CEDAR HILLS

Pressurized Irrigation System Capacity Assessment

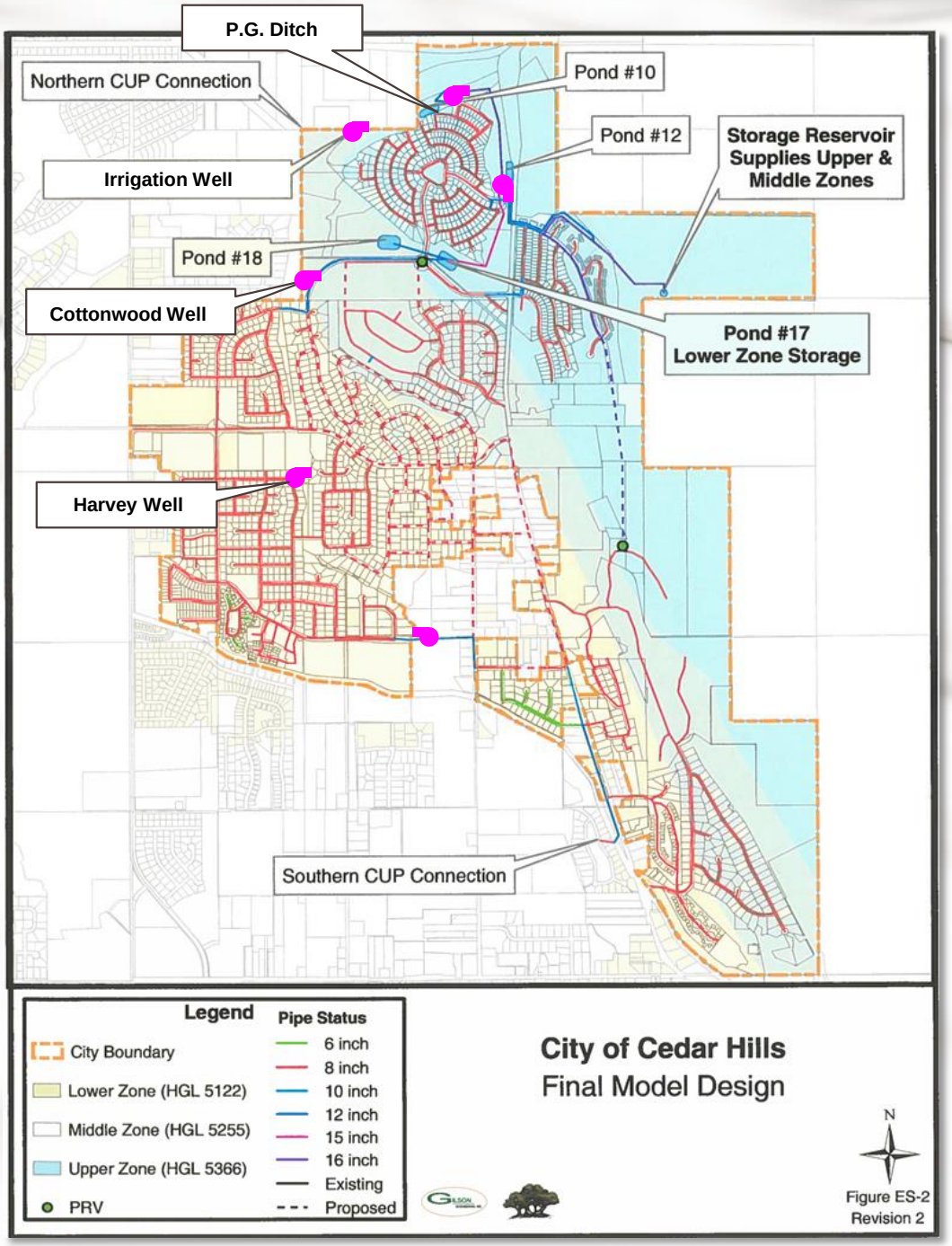
August 14, 2014

HANSEN ALLEN & LUCE INC
ENGINEERS

Background

- City is approximately 90 percent built-out
- During 2013 P.I. water use was very high with the system operating at or above design capacity much of the summer
- City is concerned that long-term operation at 2013 levels will cause premature failure of key system components and unreliable system performance
- Future growth will make this situation worse

