

# Erie County Rainwater Harvesting System Installations

## Engineering Reports & Project Conceptual Plans

- Erie County Highway Maintenance Facility
- Buffalo and Erie County Botanical Gardens

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- Town of Tonawanda Highway Garage
- Town of Tonawanda Senior Center

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- Village of Orchard Park

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**ENGINEERING REPORT FOR  
CISTERN DESIGN  
ERIE COUNTY MAINTENANCE FACILITY  
VILLAGE OF EAST AURORA, NEW YORK**

**Overview**

The Erie County Department of Public Works Maintenance Facility in East Aurora currently gets its water supplied by the Erie County Water Authority. Both potable domestic and general use needs come from the same metered source. The addition of a cistern to the property would prevent approximately 750,000 gallons per year of potable water being utilized for irrigation and general non-potable maintenance uses.

The facility has an existing roof drainage collection and discharge system that can be directed to be captured in a cistern. The existing system also discharges floor drain fluids that have first passed through a separator unit. The roof and floor drains currently discharge through a common pipe. However, the floor drain flow will be interrupted prior to any capture for the cistern and directed to a discharge point with its own separate discharge pipe.

Excess flows to the proposed cistern, when it is full, will be directed back to the original roof discharge piping via pumps. Water supply from the cistern will be done with a suction pumping, pressure demand system that will terminate at yard hose bibs for use by the facility employees. Valving of this supply will be done to allow for emptying the cistern, should the occasion arise.

**Tank Capacity**

The facility has reported that they will need a daily supply of 3,000 gallons for use in their maintenance operations and landscaping. The local weather statistics, obtained from the National Weather Service, indicate that there is an average of twelve consecutive days without rainfall, which occur primarily in May – June and September - October. By assuming that the needs of the cistern supply will occur on 9 of these days, the proposed cistern will be sized to contain 27,000 gallons of water. This will require a tank with a capacity of 3,600 cubic feet.

**System Construction**

The proposed cistern will be constructed with HDPE modular units, configured to develop the required volume. The tank is then wrapped in both filter fabric and polyethylene sheeting to contain the water. Inlet pipes, overflow pipes and suction pump lines are then sealed through the walls of the system in the appropriate places.

The drainage source, a 12” storm discharge line, will enter the storage system through a small hydrodynamic separation unit to capture suspended particles prior to reaching the cistern.

Excess flow to the proposed hydrodynamic unit as well as the cistern overflow volumes will be shunted around the collection system and directed to a deep wet well for discharge back into the storm discharge line. A ground mounted pump vault housing both the wet well suction pumps

and the pump to supply usable stored water will be placed adjacent to the existing maintenance garage. Power for the pumps, lighting and maintenance procedures will come from the existing garage facility.

### **Filtration and Pump Equipment**

The proposed hydrodynamic filtration system will be one manufactured for the specific use of cistern application. These units are typically small and compact and designed to filter suspended particles, while allowing the dissolved material to flow through.

The discharge pump for the cistern will be a small non-redundant, suction head pump that will supply water at a prescribed head and rate. The suction head pumps for the wet well discharge application will be configured to be a redundant system with emergency pumping capabilities that will be sized to draw down the storage volume at a rate greater than the peak rate of inflow.

### **Cistern System Overflow and Bypass Piping**

The proposed cistern system design will include bypass capabilities to direct flows through the cistern under cistern full conditions and also a filter bypass piping configuration for the flows that exceed the filtering capacity. Both of these flows will be directed to the wet well and temporarily stored to a precise volume which will then be discharged rapidly via the discharge pumps which will cycle for use.

### **Conclusion**

The proposed cistern design for the Erie County Public Works Maintenance Facility in the Village of East Aurora is predicted to save 750,000 gallons of treated potable water per year. Based on the required 3000 gallons per day use, the system is designed to serve anticipated stretches of non-rain days that total 9. The recharge time for the empty system is predicted to be 24 hours based on the ninetieth percentile rainfall for this area of approximately one inch.

The depth of the existing storm water supply piping dictates that the cistern be constructed with the bottom approximately 13 feet below grade. This depth will require a wet well pumping system to return the bypass and overflow quantities up to the discharge piping elevation.

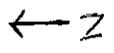
Cistern materials, piping and pumps will each be chosen for their predicted long term use and low maintenance costs to maximize the benefit of using collected storm water runoff as opposed to costly treated potable water.

During possible, but rare periods of extended drought the cistern could be emptied without recharge. If this scenario occurs, the facility will use the treated potable water which will remain available.



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119 ELLICOTT RD  
WEST FALLS N.Y. 14170



PROJECT LOCATION

DEPARTMENT OF THE ENVIRONMENT  
GEOLOGICAL SURVEY

BUFFALO (UNCL. U.S. 62) 9.2 MI.  
ORCHARD PARK 1.2 MI.

HEAST)

78°45'

42°45'

