336.3
HSP # 2	2651.3	410.4	4828.3	336.3	2799.9	406	4828.3	336.3
HSP # 3	0	0	4857.7	336.3	2904.5	406	4857.7	336.3
Jockey Pump	0	0	0	0	0	0	0	0
New Pump - 1	0	0	0	0	2905.0	406	0	0
New Pump – 2	0	0	0	0	2904.7	406	0	0
New Pump - 3	0	0	0	0	2904.8	406	0	0

CONCLUSIONS

Model results show that the WRWTP, the existing water distribution system, and the future water transmission system utilizing the proposed Kinsman extension, (with the future PRVs at Boeckman Road and at Tooze Road) are capable of providing 5 MGD to the City of Sherwood at the required HGL of 390 feet and 10 MGD to the City of Wilsonville while maintaining system pressures above 40 psi and flow velocities less than 8 ft/sec throughout the Wilsonville system, except for isolated locations. The overall results are consistent with the 2011 model scenarios although the table values did change based on the revised input data. None of the pipelines within the modeled network show velocities greater than 8 ft/sec except for some of the pipes connected to the PRVs. This high velocity resulted from the high flow passing through a relatively small sized (12-inch in diameter) pipe connection to the PRV. See the February 2011 memo for more detail on the PRV considerations.

All the nodes have pressures greater than 40 psi except for a few places where the junctions are located close to the Level C and Elligsen Reservoirs. The main reason is the proximity of the junctions to the low head reservoirs. The Water Surface Levels (WSLs) of the reservoirs are not high enough to create the minimum pressure in those locations. But low pressures at these locations will not be an issue unless fire hydrants are present. There are also pressures lower than 40 psi along the transmission main to Sherwood.

Key model results are highlighted below:

- Scenario 1 - Existing piping network with existing PRVs – 2.5 MGD supplied to Sherwood and 3.11 MGD supplied to City of Wilsonville. The system pressures throughout the modeled distribution system are above 40 psi. Flow velocities throughout the distribution system are within reasonable limits except for the SW Wilsonville Road PRV (#C), which observes high velocity due to high flow (5339.3 gpm) passing through a relatively small diameter (12-inch) pipe. A junction located close to Level C Tank (Low Water Level 485 feet) observes pressure less than 40 psi due to its high elevation (EL 470 feet). There are also pressures lower than 40 psi along the transmission main to Sherwood at higher elevations in the pipeline. The head at the Snyder Park Reservoir is only 402 feet, which would not be sufficient to fill the reservoir to maximum water elevation (408.5'). Although it is approximately 10 feet higher than the reservoir floor, so there would be some ability to fill the reservoir. Figure 1 shows the results of the Scenario 1 analysis.

- Scenario 2 - Without the Kinsman Road Transmission Line Extension, Westside Reservoir and New PRVs – 5 MGD supplied to the City of Sherwood and 10 MGD supplied to City of Wilsonville. The system pressures throughout the modeled distribution system are above 40 psi. Flow velocities throughout the distribution system are within the established velocity criteria except for the following pipes which see high velocities due to high flows through the relatively small diameter pipes. The pipes are the by-pass of Kinsman PRV (#D) passing 6539. 8 gpm through relatively small diameter (12-inch), 14-inch pipe connection close to Kinsman PRV (#D) passing 4081.8 gpm, by-pass of SW Wilsonville Road PRV (#C) passing 6535. 6 gpm through relatively small

diameter (12-inch), and 3472.2 gpm passing through a relatively small 12-inch diameter pipeline to the City of Sherwood, Charbonneau PRV (397.4 gpm passing through 4-inch pipe). The previously identified junction located close to Level C Tank (Low Water Level 485 feet) has pressure less than 40 psi due to the junction's high elevation (EL 470 feet). There are also pressures lower than 40 psi along the transmission main to Sherwood at higher elevations in the pipeline. Figure 2 shows the results of the Scenario 2 analysis.

- Scenario 3 - With the Kinsman Road Transmission Line Extension, Westside Reservoir and New PRVs in place, supplying – 5 MGD to the City of Sherwood and 10 MGD to City of Wilsonville. The system pressures throughout the modeled distribution system are above 40 psi. Flow velocities throughout the distribution system are the established velocity criteria except for the Charbonneau PRV (397.4 gpm passing through a 4-inch pipe), PRV on the Kinsman extension (4347.3 gpm passing through a 10-inch pipe) which sees high velocities due to high flows passing through relatively small diameter pipes. The previously identified junction located close to Level C Tank (Low Water Level 485 feet) sees pressure less than 40 psi due to the junction's high elevation (EL 470 feet). There are also pressures lower than 40 psi along the transmission main to Sherwood at higher elevations in the pipeline. Figure 3 shows the results of the Scenario 3 analysis.

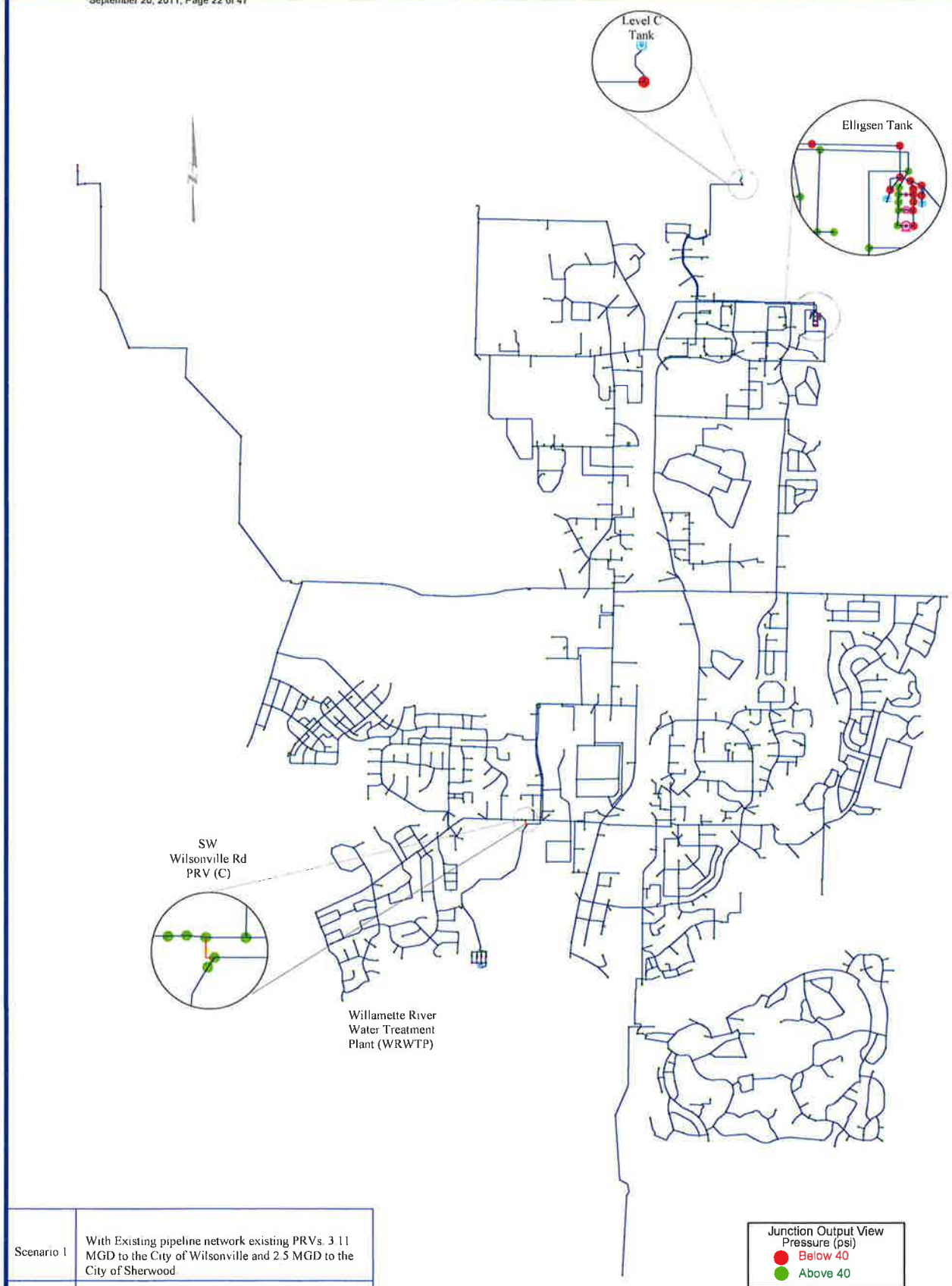
- Scenario 4 - With the Kinsman Road Transmission Line Extension, Westside Reservoir and New PRVs in place, supplying – 5 MGD to the City of Sherwood and 10 MGD to City of Wilsonville using only existing pumps. The system pressures throughout the modeled distribution system are above 40 psi. Flow velocities throughout the distribution system are the established velocity criteria except for the Charbonneau PRV (397.4 gpm passing through a 4-inch pipe), new PRV on the Kinsman extension (3282 gpm passing through a 10-inch pipe) which sees high velocities due to high flows passing through relatively small diameter pipes. The previously identified junction located close to Level C Tank (Low Water Level 485 feet) sees pressure less than 40 psi due to the junction's high elevation (EL 470 feet). There are also pressures lower than 40 psi along the transmission main to Sherwood at higher elevations in the pipeline. Figure 4 shows the results of the Scenario 4 analysis.

In all scenarios, the City of Wilsonville is able to provide a minimum HGL of 390 feet at the connection point to the City of Sherwood transmission pipeline at the intersection of Tooze Road and Westfall Road without negatively impacting the City of Wilsonville's ability to meet its local demand. After modeling the full length of the Sherwood main, there is concern that the existing system would not be able to supply enough pressure to fill the Snyder Park Reservoir at a demand of 3.11 MGD (as shown by the low head at the reservoir in Scenario 1).

Also, the City of Wilsonville water distribution system will be hydraulically balanced and allow for normal operation of the Elligsen reservoir. Under the Average and Peak day conditions (all four modeled flow scenarios), the Elligsen reservoirs were filling from system pressure and was not draining, even when meeting the additional 2.5 MGD (average day) and 5 MGD (peak day) Sherwood demand.

