MAY THE PNWS-AWWA SOURCE BE WITH YOU BOISE 2016

Using Functional Objectives to Meet Water System Operational Needs, Develop Design Criteria, Drive the Design Process & Improve Water Quality

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North City WATER DISTRICT

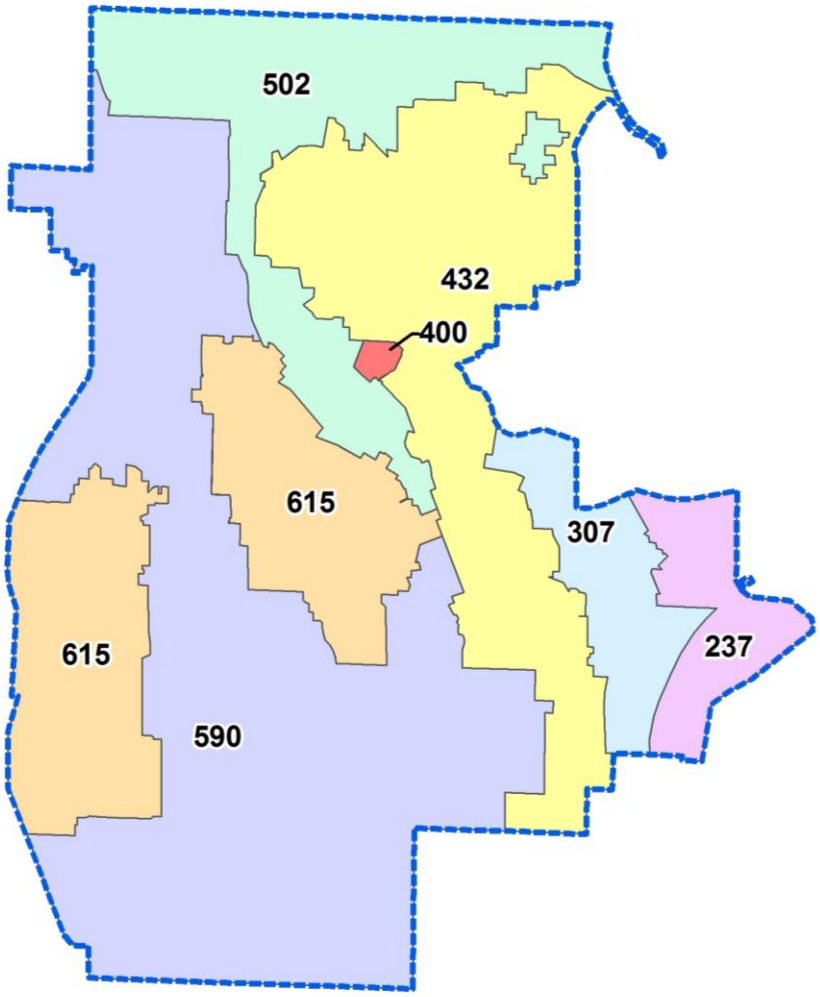
BHC

Presentation Outline

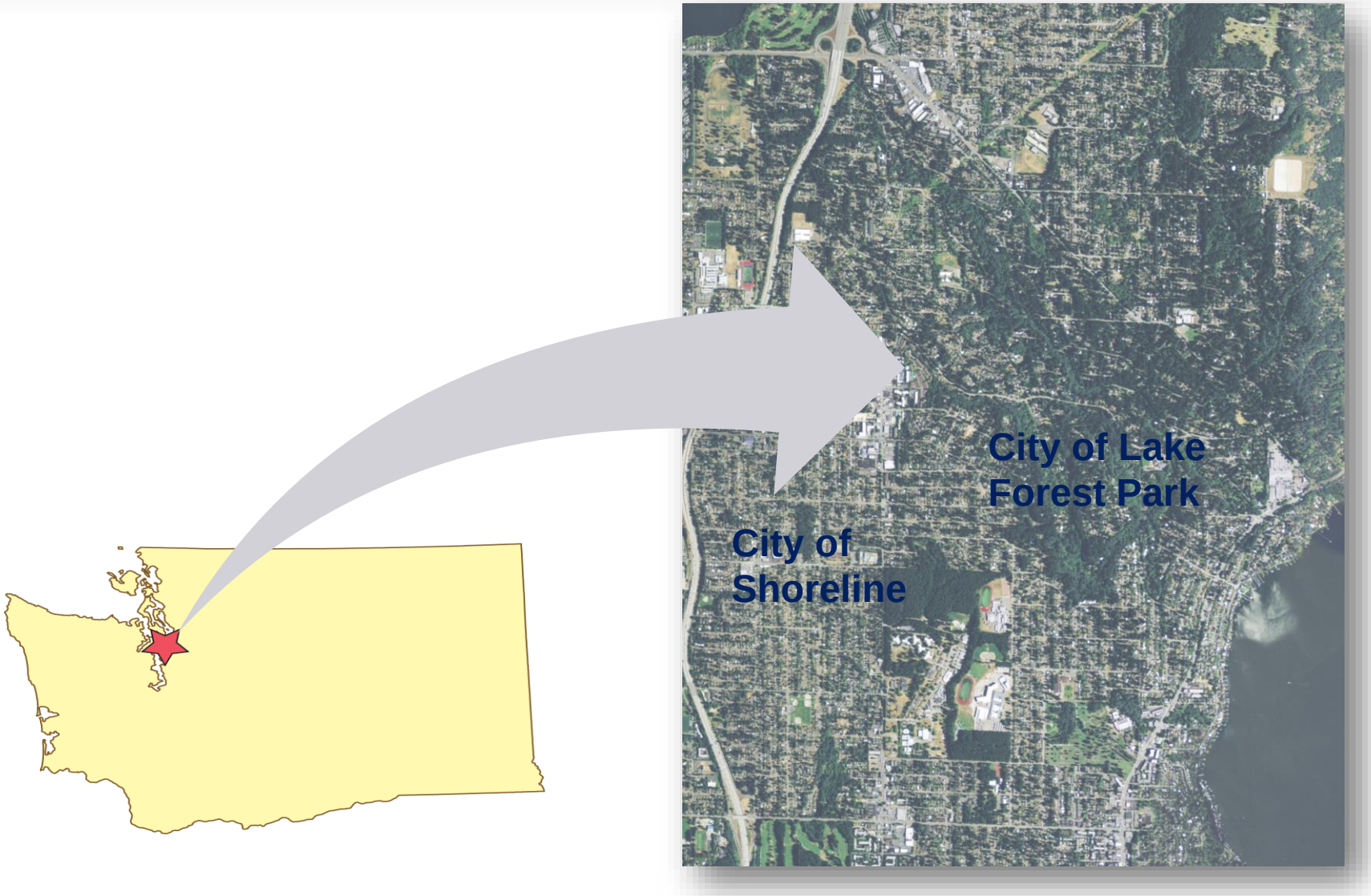
- North City Water District Overview
- Need for Project/Project Details
- Functional Objectives
  - Operational Needs
  - Design Criteria
  - Design Process
  - System and Water Quality Improvements
