

A large green geometric graphic consisting of a right-angled triangle with its hypotenuse facing the top-right, and a rectangular extension on the left side, creating a shape that resembles a stylized 'L' or a corner bracket.

# **Dam Safety Inspection Report**

New Rochelle Reservoir No. 1 Dam

NYSDEC ID No. 215-0207

City of New Rochelle, Town of Eastchester

Westchester County, New York

January 6, 2020

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# Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
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**Information class:** Standard

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# 1 General Information and Inspection Personnel

## DAM SAFETY INSPECTION REPORT

### NEW ROCHELLE RESERVOIR NO. 1 DAM, CLASS C HIGH HAZARD DAM

**Name of Dam:** New Rochelle Reservoir No. 1 Dam  
**Dam File No.:** NYSDEC ID No. 215-0207  
**Location:** City of New Rochelle and Town of Eastchester, Westchester County, NY  
**Hazard Potential:** Class C (Small) - High Hazard Potential  
**Date Inspected:** 12/10/2019

#### Reservoir Information

Normal Reservoir Elevation (ft): 182.3±  
Reservoir Elevation at time of Inspection (ft): 182.4±. Minor overflow (1-2 inches) at spillway crest.

**Weather Conditions:** Temperature around 36 °F and sunny at time of inspection. Recent rainfall consisted of light snow.

**Tailwater Elevation:** No backwater.

#### Inspecting Engineers:

John K. Ruschke, PE, CFM  
Principal Project Manager, Mott MacDonald  
Water Resources/Hydraulic Engineering

Kevin K. Nollstadt, PE, CFM  
Senior Project Engineer, Mott MacDonald  
Water Resources/Hydraulic Engineering

#### Other Participants:

Antoon Abdalla  
Department of Public Works  
City of New Rochelle

Harpreet Singh  
Department of Public Works  
City of New Rochelle

## 2 Introduction

According to New York Department of Environmental Conservation (NYSDEC) records the New Rochelle Reservoir No. 1 Dam is owned by:

### **City of New Rochelle**

New Rochelle's ownership is believed to include the left embankment section and left masonry section from approximately the center of the spillway to the left abutment (looking downstream).

### **Block 138 Corporation**

Block 138 Corporation's ownership is believed to include the right masonry section from approximately the center of the spillway to the right abutment (looking downstream).

### **Town Houses at Lake Isle Association**

The Association's ownership is believed to include the right embankment section (looking downstream).

The left/right nomenclature used in this report is based on looking downstream from the middle of the Dam.

According to the latest NYSDEC visual safety inspection conducted on August 3, 2018, and the certified letter to dam owners dated October 12, 2018, this dam has been assigned a condition of **Unsound, Deficiency Recognized**, in accordance with 6NYCRR Part 673.16, due to the following ongoing deficiencies.

- Inadequate spillway capacity and low factors of safety for severe loading conditions. The Spillway Design Flood (SDF) for the subject dam is 50 percent of the Probable Maximum Flood (PMF). The spillway does not have the capacity to pass the 0.5 SDF.
- The owners of the dam have not implemented an Enhanced Dam Safety Program.
- The dam continues to be unmaintained as reported in previous inspection letters. There is significant tree growth and dense brush growth along the earth embankments and toe of the masonry dam.
- The Inspection & Maintenance (I&M) Plan on file with the NYSDEC is not being followed as part of the required Enhanced Dam Safety Program.
- The Emergency Action Plan (EAP) and Inundation Mapping on file with the NYSDEC was last updated on 11/16/2016. The EAP needs to be reviewed and updated as soon as possible.
- Submit the Annual Certification to the NYSDEC by January 31 of each year. Only the City of New Rochelle has submitted the certification. The other owners are in violation.
- The first Engineering Assessment (EA) for a Class C Dam of this size was due no later than August 19, 2012, and a full Engineering Assessment is due every 10 years thereafter. An EA has not been received by the NYSDEC for this Dam.

Based on the deficiencies noted above and the lack of maintenance that continue at the dam, the NYSDEC strongly recommended the water level of the impoundment be lowered until responsible ownership is in place, the safety of the dam has been reviewed in an Engineering Assessment report, and any needed remedial measures have been performed.

Mott MacDonald has prepared this Inspection Report of the entire dam on behalf of the City of New Rochelle. The scope of this safety inspection was to identify potential problems with dam performance, to identify additional investigations and analysis that may be required, and to provide recommendations for correcting deficiencies in order to meet the NYSDEC dam safety regulations. This Report summarizes our review of available documents and our field inspection conducted on December 10, 2019. Facility data, visual inspection checklists, findings and recommendations, and relevant photographs and maps are included herein.

There are no operating or water level records available for this dam.

The City of New Rochelle has also retained Mott MacDonald to conduct a detailed engineering assessment of the spillway capacity and structural stability of the dam. This engineering assessment will be outlined in a separate report.

### 3 Project Description

New Rochelle Reservoir No. 1 Dam is located on the Hutchinson River in the Town of Eastchester and the City of New Rochelle, Westchester County, New York. The dam was originally constructed in or around 1894. As-built drawings of the dam are not available. Project geometry used in this Report is based on data presented in the 1979, Phase I National Dam Safety Program Inspection Report and surficial measurements made by Mott MacDonald. See Table 1 for a summary of facility data. For descriptive purposes, the dam is referred to herein as "left side" and "right side" from the point of view of looking downstream from the spillway at the dam.

