

ENGINEER'S REPORT

**Town of Lansing  
Water Supply Improvements for  
Consolidated Water District  
Bone Plain Tank Pressure Zone**

TOWN OF LANSING, TOMPKINS COUNTY

By

T.G. Miller, P.C.  
Engineers and Surveyors  
203 N. Aurora Street  
Ithaca, NY 14850  
607-272-6477

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David A. Herrick, P.E.  
NYS License #064974

## TABLE OF CONTENTS

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|  |    |
|--|----|
| SECTION 1 - GENERAL WATER SYSTEM INFORMATION.....                    | 1  |
| SECTION 2 - EXTENT OF WATER WORKS SYSTEM.....                        | 1  |
| SECTION 3 - JUSTIFICATION FOR PROJECT AND PROPOSED IMPROVEMENTS..... | 2  |
| SECTION 4 - ENVIRONMENTAL SETTING.....                               | 4  |
| SECTION 5 - SOIL, GROUNDWATER AND FOUNDATION CONDITIONS .....        | 5  |
| SECTION 6 - WATER DEMANDS.....                                       | 5  |
| SECTION 7 - FLOW REQUIREMENTS .....                                  | 7  |
| SECTION 8 - SOURCE OF WATER SUPPLY .....                             | 8  |
| SECTION 9 - SEWERAGE SYSTEM AVAILABLE .....                          | 8  |
| SECTION 10 - SYSTEM AUTOMATION AND OPERATION.....                    | 8  |
| SECTION 11 - PROJECT COST .....                                      | 9  |
| SECTION 12 - FINANCING THE PROJECT COST.....                         | 9  |
| SECTION 13 - OPERATION AND MAINTENANCE COST.....                     | 10 |

## Section 1 - General Water System Information

The Town of Lansing is bounded in general by Cayuga Lake to the west; the Towns of Dryden and Groton to the east and Cayuga County (Town of Genoa) to the north. The Village of Lansing makes up the southerly portion of the Town. Outside the Village, water service in the Town is limited to the lands within the Town's Consolidated Water District (CWD) and two CWD extensions. The limits of the CWD within the southern portion of the Town are delineated on Figure 2.

Treated water to the Town of Lansing CWD is supplied from the Southern Cayuga Lake Intermunicipal Water Commission (a.k.a. Bolton Point) treatment plant on East Shore Drive through the existing Bolton Point Transmission Main and Burdick Hill Storage Tanks. The treated water is pumped by the Town's Burdick Hill Pump Station to the Town's uppermost pressure zone where pressure is sustained by the Town's Bean Hill and Village Circle Storage Tanks, each with an overflow elevation of 1188 feet (USGS). The Burdick Hill Pump Station and downstream distribution system within the CWD are owned by the Town of Lansing. The Bean Hill/Village Circle Pressure Zone also serves a portion of the Village of Lansing along the Warren Road corridor including the Tompkins County Airport, the Northwood Apartments and the Cornell Business and Technology Park. Both the Town and Village of Lansing are members of Bolton Point which operates the water works described herein.

Downstream of the Bean Hill/Village Circle Pressure Zone, water pressures in the Town's CWD are subsequently reduced by a series of pressure reducing valve (PRV) stations serving lower pressure zones generally to the west where land elevations drop as they approach Cayuga Lake. In one case, the treated water is re-pumped by the Town's other water pumping station (Pine Grove) to serve additional pressure zones located north of Salmon Creek. Figure 1 provides a schematic elevation view of the water system and its various pressure zones.

## Section 2 - Extent of Water Works System

Within the existing Bean Hill/Village Circle Pressure Zone there is documented consumer dissatisfaction with recurring low pressures in those residential neighborhoods nearest the two storage tanks, especially in the Bean Hill area. These customers have communicated a strong interest in improving the low pressure situation to the Town through surveys, board meetings, and personal contacts. The low pressures are confirmed with hydraulic calculations indicating normal working pressures fall below the Ten State Standards recommended minimum of 35 psi for the water system located above elevation 1,100 feet. The low pressures not only generate customer complaints but also present operational difficulties such as constantly 'topping-off' the storage tanks, which limits the effective usable storage volume.

As shown on the attached figures, the service area with substandard pressure is located along either a portion or full length of Bean Hill Lane, Forest Acres Drive, Hillcrest Road, Grandview Drive, Placid Terrace, Pheasant Way, Whispering Pines Drive, Arrowood Lane, Village Circle Place, Village Circle North, Village Circle South Warren Road, Springbrook Circle, Warren Road and Farrell Road, as well as most of the Woodland Park Subdivision currently under development.

The Bean Hill Booster Station was completed in 2005 as an interim response to the low pressure within the Pheasant Meadow subdivision. The relatively small booster station currently provides increased system pressure to approximately 12 single-family residences on Pheasant Way and Tiger Lilly Lane with provisions to serve up to a maximum of 33 residences. The station supplies increased domestic service pressure only and is not capable of supplying fire service within the limited service area.

In addition to substandard pressure in the Bean Hill area, there are other areas within the Town to the east of the CWD not currently served by municipal water. These un-served areas, outside the existing CWD boundary, include developed and undeveloped property along Farrell Road, Asbury Road, Collins Road, Scofield Road and Old Scofield Road. Land owners in the Scofield Road area have previously

expressed interest in obtaining municipal water service by petitioning the Town of Lansing to evaluate an extension of the service area.

### Section 3 - Justification for Project and Proposed Improvements

To improve system working pressures within the substandard service area described above, a new higher pressure zone is proposed. The new pressure zone will require a new pump station and a new storage tank to boost and maintain the higher system pressures in the zone. The new pump station is proposed to be located at the base of the existing Village Circle Tank on lands owned by the Town. Two alternative locations for a new storage tank were evaluated; one near the intersection of Bone Plain Road and Scofield Road and a second on Bone Plain Road within the Town of Dryden. The location of the proposed pump station and the alternative tank locations, together with improvements to the existing distribution piping are shown on Figure 2.

Improvements to the distribution system within the CWD will also be necessary to create the new Bone Plain Tank Pressure Zone. Most of the existing distribution system piping within the zone will be switched over from the existing Bean Hill/Village Circle Pressure Zone to the new higher pressure zone. Certain existing gate valves will be closed and new closed-between-pressure (CBP) valves will be installed to maintain the differential pressures between the existing and new pressure zones. Additional distribution piping, to be installed by the Town or by private land developers, will be required to complete the new pressure zone loops and interconnections while maintaining service in the Bean Hill/Village Circle Pressure Zone. Once the improvements are completed, the existing Bean Hill Booster Pump Station will be decommissioned and existing pump house removed. The major distribution system improvements within the existing CWD are shown on Figures 3 and 4.

#### A. Village Circle Pump Station

The proposed pump station will be located adjacent to the Village Circle Tank on the same parcel of land owned by the Town of Lansing. Ground elevation at the site is approximate 1120 feet USGS. The land is not located within a mapped flood zone. Improvements will include a new pump house with duplex or triplex electric driven pumps and associated electrical equipment, control panels, and telemetry and SCADA gear. Water to the pump house will be supplied through a new suction water main connected to the existing 16-inch low pressure main that feeds the Village Circle Storage Tank. A new 8-inch discharge main will supply the boosted water to the improved distribution system. The suction mains will be configured to allow a second possible future water tank on the site. Sanitary service will be provided with a new lateral from the Town's sanitary sewer collection system. New or improved electric and telephone services will be extended to the pump station and some paving, grading and drainage improvements will likely be required on the site. Standby electric service, in the form of a 30kW diesel powered generator will be connected to the pump station electrical panel.