HANSEN ALLEN & LUCE INC
ENGINEERS



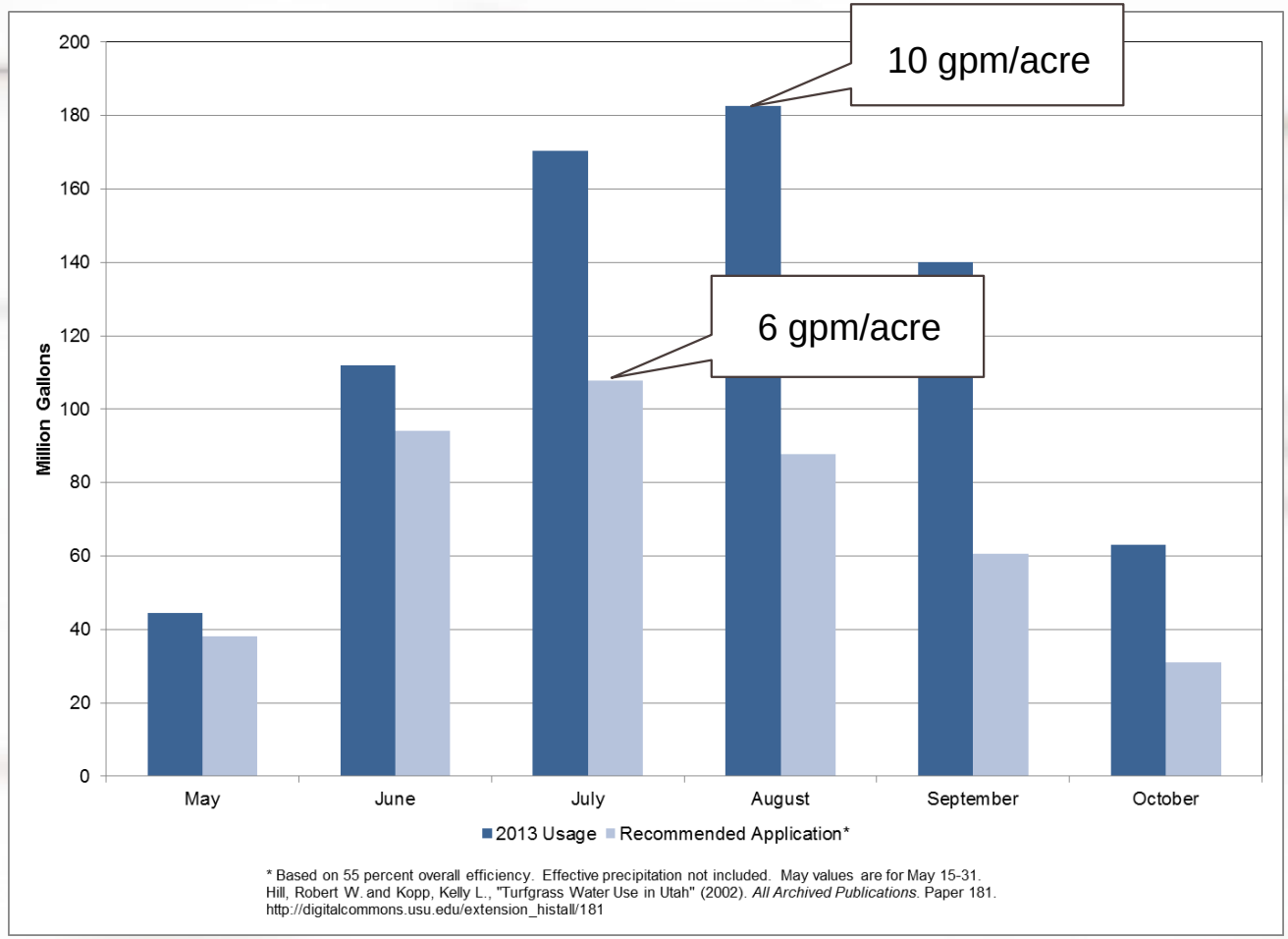
HANSEN ALLEN & LUCE INC
ENGINEERS

Scope of Study

- Evaluate the capacity and performance of P.I. System
- Develop a computer model of P.I. System
- Evaluate P.I. System under 2013 water demand conditions
- Evaluate P.I. System with reduced water demands
  - Current level of development
  - Build-out conditions
- Evaluate system operation with failure of key components