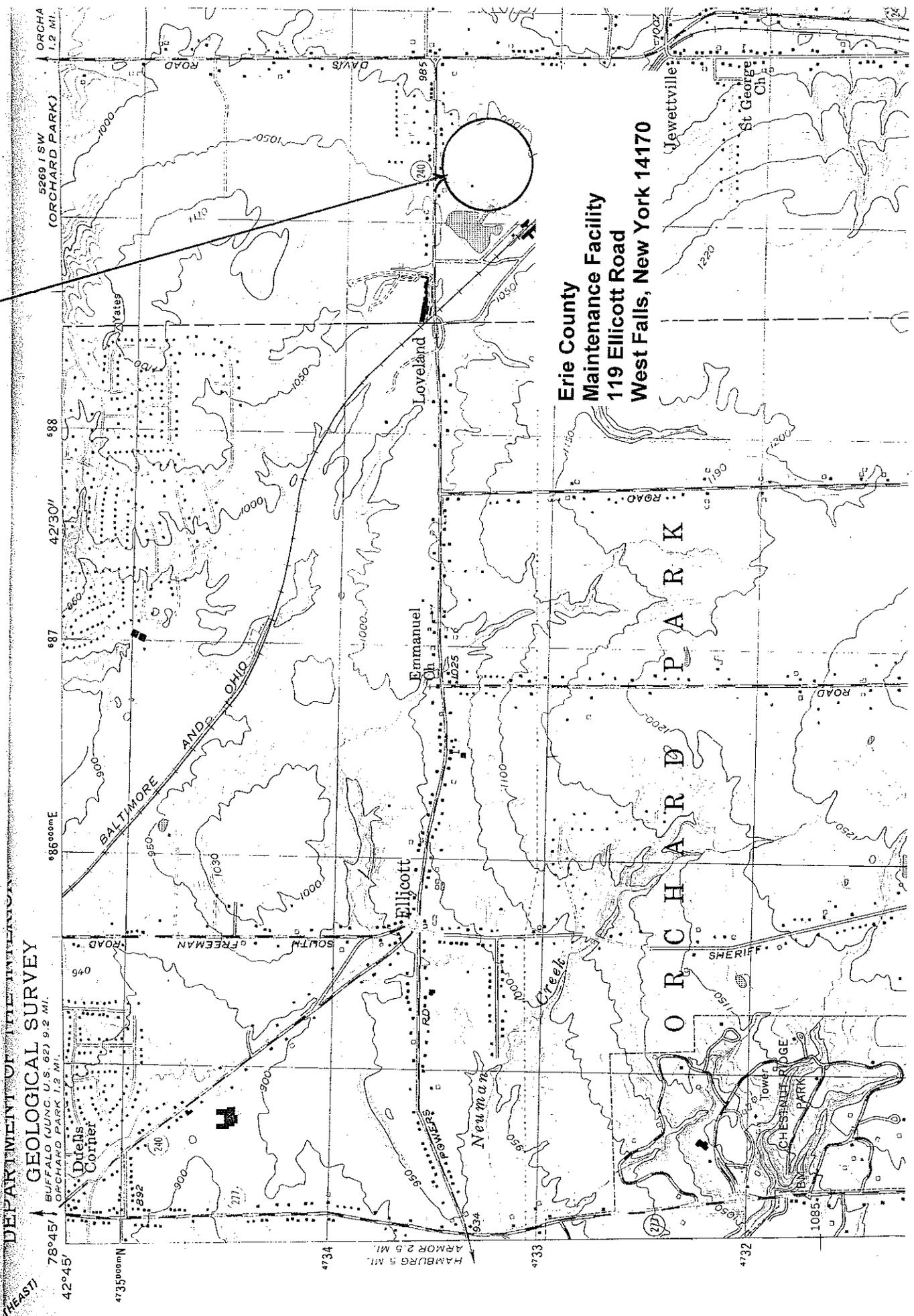
4735000mN

4734

HAMBURG 5 MI.  
ARMOR 2.5 MI.

4733

4732



Erie County  
Maintenance Facility  
119 Ellicott Road  
West Falls, New York 14170

O R C H A R D P A R K

TOWER LODGE  
CHESTNUT RIDGE  
PARK

**ENGINEERING REPORT FOR  
CISTERN DESIGN  
Buffalo and Erie County Botanical Gardens  
NEW GROWING HOUSE AREA**

**Overview**

The Buffalo and Erie County Botanical Gardens in South Buffalo, New York is currently serviced by potable water supplied by the City of Buffalo Water Authority. Both potable domestic and general use needs come from the same metered source. The addition of a cistern to the property would prevent approximately 261,000 gallons per year of potable water being utilized for irrigation and general non-potable landscape use.

The facility is proposing constructing 4 greenhouse buildings with a total contributing roof area of 7,500 sq. ft. The gardens will also construct an exhibit of non-native plants and grasses which will require drip irrigation on a fairly regular basis. The new exhibit is in close proximity to the proposed greenhouse buildings and therefore utilizing the greenhouse roof storm water runoff to charge a cistern and water the proposed plant exhibit makes good environmental sense.

Excess flows to the proposed cistern, when it is full, will be directed to the site drainage system of underground piping and eventually discharged via gravity flow. Water supply from the cistern will be provided by a suction pump, pressure demand system that will feed the drip irrigation system in the new plant exhibit area and will also have a yard hose bib for use by the facility employees. Valving of this pumped supply will be designed to allow for the emptying of the cistern should the need arise.

**Tank Capacity**

The Botanical Garden staff has provided a drip line layout and from the configuration of this layout it has been determined that the drip line system will require 1,000 gallons per day. The local weather statistics, provided by the National Weather Service, indicate that there is an average of twelve consecutive no rain days, which occur primarily in May – June and September - October. By assuming that the needs of the cistern supply will occur on 9 of these days, the cistern will be sized to contain 9,000 gallons of water. This will require a tank with a capacity of 1,200 cubic feet.

**System Construction**

The cistern will be constructed with modular HDPE units configured to develop the required volume. The tank is then wrapped in both filter fabric and polyethylene sheeting to contain the water. Inlet pipes, overflow pipes and suction pump lines are then sealed through the walls of the system in the appropriate places.

The drainage source, the growing house roof storm water runoff, will be collected and piped to a small hydrodynamic separation unit which will prevent suspended particles from settling inside the cistern. The hydrodynamic separation unit is piped to the cistern.

Excess flow to the hydrodynamic unit as well as the cistern overflow volumes will be piped back to the site storm water collection and discharge system. A ground level pump vault housing the pump to supply the cistern stored water will be placed adjacent to the cistern area in a spot yet to be determined. Power for the pumps, lighting and maintenance procedures will come from the proposed greenhouses.

### **Filtration and Pump Equipment**

The hydrodynamic filtration system will be one manufactured for the specific use of cistern application. These units are typically small and compact and designed to filter suspended particles, while allowing the dissolved material to flow through.

