

PA Section AWWA – 2015
67th Annual Conference
Technical Session - Distribution

Clearfield Municipal Authority
Water Storage and Transmission Project

Presented By:

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Gwin, Dobson & Foreman, Inc.

April 23, 2015 11:00-11:30 AM

System Description

■ Clearfield Municipal Authority

- Created: 1882
- Customers: 6,000
- Population Served: 12,000

■ Service Area

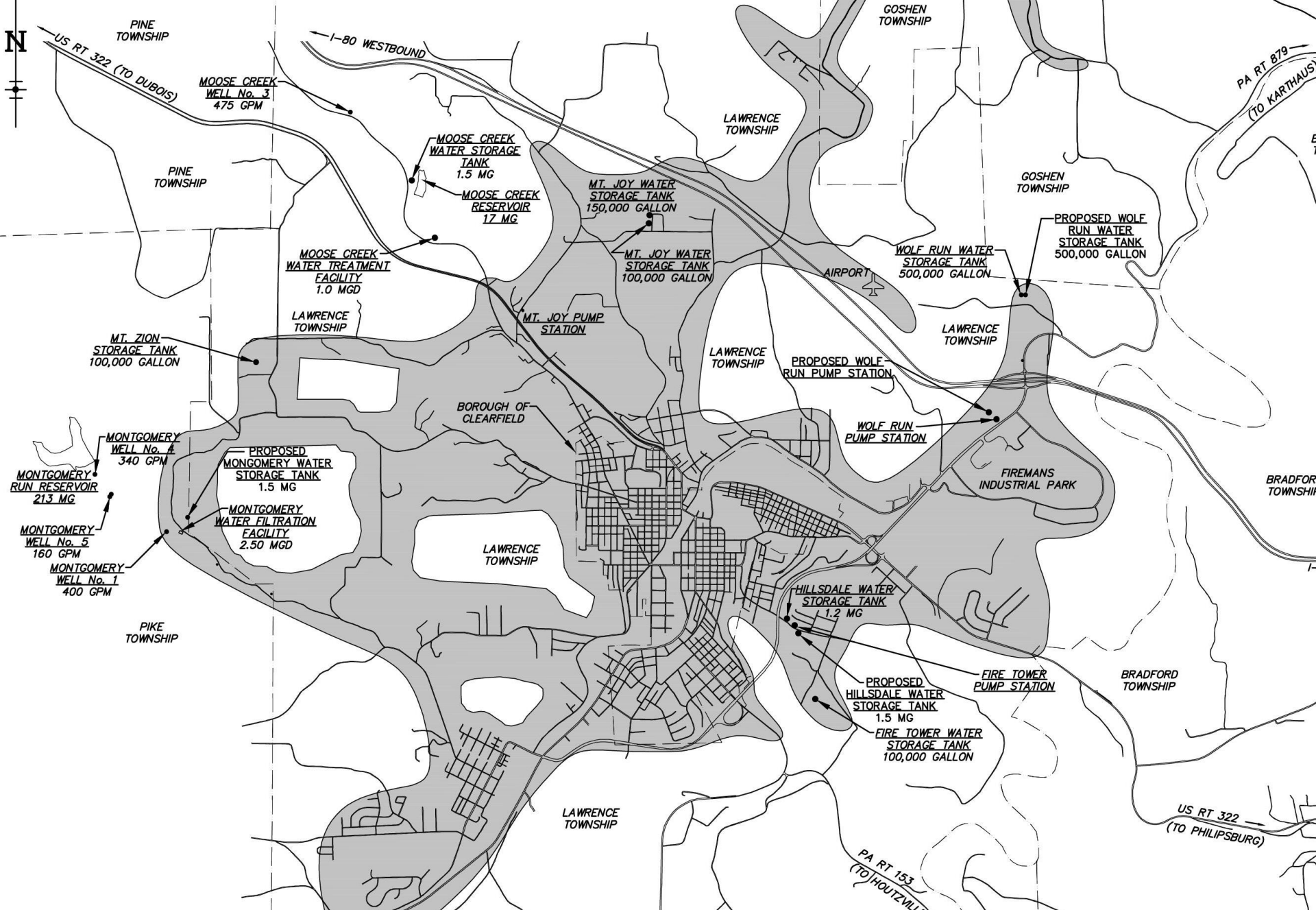
- Clearfield Borough; Lawrence & Goshen Twps

■ Water Sources

- Montgomery Run Reservoir: 210 mg
- Moose Creek Reservoir: 18 mg
- Moose Creek Well Field: 475 gpm

System Description (cont.)