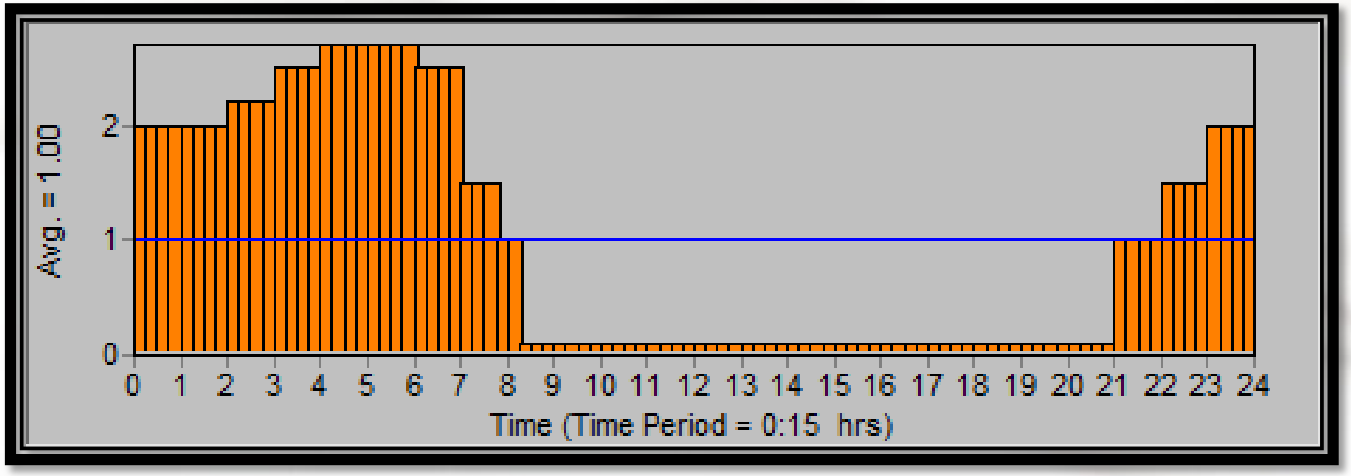
HANSEN ALLEN & LUCE INC
ENGINEERS

2013 Water Usage vs. Recommended