The discharge pump for the cistern will be a small non-redundant, suction head pump that will supply water at a prescribed head and rate.

### **Cistern System Overflow and Bypass Piping**

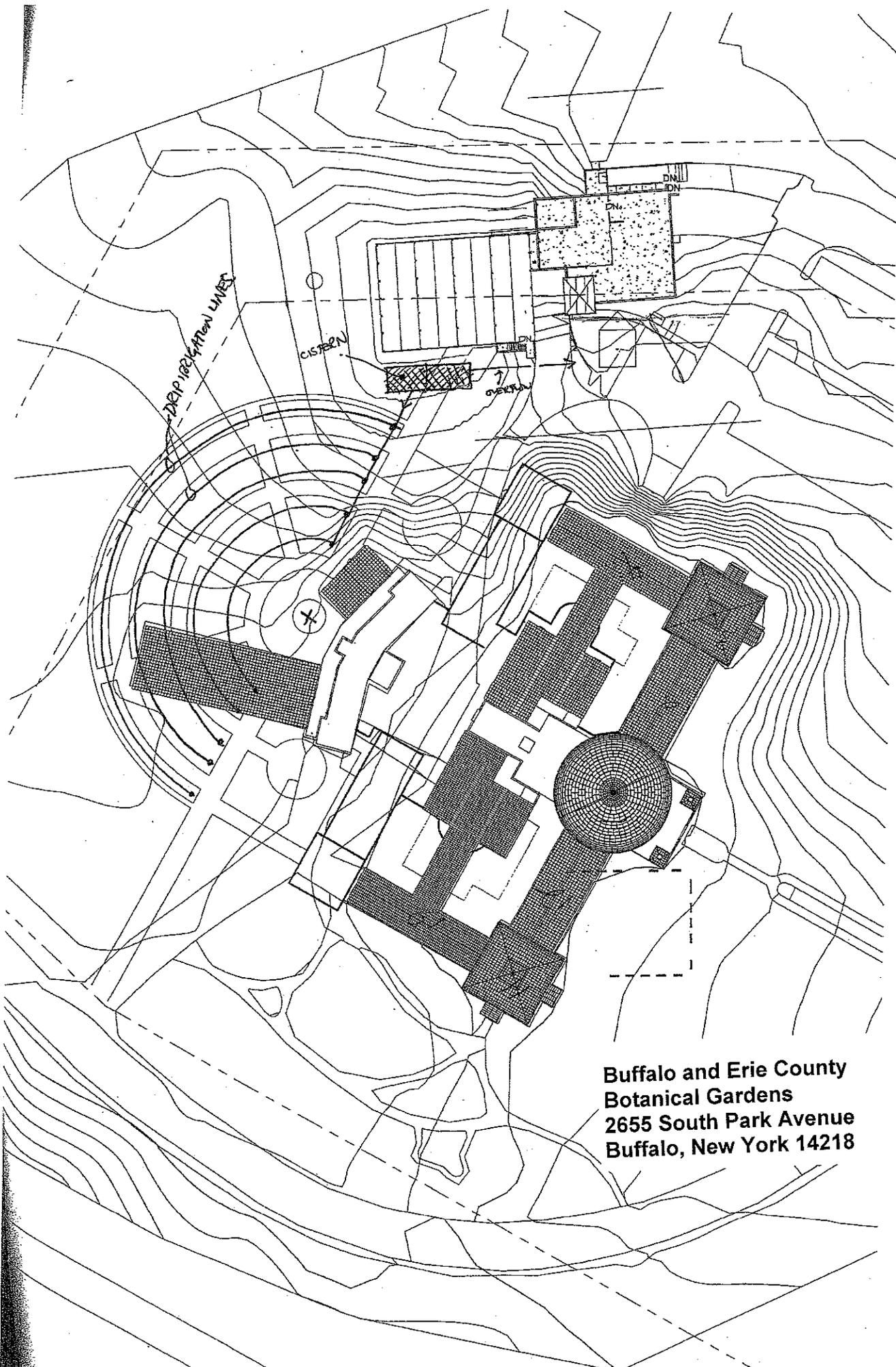
The cistern system design will include bypass capabilities to direct flows through the cistern under cistern full conditions and also a filter bypass piping configuration for the flows that exceed the filtering capacity. Both of these flows will be directed back to the site storm water drainage system.

### **Conclusion**

The proposed cistern design for the Buffalo and Erie County Botanical Gardens' new greenhouse area is predicted to save 261,000 gallons of treated potable water per year. Based on the required 1000 gallons per day use, the system is designed to serve anticipated stretches of non-rain days that total 9. The recharge time for the empty system is predicted to be 54 hours based on the ninety percentile rainfall for this area of approximately one inch.

Cistern materials, piping and pumps will each be chosen for their predicted long term use and low maintenance costs to maximize the benefit of using collected storm water runoff as opposed to costly treated potable water.

During possible, but rare, periods of extended drought the cistern could be emptied without recharge. If this scenario occurs, the facility will use the treated potable water, which will remain available.



**Buffalo and Erie County  
Botanical Gardens  
2655 South Park Avenue  
Buffalo, New York 14218**



**Engineering Report  
Cistern Design  
Town of Tonawanda Highway Garage  
500 Woodward Avenue  
Tonawanda New York**

**Overview**

The Town of Tonawanda Highway Department annually uses approximately 750,000 gallons of potable water for street sweeping, truck cleaning, paving and irrigating an onsite tree farm. This water is supplied by the Tonawanda Water Treatment Plant.

The Highway Garage has an existing 51,000 sq. ft. roof drainage collection and discharge system that can be directed to be captured in a cistern. Based on the 30 year average rainfall data for this area from the National Weather Service, there is adequate collection area to capture over 860,000 gallons of water during the 8 month period of the year in which the water could be used for municipal operations.