Design pumping capacity of the Village Circle Pump Station will generally be based on the peak hourly demands on the system as discussed in Section 5 of this report. Provisions will be built into the station to allow for future increases in pumping capacity as demand within the pressure zone increases. These provisions will likely include a blank concrete pedestal and capped pipe connections to allow for installation of a third pump at some time in the future.

#### B. Bone Plain Tank

Two sites for erecting a storage tank were evaluated. The locations and normal water level elevations were selected primarily to deliver improved service for CWD customers in the substandard service area. However, future expansion of the service area to include property in the Town located east of the existing CWD is a necessary consideration. The topographical high point within the possible future service area is at approximate elevation 1240 feet USGS near the intersection of Scofield Road and Bone Plain Road. To provide a minimum 35 psi working pressure at this location the new tank will need to have a normal low water elevation of 1320 feet. Under Option 1, the tank site on Bone Plain Road in the Town of Dryden will require a longer water main extension, but allows for a standard ground tank construction method. Under Option

2, the tank is located near the intersection of Bone Plain Road and Scofield Road, reducing the amount of water main and keeping all proposed water works within the Town of Lansing, but requires an elevated style storage tank.

Based on early estimates of construction cost, Option 1 was determined to be significantly less than Option 2, primarily due to the lower construction costs associated with a ground tank versus an elevated tank. The elevated tank would also have visual impacts that are inconsistent with the surrounding rural setting. The long-term costs of pumping, operation and maintenance costs of the two options are approximately equal. Therefore, the ground tank and site of Option 1 is the recommended alternative subject to acquiring the land and any permanent easements for the water main.

The storage tank will need to provide a reserve fire volume of 150,000 gallons below the normal low working level based on a fire flow rate of 1,250 gpm and flow duration of 2 hours. The full storage capacity of the tank is estimated to be 200,000 gallons in order to provide a working volume of 50,000 gallons in addition to the reserve fire volume. To provide these required volumes and elevations the tank dimensions are approximately 48 feet high by 26 feet in diameter with an overflow elevation of 1330 feet and base elevation of 1282 feet.

C. Distribution System Improvements and Project Phasing

Additions and alterations to the existing CWD distribution system will be completed through a combination of private development activity and capital construction by the Town on behalf of the CWD.

1. Town Improvements

As shown on Figure 2, the water main improvements will include a transmission main extension to the Bone Plain Tank from the terminus of the existing distribution system on Farrell Road. The extension is expected to include approximately 8,300 feet of 12-inch pipe along with necessary valves and hydrants. Service taps and laterals will not be installed at this time on the transmission main. The Town will also complete distribution system improvements at two locations within the existing CWD as shown on Figures 3 and 4.

- a. On Warren Road, approximately 1,440 feet of 12-inch main will be installed to serve as a low pressure Village Circle Tank transmission main to allow switching over the existing parallel 10-inch distribution main to the new higher pressure Bone Plain Tank zone.
- b. Approximately 620 feet of 12-inch main will be installed to provide a connection between the distribution main on Village Circle North and the main on Springbrook Circle. This new connecting main will become part of the new higher pressure zone network and allow the existing 10-inch main on Warren Road between Village Circle North and Farrell Road to remain as a transmission main within the existing lower pressure piping network.

2. Private Development Improvements

The distribution system improvements within the CWD to be completed by approved private developments include the Woodland Park Subdivision, Cayuga Way/Lakeview Subdivision and Village Circle-Village Solars Planned Development Area (PDA).

- a. Upon completion of all phases of the Woodland Park Subdivision, a main installed along Hillcrest Road will create a southerly loop within the new pressure zone by connecting the system on Warren Road to the system in the vicinity of Whispering Pines Drive.
- b. Adjacent to the Bean Hill Tank, water mains to serve the Cayuga Way Subdivision have recently been installed by the developer. Upon completion of the Lakeview Subdivision, the mains will provide both higher pressure distribution piping to serve residential building lots close to the Bean Hill Tank base elevation as well as lower pressure transmission piping to supply the Bean Hill Tank.

- c. As shown on Figure 4, improvements to be completed within the Village Circle-Village Solars PDA include approximately 1,700 feet of 8-inch water main along and adjacent to Village Circle South. This new piping, along with the main installed by the Town at Springbrook Circle, will be connected to the new higher pressure grid and will provide distribution services to the existing and proposed multi-family apartment units within the PDA. Service connections currently on the existing 16-inch main will be switched over to the new 8-inch mains and the existing 16-inch main will remain connected to the lower pressure zone and serve as a transmission main to supply the Village Circle Tank.
3. Phasing of Proposed Improvements  
Improvements to be completed by the Town in Phase 1 are identified on Figure 4 and include the Village Circle Pump Station and a short length of distribution piping that will connect to the new distribution mains being installed by the Village Circle-Village Solars PDA. In the interim, the Village Circle Pump Station will deliver domestic and fire protection service to the new apartment buildings that are either approved or currently under construction in the PDA. Until the Bone Plain Tank is operational, water storage will be provided from temporary pneumatic tanks limiting service to domestic and sprinkler use within the relatively small Phase 1 service area. The pneumatic storage will be removed once the Bone Plain Tank is operational.

#### **Section 4 - Environmental Setting**

##### **A. Wetlands**

Both the Federal National Wetlands Inventory and New York State Freshwater Wetland Maps indicate regulated wetlands are immediately adjacent to the water main route along Farrell Road. An extensive State wetland identified as WG-20 is located south of Farrell Road. A Federal freshwater forested/shrub wetland exists north and west of Farrell Road which is connected to WG-20 by a large diameter culvert under Farrell Road. To the east of the Bone Plain Road tank site there are additional State (WG-19) and Federal identified wetlands; however, they are well beyond the limits of the project.

##### **B. Streams**

Based on environmental data compiled by the Tompkins County ITS-GIS Division the water main route along Farrell Road and the old Scofield Road will potentially cross two intermittent streams. The NYSDEC Environmental Mapper suggests these are Class 'C' streams, but are not 'protected'. The NYSDEC will be consulted to determine if any environmental permits are required for the construction of the water main at the stream crossings.

##### **C. Unique Natural Areas (UNA)**

There are numerous UNAs in the vicinity of the project, all with physical characteristics of wetlands: UNA-65 (Head Corners Wetland), UNA-67 (Dryden/Lansing Swamp) and UNA-68 (DEC Mapped Wetlands).

##### **D. Agricultural Land Resources**

In the Town of Lansing, several properties abutting Farrell Road and Scofield Road are presently included in Tompkins County Agricultural District No.1. All of the land east of Scofield Road and along Bone Plain Road in the Town of Dryden falls within Agricultural District No. 1. Up to 1-acre of land will be acquired by the Town of Lansing from a landowner on Bone Plain Road for the construction of the Bone Plain Storage Tank. While there is no active farming occurring on any of the land to be acquired, it is the Town's expectation that a preliminary and final Notice of Intent to undertake the water system improvements will be filed with the NYS Department of Agriculture and Markets.

E. Archeological Sensitive Area

The New York State Office of Parks, Recreation and Historical Preservation (NYSOPRHP) has identified an archeological sensitive area in the vicinity of Farrell Road and old Scofield Road. While the water main route will generally be confined within the existing or former road right-of-ways where ground has been previously disturbed, it is necessary to file with NYSOPRHP a Project Review Cover Form. The Form, together with photographs of the water main route, will be used by NYSOPRHP to determine if any archeological investigations will be required.