MWH

LIST OF FIGURES



Scenario 1	With Existing pipeline network existing PRVs. 3.11 MGD to the City of Wilsonville and 2.5 MGD to the City of Sherwood
Scenario 2	Without Kinsman Road Extension, Westside Reservoir and New PRVs. With 10 MGD to the City of Wilsonville and 5 MGD to the City of Sherwood

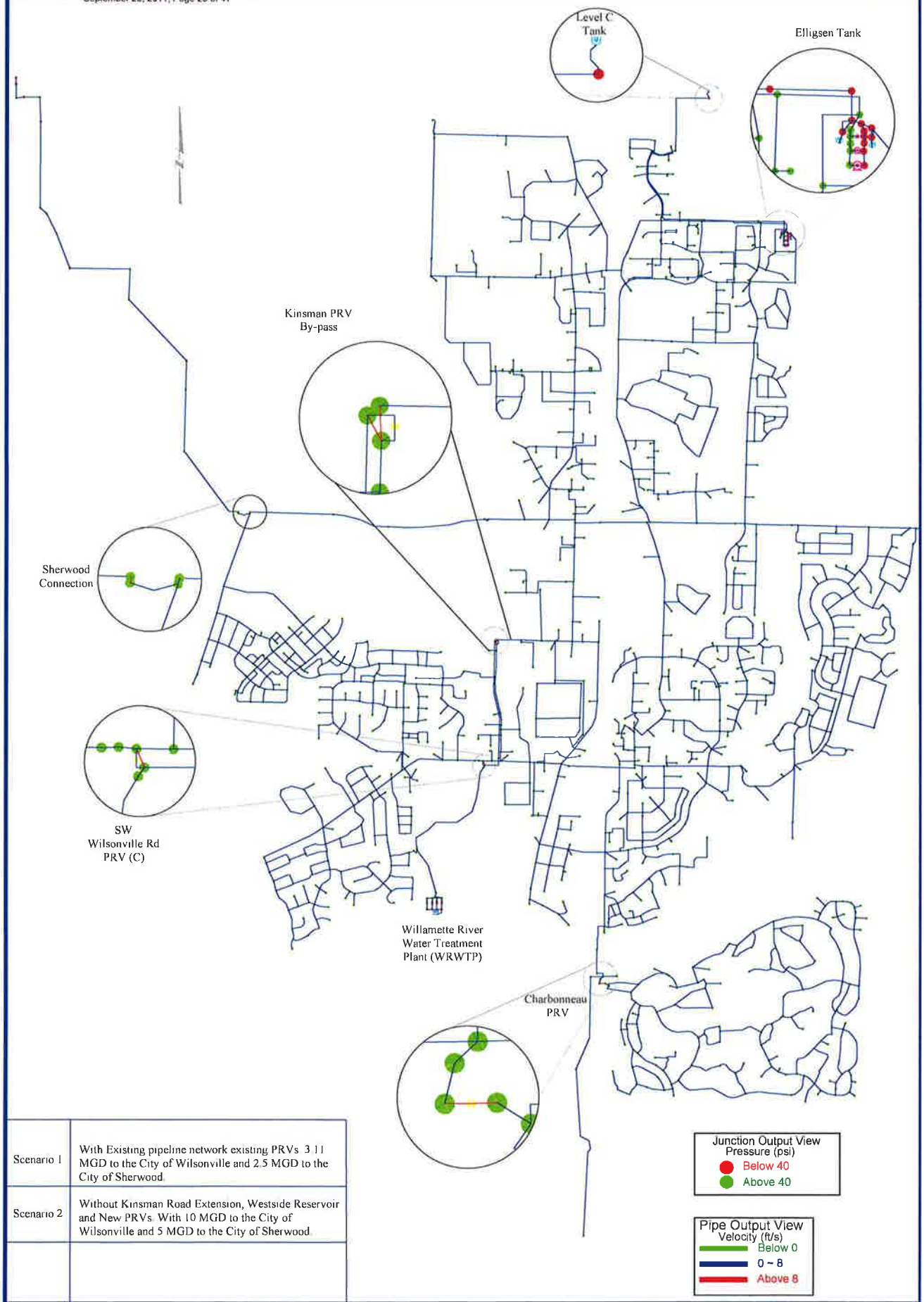
Junction Output View
Pressure (psi)
Below 40
Above 40

Pipe Output View
Velocity (ft/s)
Below 0
0 ~ 8
Above 8

MWH

City of Wilsonville

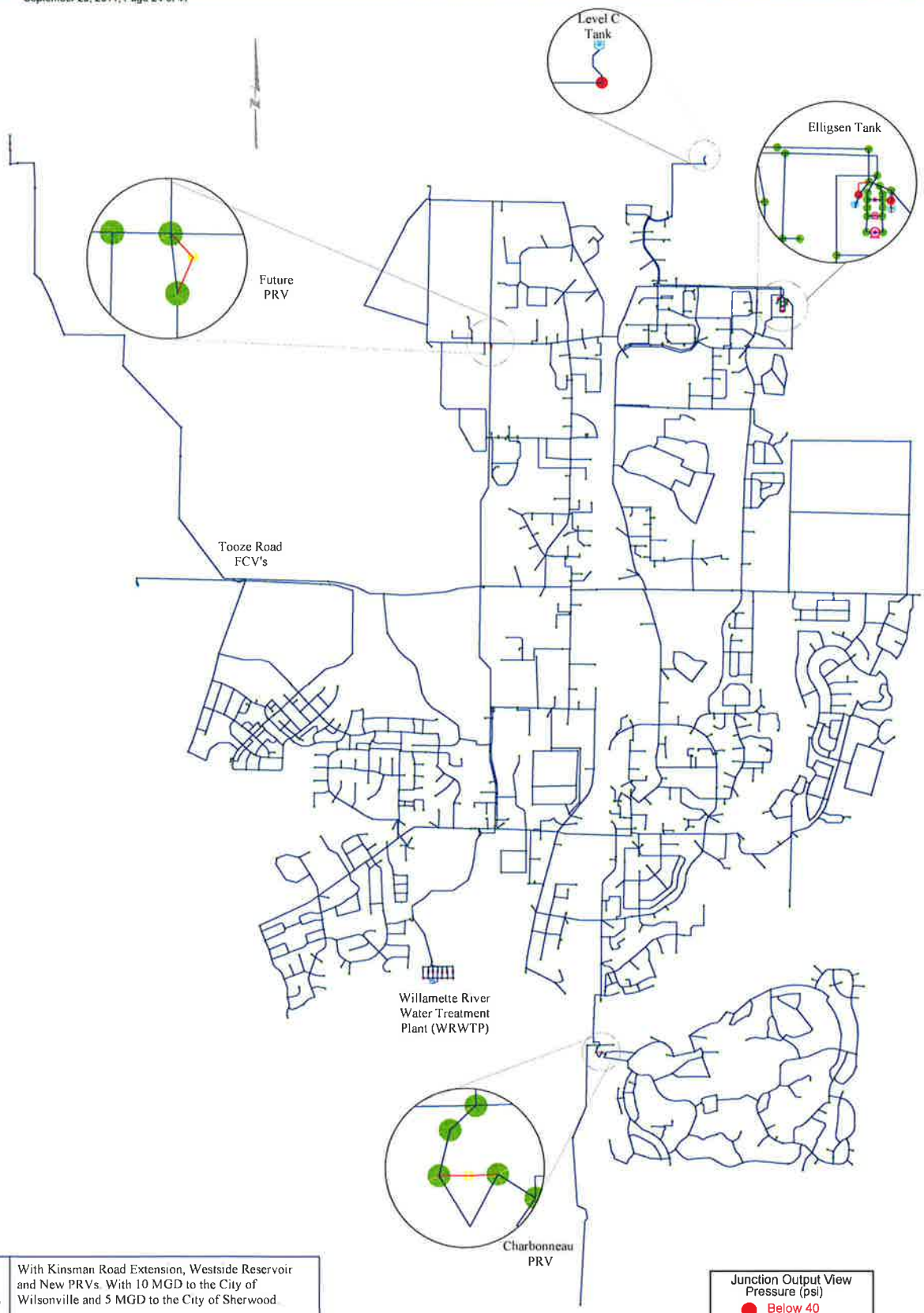
Figure 1 - Scenario 1
High Velocity (>8 fps)
Low Pressure (<40 psi)



Scenario 1	With Existing pipeline network existing PRVs 3.11 MGD to the City of Wilsonville and 2.5 MGD to the City of Sherwood.
Scenario 2	Without Kinsman Road Extension, Westside Reservoir and New PRVs. With 10 MGD to the City of Wilsonville and 5 MGD to the City of Sherwood.

MWH | City of Wilsonville

Figure 2 - Scenario 2
High Velocity (>8 fps)
Low Pressure (<40 psi)



Scenario 3	With Kinsman Road Extension, Westside Reservoir and New PRVs. With 10 MGD to the City of Wilsonville and 5 MGD to the City of Sherwood.
Scenario 4	With Kinsman Road Extension, Westside Reservoir and New FCVs. With 10 MGD to the City of Wilsonville and 5 MGD to the City of Sherwood. Only the 3 existing pumps on at WTP.

Junction Output View
Pressure (psi)
- Below 40
- Above 40

Pipe Output View
Velocity (ft/s)
- Below 0
- 0 ~ 8
- Above 8

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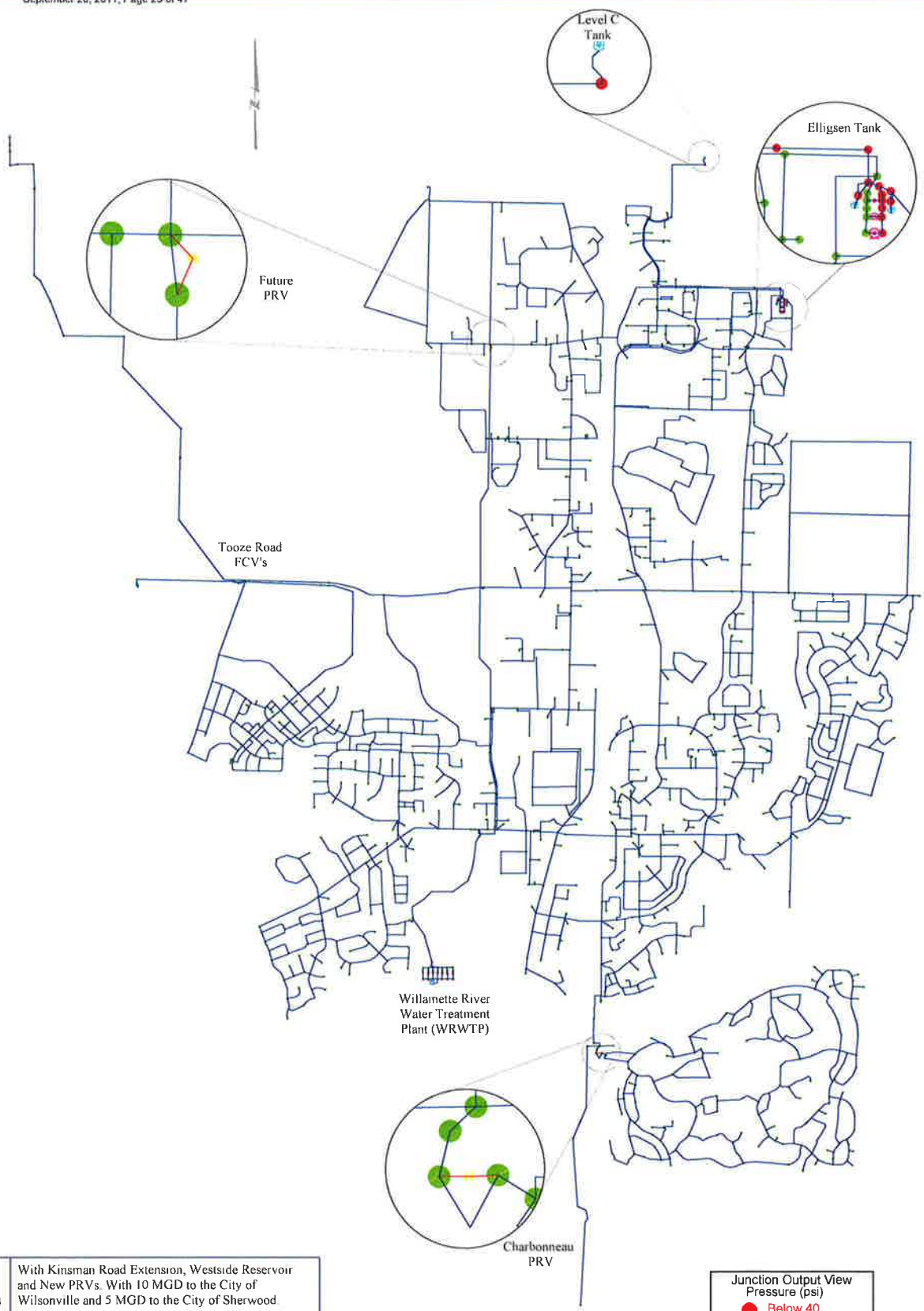
Figure 3 - Scenario 3
High Velocity (>8 fps)
Low Pressure (<40 psi)