- Water Treatment Plants
 - Montgomery Run WTP: 2.5 mgd
 - Moose Creek WTP: 1.0 mgd
- Water Storage
 - 3.65 mg (2013) ; 6.95 mg (2015)
- Water Pumping
 - 3 Booster Stations
- Water Transmission & Distribution System
 - 85 miles (4-20 inch; cast, ductile, PVC)
- Water Production
 - 1.64 mgd (avg)
 - 2.20 mgd (peak)



Service Area & Facilities Map

Storage-Transmission Problems

- No Distribution Storage at Montgomery WTP
- 100-year old Transmission Line in Poor Condition
- System Supply Vulnerable to Extended Outages
- Lack of Fire Protection Storage at Industrial Park
- Industrial Park Booster Station in Poor Condition
- Deteriorated In-town Distribution Storage Tank
- Update Water Meters System & SCADA System

Hydraulic Analysis and Evaluation

- Hydraulic parameters of the design of the Montgomery transmission main and storage tank
- Effect of replacing old 16" main in relation to siting new finish water storage tank
- Distribution storage tanks in Clearfield (Hillsdale) and Industrial Park (Wolf Run) based on storage capacity for ISO standards

Hydraulic Analysis and Evaluation

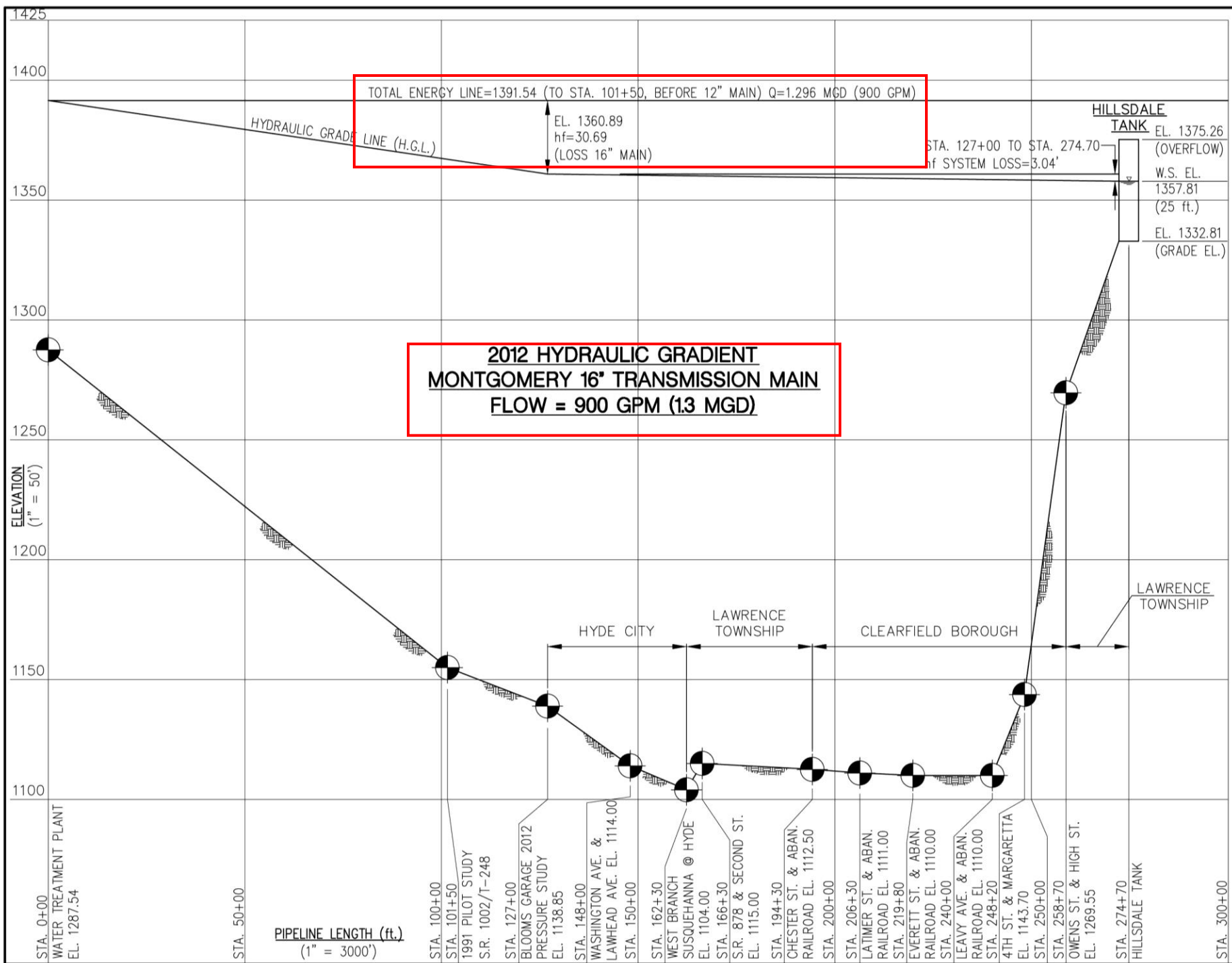
GOALS:

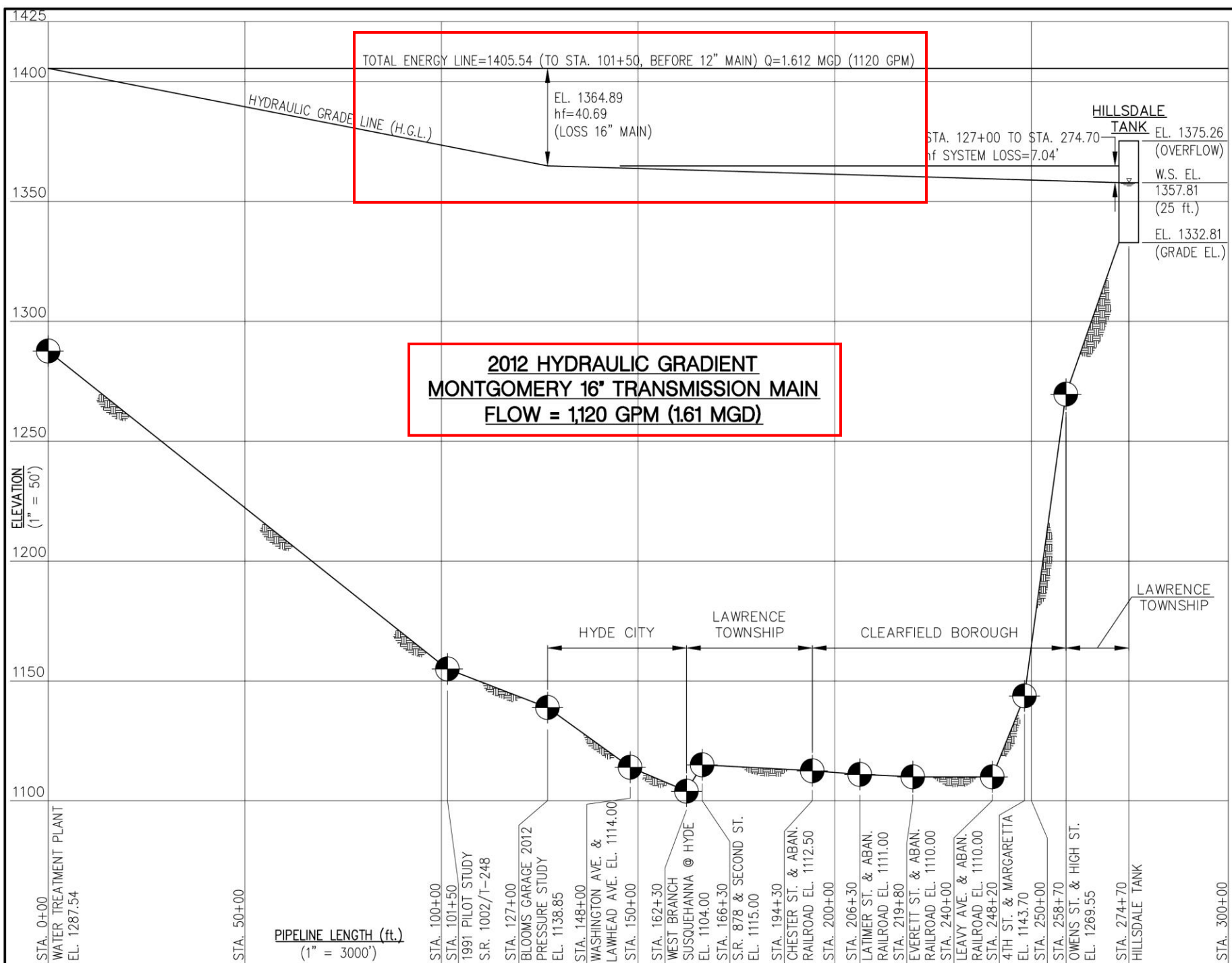
- Increase system hydraulic capacity
- Stabilize Montgomery Run WTP operation
- Enhance system reliability; reduce system vulnerabilities
- Stabilize system operating pressures; create gravity service
- Increase fire protection
- Provide additional finished water & distribution storage