- Construction Progress
- Project Schedule
- Questions

North City Water District

- Founded in 1931
- Serves approximately 25,000 people in the Cities of Shoreline and Lake Forest Park
- Changed name from Shoreline Water District to North City Water District in 2014

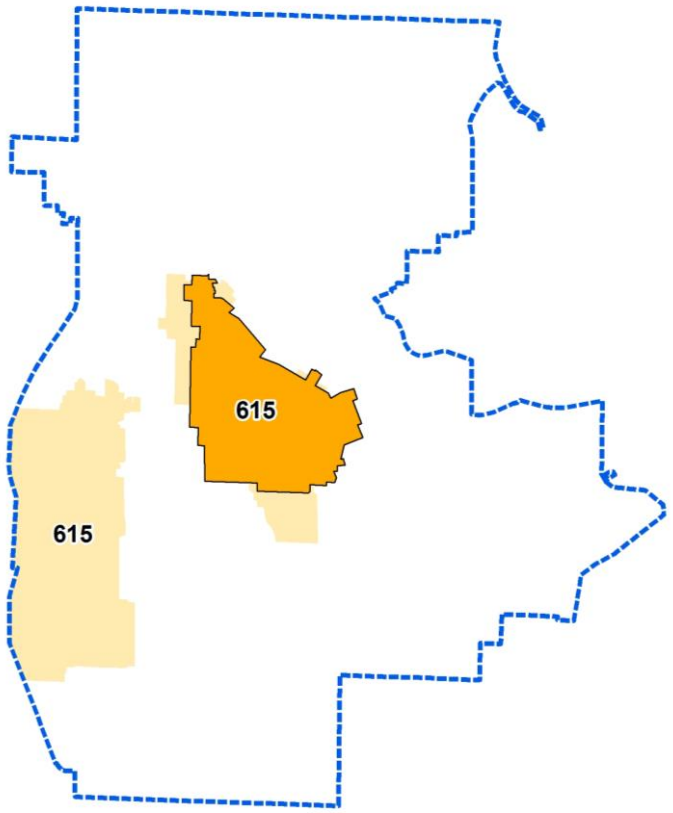


Project Location



Need for Project

- Revised population projections and 615 Zone expansion
- Replace aging equipment in 660 Zone Booster Pump Station
- Address system deficiencies:
  - 3.7 MG dead storage
  - 590 Zone pressure relief
  - 502 Zone redundancy
- Improve aesthetics