Scenario 3	With Kinsman Road Extension, Westside Reservoir and New PRVs. With 10 MGD to the City of Wilsonville and 5 MGD to the City of Sherwood
Scenario 4	With Kinsman Road Extension, Westside Reservoir and New FCVs. With 10 MGD to the City of Wilsonville and 5 MGD to the City of Sherwood Only the 3 existing pumps on at WTP

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Figure 4 - Scenario 4
High Velocity (>8 fps)
Low Pressure (<40 psi)

MWH

TECHNICAL MEMORANDUM

Project:	City of Wilsonville, OR Hydraulic Transient Model Update
Subject:	Hydraulic Transient Analysis – City of Wilsonville
Prepared By:	Chris Michalos, P.E.
Prepared For:	Eric Mende, P.E.
Reviewed By:	Corie Peterson, P.E.
Date:	August 12, 2011

INTRODUCTION

MWH was contracted by the City of Wilsonville to perform additional hydraulic transient analyses evaluating the effects of changing the valves at the Tooze Road connection to the Sherwood transmission pipeline from Pressure Reducing Valves (PRV) to Flow Control Valves (FCV). This technical memorandum is presented as an Addendum to the Hydraulic Transient Analysis Technical Memorandum prepared for the City of Wilsonville dated April 6, 2011.

The City of Wilsonville's H2ONet hydraulic distribution system model presented in the April 6, 2011 technical memorandum was used as a baseline for the H2OSurge model for the current hydraulic transient analyses. Revisions to the existing model included changing the valves at the Tooze Road connection to the Sherwood pipeline from PRVs to Flow Control Valves and the City of Sherwood's 48-inch diameter transmission pipeline profile information along with the recently installed Air/Vacuum Air Release Valves (AVAR). Sizes and locations of these valves were based on design drawings received from Murray, Smith & Associates (MSA), Sherwood's engineer on the project. The assumptions and boundary conditions presented in the April 6, 2011 technical memorandum were utilized for this analysis.

The objective of this hydraulic transient analysis is to evaluate the effects of changing the valves at the Tooze Road connection to the Sherwood transmission pipeline from PRVs to FCV's based upon an uncontrolled shut down of the operating pumps at the Willamette River Water Treatment Plant (WRWTP) under the different flow and operational scenarios presented below to determine if surge mitigation strategies are required and to determine the size and type of the recommended surge facilities.

MODEL SCENARIOS

The hydraulic transient analysis scenarios evaluated are summarized in Table 1. They include evaluating the affect of the FCV on the previous study results as well as three additional scenarios. The scenarios evaluated in the April 6, 2011 technical memorandum are numbered 1A through 3B and assumed that the AVAR valves installed along the Sherwood Transmission line were active and the future Kinsman extension, the future West Side Reservoir and the future PRV to the West Side Reservoir were not included in the analysis. The additional scenarios analyzed as part of the revised scope are presented as 4A through 4C and assumed that the 48" diameter segment 3 transmission line (0.375" thick steel pipe) including the AVAR's is operational.

Table 1 – Summary of Hydraulic Transient Analysis Scenarios

Scenario	WRWTP Flow Rate	Wilsonville Demand (MGD)	Sherwood Demand (MGD)
1A	10	7.5	2.5
1B	10	10	0
2A	15	10	5
2B	15	15	0
3A	12.5	10	2.5
3B	12.5	12.5	0
4A	12.5	10	2.5
4B	15	10	5
4C	15	15	0

Each scenario was modeled with and without the recommended 750 cubic foot (5,600 gallon) hydropneumatic tank located at the WRWTP HSPS in order to determine the affect of the FCV on the severity of the hydraulic transient event and the performance of proposed hydropneumatic tank to mitigate the hydraulic transient. Scenario 4C was determined to be the same as Scenario 2B and therefore was not evaluated.

ANALYSIS RESULTS

The pressure history (graph of pressure versus time) at the node downstream of the WRWTP, the node downstream of the Tooze Road FCV (Junction ID 3846), and upstream of the Tooze Road FCV (Junction ID 4016) were developed for each scenario with and without surge protection devices to show both the magnitude of the downsurge and to review the performance of the recommended 750 cubic foot hydropneumatic tank and AVAR's along the Sherwood transmission pipeline. The node downstream of the WRWTP was selected to show the effect of the hydraulic transient at the WRWTP. Junctions 3846 and 4016 were selected to be consistent with the results presented in the April 6, 2011 technical memorandum. Junction 3846 shows the effect of connecting the Sherwood system to the Wilsonville system using a FCV and Junction 4016 (upstream of the FCV) was selected for sub-scenario's where the Sherwood demand is set to zero and is indicative of the surge induced pressure history of the Wilsonville system but the

pressure history is just for one point in a system of hundreds of points. The key model results are highlighted below.

Figures 1 through 20 present the hydraulic transient modeling results for the monitoring points described above for all scenarios listed in Table 1. Comparing the results to those presented in the April 6, 2011 technical memorandum show that the surge event utilizing the FCV instead of the PRV produces similar surge results. The interconnection to the Sherwood transmission pipeline helps mitigate the pressure surge at the Tooze Road FCV whenever the control valve within the reservoir inlet pipe is open. When the Snyder Park Reservoir fills and the intake control valve closes (zero demand), the surge mitigation benefit of the interconnection between the two systems disappears. Since the Snyder Park Reservoir can fill and be closed off to the Wilsonville system at anytime, the surge mitigation benefit of the Sherwood transmission pipeline connection may not be available when the surge event occurs.

One can see from Figures 1 through 14, the recommended a 750 cubic foot (5,600 gallon) hydropneumatic tank located at the WRWTP HSPS trims the down-surge and upsurge magnitudes at the Tooze Road connection but mild pressure oscillations still occur over the 200 second simulation as the system self dampens to 60 psi, the backpressure from the Elligsen Tank. Most importantly the hydropneumatic tank prevents objectionable negative pressure zones from developing within the system. Based upon the April 6, 2011 technical memorandum, installation of the hydropneumatic tank is recommended after the WRWTP output exceeds 10.0 MGD. However, based upon a review of Figure 3 which shows a significant downsurge at the FCV when the Wilsonville demand is 10 MGD and the Sherwood demand is 0 MGD. Therefore, installation of the hydropneumatic tank should be considered when the WRWTP output approaches 10.0 MGD.

Consistent with the results presented in the April 6, 2011 memorandum, several locations of the distribution system experienced unacceptable low pressure during the surge event when the hydropneumatic tank is not operational. These locations are presented in the April 6, 2011 memorandum. ***Surge mitigation is necessary to prevent vacuum zones from developing within the Wilsonville distribution system under this scenario.*** A vacuum of 5.0 psi can cause infiltration of ground water through the rubber gasket pipe joints of the transmission and distribution piping. When full vacuum pressure is reached at a node location, a vapor cavity can develop creating a multiphase (liquid and vapor) system. The hydraulic transient model results cannot be relied upon beyond the point in time that full vacuum conditions are developed. The upsurge value predicted by the model after a full vacuum event cannot be taken with confidence since a violent vapor cavity collapse can cause a large pressure spike with a magnitude not readily predictable. The true upsurge value cannot be accurately predicted by the model since the model uses equations that are only valid for liquid flow and the development and collapse of a vapor cavity is a two phase phenomena. Prudent design requires that surge mitigation be added to the WRWTP HSPS which prevents or reduces the surge so that the high vacuum and vapor cavity zones are prevented from developing

As shown on Figures 15 and 16, and 19 and 20, the AVAR's prevent negative pressures from forming along the Sherwood Transmission Pipeline for scenarios 4A and 4B. In addition, the

use of the hydropneumatic tank further reduces both the downsurge and upsurge along the pipeline.

CONCLUSIONS AND RECOMMENDATIONS

The composite system including the existing WRWTP HSPS, the Wilsonville transmission and distribution piping, and the Sherwood transmission pipeline is not a highly-volatile system with respect to transient conditions. The model results indicate that as the WRWTP outputs approaches 10 MGD, a 750 cubic foot hydropneumatic tank is required at the WRWTP HSPS to mitigate the down-surge upon sudden loss of power to prevent development of negative pressure zones in the Wilsonville transmission and distribution system. Connection of the Wilsonville system to Sherwood's Snyder Park Reservoir helps mitigate surge at the Tooze Road PRV whenever the control valve within the reservoir inlet pipe is open. When the Snyder Park Reservoir fills and the intake control valve closes (zero demand), the surge mitigation benefit of the interconnection between the two systems disappears. Since the Snyder Park Reservoir can fill and be closed off to the Wilsonville system at anytime, the surge mitigation benefit of the Sherwood transmission pipeline connection may not be available when the surge event occurs. To determine a more precise plant output at which the hydropneumatic tank must be installed (to prevent unacceptable low pressure zones during surge events) will require additional studies.

Once the WRWTP operations approach the 10 MGD threshold, the additional studies are recommended. At that time the hydraulic transient model should be updated so that the threshold plant output that requires a hydropneumatic system can be determined with more accuracy. Installing the hydropneumatic tank earlier than actually required will produce benefits to the system and may even prove cost effective by reducing water main failures and extending the useful life of the pipe already installed. The 750 cubic-foot hydropneumatic tank was modeled to have a 24-inch diameter connection to the WRWTP HSPS discharge manifold and to have no more than 3 velocity heads (i.e., K=3.0) of head loss. To achieve the predicted performance of the recommended hydropneumatic tank, the location of the tank must be optimized by installing the tank very close to the pump discharge manifold. Therefore, the hydropneumatic tank should be connected as close to the HSPS as possible, preferably adjacent to the HSPS building at the WRWTP.