New Rochelle Reservoir No. 1 Dam is a relatively long dam on the southern end of the impoundment. The dam consists of a masonry section about 675 feet long with earth embankments on each end. The primary spillway is an overflow channel approximately 30 feet wide at the crest and is situated near the center of the masonry section.

The masonry portion of the dam is constructed of stone blocks and mortar. This section is approximately 675 feet long and varies from height of about 30 feet near the center of the structure down to about 6 feet at the left end. The primary spillway is located within this segment.

The spillway is situated about 265 feet from the northeastern (left) end of the masonry section. It is approximately 30 feet wide and has a crest elevation 4 feet lower than the crest of the rest of the masonry section. The spillway has a crest width of 6 feet and then slopes off at approximately a 2 vertical on 1 horizontal slope. The bottom and sides of the spillway channel are lined with stone block to convey the water well beyond the downstream toe of the dam.

There is a stone building, referred to as the gate house, located approximately 150 feet from the southwest (right) end of the masonry section. Old inspection reports indicate that there were several pipes which passed through the gate house. However, the location where the pipes exited has been sealed and so the reservoir has no means to lower or drain the water.

The earthen dikes extend beyond the ends of the masonry section. The left dike is approximately 75 feet long and 6 feet high. The right dike is about 700 feet long and 10 feet high at its maximum height. The top elevation of each dike is about 2 feet higher than the crest elevation of the masonry portion of the dam.

The dam is classified as a Class C – High Hazard dam due to the presence of the Hutchinson River Parkway immediately downstream of the dam. Since the dam is less than 40 feet high and has a normal pool capacity of less than 1000 acre feet, the size of the dam is considered small. Therefore, the spillway design flood is 50% of the probable maximum flood (PMF).

A Project Location Map and site plan as well as other relative drawings and maps are presented in Appendix A. The Dam Safety Checklists are presented in Appendix B and Inspection Photographs are presented in Appendix C, respectively.

No detailed records of subsurface investigations were available at the time of our inspection. Some limited data from the 1913 and 1915 state inspection reports and profiles dated September 21, 1979 provided by the State indicate that the dam is founded on rock. A 1978 boring program conducted for the Townhouse Development provide limited data on subsurface conditions near the downstream toe of the embankment only to a depth of 3 to 9 feet. The 1979 profiles provided by the state are presented in Appendix A.



**Table 1 Facility Data**  
**Reservoir Dam No. 1**

Geographical Location	New Rochelle/Eastchester, Westchester County, NY
NYSDEC	215-0207
NATDAM ID #	NY00020
Date of completion	1894 (no available design or construction records)
Latitude (N)	40 ° 57' 24"
Longitude (W)	73 ° 47' 56"
Purpose	Recreation
NYSDEC Hazard Classification	Class "C" (small), High Hazard Potential
Drainage Area	2.2 square miles (1,292 acres)
Dam Type	Masonry Dam w/Earthen Dikes at each end
Maximum Dam Height	30± ft
Dam Length	Left Dike (NE) approximately 75 ft Masonry Dam 675 ft Right Dike (SW) approximately 700 ft
Masonry Dam	U/S face: vertical DJS face: 3V:2H Crest Elevation: 186.5± ft Crest Width: 6 ft
Earth Dikes	U/S slope: about IV:2H DJS slope: varies from IV:1.5H to Iv:3H Crest Elevation: 188.5± ft Crest Width: 6 to 8 ft
Spillway	overflow channel Spillway length: 30 ft Crest Elevation: 182.28 ft Crest Width: 6 ft Drop: 12 ft w/2V:1H d/s slope
Normal Pool Elevation	182.28 ft
Reservoir Area	62 acres w/water level at top of service spillway 81 acres w/water level at top of masonry Dam 92 acres w/water level at top of earth dikes
Normal Storage Capacity	582 acre-ft w/ water level at top of service spillway 869 acre-ft w/water level at top of masonry Dam 1,043 acre-ft w/water level at top of earth dikes
Spillway Capacity	744 cfs (w/water level @ top of masonry Dam)
Low Level Outlet	Gate House located 150 ft from left (SW) end of masonry section. Several pipes pass thru gate house. Pipe exit is sealed. No functioning reservoir drain.

## 4 Visual Inspection

A safety inspection was performed on December 10, 2019 in accordance with NYSDEC recommended guidelines. Observations made during the inspection are outlined below. As previously stated, the left/right nomenclature used in this report is based on looking downstream from the middle of the dam.

### 4.1 Masonry Dam

The masonry portion of the dam is constructed of stone blocks and mortar. This section is approximately 675 feet long and varies from a maximum height of approximately 30 feet near the center of the structure down to approximately 6 feet at the northeastern end. The service spillway is located within this segment. There is a gate house located approximately 150 feet from the southwestern end of the masonry section.

The majority of the masonry dam is in fair to good condition. The portion of the masonry dam to the right of the gate house had significant vegetative growth over the structure which limited the inspection of same. The vertical and horizontal alignments are in good condition with no signs of movement. No signs of structural instability were observed. Masonry blocks are in overall good condition. Mortar joints are in fair condition with some areas of loose or missing mortar were observed. Mortar repairs should be made as needed to ensure long term performance.