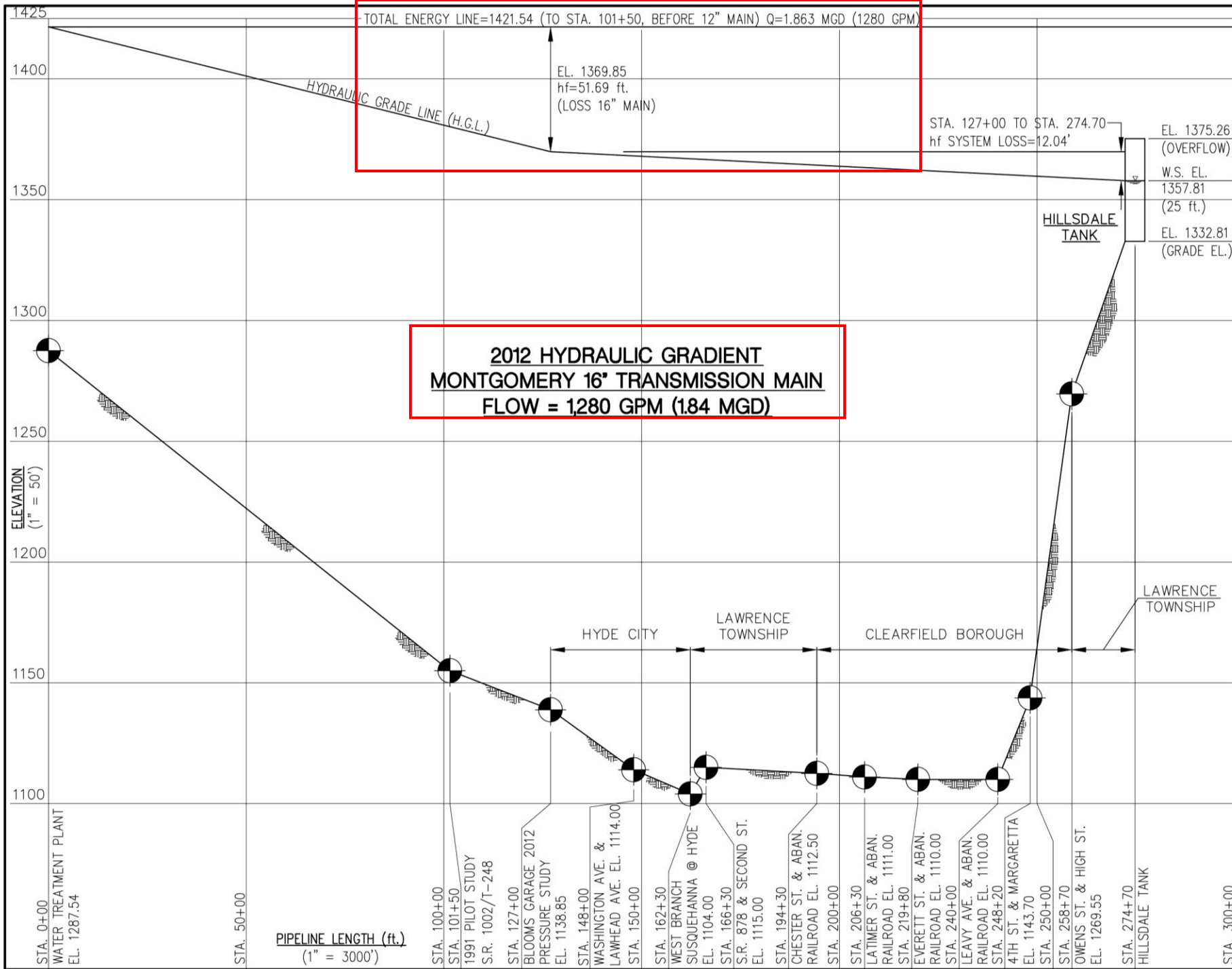
Hydraulic Analysis and Evaluation

Montgomery Run System Problems:

- No Storage at WTP causes pumps to run continuously
- WTP is paced to system demand; makes it difficult to operate
- 16" main results in excessive discharge pressures and costs
- When demand rises customers see higher pressures with the potential for pipe breaks and leakage
- Only 30 – 50 feet of total head available between WTP & town