LIST OF FIGURES

Figure 1
Pressure History Downstream of Tooze Road FCV
7.5 MGD to City of Wilsonville and 2.5 MGD to City of Sherwood

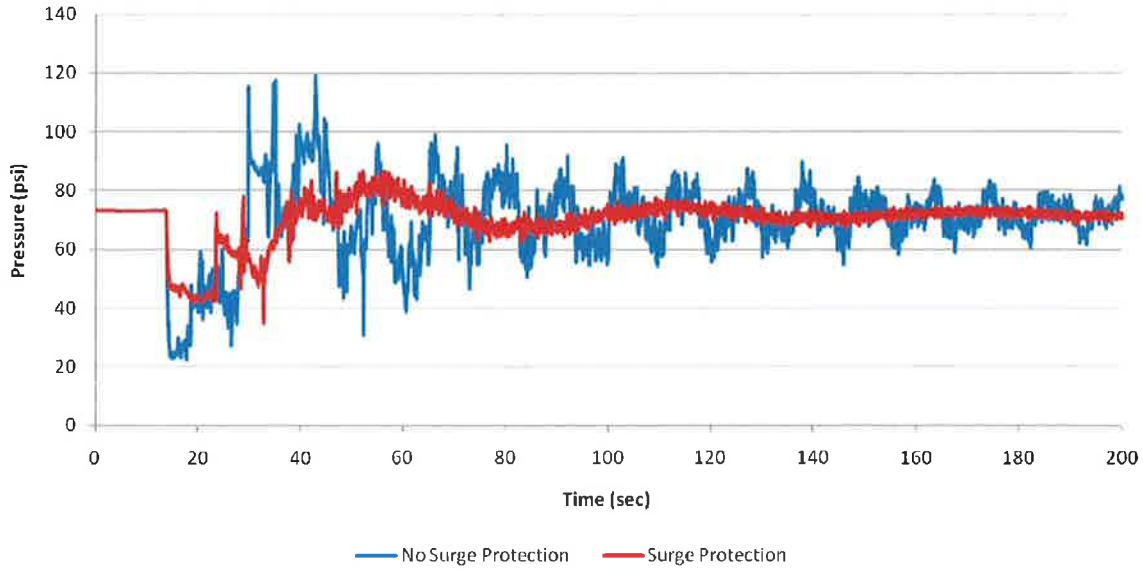


Figure 2
Pressure History Downstream of WRWTP
7.5 MGD to City of Wilsonville and 2.5 MGD to City of Sherwood

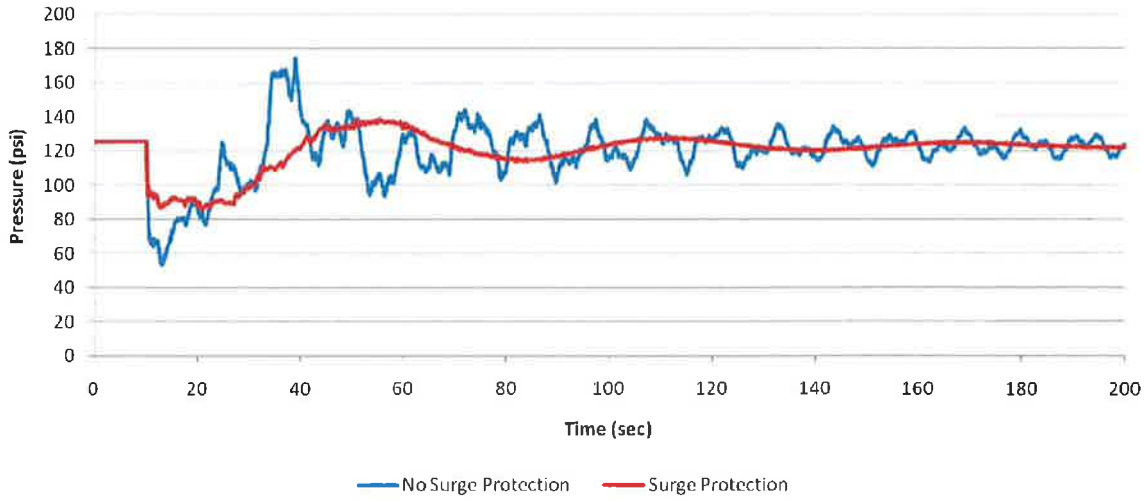


Figure 3
Pressure History Upstream of Tooze Road FCV
10 MGD to City of Wilsonville and 0 MGD to City of Sherwood

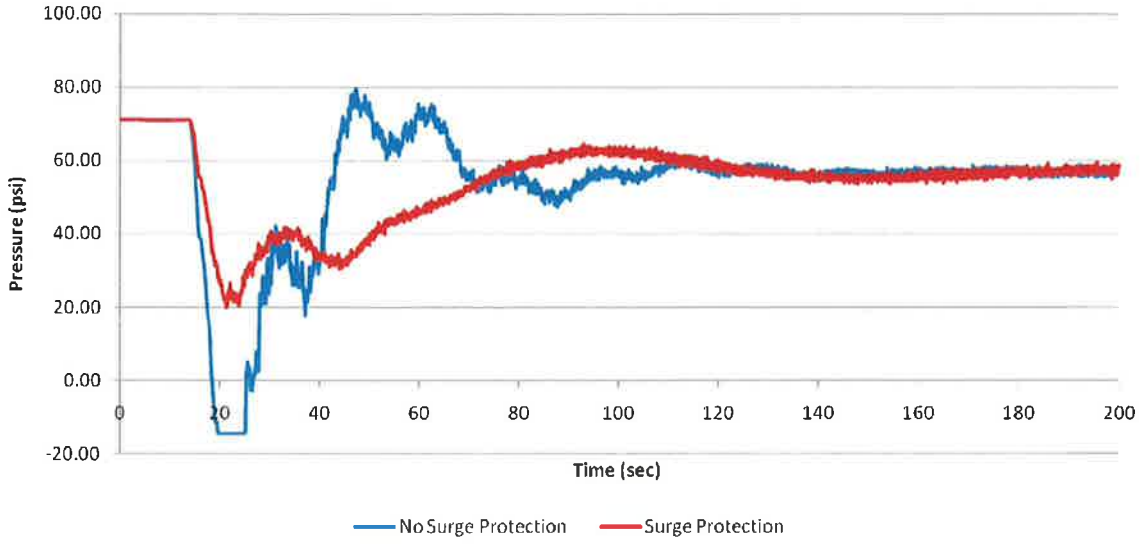


Figure 4
Pressure History Downstream of WRWTP
10 MGD to City of Wilsonville and 0 MGD to City of Sherwood

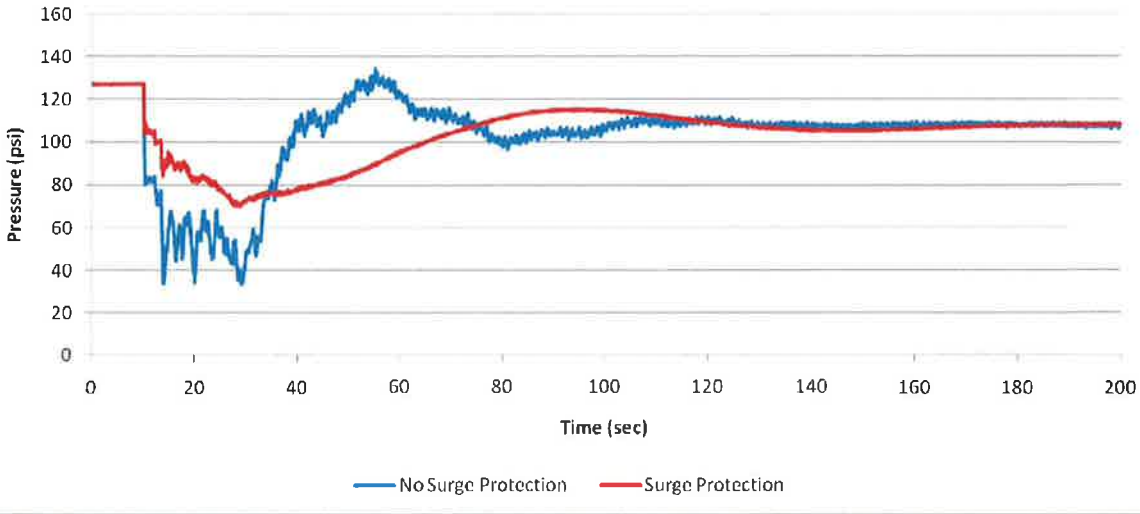


Figure 5
Pressure History Downstream of Tooze Road FCV
10 MGD to City of Wilsonville and 5 MGD to City of Sherwood

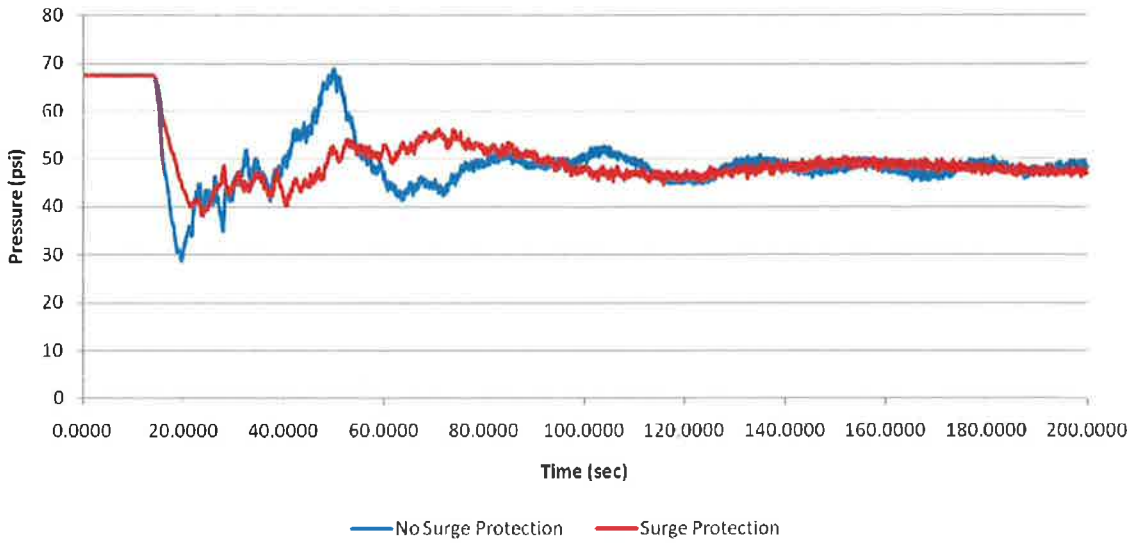


Figure 6
Pressure History Downstream of WRWTP
10 MGD to City of Wilsonville and 5 MGD to City of Sherwood