Minor seepage and wet spots were observed on the downstream face of the gate house structure, approximately 30 feet to the right of the spillway, and along the joints (left and right side) between the masonry dam and the spillway wing walls. In addition, a soft/wet spot was observed in the earth near the toe of the masonry dam approximately 20 feet to the left of the primary spillway. Visual seepage through the masonry Dam should be eliminated to ensure long term performance of the dam.

Inspection of the upstream masonry face was limited to the exposed portion above the water elevation. The masonry block appears to be in good condition. The mortar joints in several locations are also in need of repair.

Concrete blocks have been set on top of the crest adjacent to the gate house which are not part of the original dam construction. The blocks appear to have been placed to restrict access around the gate house.

Vines and ivy cover a large portion of the downstream face of the masonry dam along the right side of the structure. Root intrusion into the masonry dam was noted in several locations. All mortar joints impacted by root intrusion should be cleaned to remove the existing vegetation and repaired.

Dense brush and large trees were also observed near the toe of the masonry dam. The presence of woody vegetation and trees represents a potential risk that could impact the foundation of the dam if uprooted from storms or overtopping of the Dam. The prolongation of roots in close proximity of the dam can also cause conduits for uncontrolled excessive seepage. They also hinder close visual inspection of the structure. All woody vegetation and trees in close proximity of the dam should be removed.

The base of the masonry dam is not protected from high erodible forces if overtopping of the masonry dam occurs.

A shallow steel pipe was noted left of the gate house structure running perpendicular with the dam. A small discharge of water was noted from the subject pipe. The origin and configuration of the piping in relation to the dam is unknown and should be further investigated.

Security fencing in and around the dam has been removed or cut in several locations. Overall, Security fencing is in poor condition.

Despite the Dam's reasonably good structural appearance, there are no records available that demonstrate acceptable factors of safety for structural stability for all potential loading conditions. A detailed engineering assessment is being performed and will be outlined in a separate report.

## 4.2 Concrete Spillway

The service spillway is an uncontrolled overflow channel located approximately 265 feet from the northeastern end of the masonry dam. It is approximately 30 feet wide and has a crest elevation approximately 4 feet lower than the crest of the rest of the masonry sections. The spillway has a crest width of approximately 6 feet and then slopes off at approximately a 2 vertical on 1 horizontal slope. The bottom and sides of the channel are lined with stone block to carry the water well beyond the downstream toe of the dam.

The SDF for the subject dam is 50 percent of the PMF. Assuming no inflow, the spillway should also have sufficient discharge capacity to evacuate 75 percent of the storage between the maximum design high water and the spillway crest within 48 hours. The current spillway does not have sufficient capacity to safely pass the SDF. An Engineering Assessment is being performed to evaluate spillway modifications in order to achieve these objectives. The inadequate capacity of the spillway results in an overtopping of the entire masonry dam during the required SDF.

A wrought iron fence has been placed along the spillway crest. Debris from high flows is likely to become hung up on this fence. This will significantly reduce spillway discharge capacity and will also increase stress on the structure. The fence should be removed, and alternative safety measures considered.

A footbridge has been installed over the lower portion of the spillway discharge channel. The bottom of the bridge is above the sidewall of the discharge channel. The bridge could be impacted if the capacity of the channel is exceeded or if heavy debris is passed through the channel. The presence of the bridge will be evaluated under the engineering assessment being performed.

Concrete blocks have been set on top of the stone spillway training walls which are not part of the original dam construction. The concrete blocks appear to have been placed to restrict access onto the dam and spillway.

Some undermining of the spillway wing walls was observed along the spillway chute/channel. Also, the downstream end of the spillway chute is cracking and collapsing into the plunge pool. Some erosion of the downstream channel observed at the plunge pool likely due to the collapsing spillway chute. The subject damage appears to have been present since the Army Corp inspection that was for performed in 1979.

## 4.3 Gate House

The gate house was reported to contain several pipes which passed through dam, presumably for low-level control of the reservoir water level and a water supply intake by the New Rochelle Water Company. The intake structure for the piping within the reservoir is submerged and not readily accessible. At the base of the gate house is two chambers housing piping and valves. The steel doors to these chambers are in poor condition and do not prohibit access into the structure. A large boulder was placed in front of one of the doors. The floor of both chambers was flooded restricting inspection of the piping and valves. The condition and age of the valves are unknown. If part of the original construction, the piping and valves would be over 100 years old. The pipes within the structure were reportedly sealed. Further investigation is necessary to verify if the pipes have been properly sealed.

Dam safety regulations require that, assuming no inflow, the service spillway, or low-level outlet, should have sufficient capacity to evacuate 75 percent of the storage between the auxiliary spillway crest and the service spillway crest within 7 days. Since the gates and valves in the gate house are arguably inoperable, the reservoir presently has no emergency maintenance drain capability.

Wet spots were observed in the masonry at the downstream face of the gate house. These areas should be monitored for further consideration and possible correction action if necessary.

#### 4.4 Left Earthern Dike

The left dike is approximately 75 feet long and 6 feet high. The crest elevation is approximately 2 feet higher than the crest elevation of the adjacent masonry dam. The left dike has a steep side slope on the upstream side which is protected with riprap stone from wave action and ice. The crest of the embankment is not well defined and varies from approximately 4 to 6 feet in width. There is a chain link fence along the crest of the embankment. The downstream side slope is moderately sloped with a height that varies with the transition into the surrounding topography. The entire dike has been cleared of the shrubs and trees. The stumps of same were visible from the inspection. The vertical and horizontal alignments are in good condition with no signs of notable movement or settlement.