Existing 660 Zone Pump Station

- Constructed in 1994
- Serves closed 615 Zone (formerly 660) and 590 Zone

Existing 660 Zone Pump Station

- Q_{PHD} = 460 gpm; 3 pumps
- Q_{FFD} = 1,980 gpm; 2 pumps

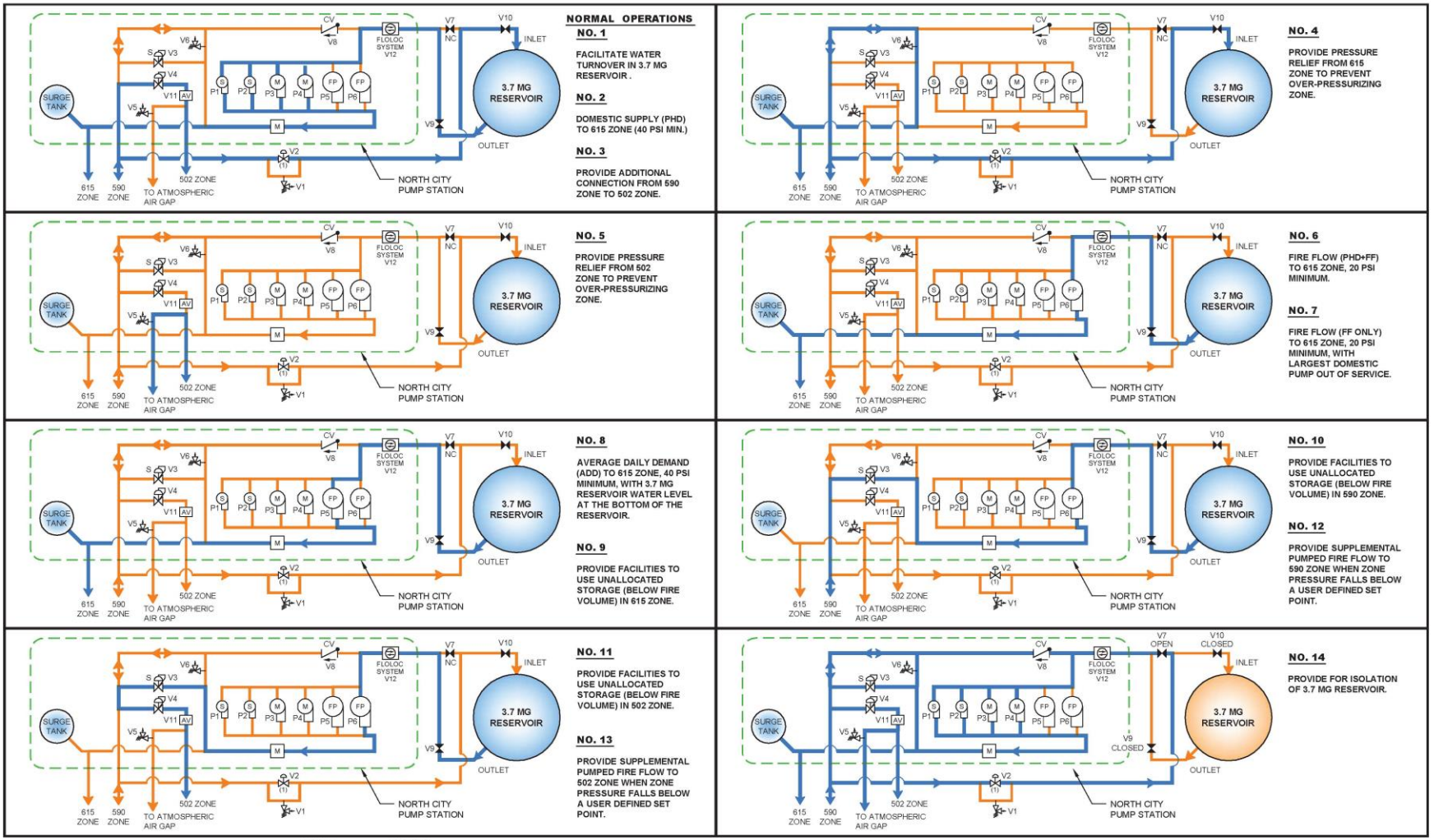
Functional Objectives

- Used to ensure that the project goals are achieved
- Project goal is for a facility to:
  - Meet water system operations needs: normal, fire flow, and emergency
  - Improve water quality
  - Improve system redundancy
- First project task was functional objectives development

Functional Objectives

No.	Functional Objective	Normal Operation	Frequency of Use
1	Facilitate water turnover in 3.7 MG Res	Yes	High
2	Domestic supply (PHD) to 615 Zone, 40 psi minimum	Yes	High
3	Provide additional connection from 590 Zone to 502 Zone	Yes	High
4	Provide pressure relief from 615 Zone to prevent over-pressurizing zone	No	Low
5	Provide pressure relief from 502 Zone to prevent over-pressurizing zone	No	Low
6	Fire Flow (PHD+FF) to 615 Zone, 20 psi minimum	No	Low
7	Fire Flow (FF Only) to 615 Zone, 20 psi min, with largest domestic pump out of service	No	Very Low
8	ADD to 615 Zone, 40 psi min, with 3.7 MG tank water level at the bottom of the reservoir	No	Low
9	Provide facilities to use unallocated storage (below fire volume) in 615 Zone	No	Low
10	Provide facilities to use unallocated storage (below fire volume) in 590 Zone	No	Low
11	Provide facilities to use unallocated storage (below fire volume) in 502 Zone	No	Low
12	Provide supplemental pumped FF to 590 Zone when zone pressure falls below a set point	No	Low
13	Provide supplemental pumped FF to 502 Zone when zone pressure falls below a set point	No	Low
14	Provide ability to isolate 3.7 MG reservoir	No	Very Low
15	Provide pressure relief from 590 Zone to prevent over-pressurizing zone	No	Low