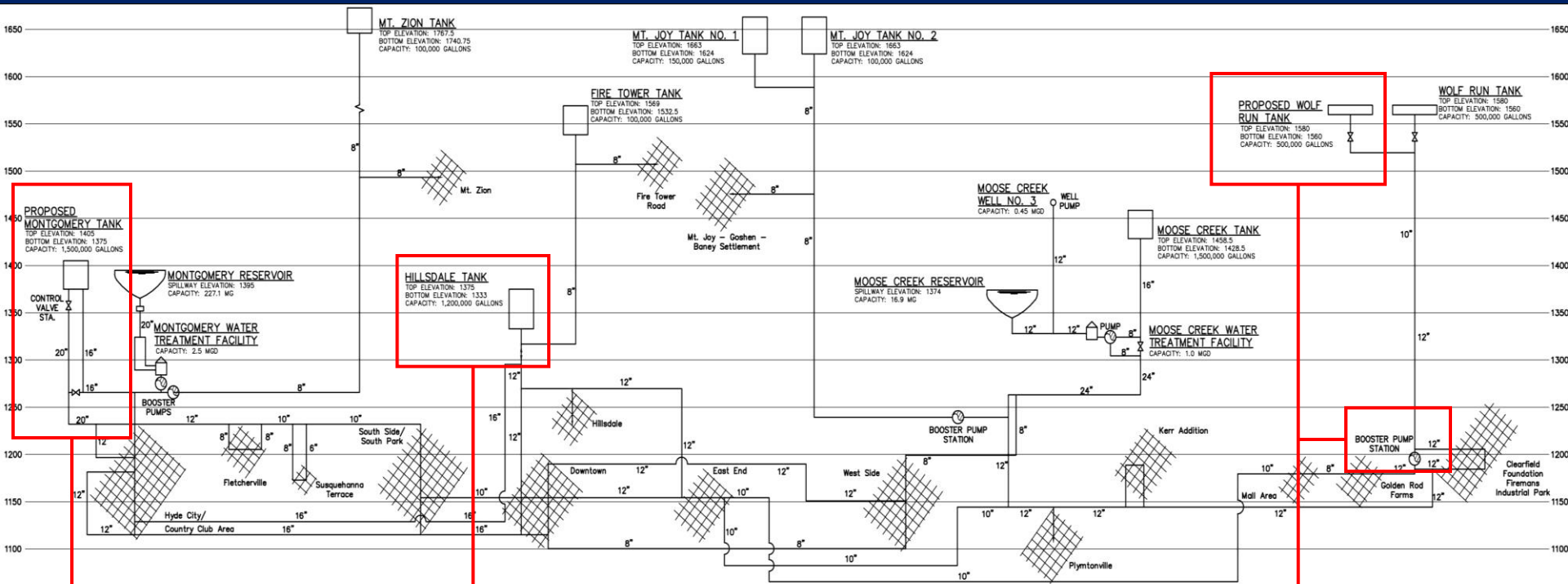




Design Considerations

- After further simulation, set Montgomery Tank Overflow at Elevation 1405
- Provide separate fill line to tank from WTP pumps
- After further simulation, set Hillsdale Distribution Storage Tank Overflow at Elevation 1373
- Replace 16" main with 20" main; by eliminating line head loss, in effect moves tank 2 miles closer to town
- Provide for control valve to regulate flow on tank outlet line to town