The building downspouts that drain the south 60% (51,000 sq. ft.) of the main garage building roof currently all individually tie into a common 12" storm sewer that runs east along the south side of the building. This storm sewer also serves the parking lot inlets and cannot be used to direct the combined flows to the cistern. Each of the 9 downspout connections to the existing sewer would have to be bulk headed. Approximately 520 feet of new 8" SDR 35 storm line would be installed along the entire south side of the building between the building and the existing storm sewer. The new sewer would collect the downspouts and direct them toward the middle of the building and the current wash bay area where the new cistern system will be located. The Town Highway Department would provide the repaving of the area disturbed by installation of the system and sewers, labor and materials as their contribution to the local match.

Any excess flows to the cistern, when it is full, will be directed back to the Town of Tonawanda Stormwater system where the roof and site currently drain. Water supply from the cistern will be done with a suction pumping, pressure demand system that will terminate at yard hose bibs at the washing station for use in vehicle washing and street sweeper filling. A hose will also be run from this point to the sprinklers that irrigate the tree farm. Valving of this supply will be done to allow for emptying the cistern, should the occasion arise. During possible, but rare, periods of extended drought the cistern could be emptied without recharge. If this scenario occurs, the facility will use the treated potable water which will remain available.

**Tank Capacity**

To eliminate the use of potable water for Highway operations the system will need to provide for a daily demand of 3,000 gallons. Based upon the estimated 860,000 gallons of rainwater the catchment area will provide the proposed cistern will be able to meet this demand. The local weather statistics, obtained from the National Weather Service,

indicate that there is an average of twelve consecutive days without rainfall, which occur primarily in May – June and September - October. By assuming that the needs of the cistern supply will occur on 9 of these days, the proposed cistern will be sized to contain 27,000 gallons of water. This will require a tank with a capacity of 3,600 cubic feet.

### **System Construction**

The proposed cistern will be designed and constructed in compliance with the American Rainwater Catchment Systems Association Rainwater Catchment and Design and Installation Standards as well as state and local building code requirements. Cistern materials, piping and pumps will each be chosen for their predicted long term use and low maintenance costs to maximize the benefit of using collected storm water runoff as opposed to costly treated potable water.

### **Filtration and Pump Equipment**

The proposed hydrodynamic filtration system will be one manufactured for the specific use of cistern application. These units are typically small and compact and designed to filter suspended particles, while allowing the dissolved material to flow through.

The discharge pump for the cistern will be a small non-redundant, suction head pump that will supply water at a prescribed head and rate. The suction head pumps for the wet well discharge application will be configured to be a redundant system with emergency pumping capabilities that will be sized to draw down the storage volume at a rate greater than the peak rate of inflow.

### **Cistern System Overflow and Bypass Piping**

The proposed cistern system design will include bypass capabilities to direct flows through the cistern under cistern full conditions and also a filter bypass piping configuration for the flows that exceed the filtering capacity. Both of these flows will be directed via a gravity overflow to the existing storm sewer which currently serves the site.

### **Conclusion**

The proposed cistern design for the Town of Tonawanda Highway Department Garage facility is predicted to save 540,000 gallons of treated potable water per year. At the current cost the Town is paying in sewer and water fees per gallon of potable water they use the estimated annual savings will be \$ 3,000. The recharge time for the empty system is predicted to be 24 hours based on the ninetieth percentile rainfall for this area of approximately one inch.