There were no signs of seepage noted along the dike.

#### 4.5 Right Earthern Dike

The right dike is approximately 700 feet long and approximately 10 feet high. The crest elevation is about 2 feet higher than the crest elevation of the adjacent masonry dam. The upstream slope has riprap stone protection from wave action and ice and includes access points to the lake for recreation. There is a stone pathway along a portion of the crest of the dike that serves for recreational purposes and provides access to the lake for the adjacent townhouse community. The downstream slope is approximately 2H:1V and is maintained lawn areas. The townhouse community is situated just downstream of the toe of the dike.

The dike is covered with numerous large trees and brush on the upstream side and a few large trees on the crest and downstream slope. Minor erosion/depressions were observed along the upstream slope. Trees and brush should be removed from the dike.

There is a wooden fence that runs across the dike at the transition from the right earth dike and the right masonry dam. Some minor erosion was observed in the dike along the wooden fence.

There were no signs of seepage noted along the dike.

## 5 Evaluation of Observations

The subject dam has been assigned an **Unsound, Deficiency Recognized** condition rating by NYSDEC. Our site inspection confirmed the following ongoing deficiencies identified by NYSDEC.

- The SDF for the subject dam is 50 percent of the PMF. The spillway does not have the capacity to pass the SDF and there is no overtopping protection at the toe of the masonry dam in the event that overtopping occurs.
- All the owners of the dam have not implemented an Enhanced Dam Safety Program.
- There is significant tree growth and dense brush growth along the earth embankments and along the toe of the masonry dam. Excessive vines on the dam itself is limiting inspection and allowing root intrusion into the masonry dam.
- The Inspection & Maintenance (I&M) Plan on file with the NYSDEC is not being completely followed as part of the required Enhanced Dam Safety Program.
- The 1979, Phase I National Dam Safety Program Inspection Report prepared by the Army Corp of Engineers identified an unacceptable factor of safety for sliding under overtopping conditions.

Based on this visual safety inspection and review of available documents, New Rochelle Reservoir No. 1 Dam was found to have serious deficiencies and lack of maintenance that continues at the Dam. The NYSDEC has determined that New Rochelle Reservoir No. 1 Dam must be repaired and brought into compliance with current Dam safety regulations as determined by an Engineering Assessment. Alternatively, the dam must be breached or removed. In the event of dam failure, the dam poses a high-hazard potential to downstream people, structures, and public infrastructure.

Recommendations for improvements and bringing the dam into compliance with the requirements of the NYSDEC can be found in Section 6 of this report.

## 6 Recommendations

The primary objective of a Dam safety program is to ensure the integrity and viability of a dam such that it does not present unacceptable risk to the public, property, the environment and the owner. It requires the collective application of engineering principles and experience. It requires a philosophy of risk management that recognizes that a dam is a structure whose safe functioning is not explicitly determined by its original design and construction. Failure of a dam can have major consequences to the public and to the owners of the dam. Regardless of the regulatory framework under which a dam is being operated, dam owners have ultimate responsibility for the safe operation of this dam.

An effective program includes regular safety inspections, maintenance and repairs when needed. The owners should act on all dam safety related findings in a prompt manner in order to reduce risk as low as reasonably possible. Without immediate attention, the dam may further deteriorate or may fail under extreme loading events, which can lead to a complete breach and major consequences in many ways.

### 6.1 Maintenance Deficiencies

Based on our safety inspection, the following recommendations are made regarding maintenance.

1. Develop a plan and schedule for implementation of tree and brush removal on and near the dam. In addition, develop a plan to reestablish the dikes after vegetation has been removed including removal of stumps and large roots, restoring/replenishing of riprap slope protection as needed, filling in eroded areas and depressions and reestablishing grass vegetation.
2. Consideration should be given to removing or relocating the security fencing from the crest of the dam. The fencing along the crest of the dam can be a safety concern to the structural integrity of the dam during an overtopping event.
3. Remove and clear the vines and ivy causing root intrusion along the crest and face of the masonry dam.
4. Clean and repair the mortar joints along masonry dam in need of repair due to erosion and root intrusion to ensure long term performance and reduce the potential for seepage.
5. Continue to monitor the observed wet spots along the downstream face of the masonry dam for any changes in the current conditions.
6. Continue to monitor the wet spot observed in the earth just downstream of the toe of the masonry dam approximately 20 feet to the left of the spillway. Observe the wet spot for any changes in the current conditions.
7. Investigate the steel pipe situated to the left of the gate house running perpendicular to the masonry dam. Determine the origin and configuration of the pipe and the source of flow through the pipe.
8. Investigate the piping and valves at the gate house and the standing water in the valve chambers and determine if they were properly sealed.
9. Remove the wrought iron fence across the primary spillway crest. The fence is likely to collect debris flowing over the spillway and have an adverse impact on the capacity of the spillway and/or potentially cause a safety concern to the structural integrity of the dam. Other means of safety related to the spillway should be considered.
10. Address the safety concerns with access to the gate house. The steel doors leading to one of the chambers of the gate house currently does not prohibit access into the structure.