### Section 5 - Soil, Groundwater and Foundation Conditions

Based on Town experience with construction of previous water and sanitary sewer works in the area, soil conditions are expected to include relatively shallow depth (3 to 6 feet) of shale bedrock overlaid by silty loam and topsoil. The upper layers of shale bedrock are typically weathered and rippable with standard construction equipment; however, hydraulic hammer equipment may be required in some locations. Soil borings or test holes will be required at regular intervals along proposed water main routes to estimate the depths and hardness of bedrock prior to final design. Borings, along with detailed geotechnical evaluations, will also be completed at the selected tank and pump house sites prior to foundation design.

Ground water in the area is known to be either perched or flowing laterally at the bedrock-overburden interface. The volumes and flow rates of groundwater are typically quite low given the relative impermeability of the overburden and non-fractured state of the shale bedrock. Previous construction has shown that standard, relatively simple, trench dewatering operations are sufficient to allow construction of waterworks and structures in the area. Trench water stops will be installed at specific locations along water main construction to relieve hydrostatic pressures and prevent significant water flows within granular water pipe backfill and bedding materials.

### Section 6 - Water Demands

Estimates of current and future water demands for the new Bone Plain Pressure Zone are summarized in the following tables. The unit demands were derived from historical water meter readings of the customers in the area and prior planning studies for water and sanitary sewer projects.

A. Current Customers and Lands Within the CWD

The water demand figures in Table 1 are for the lands within the existing Town CWD to be switched over and served by the new higher Bone Plain Tank pressure zone. The total land area within the existing CWD to be served by the new pressure zone is approximately 470 acres as delineated on Figures 2 and 3. Approved building lots are based on residential and multi-family subdivisions already approved by the Town. The vast majority of the residential building lots are within the Residential-Low Density (R1) zoning district west of Warren Road and North of Farrell Road. All of the existing and proposed apartment units are within the Residential-Moderate Density (R2) zoning district east of Warren Road and south of Farrell Road. The proposed Village Circle-Village Solars apartments are being developed on previously disturbed land where a recently installed municipal sewer system now allows increased unit densities. Future demand assumes full build-out of the approved subdivisions and completion of all proposed apartment unit developments. The majority of the vacant land is within the R1 zoning district and future demand assumes 1-acre single family residences will occupy half of this remaining land area. Given the current rate of house construction and projections for apartment development presented by the developers, the future water demand for the area is expected to be reached by the year 2033 or within approximately 20 years.

| <b>Table 1 – Current Customers and Developable Land in the CWD</b> |                 |                       |                      |                     |
|--|-----------------|-----------------------|----------------------|---------------------|
| Description  | Number of Units | Demand per Unit (GPD) | Current Demand (GPD) | Future Demand (GPD) |
| Existing Single Family Residence                                   | 151             | 200                   | 30,200               |                     |
| Existing Two-Family Residence                                      | 2               | 400                   | 800                  |                     |
| Existing Ivy Bridge (former Springbrook Apts)                      | 48              | 100                   | 4,800                |                     |
| Existing Lucente 1-Bedroom Apartments                              | 146             | 100                   | 14,600               |                     |
| Proposed VCVS PDA 1-Bedroom Apartments                             | 135             | 100                   |                      | 13,500              |
| Proposed VCVS PDA 2-Bedroom Apartments                             | 133             | 120                   |                      | 15,960              |
| Proposed VCVS PDA 3-Bedroom Apartments                             | 44              | 180                   |                      | 7,920               |
| Approved Subdivision Building Lots                                 | 64              | 200                   |                      | 12,800              |
| Approved Woodland Park Townhouses                                  | 44              | 150                   |                      | 6,600               |
| Vacant (9 parcels, 38 acres)                                       | 19              | 200                   |                      | 3,800               |
| <b>Total Estimated Demands (rounded):</b>                          |                 |                       | <b>50,400</b>        | <b>60,600</b>       |

**B. Potential Water Service Area Expansion**

While it is not a priority of the CWD improvements project, the location of the Bone Plain Tank and associated transmission main could facilitate future expansion of the Town's water service area. Such expansion will have to be preceded by a separate Town action to establish a new water benefit district or extend the boundary of the CWD.

The approximate land area outside of the CWD boundary that can potentially be served by the Bone Plain Tank pressure zone is roughly 1,100 acres. Future development activity within the potential service area is expected to be limited since a majority of the land is within the Town's Residential-Mixed Use Transitional zoning district, is within the Tompkins County Agricultural District 1 or is inventoried wetlands. Other than the Farm Pond Circle Subdivision on Collins Road, which is currently under construction, there are no pending residential subdivisions or other land development projects within the potential future expansion area. Solely for the purpose of infrastructure planning, it has been assumed that roughly 50% of the potential future service area may be connected to the Town water system within a period of 20 years.

U.S. Census data indicates an approximate 5% population growth rate for the Town of Lansing between 2000 and 2010, much of which has occurred in the southern portion of the Town where water, and more recently sanitary sewer, services are accessible. A prediction of population growth in the potential future service area is assumed to be twice that of the Town-wide growth rate, or approximately 1% per year over the next 20 years. Based on these conservative assumptions, the resultant water demand for the future service area is summarized in Table 2:

| <b>Table 2 - Potential Future Water Service Area</b> |                 |                       |                     |
|--|-----------------|-----------------------|---------------------|
| Description  | Number of Units | Demand per Unit (GPD) | Future Demand (GPD) |
| Existing Single Family Residence                     | 85              | 200                   | 17,000              |
| Existing Two-Family Residence                        | 2               | 400                   | 800                 |
| Existing Apartment Units                             | 14              | 100                   | 1,400               |
| Subtotal Existing Uses:                              |                 |                       | 19,200              |
| Allowance for Future Growth (20%):                   |                 |                       | 3,800               |
| Subtotal of Potential Connected Demand:              |                 |                       | 23,000              |
| <b>Assume 50% Connected to Town System:</b>          |                 |                       | <b>11,500</b>       |

**C. Summary of Water Demands**

Based on the water demands presented above, the initial (2014) average day water demand on the Bone Plain Tank pressure zone will be approximately 50,400 gpd. Within a 20-year planning period, the average day demand could be as high as 122,500 gpd if growth assumptions within the CWD and future potential service area are realized.

Based on meter readings recorded at the Towns' Burdick Hill Pump Station, the maximum day demands are estimated to be approximately 150% of the average day demands. The ratios of peak hourly demand to design average demand (e.g. peak factors) are derived from Figure 1 of the Ten State Standards for Wastewater Facilities. Using an estimated per capita average water use of 50 gpd, the 2014 and 2034 populations are estimated to be 1,000 and 2,500 persons, respectively. Figure 1 indicates such population counts equate to hourly peak factors between 3.5 and 3.8. For simplicity, a peak factor of 3.75 has been selected. Fire flow demands, discussed in more detail in Section 6, are expected to be relatively infrequent or occur only a few days a year at most. The following Table 3 presents the estimated normal system demands for the pressure zone in both gallons per day (GPD) and gallons per minute (GPM), based on a 24-hour day.

| <b>Table 3 – Summary of Water Demands</b> |           |       |           |       |
|---|-----------|-------|-----------|-------|
| Description                               | Year 2014 |       | Year 2034 |       |
|   | (GPD)     | (GPM) | (GPD)     | (GPM) |
| Average Day Demand                        | 50,000    | 35    | 122,500   | 90    |
| Maximum Day Demand                        | 75,000    | 52    | 184,000   | 130   |
| Maximum Hour Demand                       | 190,000   | 130   | 460,000   | 325   |

The volume of unaccounted water from the entire system operated by Bolton Point is estimated to be 0.05 MGD or approximately 2% of the total average day volume delivered. The unaccounted volume includes water used for flushing mains, to fight fires and due to leaks in the distribution system. Given the relative age of the system in the Town of Lansing compared to other parts of the system, unaccounted water in the new pressure zone is expected to be less than 2% and is not factored into the system or demand calculations.