Town of Tonawanda  
Highway Garage  
500 Woodward Avenue  
Tonawanda New York

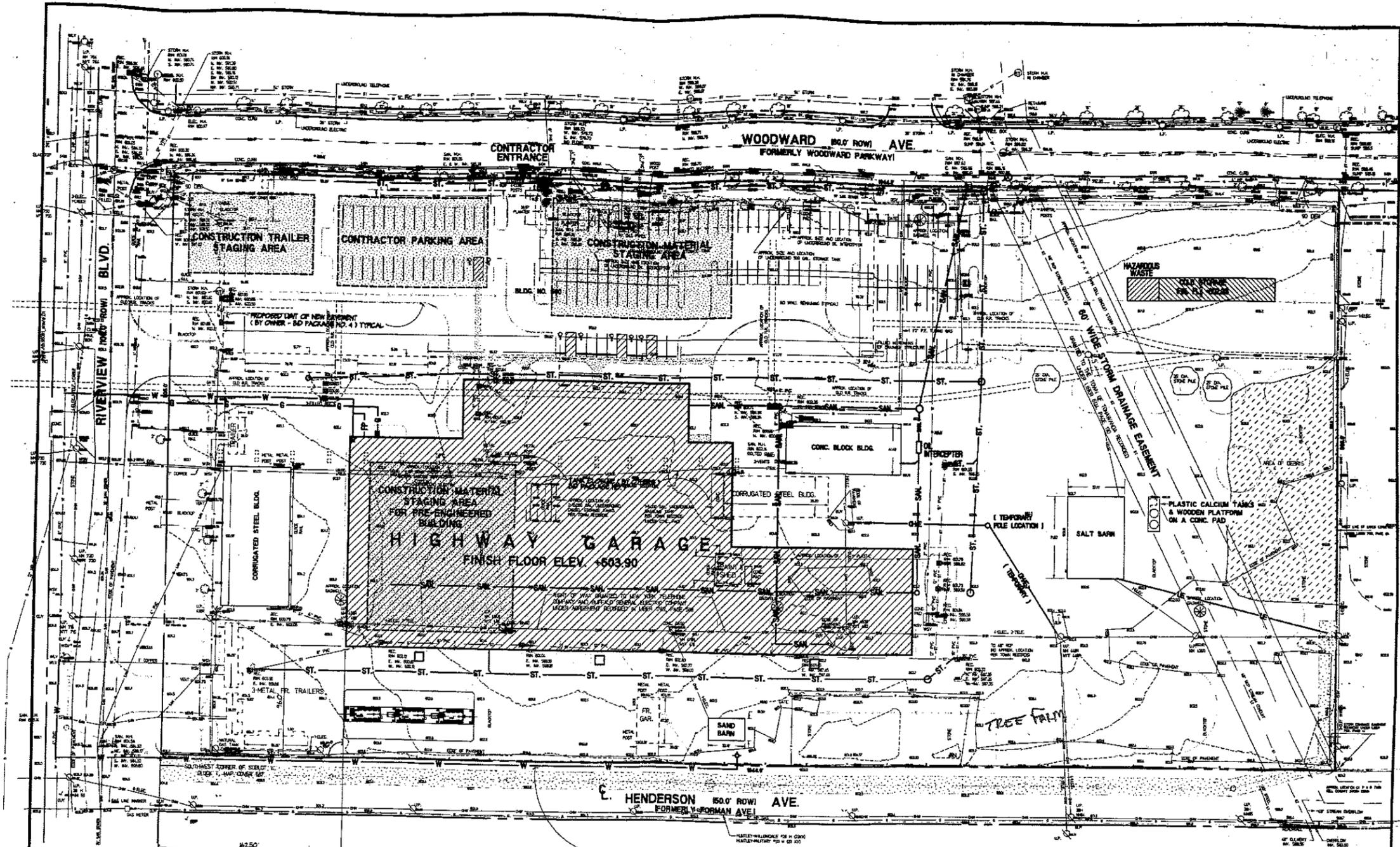
WOODWARD

HENDERSON

DRIVEWAY

RIVERVIEW





AREA= 12.103 ACRES

NOTE:  
THE LOCATIONS OF UNDERGROUND UTILITIES AS SHOWN HEREIN ARE BASED ON AERIAL-ROAD STRIPES AND RECORD DRAWING PROVIDED. THE SUPERVISOR LOCATIONS OF UNDERGROUND UTILITIES STRUCTURES MAY VARY FROM LOCATIONS SHOWN HEREIN. EXISTING BURIED UTILITIES STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES STRUCTURES.

TOPOGRAPHIC INFORMATION WAS OBTAINED FROM THE OFFICE OF WINDMILL ASSOCIATES, ENGINEERS - SURVEYORS, 870 HAWKINS FALLS BLVD., TONAWANDA, NEW YORK 14150, DRAWING NO. 6-2084, DATED 10-27-85.

DATE	BY	CHKD.	APP'D.

GENERAL REVISIONS FOR BID PACKAGE NO. 2

NO.	DATE	DESCRIPTION

**SITE PLAN**

1" = 30.0'

6PD 20 MAR 86  
**HIGHWAY DEPARTMENT BUILDING - JOB NO. 2369.1**  
 TOWN OF TONAWANDA  
 488 WOODWARD AVENUE  
 TONAWANDA, NEW YORK 14150

**GENERAL NOTES:**

- CONTRACTOR SHALL REPAIR ALL SIDEWALKS, PATHWAYS AND LAWN AREAS DISTURBED BY SITE WORK CONSTRUCTION ACTIVITY.
- THE DEPTH AND LOCATIONS OF EXISTING UTILITIES ARE NOT KNOWN. NOTIFY UTILITY COMPANIES AND UNDERGROUND UTILITY LOCATING SERVICE. ACTUAL LOCATIONS ARE TO BE DETERMINED BY THE CONTRACTOR IN THE FIELD. CONTRACTOR SHALL USE ALL REASONABLE MEASURES INCLUDING METAL DETECTORS, ELECTRONIC SENSORS, PROBING AND HAND EXCAVATION TO AVOID DISTURBING EXISTING BURIED UTILITIES.
- ALL EXCAVATED MATERIAL SHALL BE REMOVED FROM SITE.
- CONTRACTOR SHALL PERFORM EXPLORATORY EXCAVATION AT ALL PROPOSED UTILITY CROSSINGS TO CONFIRM PROPER CLEARANCES. OBTAIN ALL UTILITY CONNECTION CONDITIONS PRIOR TO INSTALLING PROPOSED UTILITIES.
- ALL MATERIALS AND CONSTRUCTION SHALL CONFORM WITH NEW YORK STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS.
- ESSENTIALLY SUBMIT DOCUMENTATION THAT ALL PROPOSED MATERIALS MEET SPECIFICATING SUBMIT MATERIAL DELIVERY TESTS.
- PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT A PROPOSED PROJECT SCHEDULE FOR APPROVAL.

**NOTE: THIS DRAWING IS BEING ISSUED IN BID PACKAGE NO. 2 FOR REFERENCE ONLY.**



BID PACKAGE NO. 2 - PRE-ENGINEERED BUILDING	SITE LAYOUT PLAN	93081-20	D1
TRAUTMAN ASSOCIATES		15 FEB 86	

6 24 22 20

22

**Engineering Report  
Cistern Design  
Town of Tonawanda Senior Center  
291 Ensminger Road  
Tonawanda New York**

**Overview**

The Town of Tonawanda Parks Department annually uses approximately 190,000 gallons of potable water for greenhouse, garden, lawn and field watering. This water is supplied by the Town of Tonawanda Water Treatment Plant. A proposed rainwater reuse cistern at the Town Park's Department operated Senior Center Site on Ensminger Road could provide an adequate supply to eliminate the need for potable water. The Senior Center facilities include a greenhouse which the town uses to grow ornamental plants and flowers for the town garden beds and planter boxes. The location of the cistern at this location would be convenient for supplying the green house as well as provides an ideal location for filling the parks watering trucks and watering the onsite soccer fields.

The Senior Center has an existing 14,000 sq. ft. of roof area that discharges through a single 4 inch lateral from the basement of the facility that exits the building adjacent to an existing loading dock. This provides for the convenient installation of a cistern along the lateral that connects the building to the storm sewer. Based on the 30 year average rainfall data for this area from the National Weather Service, there is adequate collection area to capture 230,000 gallons of water during the 8 month period of the year in which the water would be needed for municipal operations. Any excess flows to the cistern, when it is full, will overflow to the Town of Tonawanda stormwater system which outfalls to Two Mile Creek.