Functional Objectives



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SHORELINE Water District

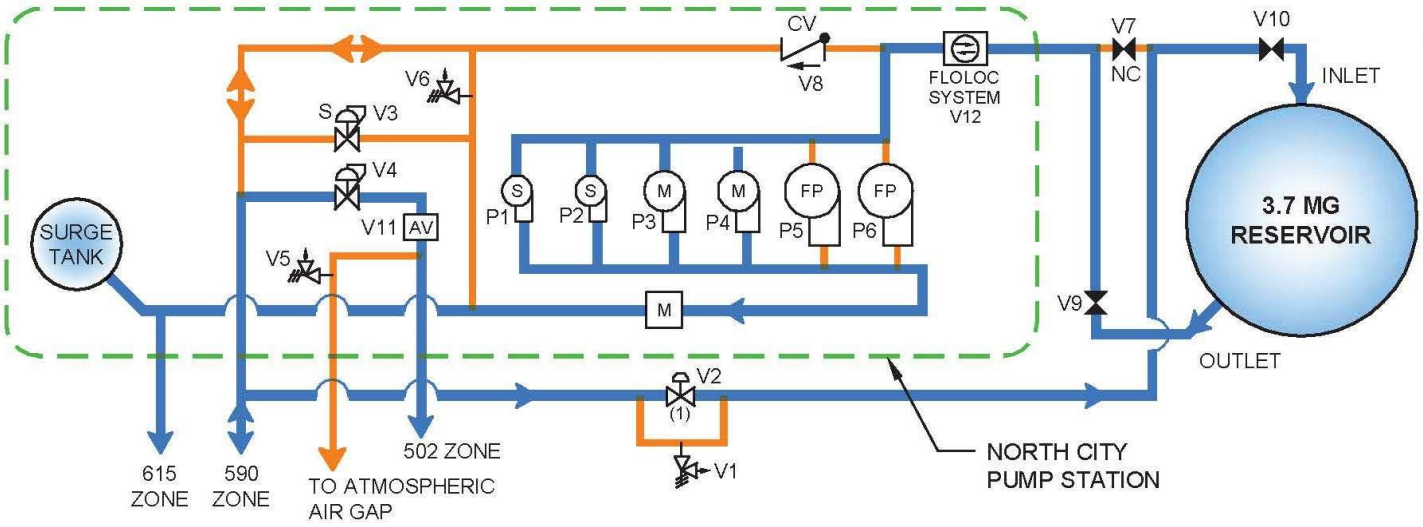
Functional Objectives
North City Pump Station
August 2013

Figure 1

Functional Objectives – Design Criteria

- Second project task was to develop design criteria based on functional objectives
- Where to focus system efficiency
- Flow
- Pump selection
- Piping and valving

Functional Objectives 1, 2, and 3
Normal Operation



NORMAL OPERATIONS

NO. 1

FACILITATE WATER TURNOVER IN 3.7 MG RESERVOIR .

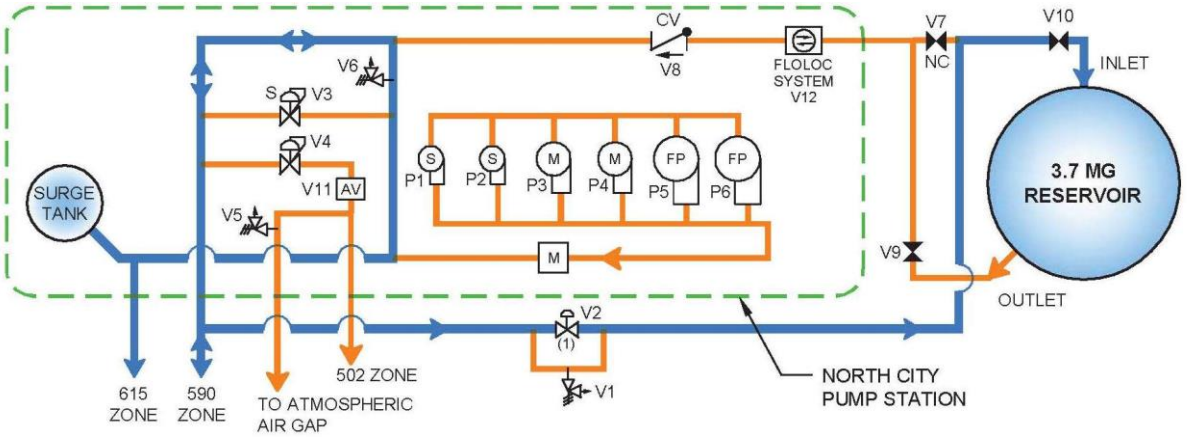
NO. 2

DOMESTIC SUPPLY (PHD) TO 615 ZONE (40 PSI MIN.)