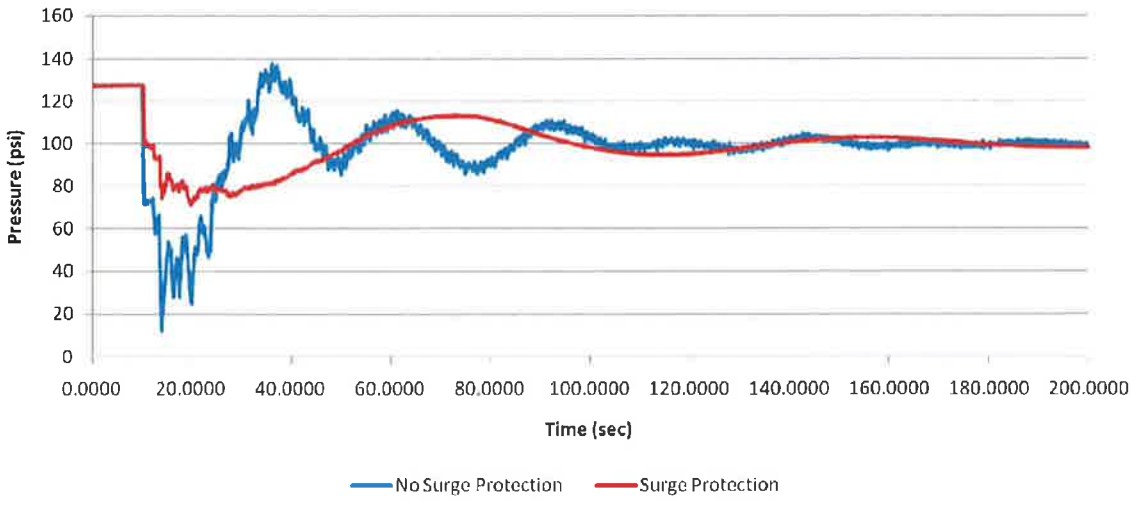


Figure 7
Pressure History Upstream of Tooze Road FCV
15 MGD to City of Wilsonville and 0 MGD to City of Sherwood

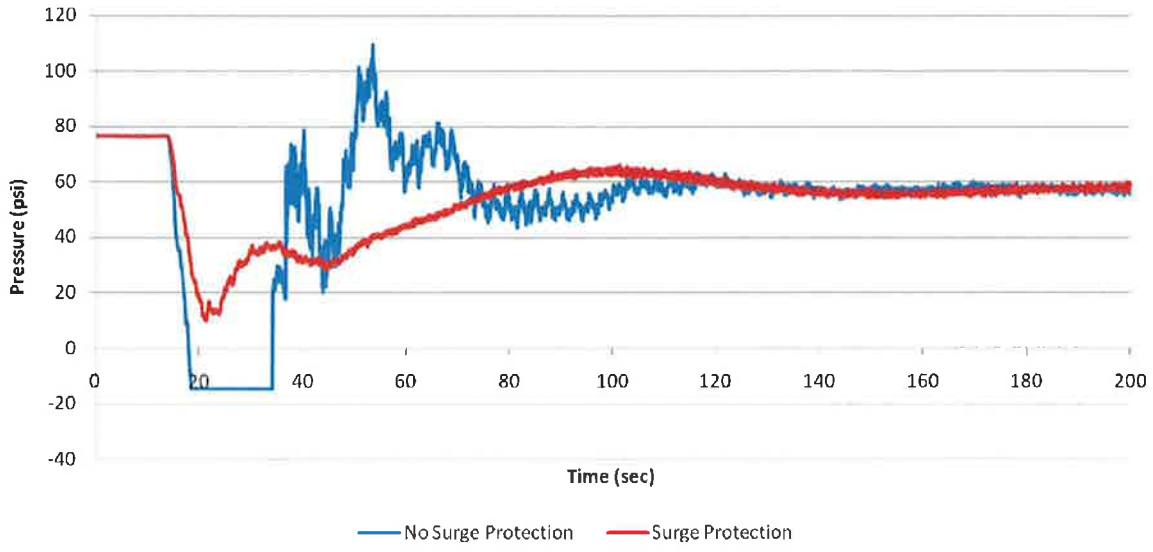


Figure 8
Pressure History Downstream of WRWTP
15 MGD to City of Wilsonville and 0 MGD to City of Sherwood

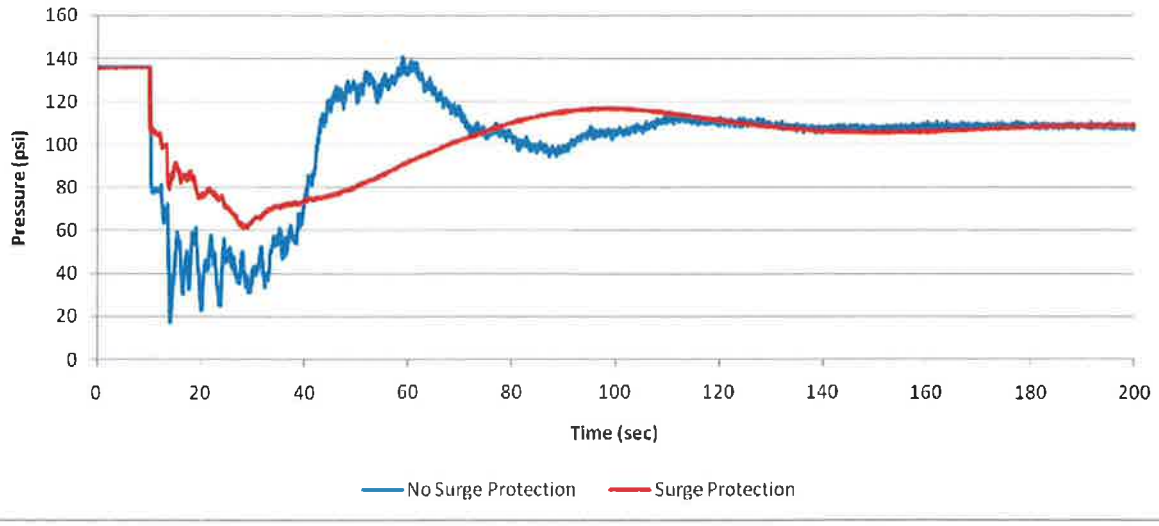


Figure 9
Pressure History Downstream of Tooze Road FCV
10 MGD to City of Wilsonville and 2.5 MGD to City of Sherwood

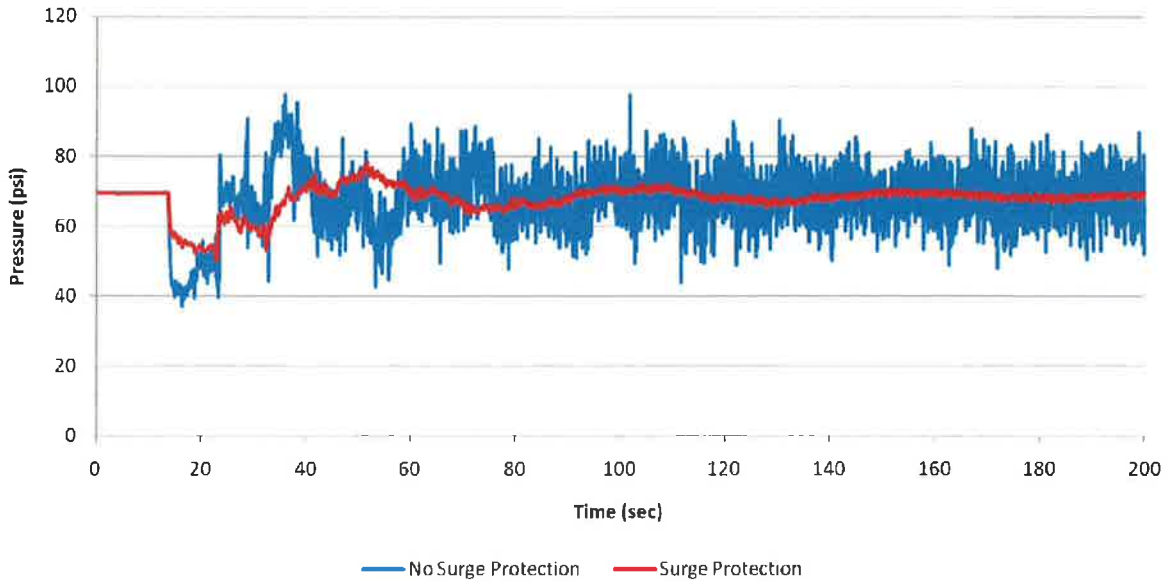


Figure 10
Pressure History Downstream of WRWTP
10 MGD to City of Wilsonville and 2.5 MGD to City of Sherwood

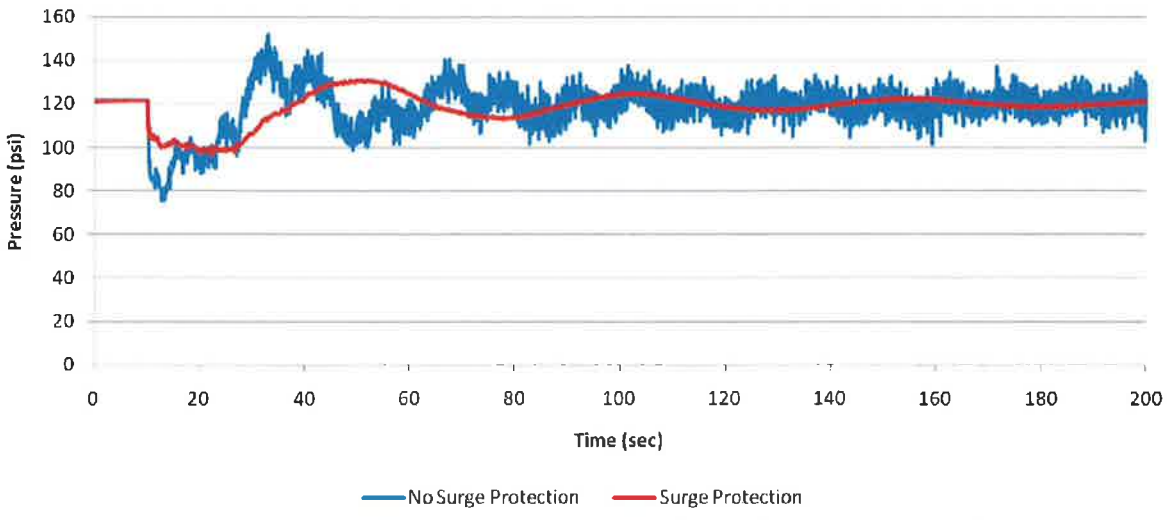


Figure 11
Pressure History Upstream of Tooze Road FCV
12.5 MGD to City of Wilsonville and 0 MGD to City of Sherwood