**Section 7 - Flow Requirements**

According to the American Water Works Association the distribution system should be capable of supplying the maximum hour demand flow rate, or the maximum day demand plus the fire flow requirements, whichever is greater. In this case, the latter case controls and system capacities are assessed based on the maximum day demand plus fire flow requirements.

The majority of the structures within the proposed Bone Plain Tank service area are single or two-family residences. Within the existing CWD the yard setback requirements result in building separation distances well in excess of 30 feet. Within the potential future service area zoning can allow separation distances as little as 30 feet, but other factors, such as Health Department requirements for on-site septic systems, typically result in much greater separations. For such residential neighborhoods with separation distances between 31 and 100 feet, the Insurance Services Office (ISO) suggests a needed fire flow of 750 gpm.

The existing apartment buildings within the service area are un-sprinkled two-story wood frame structures with an approximate floor area of 3,100 square feet per floor. The separation distance between structures in all cases is greater than 100 feet. The needed fire flow for such neighborhoods is estimated to be approximately 1,500 gpm based on ISO criteria.

A computer model of the water system has been developed to estimate the available fire flows from the system in addition to the maximum day domestic demands assuming a 20 psi minimum residual pressure. The model includes separate scenarios for the existing system and for the system following completion of the proposed improvements. Based on the results of the computer model, the available fire

flows to all areas of the system remaining on the lower Village Circle Tank pressure zone will remain unchanged or slightly increase following completion of the proposed system improvements. Available fire flows to all areas on the higher Bone Plain pressure zone are estimated to be approximately 1,250 gpm or greater and therefore more than adequate for the neighborhoods with one- and two-family residences. These include the residences currently without fire service on Pheasant Way and Tiger Lily Lane that are served by the Bean Hill Booster Pump Station.

Within the R2 Zoning District, where the existing apartment buildings are located, the new higher pressure grid will increase normal operating pressures by approximately 60 psi to generally between 90 and 95 psi. These increased operating pressures are necessary to allow the installation of sprinkler systems within the new apartment buildings currently proposed in this area. Along Farrell Road and Springbrook Circle, the available fire flows will increase to approximately 1,400 gpm, or about 100 to 200 gpm greater than are currently available. Throughout the Village Circle area, the fire flows available from the new higher pressure grid are estimated to be on the order of 1,300 to 1,400 gpm, and if necessary, can be supplemented by the parallel lower pressure grid along Village Circle South which has the capacity of delivering over 2,000 gpm.

In summary, the proposed system improvements will allow the installation of sprinkler systems in the proposed new Village Circle-Village Solars PDA, and will provide adequate fire flows throughout the new pressure zone, without impacting system capacity within the remaining lower pressure zone service area.

### **Section 8 - Source of Water Supply**

Treated water to the system will continue to be supplied from the Southern Cayuga Lake Intermunicipal Water Commission (Bolton Point) Treatment Plant. The Town of Lansing is a member of the Commission and there is sufficient reserve capacity to supply the projected increase in system demand. The treatment plant currently has a rated capacity of 9 MGD and delivered an average of only 2.8 MGD during 2011. The amount of water currently being pumped by the Town's Burdick Hill Pump Station is approaching the capacity of the station and upgrades will be needed in the near future. The projected increases in demand discussed previously in this report, as well as projections for other areas of the CWD, will be assessed in a separate study to determine the improvements necessary for this pump station.

### **Section 9 - Sewerage System Available**

Municipal sewerage, specifically the Warren Road Sewer District, has been extended to serve a limited number of properties in the CWD. Wastewater collected by the sewer system is conveyed through the Village of Lansing and treated at the Village of Cayuga Heights treatment plant. Disposal of wastewater for remaining developed lands is handled by individual on-site sewage treatment system regulated by the Tompkins County Health Department. Minimum separation distances between the proposed water works and the existing sewerage and on-site disposal systems will be maintained in accordance with the Ten State Standards and New York Department of Environmental (NYSDEC) standards.

Municipal sanitary sewer service will be provided to the Village Circle Pump Station. Floor drains within the pump station will be connected to the sanitary sewer. Under normal circumstances, flows to the sewer system will be insignificant and the capacity of the sewer system is more than sufficient to accommodate any occasional discharge.

### **Section 10 - System Automation and Operation**

Normal daily operation and maintenance of the improved system will be performed by Bolton Point. During Phase 1 of the improvements, the pumps at the Village Circle Pump Station will be controlled automatically based on pressure in the distribution system or discharge side of the pumps. In general, the lead pump at the station will be activated when the pressure drops to a preset normal low pressure and if the pressure continues to drop, the lag pump at the station will be activated. Once the distribution pressure reaches a preset normal high pressure, the pump or pumps will be deactivated. Normal low and high pressures will likely be set to maintain distribution pressures between approximately 40 and 60 psi.

Once the Bone Plain Tank and associated transmission main are completed and operational, the automated controls for the pumps will be switched over to a telemetry system that will allow activation of the pumps based on water levels in the tank. In general, the lead pump at the station will be activated when the water in the tank drops to a preset normal low water level. If the water level continues to drop, the lag pump at the station will be activated. Once the water in the tank reaches the preset normal high level, the pump or pumps will be deactivated. The normal high level in the tank will be set as close to the tank overflow as practical. The normal low level in the tank will be set to maintain the required fire flow reserve volume in the tank at all times during normal operating conditions.

A supervisory control and data acquisition (SCADA) system will be installed to assist Bolton Point with system operations and monitoring. The SCADA system will provide the capability to monitor pump operations, tank levels, system pressures and alarms, and allow the manual override of pump controls by Bolton Point staff from the plant on East Shore Drive. The improvements will effectively be an expansion of the existing Bolton Point SCADA system to include the new Bone Plain Tank and Village Circle Pump Station.

**Section 11 - Project Cost**

The project cost is summarized below and further itemized in Appendix A.