NO. 3

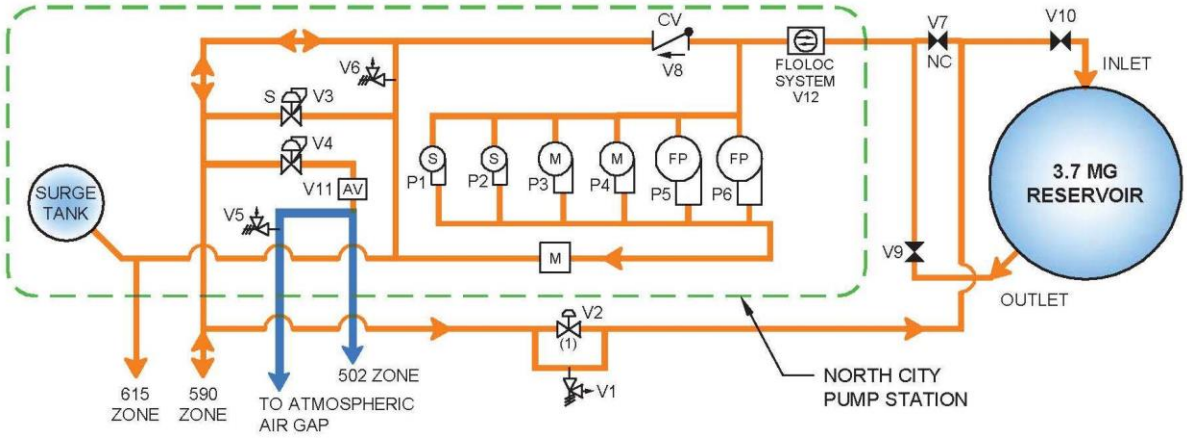
PROVIDE ADDITIONAL CONNECTION FROM 590 ZONE TO 502 ZONE.

Functional Objectives 4 and 5
Pressure Relief from 615 and 502 Zones



NO. 4

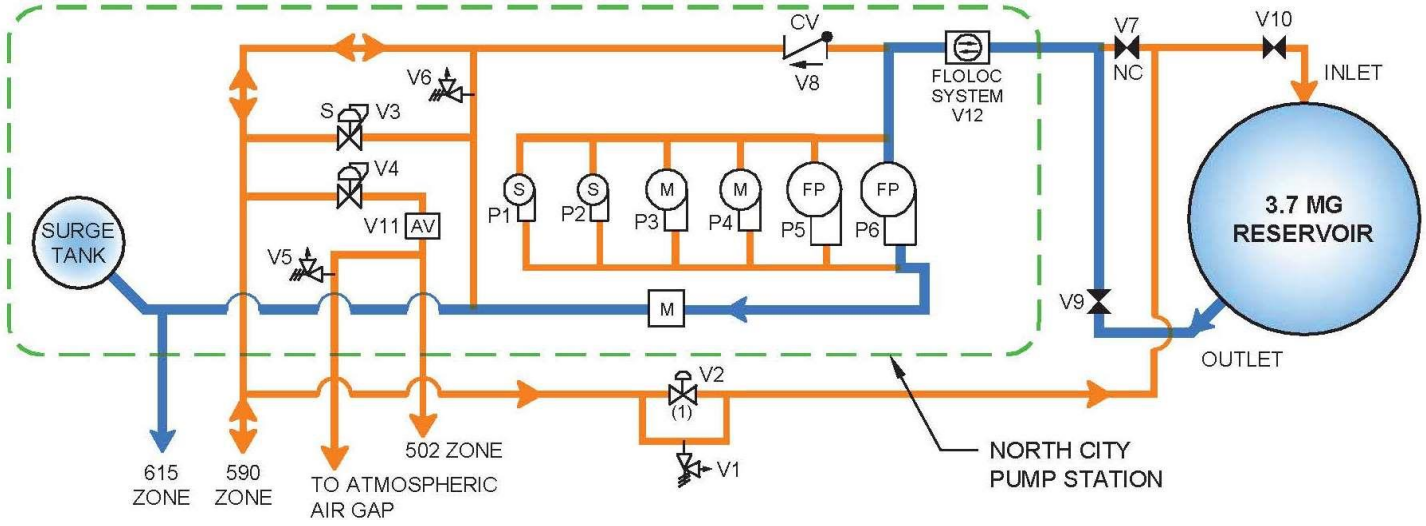
PROVIDE PRESSURE RELIEF FROM 615 ZONE TO PREVENT OVER-PRESSURIZING ZONE.



NO. 5

PROVIDE PRESSURE RELIEF FROM 502 ZONE TO PREVENT OVER-PRESSURIZING ZONE.