## 6.2 Structural Deficiencies

Based on the 1979 Phase I Inspection Report for the National Dam Safety Program, our field inspection and records review, the following repairs or modifications should be further investigated to bring the structure into full compliance with the current Dam Safety regulations.

1. The dam currently does not have the capacity of safely conveying the spillway design storm. The dam will need to be modified to satisfy this requirement which may include modifications to the spillway such as lowering the crest elevation of the masonry dam to create an auxiliary spillway and/or to provide overtopping protection to allow the dam to be overtopped.
2. The dam currently does not have an active low-level outlet drain to lower the reservoir water level below the primary spillway. Provisions should be made to include a permanent structure with the capability to lower and/or drain the reservoir.
3. Repair/replace the deteriorating spillway channel at the downstream end near the plunge pool and repair/restore the deteriorating spillway wing walls at the downstream end and where undermining is occurring.
4. Complete stability analysis for both overturning and sliding to verify suitable factors of safety exist.

Mott MacDonald has been retained by the City of New Rochelle to complete a full engineering assessment. A separate report will be prepared to convey the findings of the assessment.

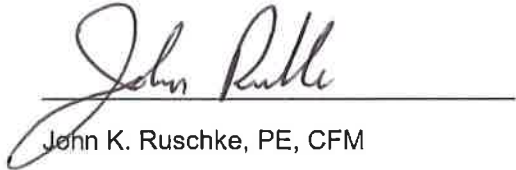
## 6.3 Short-Term Risk Reduction

The following measures should be considered to minimize the risk to the structure and the downstream community in the event of a dam failure.

1. Develop and implement an engineered plan to temporarily lower the water level at the dam as soon as possible. The recommendation to temporarily dewater the reservoir will involve an engineered procedure to draw down by pump, siphon, or other methods at a controlled rate (not too rapidly) to a defined target elevation. Normal water elevations should be restored when Dam safety compliance issues are resolved.
2. Modify the left masonry dam by lowering the crest elevation by approximately three (3) feet creating an auxiliary spillway so the dam can safely convey the spillway design storm (0.5 PMF) and reduce the risk of failure due to an overtopping storm event.
3. Once the reservoir water level is lowered, perform a condition inspection of the upstream face of the dam and gate house, including investigations of the intake structures and piping at the gate house.

## 7 Certification

All work performed in connection with this Report conforms to the requirements of 6 NYCRR Part 673 "Dam Safety", NYSDEC Engineering Guidelines for Dam Safety, and generally accepted engineering practices. All conclusions and recommendations in this Report have been made independent of the Owner, its Employees, and its Representatives.