**Table 4 – Summary of Total Project Cost**

| <u>Description</u>                     | <u>Opinion of Probable Cost</u> |
|--|---------------------------------|
| Mobilization                           | \$ 10,000                       |
| Village Circle Pump Station            | \$ 251,700                      |
| Main Extensions:                       |                                 |
| • Village Circle to Springbrook Circle | \$ 54,600                       |
| • Warren Road                          | \$ 115,800                      |
| • Farrell Road to Bone Plain Road Tank | \$ 746,200                      |
| Bean Hill Pump Station removal         | \$ 20,000                       |
| Bone Plain Road Storage Tank (0.20MG)  | <u>\$ 345,000</u>               |
| Subtotal Construction =                | \$1,543,300                     |
| Fees and Other Expenses @ 20%          | \$ 308,900                      |
| Project Contingency @ 10 %             | <u>\$ 154,300</u>               |
| Total Project Cost to Finance =        | \$2,006,500                     |

**Section 12 - Financing the Project Cost**

The Project Cost is planned to be financed through the issuance of bond anticipation notes and 20-year serial bonds. The Town's Fiscal Advisor, Municipal Solutions prepared the amortization schedule attached as Appendix B. The debt service payments on the bonds will be paid from the CWD fund using revenue raised annually from all owners of real property located within the CWD boundary. The CWD uses the "Equivalent Dwelling Unit" method of assessing capital project cost amongst benefitted property. Equivalent Dwelling Units (EDUs) are determined from "Schedule B, Definition of Units for Purposes of Consolidated Water District Charges", which is incorporated as Appendix C. There are 2,670.75 EDU's currently in the CWD and the charge in 2014 for each EDU will be \$155. The expected revenue to be raised in 2014 is approximately \$413,966.

Since 2005 the number of EDUs in the CWD has grown at an average annual rate of 0.80%. Assuming this growth rate increases to 1% annually as a result of new connections from the approved residential subdivisions and multi-family apartment units the number of EDUs in year 2021 could approach 2,860. The projected debt service payment in year 2021 is \$140,031. At the present charge of \$155/EDU, the CWD would raise approximately \$443,300. The debt service payment in 2014 of the CWD for prior capital improvement financing will be \$77,530. This current CWD debt will be retired in 2021 when the principal and interest payments on the serial bonds for the Bone Plain Tank Pressure Zone improvements are expected to begin.

**Section 13 - Operation and Maintenance Cost**

Electrical costs associated with the proposed Village Circle Pump Station are estimated to be approximately \$3,000 in the first full year of operation based on the 50,400 gpd (2014) average day water demand, a total dynamic pumping head of 175 feet and an estimated electrical power cost of \$0.15 per kW-hour. An additional allowance of \$9,000 for property insurance, snow removal, lawn/driveway maintenance and miscellaneous parts replacement should be included in the 2015 CWD budget planning.

Operation and maintenance costs of the CWD are financed by metered water revenues. CWD customers receive a quarterly water use bill generated on the rates and surcharges as listed below:

A. Bolton Point Water Rate:

| <u>Gallons Consumed</u> | <u>Flat Rate per Quarter</u> |
|-------------------------|------------------------------|
| 0-10,000                | \$40.80(base charge)         |
| 10,001 and over         | \$4.08/1,000 gallons         |

B. Town O&M Surcharge: The Town will levy a surcharge of \$0.62 per 1,000 gallons to cover a portion of O&M expenses associated with the CWD and the O&M expenses specifically attributable to the Bone Plain Tank Pressure Zone infrastructure.

C. The minimum quarterly bill for a single-family residence in 2014 will be \$47.00 based on the following:

|  |   |                          |
|--|---|--------------------------|
| Quarterly water consumption                    | = | 10,000 (or less) gallons |
| Bolton Point Water rate (\$4.08/1,000 gallons) | = | \$40.80                  |
| Town O&M Surcharge (\$0.62/1,000 gallons)      | = | \$6.20                   |
| Total  | = | \$47.00                  |

## **APPENDIX A**

Opinion of Probable Project Cost

Town of Lansing Consolidated Water District  
 Bone Plain Tank Pressure Zone  
 Opinion of Probable Costs to CWD

11/27/13

|   | Unit | Quantity | Cost per Unit | Item Total          |
|---|------|----------|---------------|---------------------|
| <b>Mobilization</b>   |      |          |               |                     |
|   |      |          | Subtotal=     | \$ 10,000           |
| <b>Village Circle Pump Station</b>                            |      |          |               |                     |
| Site Development, Water Main, Utilities                       | L.S. | 1        | \$ 85,300.00  | \$ 85,300           |
| Pump, Pump House, Controls, Fixtures                          | L.S. | 1        | \$ 121,700.00 | \$ 121,700          |
| Electric Service, Transformer, Main Panel                     | L.S. | 1        | \$ 44,700.00  | \$ 44,700           |
|   |      |          | Subtotal=     | \$ 251,700          |
| <b>Village Circle to Springbrook Circle Main Extension</b>    |      |          |               |                     |
| 12" Ductile Iron Pipe   | L.F. | 620      | \$ 60.00      | \$ 37,200           |
| Fire Hydrant Assembly   | EA.  | 1        | \$ 5,000.00   | \$ 5,000            |
| 12" Gate Valve  | EA.  | 2        | \$ 3,000.00   | \$ 6,000            |
| Connection to Existing  | EA.  | 2        | \$ 3,200.00   | \$ 6,400            |
|   |      |          | Subtotal=     | \$ 54,600           |
| <b>Warren Road Main Extension</b>                             |      |          |               |                     |
| 12" Ductile Iron Pipe   | L.F. | 1,440    | \$ 60.00      | \$ 86,400           |
| Fire Hydrant Assembly   | EA.  | 1        | \$ 5,000.00   | \$ 5,000            |
| 12" Gate Valve  | EA.  | 6        | \$ 3,000.00   | \$ 18,000           |
| Connection to Existing  | EA.  | 2        | \$ 3,200.00   | \$ 6,400            |
|   |      |          | Subtotal=     | \$ 115,800          |
| <b>Bean Hill Pump Station</b>                                 |      |          |               |                     |
| Decommission Existing Pump Station                            | L.S. | 1        | \$ 20,000.00  | \$ 20,000           |
|   |      |          | Subtotal=     | \$ 20,000           |
| <b>Water Main Extension to Bone Plain Ground Storage Tank</b> |      |          |               |                     |
| 12" Ductile Iron Pipe   | L.F. | 8,300    | \$ 60.00      | \$ 498,000          |
| Fire Hydrant Assembly   | EA.  | 18       | \$ 5,000.00   | \$ 90,000           |
| 12" Gate Valve  | EA.  | 15       | \$ 3,000.00   | \$ 45,000           |
| Connection to Existing  | EA.  | 1        | \$ 3,200.00   | \$ 3,200            |
| Rock Removal  | CY   | 1,100    | \$ 100.00     | \$ 110,000          |
|   |      |          | Subtotal=     | \$ 746,200          |
| <b>Ground Storage Tank 200,000 gallon</b>                     |      |          |               |                     |
| Tank and Foundation   | L.S. | 1        | \$ 230,000.00 | \$ 230,000          |
| Telemetry and Controls  | L.S. | 1        | \$ 50,000.00  | \$ 50,000           |
| Land Acquisition  | L.S. | 1        | \$ 15,000.00  | \$ 15,000           |
| Paving, Grading, Drainage, Fencing                            | L.S. | 1        | \$ 50,000.00  | \$ 50,000           |
|   |      |          | Subtotal=     | \$ 345,000          |
| Construction Subtotal=  |      |          |               | \$ 1,543,300        |
| Planning Fees   | @    | 3%       |               | \$ 46,500           |
| Survey and Engineering Fees                                   | @    | 9%       |               | \$ 138,900          |
| Construction Fees   | @    | 5%       |               | \$ 77,200           |
| Other Expenses  | @    | 3%       |               | \$ 46,300           |
| Contingencies   | @    | 10%      |               | \$ 154,300          |
| Miscellaneous Subtotal=                                       |      |          |               | \$ 463,200          |
| <b>Total Project Cost to Finance</b>                          |      |          |               | <b>\$ 2,006,500</b> |