Functional Objectives 6 and 7
Fire Flow to 615



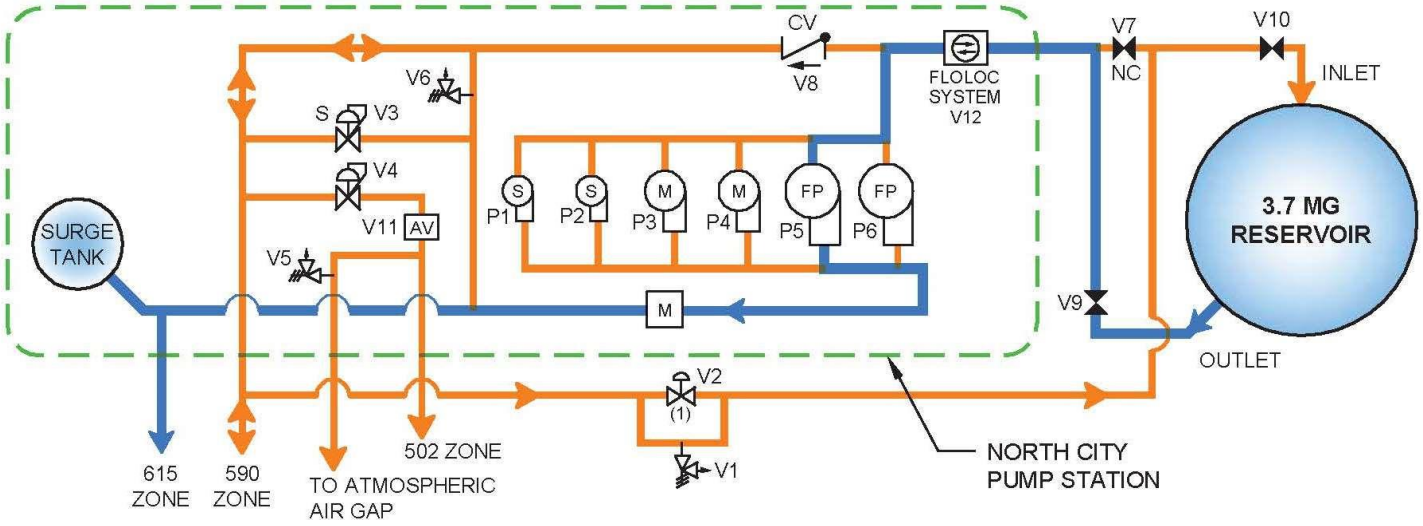
NO. 6

FIRE FLOW (PHD+FF) TO 615 ZONE, 20 PSI MINIMUM.

NO. 7

FIRE FLOW (FF ONLY) TO 615 ZONE, 20 PSI MINIMUM, WITH LARGEST DOMESTIC PUMP OUT OF SERVICE.

Functional Objectives 8 and 9
Use of Unallocated Storage



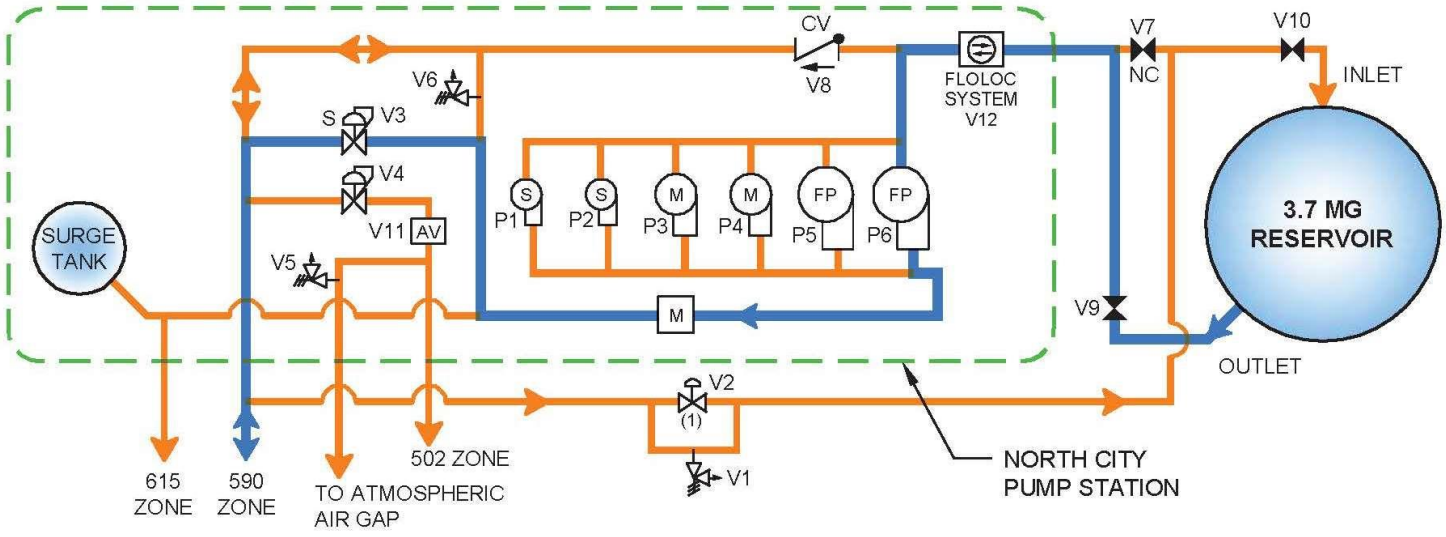
NO. 8

AVERAGE DAILY DEMAND (ADD) TO 615 ZONE, 40 PSI MINIMUM, WITH 3.7 MG RESERVOIR WATER LEVEL AT THE BOTTOM OF THE RESERVOIR.