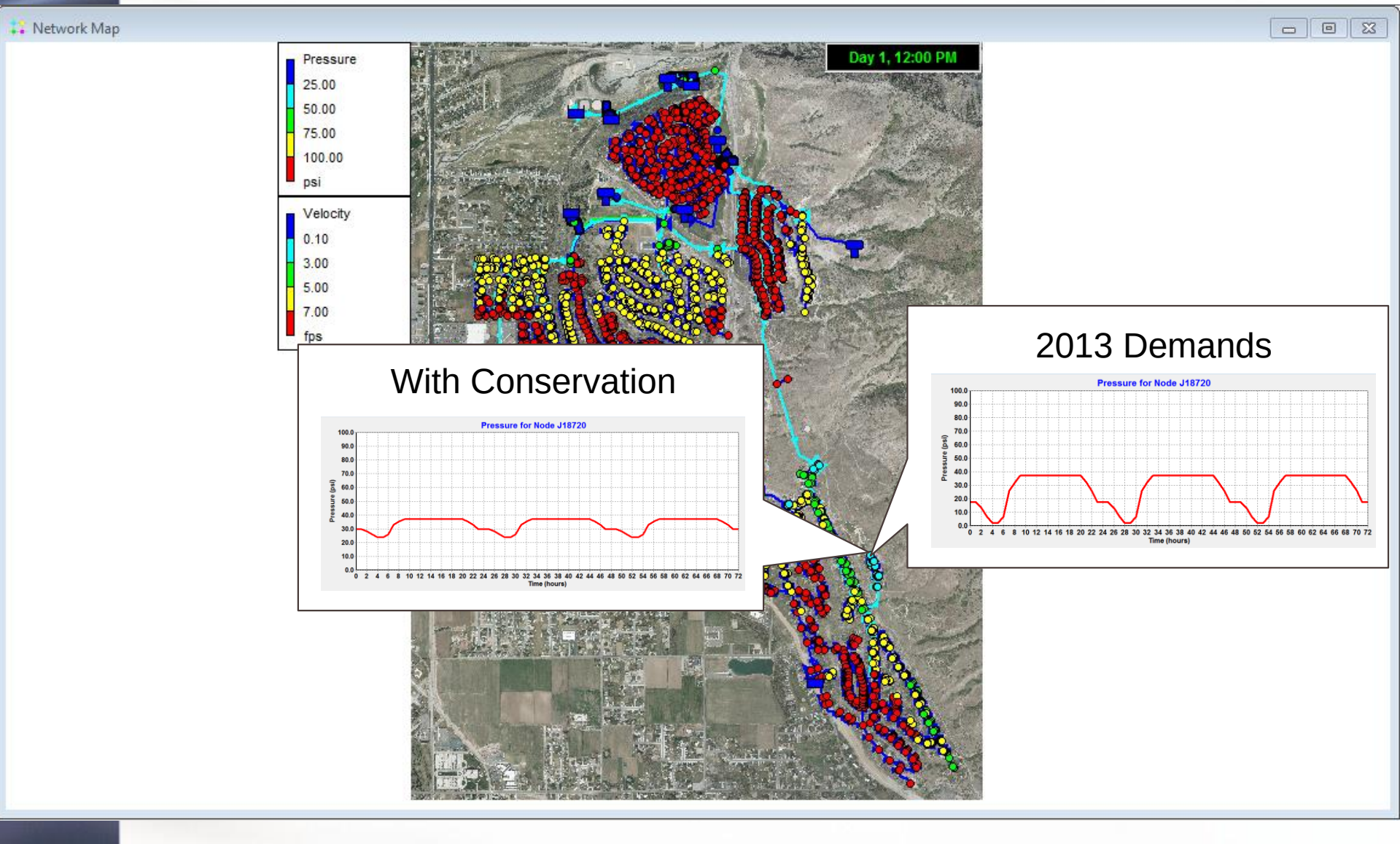
HANSEN ALLEN & LUCE inc
ENGINEERS

Daily Demand Distribution

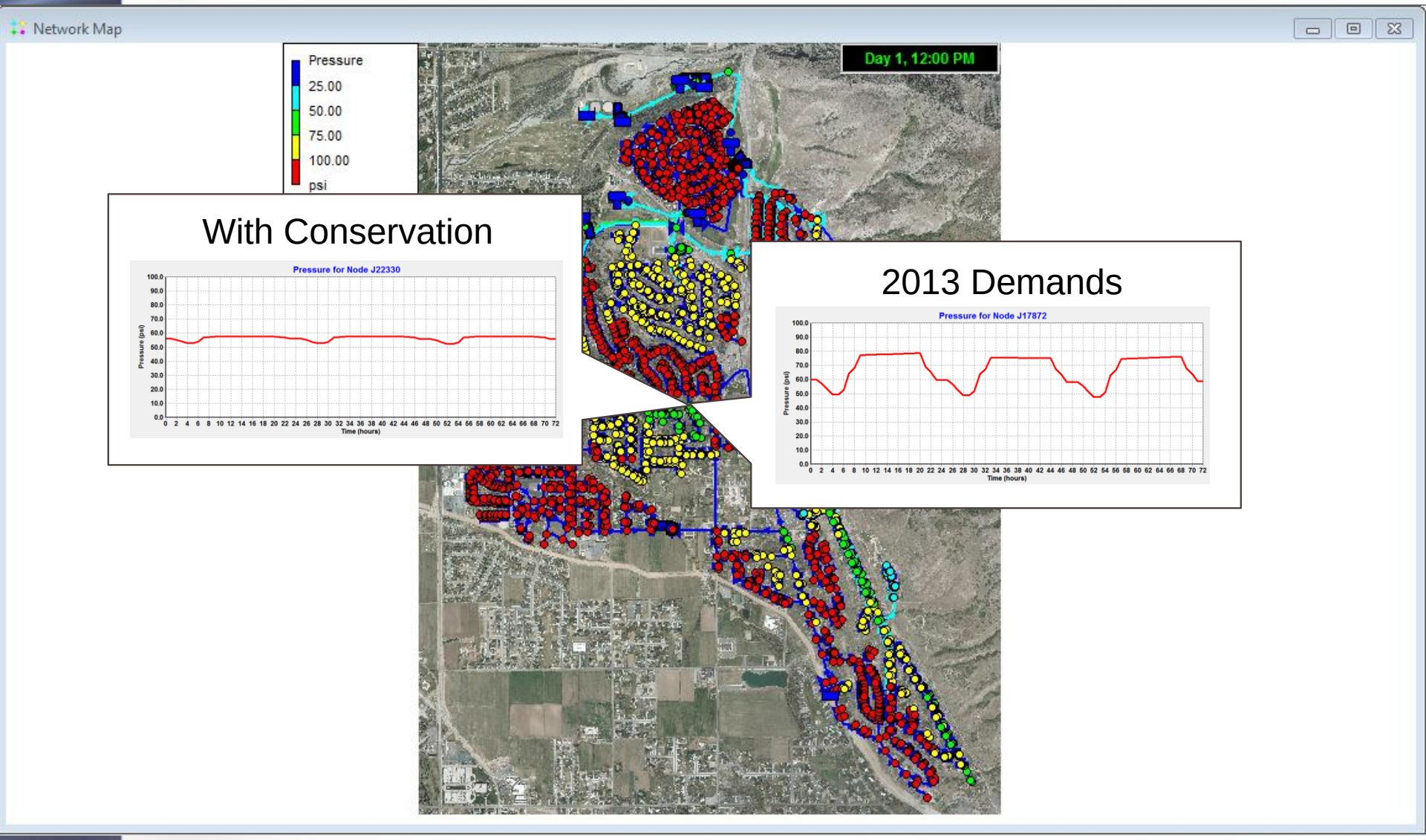