## **APPENDIX B**

Maturity Schedule

Town of Lansing  
 Consolidated Water District Bone Plain Tank Pressure Zone  
 \$2,006,500  
 5 Years BAN and 20 Year Bond

Level Debt

INPUT:

|                |             |
|----------------|-------------|
| Issue size:    | \$2,006,500 |
| Interest Rate: | Variable    |
| Issue Date:    | 09/01/14    |
| 1st principal: | 09/01/16    |
| 1st interest:  | 09/01/15    |

|               |      | Principal<br>Payment<br>September 1 | Interest<br>Rates | Interest<br>March 1 | Interest<br>September 1 | Total<br>Interest | Total<br>Debt<br>Service |
|---------------|------|-------------------------------------|-------------------|---------------------|-------------------------|-------------------|--------------------------|
|               | 2015 |                                     |                   |                     |                         |                   |                          |
| BAN           | 2016 | \$0                                 | 1.100%            | 0.00                | 22,071.50               | \$22,071.50       | \$22,071.50              |
| BAN           | 2017 | 41,500                              | 1.250%            | 0.00                | 24,562.50               | 24,562.50         | 66,062.50                |
| BAN           | 2018 | 45,000                              | 1.400%            | 0.00                | 27,510.00               | 27,510.00         | 72,510.00                |
| BAN           | 2019 | 45,000                              | 1.550%            | 0.00                | 29,760.00               | 29,760.00         | 74,760.00                |
| BAN           | 2020 | 50,000                              | 1.750%            | 0.00                | 32,812.50               | 32,812.50         | 82,812.50                |
| SB            | 2021 | 60,000                              | 3.750%            | 40,015.63           | 40,015.63               | 80,031.25         | 140,031.25               |
| SB            | 2022 | 65,000                              | 3.750%            | 38,890.63           | 38,890.63               | 77,781.25         | 142,781.25               |
| SB            | 2023 | 65,000                              | 3.750%            | 37,671.88           | 37,671.88               | 75,343.75         | 140,343.75               |
| SB            | 2024 | 70,000                              | 3.750%            | 36,453.13           | 36,453.13               | 72,906.25         | 142,906.25               |
| SB            | 2025 | 70,000                              | 3.750%            | 35,140.63           | 35,140.63               | 70,281.25         | 140,281.25               |
| SB            | 2026 | 75,000                              | 3.750%            | 33,828.13           | 33,828.13               | 67,656.25         | 142,656.25               |
| SB            | 2027 | 75,000                              | 3.750%            | 32,421.88           | 32,421.88               | 64,843.75         | 139,843.75               |
| SB            | 2028 | 80,000                              | 3.750%            | 31,015.63           | 31,015.63               | 62,031.25         | 142,031.25               |
| SB            | 2029 | 80,000                              | 4.500%            | 29,515.63           | 29,515.63               | 59,031.25         | 139,031.25               |
| SB            | 2030 | 85,000                              | 4.625%            | 27,715.63           | 27,715.63               | 55,431.25         | 140,431.25               |
| SB            | 2031 | 90,000                              | 4.625%            | 25,750.00           | 25,750.00               | 51,500.00         | 141,500.00               |
| SB            | 2032 | 95,000                              | 4.625%            | 23,668.75           | 23,668.75               | 47,337.50         | 142,337.50               |
| SB            | 2033 | 100,000                             | 4.625%            | 21,471.88           | 21,471.88               | 42,943.75         | 142,943.75               |
| SB            | 2034 | 100,000                             | 4.625%            | 19,159.38           | 19,159.38               | 38,318.75         | 138,318.75               |
| SB            | 2035 | 105,000                             | 4.625%            | 16,846.88           | 16,846.88               | 33,693.75         | 138,693.75               |
| SB            | 2036 | 110,000                             | 4.625%            | 14,418.75           | 14,418.75               | 28,837.50         | 138,837.50               |
| SB            | 2037 | 115,000                             | 4.750%            | 11,875.00           | 11,875.00               | 23,750.00         | 138,750.00               |
| SB            | 2038 | 120,000                             | 4.750%            | 9,143.75            | 9,143.75                | 18,287.50         | 138,287.50               |
| SB            | 2039 | 130,000                             | 4.750%            | 6,293.75            | 6,293.75                | 12,587.50         | 142,587.50               |
| SB            |      | 135,000                             | 4.750%            | 3,206.25            | 3,206.25                | 6,412.50          | 141,412.50               |
| <b>TOTALS</b> |      |                                     |                   |                     |                         |                   |                          |
|               |      | \$2,006,500                         |                   | \$494,503.13        | \$631,219.63            | \$1,125,722.75    | \$3,132,222.75           |

## **APPENDIX C**

Schedule B, Definition of Units for Purposes of Consolidated Water District Charges

DEFINITION OF UNITS  
FOR PURPOSES OF  
CONSOLIDATED WATER DISTRICT CHARGES  
AND WATER DISTRICT EXTENSIONS

|  |  |
|--|--|
| Single Family House.....   | 1 Unit   |
| Two Family House.....  | 2 Units  |
| Multiple Dwellings.....  | 1 Unit for each dwelling unit  |
| Mobile Home Park.....  | 1 Unit for each approved and occupied<br>0.25 Units per approved vacant space<br>(as approved by Tompkins Co. Health Dept.)                            |
| Commercial Property/Professional Offices.....  | 1 Unit for each store or separate place of<br>business   |
| School – Education, Non-Residential.....<br>(Annual update based on enrollment in Sept.)   | 1 Unit for each 10 students, faculty and<br>full-time equivalent staff   |
| Group Living Accommodations.....<br>(e.g. dormitories or other facilities where groups<br>of generally unrelated persons reside) | 1 Unit for each 3 beds, based on maximum<br>permitted occupancy  |
| Motel, Boarding Houses, Bed-n-Breakfasts.....  | 1 Unit for the first 3 sleeping rooms. For<br>the fourth and each subsequent room<br>0.75 units  |
| Industrial.....  | 1 Unit for each 16,000 cubic feet or part<br>thereof of water consumed annually<br>using a three year rolling average based<br>on water meter readings |
| In Home/On-Premises Occupation with Employees. ..  | 1 Unit for each separate business  |
| Cold Storage Warehouse/No Office.....  | 0.25 Unit  |
| Vacant Land.....   | 0.25 Unit  |

Any use or occupancy which is reasonably susceptible of inclusion in more than one category, shall be deemed to be in the category resulting in the largest number of units. The final determination of the applicable category shall rest with the Lansing Town Board.

Any uses not specifically defined may be defined by the Lansing Town Board.