Water supply from the cistern will be done with a suction pumping, pressure demand system that will terminate at yard hose bibs for use by the facility employees. Valving of this supply will be done to allow for emptying the cistern, should the occasion arise. During possible, but rare periods of extended drought the cistern could be emptied without recharge. If this scenario occurs, the facility will use the treated potable water which will remain available.

**Tank Capacity**

In order to compliment the cistern proposed at the Highway Garage and meet the Town's overall operational demand for non-potable water, the cistern at the Town Senior Center will need to provide a daily supply of 1,200 gallons for use in their operations. The local weather statistics, obtained from the National Weather Service, indicate that there is an average of twelve consecutive days without rainfall, which occur

primarily in May – June and September - October. By assuming that the needs of the cistern supply will occur on 9 of these days, the proposed cistern will be sized to contain 11,000 gallons of water. This will require a tank with a capacity of 1,466 cubic feet.

### **System Construction**

The proposed cistern will be designed and constructed in compliance with the American Rainwater Catchment Systems Association Rainwater Catchment and Design and Installation Standards as well as state and local building code requirements. Cistern materials, piping and pumps will each be chosen for their predicted long term use and low maintenance costs to maximize the benefit of using collected storm water runoff as opposed to costly treated potable water.

### **Filtration and Pump Equipment**

The proposed hydrodynamic filtration system will be one manufactured for the specific use of cistern application. These units are typically small and compact and designed to filter suspended particles, while allowing the dissolved material to flow through.

The discharge pump for the cistern will be a small non-redundant, suction head pump that will supply water at a prescribed head and rate. The suction head pumps for the wet well discharge application will be configured to be a redundant system with emergency pumping capabilities that will be sized to draw down the storage volume at a rate greater than the peak rate of inflow.

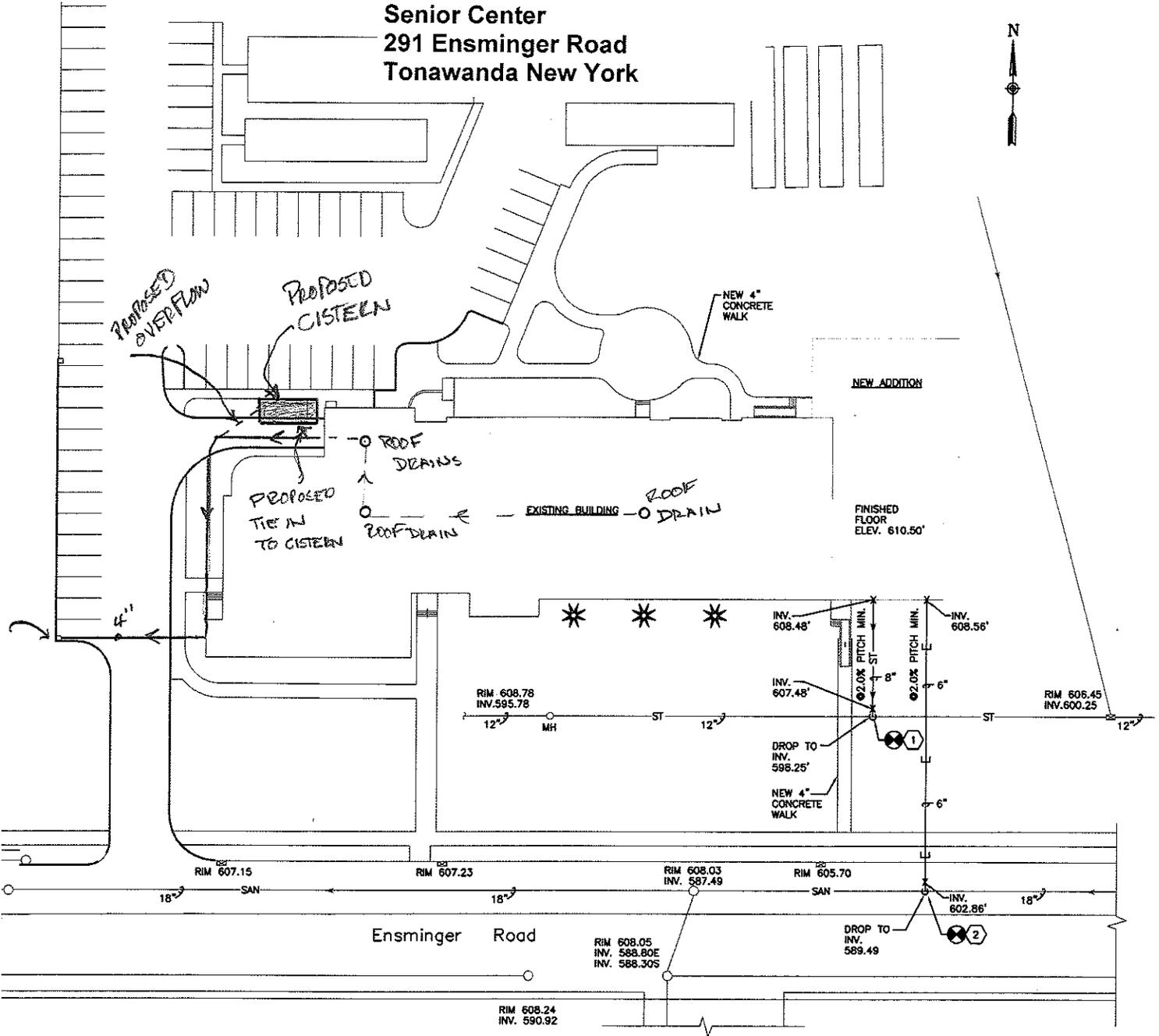
### **Cistern System Overflow and Bypass Piping**

The proposed cistern system design will include bypass capabilities to direct flows through the cistern under cistern full conditions and also a filter bypass piping configuration for the flows that exceed the filtering capacity. Both of these flows will be directed back to the existing storm drain that currently serves this discharge.