NO. 9

PROVIDE FACILITIES TO USE UNALLOCATED STORAGE (BELOW FIRE VOLUME) IN 615 ZONE.

Functional Objectives 10 and 12



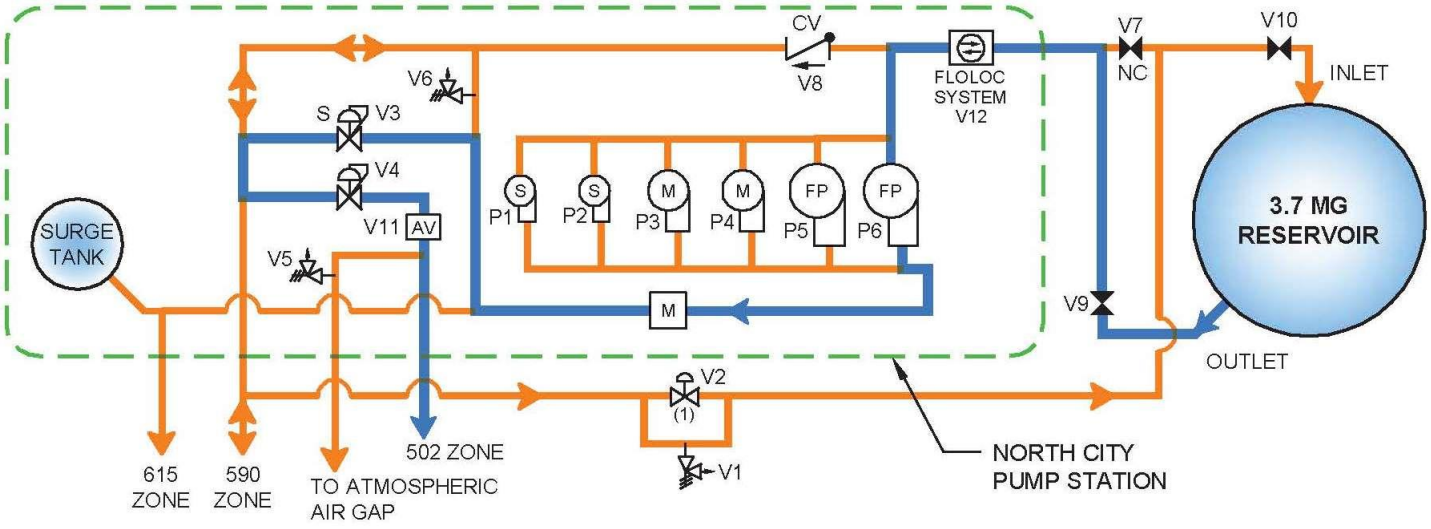
NO. 10

PROVIDE FACILITIES TO USE UNALLOCATED STORAGE (BELOW FIRE VOLUME) IN 590 ZONE.

NO. 12

PROVIDE SUPPLEMENTAL PUMPED FIRE FLOW TO 590 ZONE WHEN ZONE PRESSURE FALLS BELOW A USER DEFINED SET POINT.