John K. Ruschke, PE, CFM

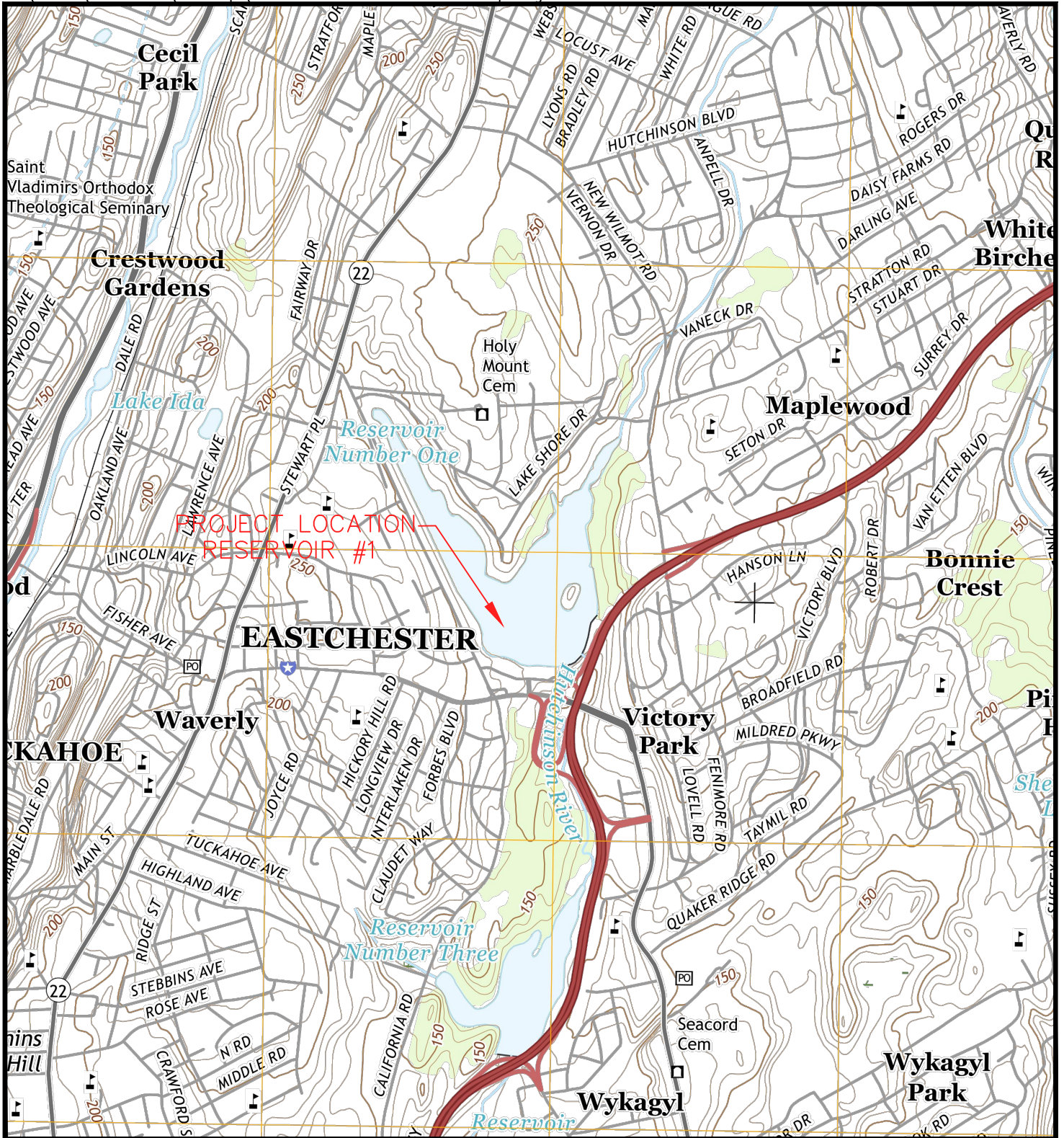
NY PE No. 071267-1



## 8 References

1. 1979, Phase I Inspection Report, National Dam Safety Program, New York District United
2. Dam Safety Inspection Report, Prepared by Paul C. Rizzo Engineering – New York, PLLC, April 2, 2013
3. NYSDEC certified letter to listed Dam Owners, dated October 12, 2018, RE: Notice of Condition Rating "Unsound, Deficiency Recognized".
4. 6 NYCRR Part 673 "Dam Safety", NYSDEC Engineering Guidelines for Dam Safety, latest edition

# Appendix A – Maps and Drawings



**RESERVOIR #1**  
LOCATION MAP

CITY OF NEW ROCHELLE  
WESTCHESTER COUNTY, NEW YORK

SCALE: 1"= 1500'  
NY MOUNT VERNON MAP



Certificate No. 24GA28016600

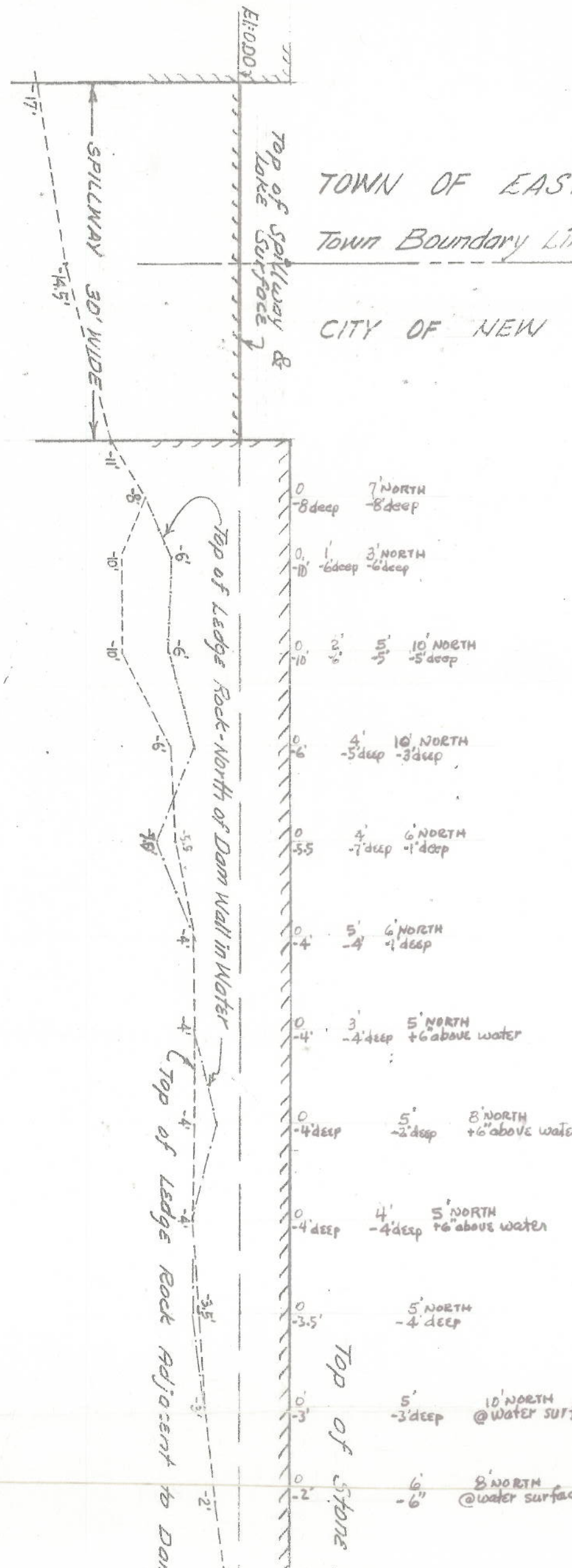
412 Mt. Kemble Avenue  
Suite G22  
Morristown, New Jersey 07960  
Tel: 908.730.6000 Fax: 973.267.2893