### **Conclusion**

The proposed cistern design for the Town of Tonawanda Senior Center is predicted to save 190,000 gallons of treated potable water per year. Based on the required 1,200 gallons per day use, the system is designed to provide the projected daily demand.

Town of Tonawanda  
Senior Center  
291 Ensminger Road  
Tonawanda New York



**PARTIAL SITE PLAN - PLUMBING**  
SCALE: 1" = 30'-0"



**DRAWING NOTES:**

1. CONNECT 8" STORM SEWER TO EXISTING 12" LOCATED IN LAWN AREA AS PER ERIE COUNTY AND TOWN OF TONAWANDA REQUIREMENTS. VERIFY LOCATION AND INVERTS PRIOR TO COMMENCEMENT OF WORK.
2. CONNECT 6" SANITARY SEWER TO EXISTING 18" LOCATED IN ENSMINGER ROAD AS PER ERIE COUNTY AND TOWN OF TONAWANDA REQUIREMENTS. VERIFY LOCATION AND INVERTS PRIOR TO COMMENCEMENT OF WORK.

**GENERAL NOTES:**

- A. THE CONTRACTOR IS ADVISED A TRENCH SHIELD AND/OR SHORING DESIGNED IN ACCORDANCE WITH OSHA STANDARDS SHALL BE USED IN ALL OPEN TRENCH EXCAVATIONS.
- B. ANY CONTRACTOR AND/OR PLUMBER PERFORMING WORK IN A CONFINED SPACE (I.E. MANHOLES, NETWELLS, CHAMBERS) OWNED BY AN ERIE COUNTY SEWER DISTRICT, MUST CERTIFY TO THE COUNTY THAT THEY HAVE THEIR OWN CONFINED SPACE ENTRY PROGRAM THAT MEETS OR EXCEEDS OSHA'S REGULATIONS. CERTIFICATION MUST BE NOTARIZED BY A NOTARY PUBLIC.
- C. CONSTRUCTION SHALL CONFORM TO THE RULES AND REGULATIONS FOR ERIE COUNTY AND TOWN OF TONAWANDA.
- D. IF ANY PROPOSED SEWER LATERAL RUNS UNDER PAVED AREA AND HAS LESS THAN FOUR (4) FEET OF COVER, THEN CONCRETE ENCASEMENT IS REQUIRED.
- E. THE CONTRACTOR MUST CONTACT THE TOWN OF TONAWANDA 24 HOURS IN ADVANCE OF CONSTRUCTION.
- F. VENTS MUST BE INSTALLED SIX (6) INCHES ABOVE GRADE, IN A GRASS AREA WITH A MUSHROOM CAP.
- G. EXISTING UTILITY LOCATIONS ARE APPROXIMATE. VERIFY EXACT LOCATION PRIOR TO COMMENCEMENT OF WORK.

**Engineering Report  
Cistern Design  
Village of Orchard Park Highway Garage  
100 West Highland Avenue  
Orchard Park, New York**

**Overview**

The Village of Orchard Park Department of Public Works annually uses approximately 65,000 gallons of potable water for routine municipal operations like street sweeping, plant and lawn watering, and vehicle washing. This water is supplied by the Erie County Water Authority.

The Village Highway Garage has an existing 6,000 sq. ft. roof with a drainage collection and discharge system that can be directed and captured in a cistern. Based on the 30 year average rainfall data for this area from the National Weather Service, the roof area is adequate to capture over 100,000 gallons of water during the 8 month period of the year in which the water would primarily be used for municipal operations.

The roof and floor drains currently exit the building in separate pipes. The gutter drains empty into 6" SDR 35 pipe which flow underground into the existing storm drainage system. The exact location and configuration of the pipe underground is unknown. It will require the installation of approximately 400 feet of new drainage line (6" SDR 35 pipe bedded in stone with 2" crusher run backfill) to reroute the building downspouts to the proposed cistern. An additional 75 feet of pipe will be required to connect the overflow of the cistern back into the existing storm sewer drop inlet.

The Village is planning to repave their lot and will do all of the drainage line work themselves. Their construction labor costs will be provided as part of the projected local match. The work area between the two buildings (60 feet by 60 feet) has close access to electrical power and located where it will allow for the gravity flow of stormwater to the system as well as provide for a gravity overflow discharge to the storm system. Any excess flows to the cistern, when it is full, will be directed back to the Village of Orchard Park Stormwater system where the roof and site currently drain. The proposed location for the cistern will also be conducive to the layout of current operations and allow for the placement of the system at a depth that will avoid freezing conditions. The depth of the existing system at this location is approximately four feet.

Water supply from the cistern will be done with a suction pumping, pressure demand system that will terminate at hose bibs located in the DPW building for use by the facility employees. The piping for this supply will be done to allow for emptying the cistern, should the occasion arise.

**Tank Capacity**

The facility has reported that they will need a daily supply of 700 gallons for use in their street sweeping operations and landscaping. Based upon the estimated 100,000

gallons of rainwater the catchment area will provide the proposed cistern will be able to meet this demand. The local weather statistics, obtained from the National Weather Service, indicate that there is an average of twelve consecutive days without rainfall, which occur primarily in May – June and September - October. By assuming that the needs of the cistern supply will occur on 9 of these days, the proposed cistern will be sized to contain 6,300 gallons of water. This will require a tank with a capacity of 840 cubic feet.

### **System Construction**

The proposed cistern will be designed and constructed in compliance with the American Rainwater Catchment Systems Association Rainwater Catchment and Design and Installation Standards as well as state and local building code requirements. Cistern materials, piping and pumps will each be chosen for their predicted long term use and low maintenance costs to maximize the benefit of using collected storm water runoff as opposed to costly treated potable water.