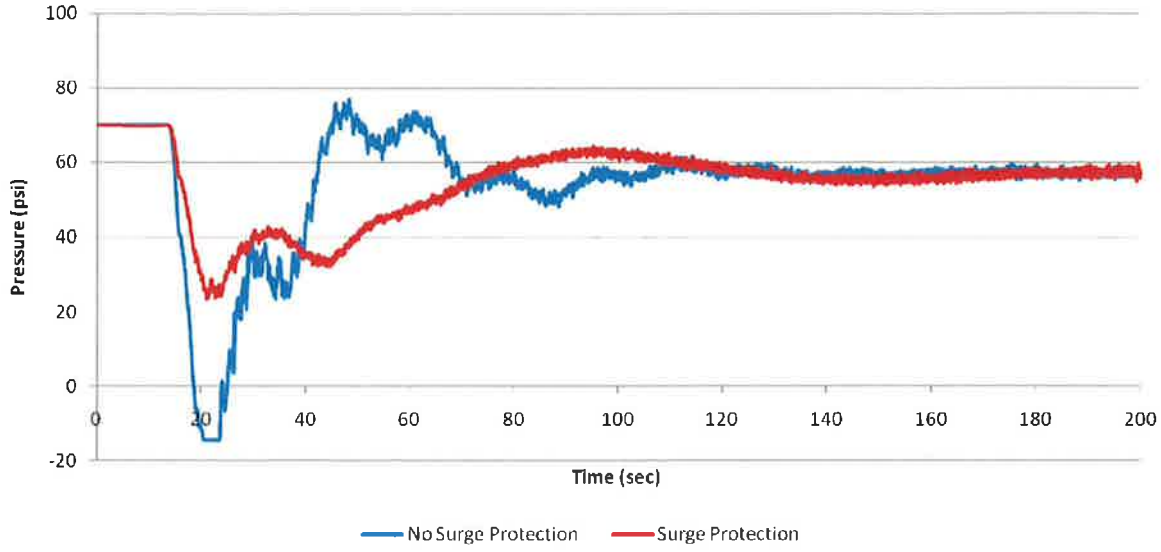


Figure 12
Pressure History Downstream of WRWTP
12.5 MGD to City of Wilsonville and 0 MGD to City of Sherwood

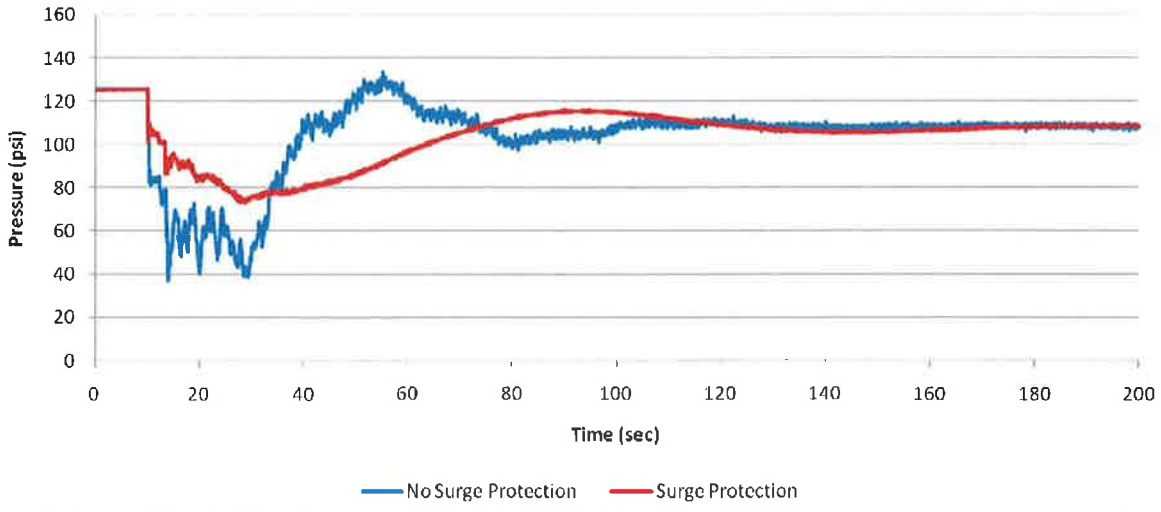


Figure 13
Pressure History Downstream of Tooze Road FCV
10 MGD to City of Wilsonville and 2.5 MGD to City of Sherwood

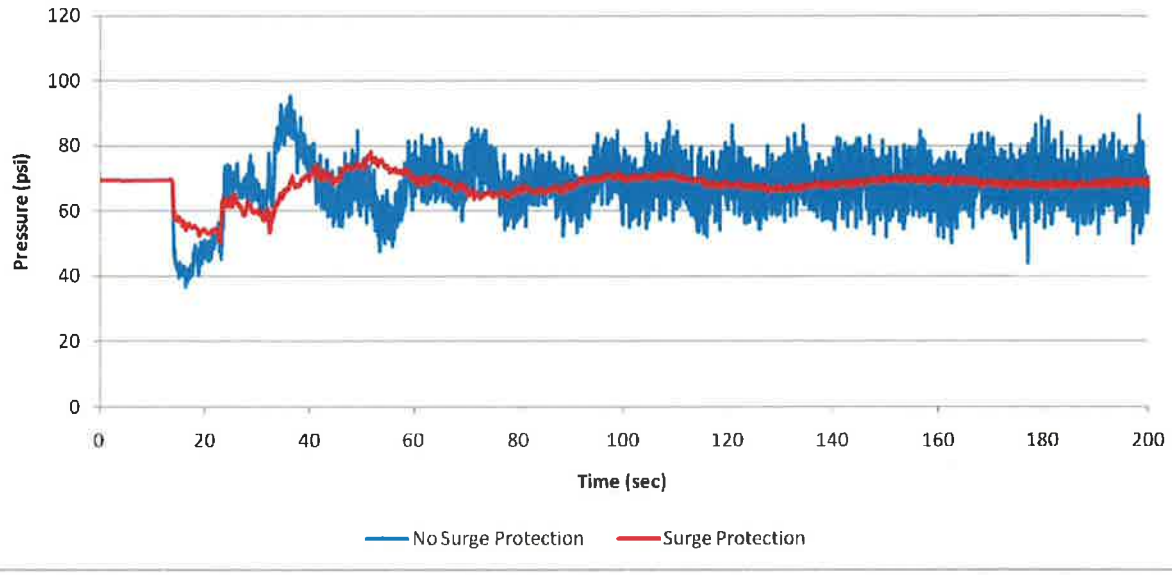
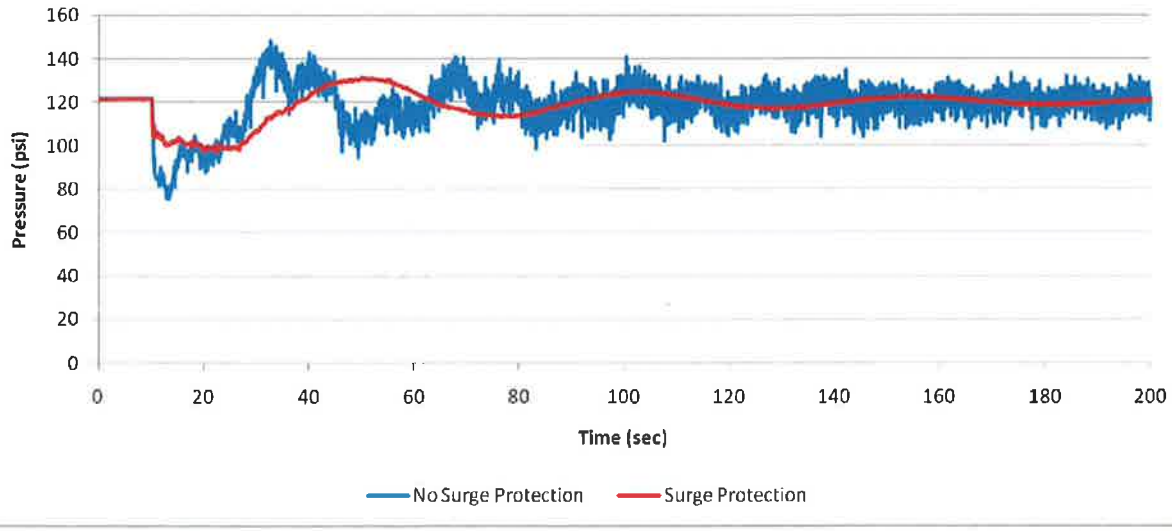


Figure 14
Pressure History Downstream of WRWTP
10 MGD to City of Wilsonville and 2.5 MGD to City of Sherwood



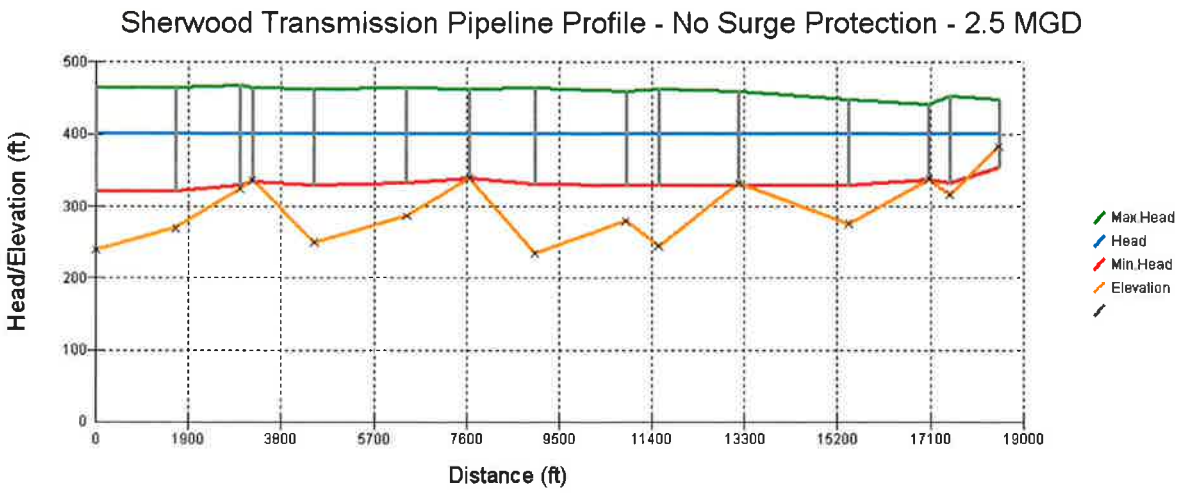


Figure 15: Sherwood Transmission Pipeline Profile – 2.5 MGD to Sherwood – No Surge Tank