Proposed System Hydraulic Profile



Montgomery
1.5 MG Tank &
20 Tran. Main

Hillsdale 1.5
MG Tank

Wolf Run
0.5 MG Tank
Pump Sta. &
Waterline

Project Components

- Montgomery WTP 1.5 MG Water Storage Tank
- New 20-in. Water Transmission Mains (Montgomery)
- Hillsdale 1.5 MG Water Storage Tank (In-Town Reservoir)
- Wolf Run 0.5 MG Water Storage Tank (Industrial Park)
- Wolf Run Pump Station Replacement (Industrial Park)
- System Wide Meter Replacement and SCADA System

Montgomery WTP Finish Water Storage Tank

- Montgomery WTP 1.5 MG Finish Water Storage Tank
 - 92 ft. diameter x 30 ft. high
 - AWWA D110, Type III Prestressed Concrete Tanks
 - Hydrodynamic Mixing Systems (Red Valve)
 - 1-day of storage for Montgomery WTP finish water
 - At Maximum Draft Condition of 4,000 gpm: 6.25 Hours
 - Contractor: DN Tanks, Inc., Wakefield, MA
 - Cost: \$1,500,000



1.5 MG Montgomery Finish Water Storage Tank



Montgomery WTP/Control Station



Montgomery Tank Control Valves

Montgomery Transmission Main

- Montgomery 20" Water Transmission Main
 - 12,800 LF of 20" PVC water transmission main
 - Flow control station at Montgomery Run WTP regulates flow from the tank and downstream "turnover" at Hillsdale tank
 - Increased Hydraulic Capacity
 - Reduced Leakage/Breakage Incidents
 - Increases System Reliability
 - Cost: \$2,060,000



16" x 16" Montgomery Transmission Main
Tapping Sleeve & Valve



Montgomery Transmission Main System Interconnection

Hillsdale Distribution Water Storage Tank

- Hillsdale 1.5 MG Distribution Water Storage Tank
 - 92 ft. diameter x 30 ft. high
 - AWWA D110, Type III Prestressed Concrete Tanks
 - Hydrodynamic Mixing Systems (Red Valve)
 - Sufficient Capacity for 5,000 gpm, 5 hour fire (downtown)
 - Specs Called for Running Bench Levels 5.5 Miles
Between Tanks to Verify Overflow Elevations
 - Contractor: DN Tanks, Inc., Wakefield, MA
 - Cost: \$1,685,000



Hillsdale 1.5 MG Distribution Storage Tank

Industrial Park Storage Tank

- Wolf Run 500,000 Gallon Water Storage Tank
 - 66 ft. diameter by 19.5 High
 - Bolted Stainless Steel with Aluminum Dome
 - Contractor: American Structures, Menomonie WI
 - Supports a 2,750 GPM Fire Flow for 3 Hour Duration
 - Hydrodynamic Mixing System
 - Cost: \$580,000





0.5 MG Wolf Run Tank Mixing System

Industrial Park Pump Station

- Wolf Run Pump Station Replacement
 - Factory-built pump station with two (2) 700 gpm centrifugal pumps with VFD's



Wolf Run (Industrial Park) Pump Station



Wolf Run Water Booster Pumping Pumps

Industrial Park Waterline

- Wolf Run Waterline Replacement
 - 600 LF of 12" waterline (pump station)
 - 3,500 LF of 6" distribution system waterline installed by Horizontal Directional Drilling (HDD) method
 - Final Contract Amount: \$430,000



Wolf Run 12"/8" Tapping Sleeve & Valve

Meter System

- AMI System - New Water Meters
 - Advanced Metering Infrastructure (AMI) System (Sensus)
 - Replacement of 5,520 5/8" and 3/4" meters; 230 1" - 4" meters; 5700 meter interface units
 - Mobile meter reading system
 - Operations and billing software
 - 5-year installation period
 - Procurement Cost: \$1,611,600 (via CoSTARS)