Revised 11/05/04  
Revised 06/20/07  
Revised 12/17/07  
Revised 07/20/11

## **DRAWINGS**

Figure 1 – Schematic System Elevation

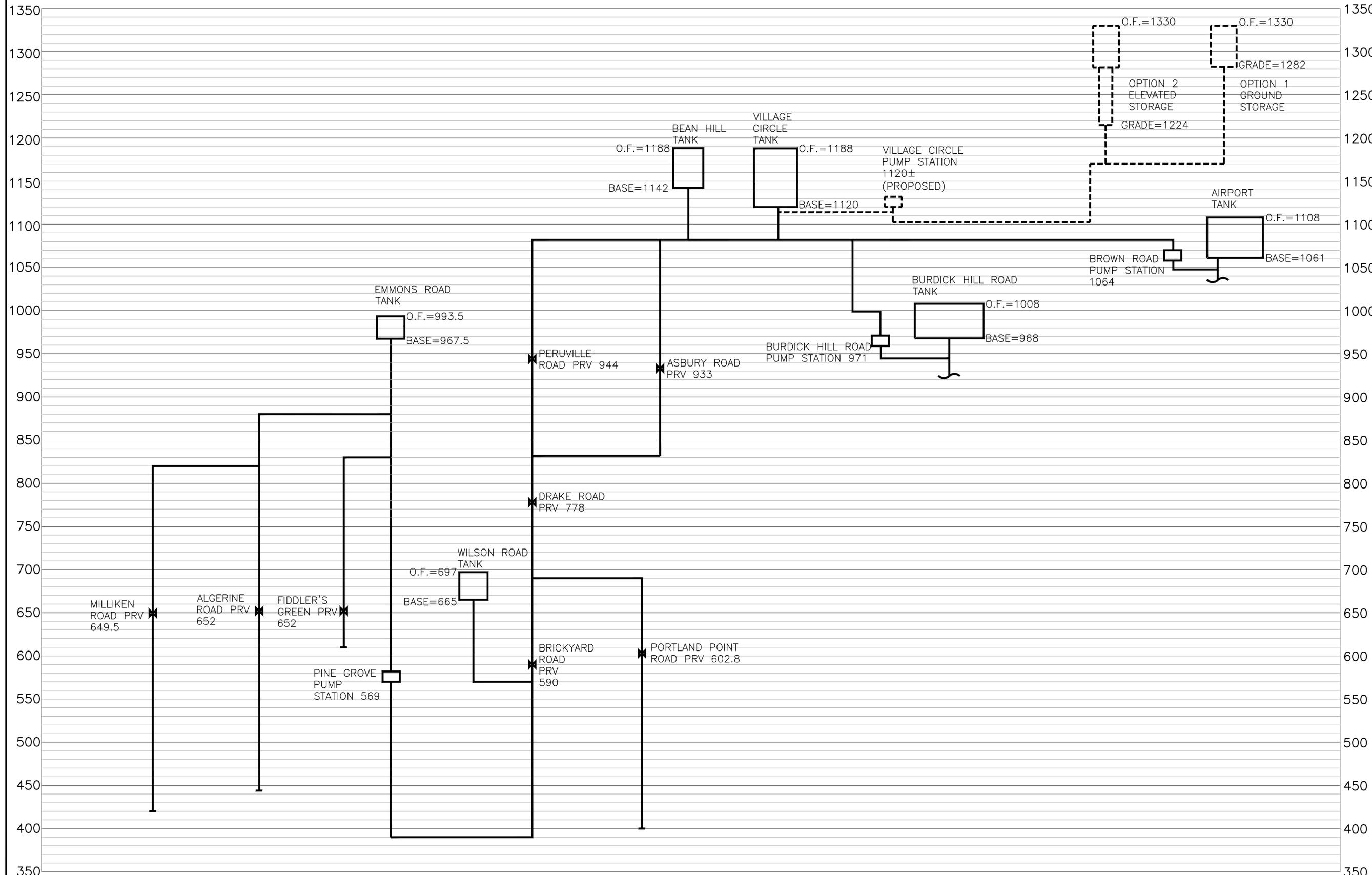
Figure 2 – Proposed Service Areas

Figure 3 – Proposed System Improvements

Figure 4 – Proposed Phase 1 Improvements



**T.G. MILLER, P.C.**  
 ENGINEERS AND SURVEYORS  
 203 NORTH AURORA STREET  
 ITHACA, NEW YORK 14850  
 WWW.TGMILLERPC.COM  
 607-272-6477



**TOWN OF LANSING  
 WATER SUPPLY IMPROVEMENTS  
 CONSOLIDATED WATER DISTRICT  
 BONE PLAIN TANK PRESSURE ZONE**

TOWN OF LANSING, TOMPKINS COUNTY, NEW YORK

| DATE | REVISION | BY |
|------|----------|----|
|      |          |    |
|      |          |    |
|      |          |    |
|      |          |    |
|      |          |    |

**SHEET TITLE**  
 SCHEMATIC  
 SYSTEM  
 ELEVATION

|                       |                   |
|-----------------------|-------------------|
| DATE:<br>11/27/13     | JOB No.<br>E11-24 |
| SCALE:<br>N.T.S.      |                   |
| DRAWN BY:<br>TRT, FLS | SHEET             |
| CHECKED BY:<br>DAH    | FIG. 1            |

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**T.G. MILLER, P.C.**  
 ENGINEERS AND SURVEYORS  
 203 NORTH AURORA STREET  
 ITHACA, NEW YORK 14850  
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**TOWN OF LANSING  
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 CONSOLIDATED WATER DISTRICT  
 BONE PLAIN TANK PRESSURE ZONE**

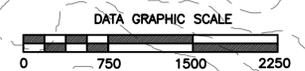
TOWN OF LANSING, TOMPKINS COUNTY, NEW YORK



| DATE | REVISION | BY |
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**SHEET TITLE**  
 PROPOSED SERVICE AREAS

|                    |                |
|--------------------|----------------|
| DATE: 11/27/13     | JOB No. E11-24 |
| SCALE: AS SHOWN    |                |
| DRAWN BY: TRT, FLS | SHEET FIG. 2   |
| CHECKED: DAH       |                |



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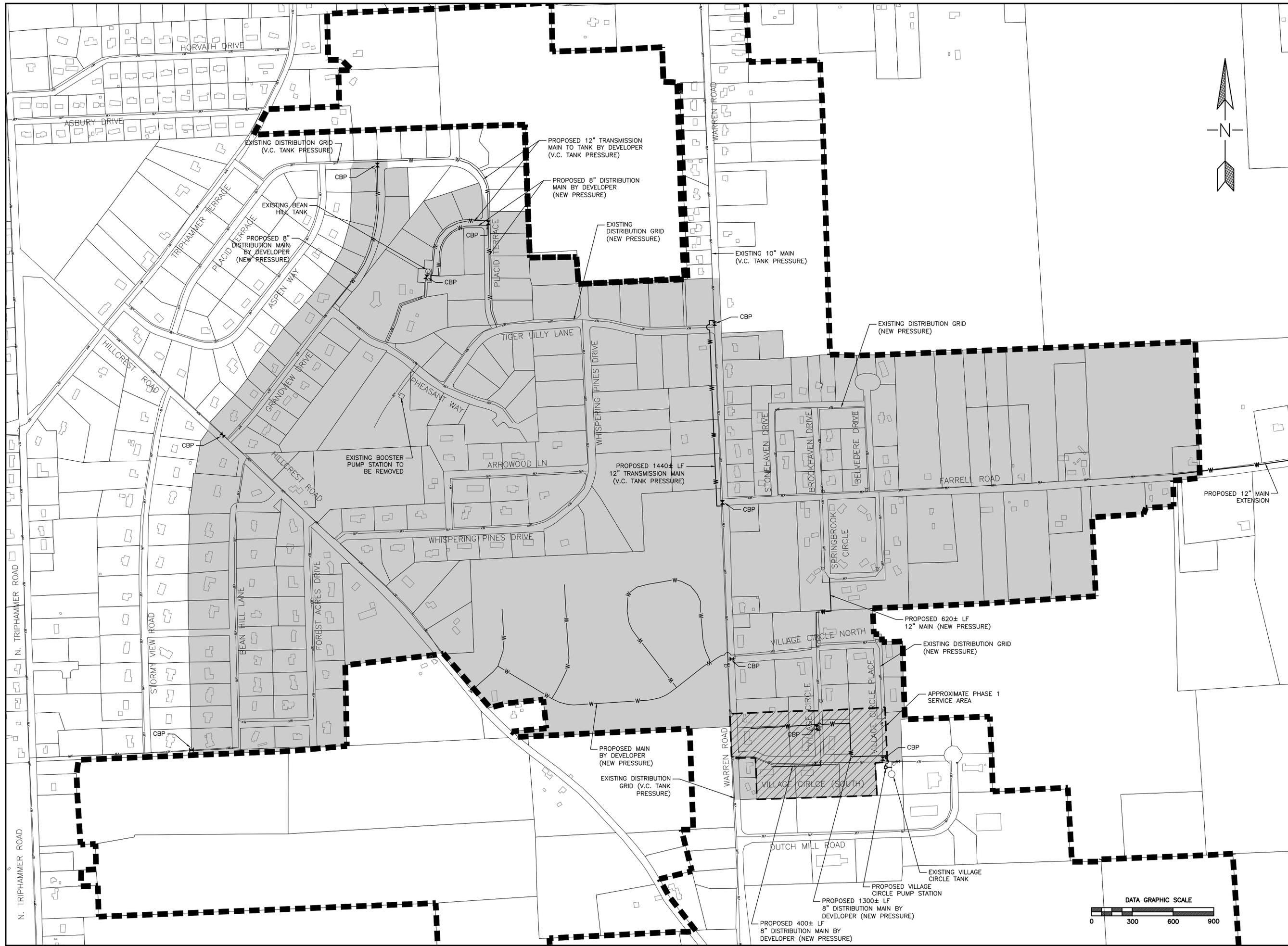