TOWN OF EASTCHESTER

Town Boundary Line

CITY OF NEW ROCHELLE

RESERVOIR No 1



0+0 0+5 0+10 0+18 0+26 0+34 0+42 0+50 0+58 0+66 0+74 0+82 0+90

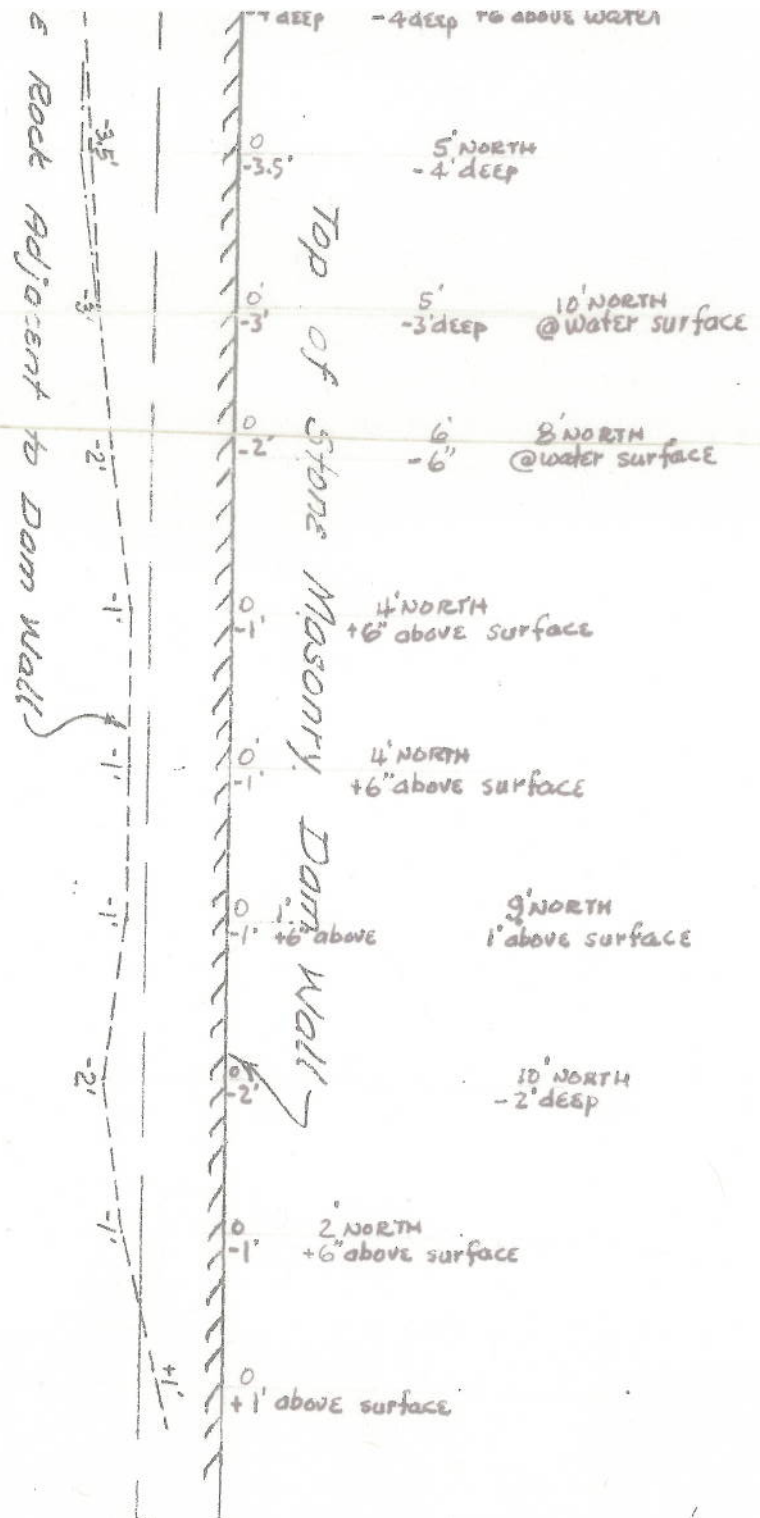
PROFILE

SCALE

WILE

SCALE - HOR. ~ 1" = 10'  
VER. ~ 1" = 10'