Functional Objectives 11 and 13



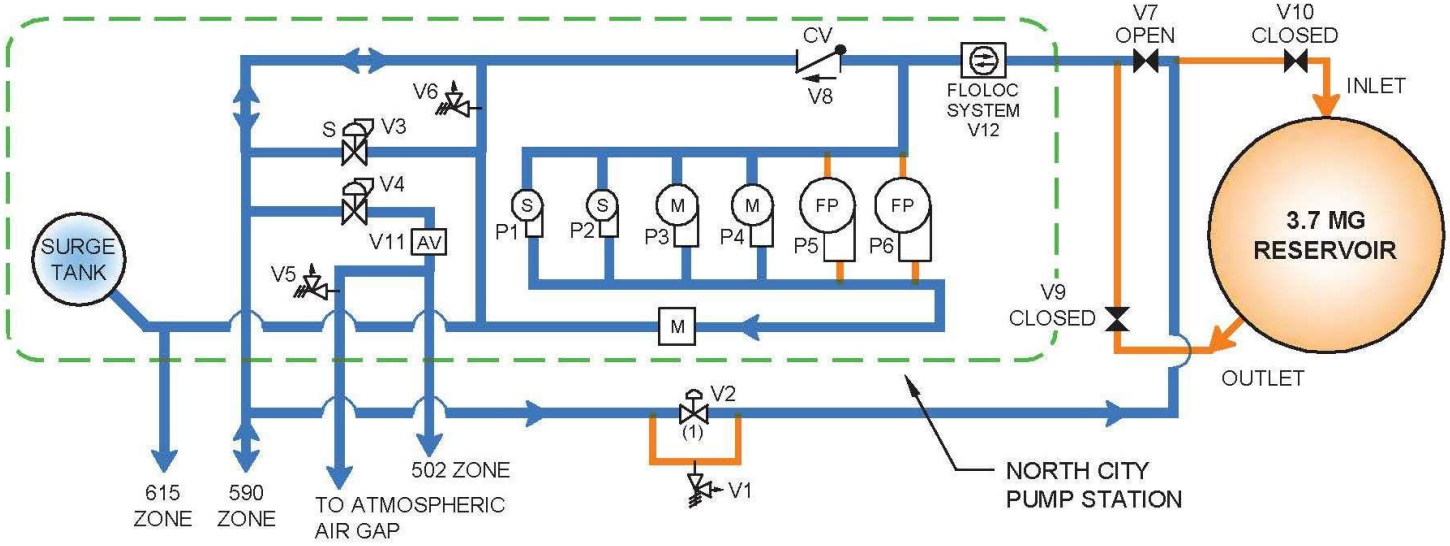
NO. 11

PROVIDE FACILITIES TO USE UNALLOCATED STORAGE (BELOW FIRE VOLUME) IN 502 ZONE.

NO. 13

PROVIDE SUPPLEMENTAL PUMPED FIRE FLOW TO 502 ZONE WHEN ZONE PRESSURE FALLS BELOW A USER DEFINED SET POINT.

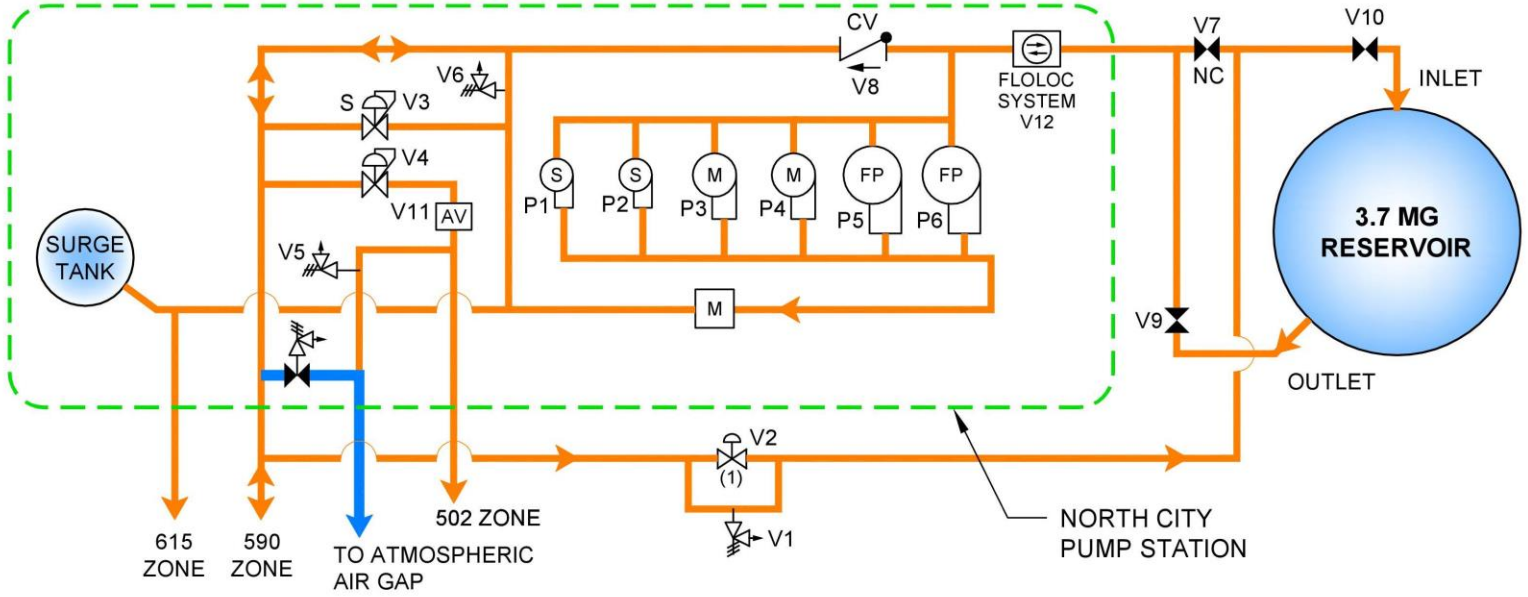
Functional Objectives 14
3.7 MG Reservoir Isolation



NO. 14

PROVIDE FOR ISOLATION OF 3.7 MG RESERVOIR.

Functional Objectives 15
Pressure Relief from 590 Zone



NO. 15

PROVIDE PRESSURE RELIEF FROM 590 ZONE TO PREVENT OVER-PRESSURIZING ZONE.

NCPS Exterior Rendering

Construction Progress – Exterior

Construction Progress – Exterior

Construction Progress – Interior

Construction Progress – Interior

Construction Progress – Interior

Project Schedule

- Construction Start Date: May 11, 2015
- Substantial Completion: July 29, 2016
- Final Completion: September 29, 2016

Acknowledgments

- NCWD Commissioners: Ron Ricker, Charlotte Haines, and Larry Schoonmaker
- Diane Pottinger – North City Water District
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Questions

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