**T.G. MILLER, P.C.**  
 ENGINEERS AND SURVEYORS  
 203 NORTH AURORA STREET  
 ITHACA, NEW YORK 14850  
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 CONSOLIDATED WATER DISTRICT  
 BONE PLAIN TANK PRESSURE ZONE**

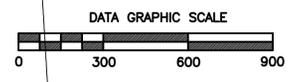
TOWN OF LANSING, TOMPKINS COUNTY, NEW YORK



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**SHEET TITLE**  
 PROPOSED  
 SYSTEM  
 IMPROVEMENTS

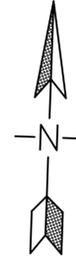
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 SCALE: AS SHOWN  
 DRAWN BY: TRT, FLS SHEET  
 CHECKED: DAH FIG.3



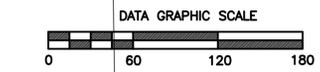
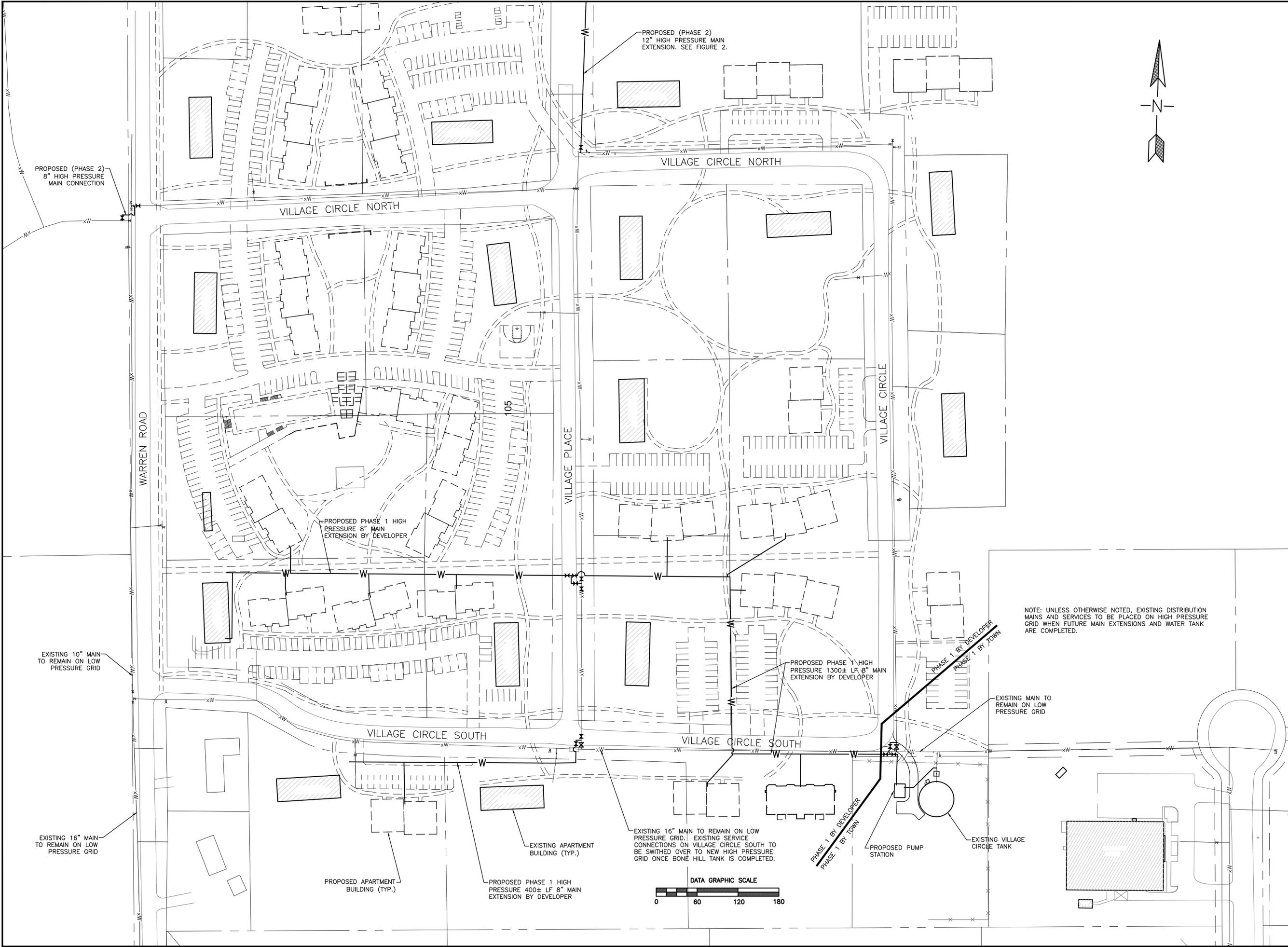
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**T.G. MILLER, P.C.**  
 ENGINEERS AND SURVEYORS  
 203 NORTH AURORA STREET  
 ITHACA, NEW YORK 14850  
 WWW.TGMILLER.PC.COM  
 607-272-6477



**TOWN OF LANSING**  
**WATER SUPPLY IMPROVEMENTS**  
**CONSOLIDATED WATER DISTRICT**  
**BONE PLAIN TANK PRESSURE ZONE**  
 TOWN OF LANSING, TOMPKINS COUNTY, NEW YORK



| DATE | REVISION | BY |
|------|----------|----|
|      |          |    |
|      |          |    |
|      |          |    |

**SHEET TITLE**  
**PROPOSED**  
**PHASE 1**  
**IMPROVEMENTS**

DATE: 11/27/13  
 SCALE: AS SHOWN  
 DRAWN BY: TRT, FLS  
 CHECKED: DAH

JOB No. E11-24  
 SHEET FIG. 4

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