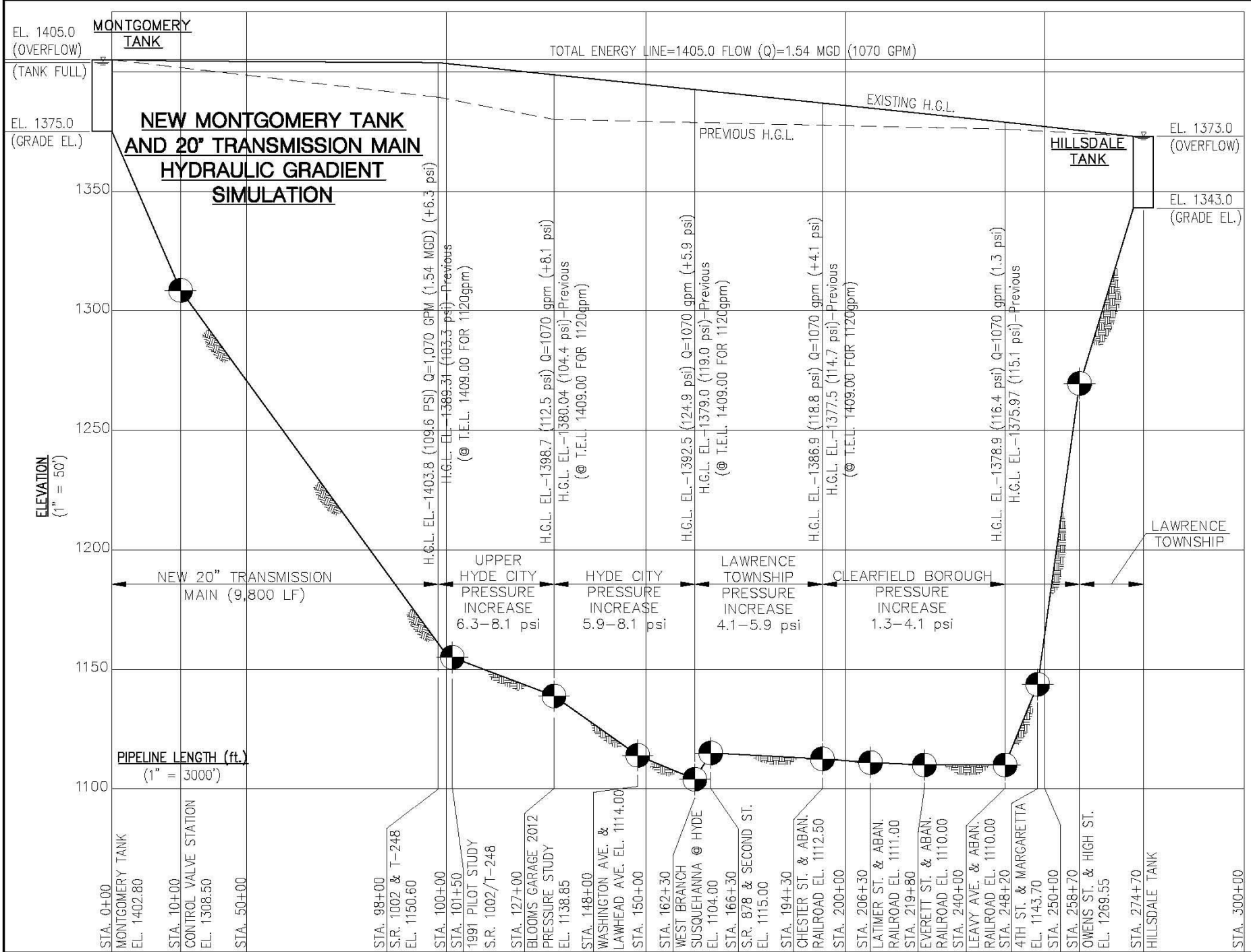
SCADA Upgrade

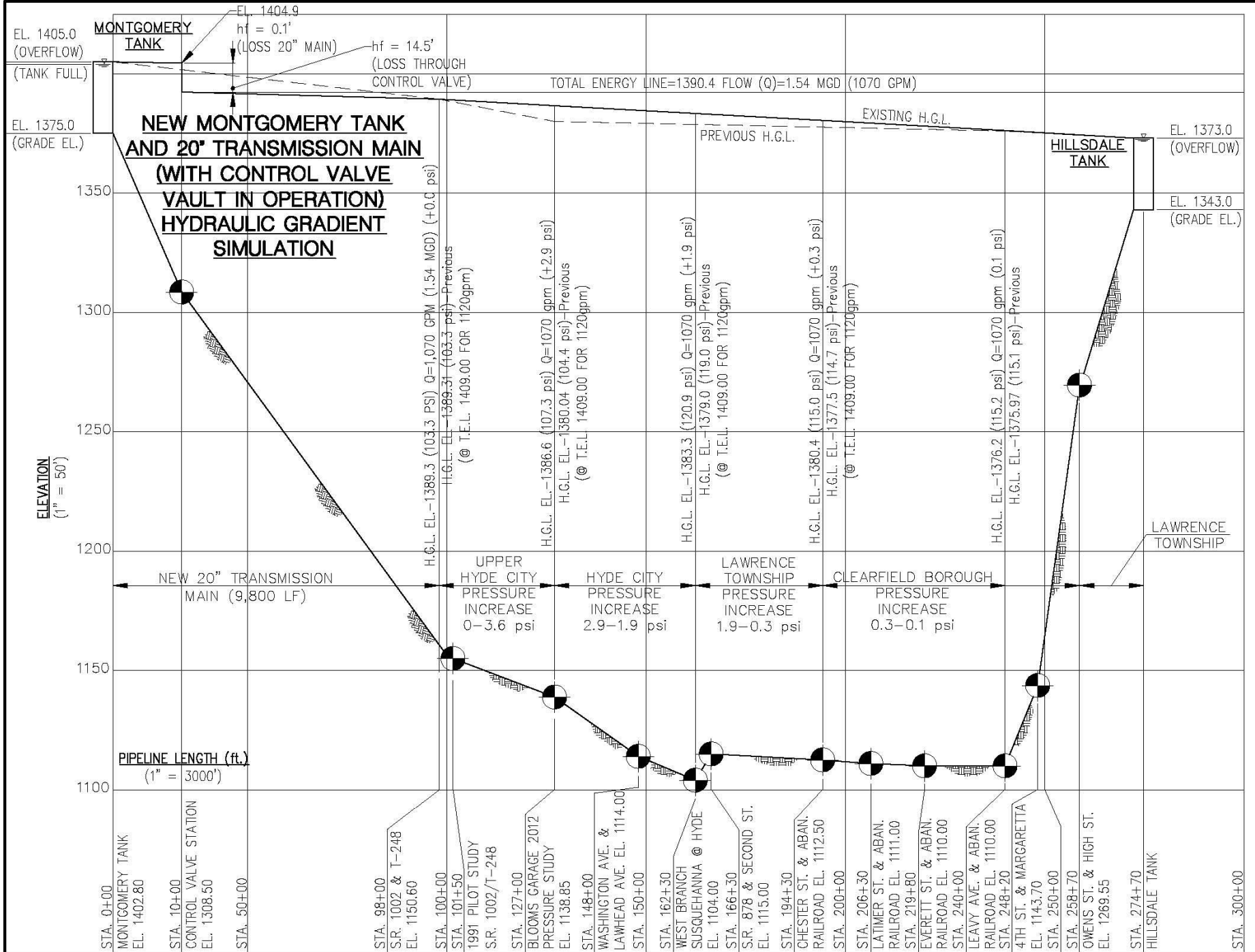
■ SCADA System Upgrade

- SCADA Control /Monitoring (Replaced D²/Aquatrol System)
 - 2 Plants, 1 Well
 - 6 Tanks
 - 3 Pump Stations
- Hardware: Allen Bradley PLC's, Allen Bradley Touch Screens and Calamp Viper Data Radios (VHF)
- Remote monitored via master unit, laptops or Smartphone
- Radio addressing allows for scenario if a site stops communicating with master unit it can default to local communication, i.e., from specific tank to a pump station or from a specific tank to a treatment plant
- Programming, Hardware & Telemetry Cost - \$250,000

Hydraulic Performance







Project Funding

Pennvest Loan

- Date: April 4, 2013
- Interest Rate: 1.56% (average)
- Term of Loan: 20 years
- Principal: \$10,320,000
- Annual Debt Service: \$605,000

Questions