### **Filtration and Pump Equipment**

The proposed hydrodynamic filtration system will be one manufactured for the specific use of cistern application. These units are typically small and compact and designed to filter suspended particles, while allowing the dissolved material to flow through.

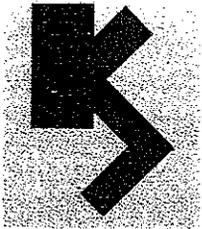
The discharge pump for the cistern will be a small non-redundant, suction head pump that will supply water at a prescribed head and rate to provide adequate pressure at the hose bibs located in the DPW building. The suction head pumps for the wet well discharge application will be configured to be a redundant system with emergency pumping capabilities that will be sized to draw down the storage volume at a rate greater than the peak rate of inflow.

### **Cistern System Overflow and Bypass Piping**

The proposed cistern system design will include bypass capabilities to direct flows through the cistern under cistern full conditions and also a filter bypass piping configuration for the flows that exceed the filtering capacity.

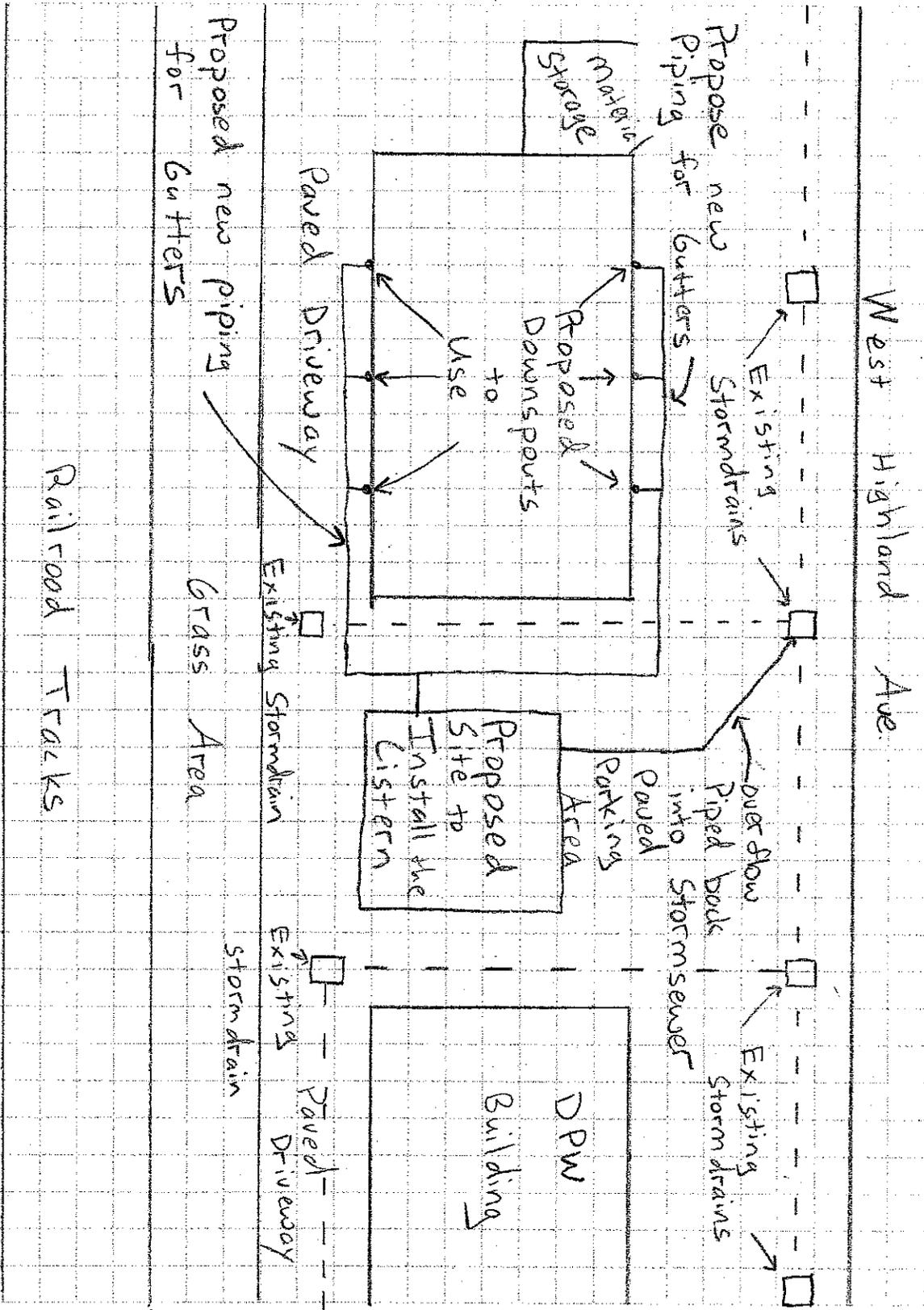
### **Conclusion**

The proposed cistern design for the Village of Orchard Park Highway Garage facility is predicted to save 65,000 gallons of treated potable water per year. Based on the required 700 gallons per day use, the system is designed to meet the projected daily demand. The proposed location for the cistern will be conducive to the layout of current operations and allow for the placement of the system at a depth that will avoid freezing conditions. The depth of the existing system at this location is approximately four feet.



Village of Orchard Park  
 Highway Garage  
 100 West Highland Avenue  
 Orchard Park, New York

SEWER PIPE
WATER PIPE
VALVES
FITTINGS
WATERWORKS SUPPLIES
CASTINGS



- Pipe Work
- 1) Approx 300 ft of Pipe to connect downspouts to Cistern
  - 2) Approx 80 ft of Pipe to connect Overflow to Storm Sewer
  - 3) Area Between the two Buildings is 60 ft x 60 ft