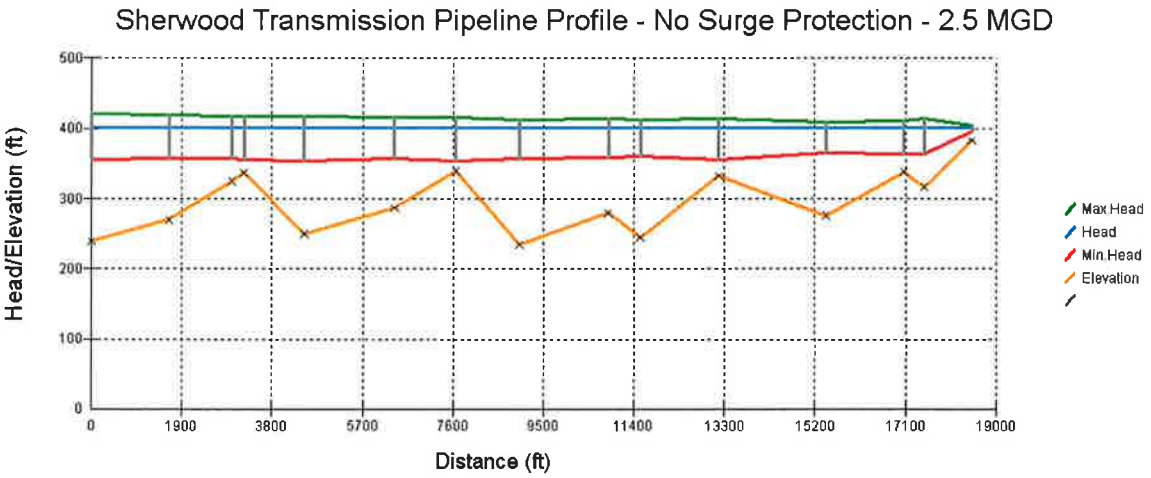


Figure 16: Sherwood Transmission Pipeline Profile – 2.5 MGD to Sherwood with Surge Tank

Figure 17
Pressure History Downstream of Tooze Road FCV
10 MGD to City of Wilsonville and 5 MGD to City of Sherwood

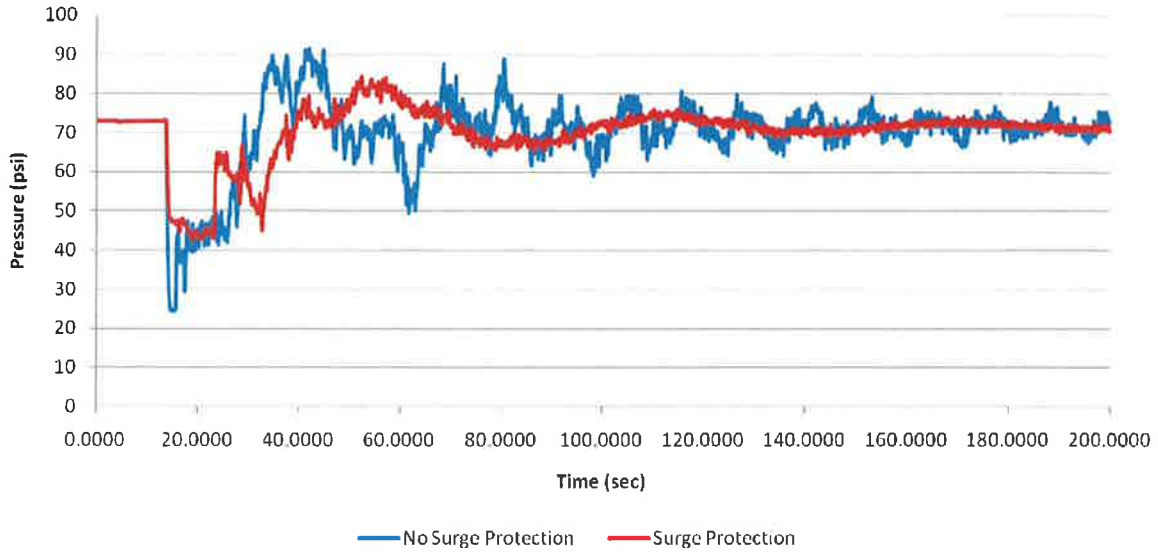
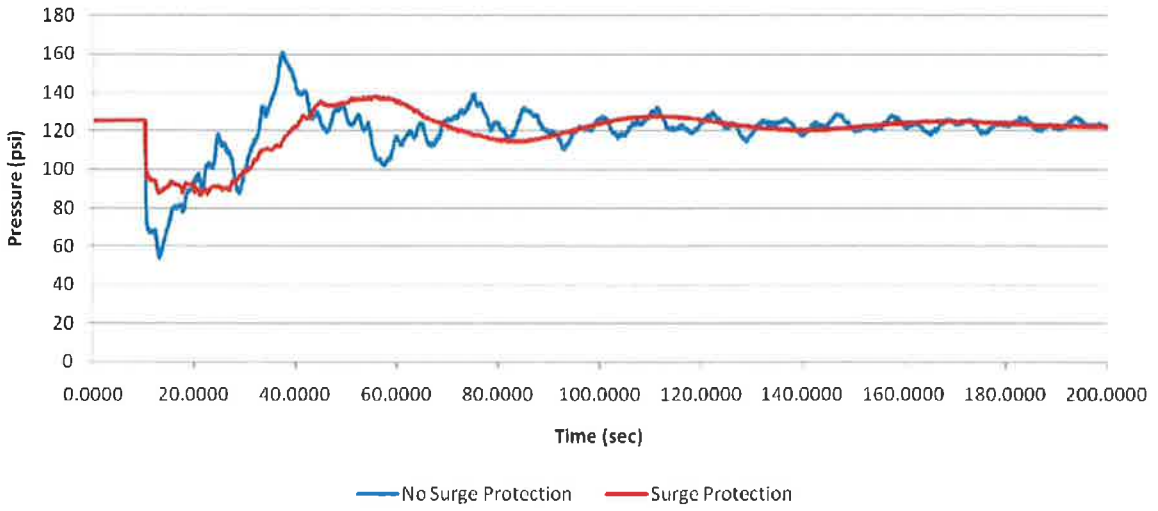


Figure 18
Pressure History Downstream of WRWTP
10 MGD to City of Wilsonville and 5 MGD to City of Sherwood



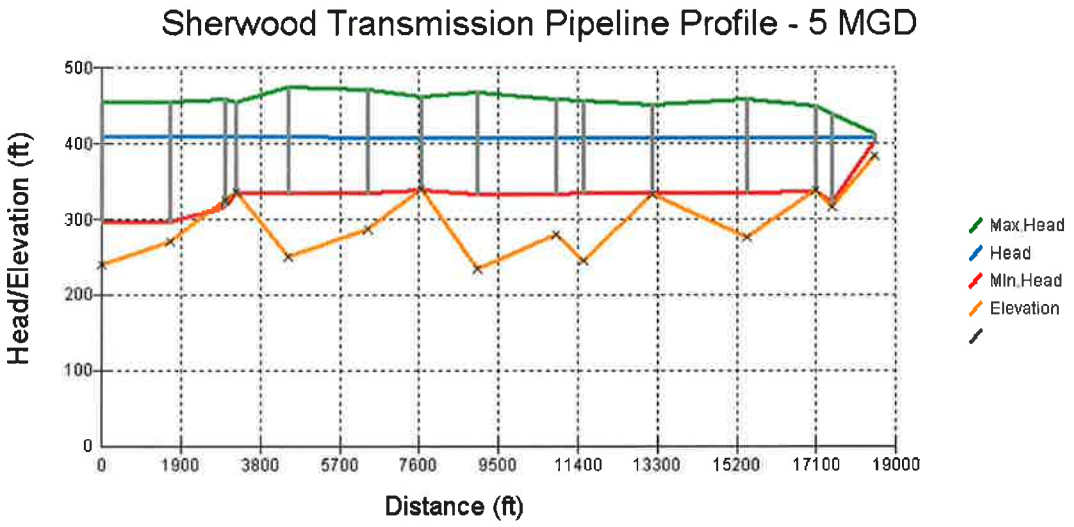


Figure 19: Sherwood Transmission Pipeline Profile – 5 MGD to Sherwood – No Surge Tank

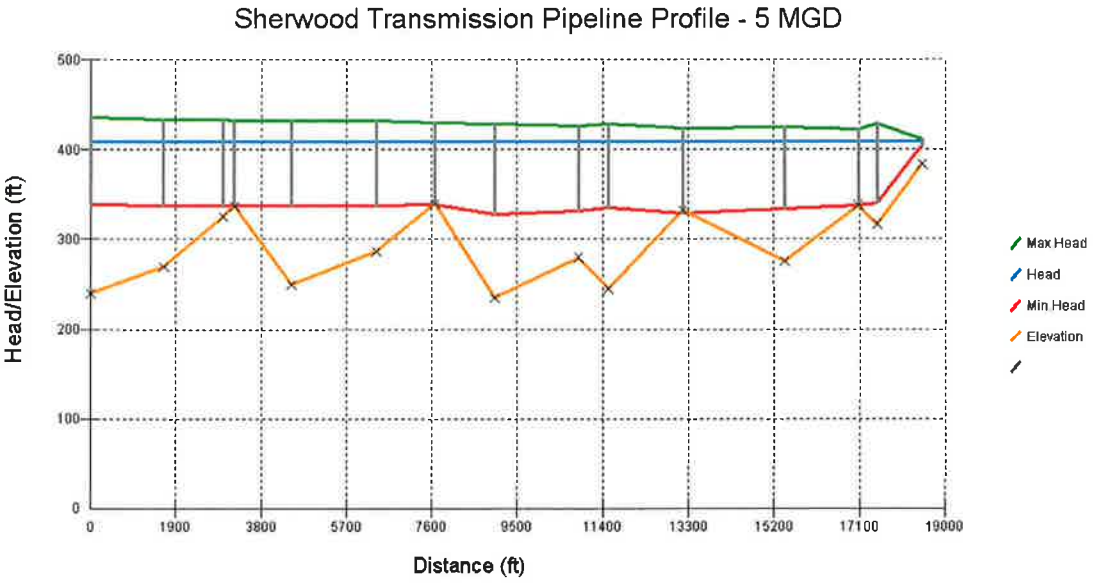


Figure 20: Sherwood Transmission Pipeline Profile – 5 MGD to Sherwood with Surge Tank

MEMORANDUM

Wilsonville/Sherwood Water Treatment and Wheeling Rates – Final

PREPARED FOR: Gary Wallis, City of Wilsonville
Craig Sheldon, City of Sherwood

PREPARED BY: Deb Galardi, Galardi Rothstein Group
Eric Rothstein, Galardi Rothstein Group

DATE: June 28, 2011

Introduction

Galardi Rothstein Group was retained by the Cities of Wilsonville and Sherwood (the cities) to assist in the development of interim water treatment and wheeling rates for production/delivery of water to the City of Sherwood following completion of the Meter Vault Project (including completion of Segment 5B of the 48-inch transmission line). The interim rates are intended to be in effect until Segment 3 of the 48-inch transmission line is in place and operational (estimated to be sometime during the 2012 to 2014 period), at which time a new water treatment rate will be developed, and the wheeling charge eliminated.