HANSEN ALLEN & LUCE inc
ENGINEERS

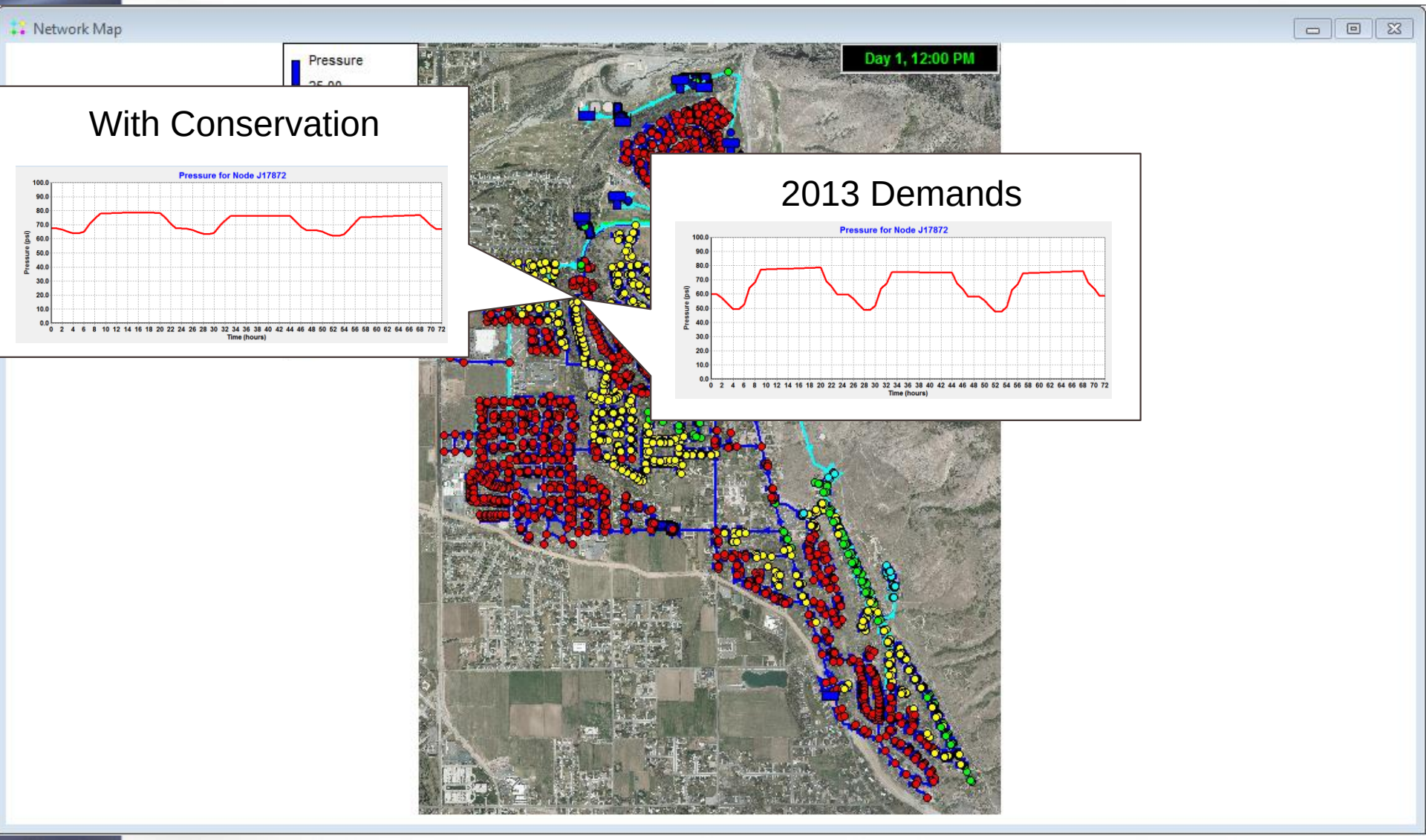
Pressure Fluctuation Comparison
Timpanogos Cove