This memorandum presents the final analysis of the interim water treatment and wheeling rates, based on cost information provided by Veolia and the City of Wilsonville, and water delivery projections provided by both cities. The rate analyses draw from industry standard approaches.

Water Production

For purposes of estimating future water treatment plant operation and maintenance costs and rates, monthly water production estimates were developed by the cities, and are presented in Table 1 (for FY2013-FY2014). Additional water production information for FY2012 and FY2013 is provided in an attachment to this memorandum ("Water Production Projections FY2012 and FY2013"). In Table 1, Wilsonville projections are provided using both 5-year average and current production information, as water use has trended downward over the past five years. Rates are developed using both sets of data to provide a potential range. Sherwood's peak demand of 2.5 mgd (June through September) is used for allocation of transmission line capacity and costs, for purposes of determining the wheeling rates.

Table 1
Water Treatment Cost Analysis
Projected Water Production (FY2013 – FY2014)

	Wilsonville	Sherwood	Total
Wilsonville based on 5-year average production			
July	163,893,126	77,500,000	241,393,126
Aug	162,216,886	77,500,000	239,716,886
Sep	117,886,130	75,000,000	192,886,130
Oct	78,315,922	42,160,000	120,475,922
Nov	63,078,905	33,000,000	96,078,905
Dec	64,284,874	33,170,000	97,454,874
Jan	66,115,903	33,526,500	99,642,403
Feb	60,342,092	31,147,200	91,489,292
Mar	67,425,224	37,677,400	105,102,624
Apr	68,017,314	38,007,000	106,024,314
May	93,683,174	53,642,400	147,325,574
Jun	119,133,752	77,250,000	196,383,752
Total (gal)	1,124,393,302	609,580,500	1,733,973,802
Mgd	*3.08*	*1.67*	*4.75*
Ccf	*1,503,200*	*814,947*	*2,318,147*
Wilsonville based on current production			
	Wilsonville	**Sherwood**	**Total**
Total (gal)	1,022,255,918	609,580,500	1,631,836,418
Mgd	*2.80*	*1.67*	*4.47*
Ccf	*1,366,652*	*814,947*	*2,181,599*

Interim Water Treatment Rate Analysis

The interim water treatment rate analysis, shown in Table 2, is based on the projection of annual plant operation, maintenance, and replacement costs associated with the projected production shown in Table 1 for FY2013 and FY2014, and projections for FY2012 shown in the Water Production Projections attachment.

Treatment Plant Costs

Operator labor, "not-to-exceed" costs, pass-through costs, and major repair and replacement estimates were obtained from Veolia (see attachments for detailed information referenced in Table 2 footnotes 1, 2, and 5). Pass-through costs fluctuate each year due to the Granular Activated Carbon (GAC) costs which are incurred every two years. Major repair and replacement (R&R) costs are based on anticipated scheduling of specific improvements, and exclude costs associated with improvements to the City of Wilsonville's water feature ($25,000 for recirculation pump in Fiscal Year 2013).

Electricity costs are projected based on Fiscal Year (FY) 2011 estimates from the City of Wilsonville, adjusted for annual inflation of 1.4 percent in FY2012 and 5 percent in subsequent years, and projected water production (for the variable portion of the electric bill)[1]. Since electricity costs are based in part on water production, Table 2 presents costs for both water production scenarios (Wilsonville based on 5 year average and current trends).

[1] Information provided by PGE indicates a current fixed annual charge of $14,880.

Table 2
Water Treatment Cost Analysis
Projected Annual Treatment Costs and Rates

		2012		2013		2014	
		5-yr Avg Prod	Current Prod	5-yr Avg Prod	Current Prod	5-yr Avg Prod	Current Prod
Operator Labor	1	$1,121,865	$1,121,865	$1,372,182	$1,372,182	$1,413,347	$1,413,347
Not to Exceed Costs	1	$117,784	$117,784	$121,317	$121,317	$124,956	$124,956
Pass Through Costs	2	$402,191	$402,191	$685,033	$685,033	$448,084	$448,084
Electricity	3	$428,165	$404,390	$500,782	$477,132	$525,821	$500,989
Security		$38,300	$38,300				
Insurance	4	$18,500	$18,500	$19,055	$19,055	$19,627	$19,627
Subtotal		$2,126,805	$2,103,030	$2,698,369	$2,674,719	$2,531,835	$2,507,003
Major Repair & Replacement	5	$185,000	$185,000	$60,000	$60,000	$51,000	$51,000
Directly Allocated Costs	6	$49,500	$49,500	$50,985	$50,985	$52,515	$52,515
Overhead/Administration	6	$62,930	$62,930	$64,818	$64,818	$66,763	$66,763
Subtotal		$112,430	$112,430	$115,803	$115,803	$119,277	$119,277
Total Costs		**$2,424,235**	**$2,400,460**	**$2,874,172**	**$2,850,522**	**$2,702,113**	**$2,677,280**
Production - ccf	7	2,051,265	1,933,203	2,318,147	2,181,599	2,318,147	2,181,599
Rate/ccf		*$1.18*	*$1.24*	*$1.24*	*$1.32*	*$1.17*	*$1.23*
Production - 1,000 gal		1,534,347	1,446,036	1,733,974	1,631,836	1,733,974	1,631,836
Rate/1,000 gal		*$1.58*	*$1.66*	*$1.66*	*$1.76*	*$1.56*	*$1.64*

1. From Veolia "WRWTP Staffing Plan and Costs"
2. From Veolia "Attachment A-1 Modified for 2011 Production Increase"; 2013 includes $250K Granular Activated Carbon costs (every 2 years)
3. Based on estimated FY2010/11 costs, adjusted for 1.4% inflation in 2012; 5% annually thereafter
4. Based on 2011 budget, escalated at 3% per year
5. From Veolia (Memorandum dated 1/15/2011)
6. From Gary Wallis, escalated at 3% per year
7. Sherwood estimates from Craig Sheldon; Wilsonville estimates from Eric Mende

Security costs are assumed to be eliminated in FY2013 as staffing at the plant increases. Insurance costs are based on the City of Wilsonville's FY2011 budget, escalated by 3 percent annually. The City of Wilsonville also provided estimates of directly allocated costs, and overhead and administration costs associated with water treatment.

Total projected treatment costs range from about $2.4 million in FY2012 to about $2.9 million in FY2013.

Interim Treatment Rates

Based on the projected costs and annual production shown in Tables 1 and 2, the interim water treatment rates range from $1.17 per hundred cubic feet (Ccf) to $1.32 per Ccf ($1.56 to $1.76 per 1,000 gallons), depending on the year, and the assumed annual water production.

Interim Water Wheeling Rates

The water wheeling rate analysis draws from an industry standard approach to determination of rate revenue requirement referred to as the "utility basis". This approach is used because it explicitly provides for recovery of capital-related revenue requirements on the basis of capital investments like the City of Wilsonville's investment in transmission line capacity that will be used to deliver water to Sherwood. Further, this approach is more suited to "arms-length" transactions between parties where returns are a cost component subject to recovery through rates.

Table 3 presents the interim water wheeling rate analysis. In short, the wheeling rates recover O&M costs and annual depreciation and return on the wheeling assets, in proportion to capacity requirements. In this case, the wheeling assets are limited to segments of the 18-inch transmission main identified in the attached diagram ("Waterline Schematic"). A portion of the line segments were installed and funded in part by developers. The City of Wilsonville's "out of pocket" costs include oversizing costs for the developer installed segments, and total project costs for the City-installed segment.

In determining Sherwood's allocation of the transmission line costs, a weighted average capacity share was determined based on the portion of the City of Wilsonville's out-of pocket costs attributable to the developer installed segments (33 percent) and the City-installed segment (67 percent). For the City-installed portion, Sherwood's share is based on the 2.5 mgd peak demand, as a percent of the total 5.56 mgd line capacity, or 45 percent. For the developer-installed line, Sherwood's share is based on the oversizing capacity of 3.3 mgd, so the allocation is 2.5 mgd/3.3 mgd, or 75 percent. The weighted average share for the all of the segments combined is 55 percent.

Operation and Maintenance Costs

The City of Wilsonville provided information on projected O&M costs associated with the 18-inch line. These costs consist of leak detection, valve exercise, line flushing, and utility locating on an annual basis. Cost estimates for each of these activities include

direct costs ($500 per occurrence for leak detection) and estimated labor hours and rates ($53.40 per hour, for labor and vehicles, combined). In addition, repair costs (major and minor) are estimated to be about $4,300 per year, including direct costs of $3,000, and about $1,300 for labor. Administration costs are added based on an overhead rate of 10 percent.

As shown in Table 3, total annual O&M costs associated with the 18 inch line are about $7,400. Sherwood's share of the total costs is 55 percent, or about $4,000.

Table 3
Wheeling Rate
Interim Rate Analysis

		Total Annual $	Total Annual Cost
O&M Costs			
Leak Detection		$714	$393
Valve Exercise		$854	$471
Line Flushing		$427	$235
Utility Locating		$427	$235
Minor Repairs		$1,427	$787
Major repairs		$2,854	$1,573
Administration		$670	$370
Capital Costs			
Depreciation Expense			$7,652
Rate of Return on Assets			$26,005
Total		**$7,374**	**$37,721**
Capacity/Sales (ccf)			814,947
Volume Rate ($/ccf)			$0.046
Rounded Volume Rate ($/ccf)			***$0.045***
Capital Assumptions:			
Total Project Costs			
Developer credits			$343,311
City installed			$697,925
City Costs (SDC Credits + CIP)			$1,041,236
Useful Life			75
Annual Depreciation Expense			$13,883
Total Line Capacity (mgd)	1		5.56
Oversizing Line Capacity (mgd)	2		3.30
Sherwood Capacity Req. (mgd)			2.50
Sherwood Allocation Share	3		55%
Accumulated Depreciation			$58,309
Net Book Value			$982,927
Rate of Return	4		4.8%

(1) Total capacity based on 3,800 gpm
(2) For developer installed line
(3) Weighted average of City funded and developer credits
(4) Base option uses Oregon Bond Index (AA 20 year Bonds) 2010

Capital Costs

The capital portion of the revenue requirements includes annual depreciation and a return on investment, based on the net book value of wheeling assets. Depreciation is

calculated using an estimated asset life of 75 years. The Oregon Bond Index is the source for rate of return (consistent to the practice of Tualatin Valley Water District).

Interim Wheeling Rates

As shown in Table 3, the total annual revenue requirements for wheeling water to Sherwood are about $38,000. Dividing the annual revenue requirements by the estimated FY2013 water production for Sherwood, results in an average rate per Ccf of $0.045 (rounded).