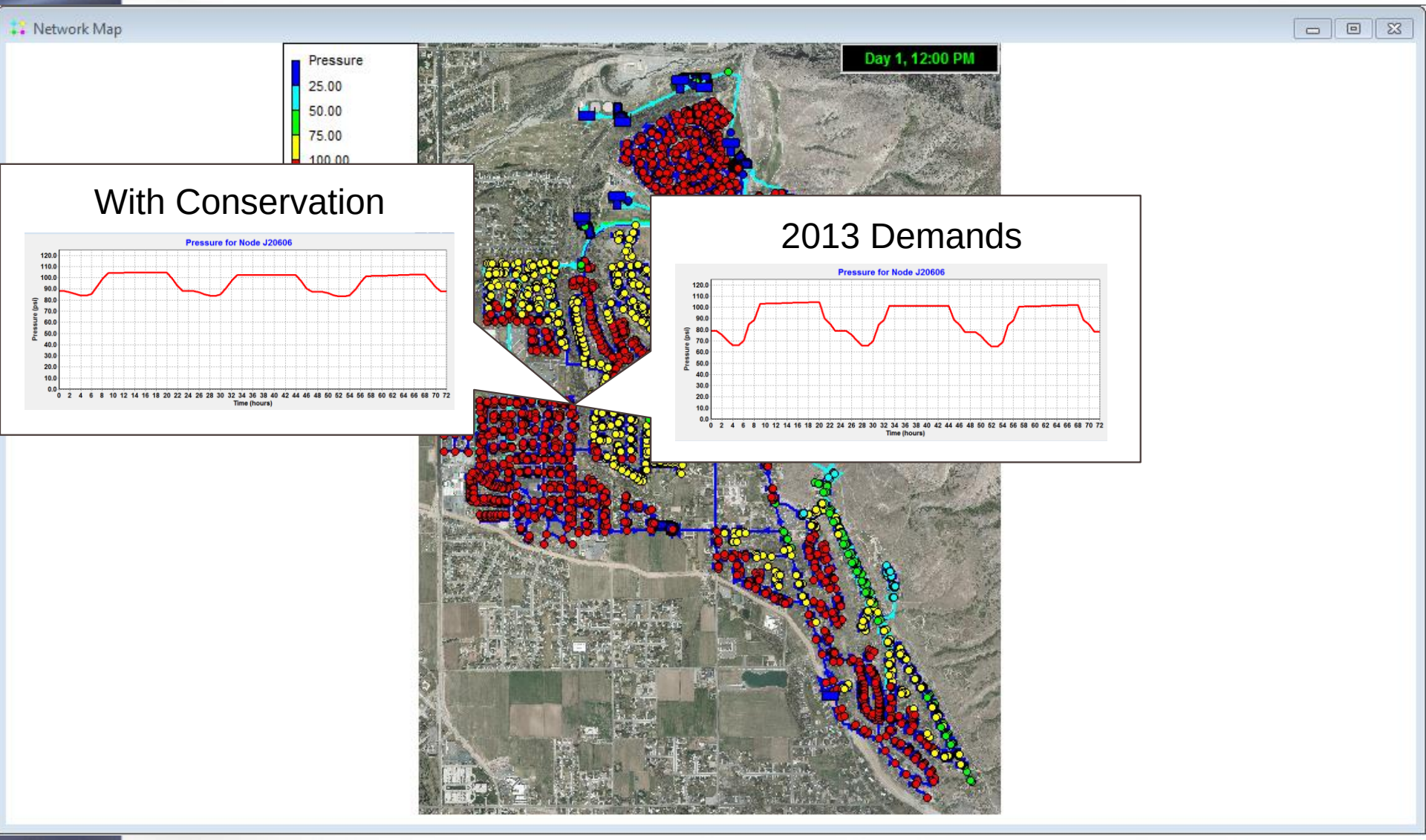
Pressure Fluctuation Comparison
Wedgewood Drive



Pressure Fluctuation Comparison
10280 North



Pressure Fluctuation Comparison
Dorchester Drive



Analysis Results

- Scenario 1
  - Very high water demand of 5.9 million gallons per day.
  - Inadequate pressures exist on Timpanogos Cove.
  - Marginal pressures occur near the top of the middle and lower zones.
  - Very high velocities in excess of 7 feet per second occur in several pipes
  - High pressure fluctuations occur in several areas, particularly in the lower zone
  - System pressures limit the available flow from the CUP South turnout.

HANSEN ALLEN & LUCE INC
ENGINEERS

Analysis Results (continued)

- Scenario 2
  - With conservation goals achieved demand would be reduced to 3.5 million gallons per day
  - System pressures significantly improved
  - Pipe velocities are improved – still a few trouble spots
  - Pressures are much more stable
  - A properly located booster pump is needed for CUP South turnout

HANSEN ALLEN & LUCE INC ENGINEERS

Analysis Results (continued)

- Scenario 3
  - At build-out, with conservation goals achieved demand would be 3.8 million gallons per day
  - System behaves similar to scenario 2 with only minor differences in pressures and velocities
  - **System appears to have adequate capacity for build-out if water conservation measures are implemented**

HANSEN ALLEN & LUCE INC
ENGINEERS

Analysis Results (continued)

- Scenario 4 – Well Failure (Cottonwood or Harvey)
  - Increase deliveries from CUP North Turnout, deliver water to lower zone from Pond 12
  - Short-term solution only – quantity of CUP water is limited
  - Demand would need to be curtailed significantly due to high velocities in booster pump discharge pipe

HANSEN ALLEN & LUCE INC ENGINEERS

Analysis Results (continued)

- Scenarios 5 & 6 – Booster Pump Failures at Ponds 10 &12
  - Water could still be delivered, but water conservation would be critically important
  - Other pumps remaining in operation would need to operate for longer periods of time
  - Increased probability of additional pump failures due to extended operation
  - Curtailment of demand would help relieve stress on remaining pumping facilities until failed booster pump is back on line

HANSEN ALLEN & LUCE INC
ENGINEERS