+74 +82 -90 +98 1+06 1+14 1+22 1+30 1+38

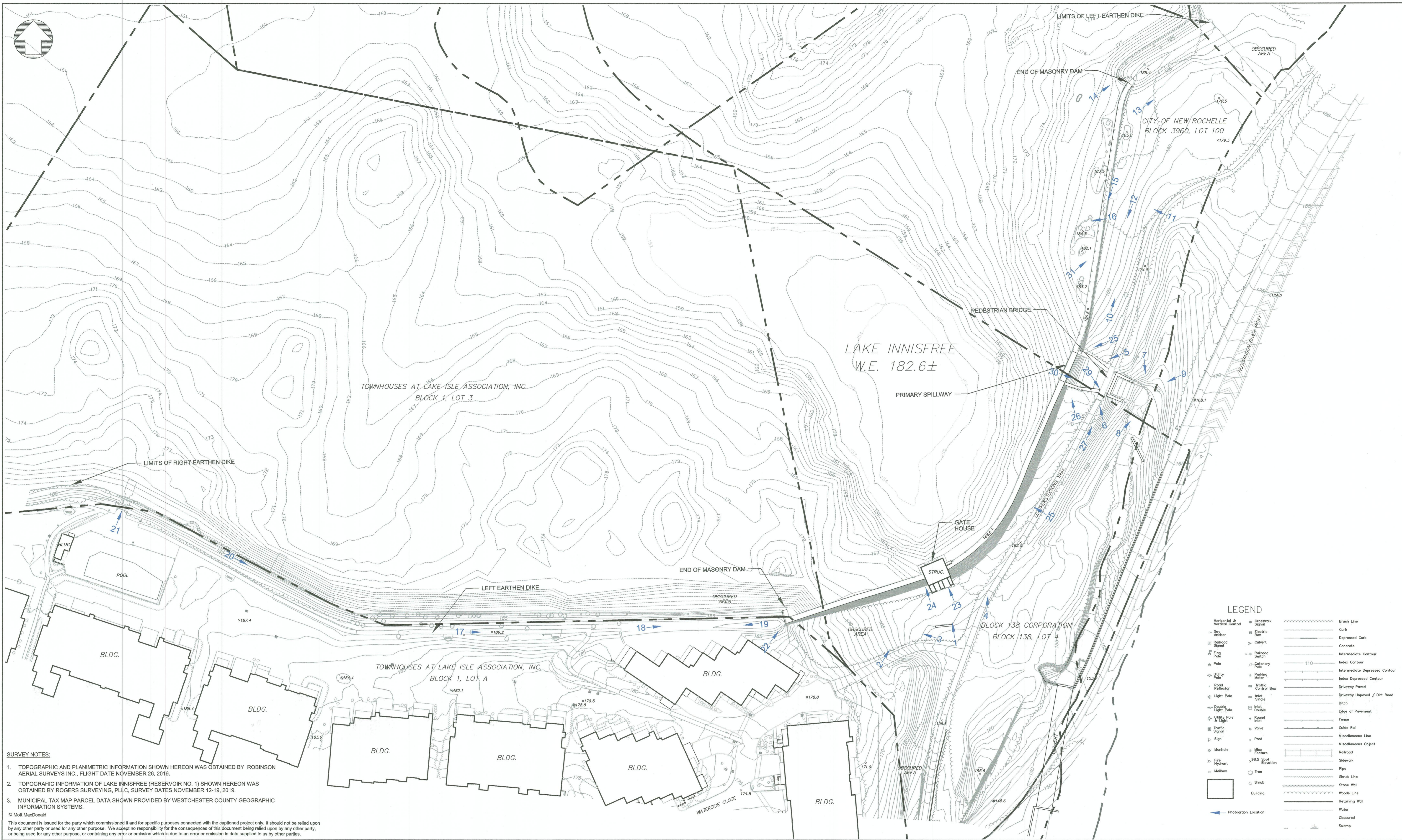


Water Surface of Lake

RESERVOIR #1 - SOUNDINGS  
 TOP OF ROCK  
 NORTH SIDE OF DAM WALL  
 CITY OF NEW ROCHELLE, N.Y.  
 DEPT. OF PUBLIC WORKS - BUR. ENGINEERING

SEPTEMBER 21, 1979

SCALE ~ 1" = 10'



**SURVEY NOTES:**

1. TOPOGRAPHIC AND PLANIMETRIC INFORMATION SHOWN HEREON WAS OBTAINED BY ROBINSON AERIAL SURVEYS INC., FLIGHT DATE NOVEMBER 26, 2019.
2. TOPOGRAPHIC INFORMATION OF LAKE INNISFREE (RESERVOIR NO. 1) SHOWN HEREON WAS OBTAINED BY ROGERS SURVEYING, PLLC, SURVEY DATES NOVEMBER 12-19, 2019.
3. MUNICIPAL TAX MAP PARCEL DATA SHOWN PROVIDED BY WESTCHESTER COUNTY GEOGRAPHIC INFORMATION SYSTEMS.

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Client  
**CITY OF NEW ROCHELLE**  
**TOWN OF EASTCHESTER**  
**WESTCHESTER COUNTY, NEW YORK**

Rev	Date	Drawn	Description	Ch'k'd	App'd

**JOHN K. RUSCHKE**  
 N.Y. Professional Engineer Lic. No 071267-1

*John Ruschke* Date 1/13/2020

Project Number **505100129** B/O **1** Total **1**

Designed	SJA	1/2020	Eng check	KKN	1/2020
Drawn	SJA	1/2020	Coordination	-	1/2020
Dwg check	KKN	1/2020	Approved	JKR	1/2020
Scale at ARCH D	Status	Rev	00	Security	STD
1"=40'	-				
Drawing Number					

**NEW ROCHELLE RESERVOIR #1 DAM**  
**SAFETY INSPECTION -**  
**PHOTOGRAPH LOCATIONS**

# Appendix B – Inspection Checklist

EXAMINATION OF EMBANKMENT DAMS AND DIKES

ITEMS	Observations/Remarks
<b>1. Description of Structure</b>	
a. Embankment Material	Earth embankments beyond the end of the masonry dam. Approximately 700 feet long at the right side and 75 feet long at the left side.
b. Cutoff Type	Unknown
c. Impervious Core	None known
d. Internal Drainage System	N/A
e. Movement (Horizontal and Vertical Alignment)	None observed
f. Junctions with Abutments or Embankments	Embankments blend into high ground. Overall in good condition.
g. Miscellaneous	A townhome development was constructed in the 1980's just downstream of the right embankment. Some of the downstream slopes may have been filled in due to the development.
<b>2. Crest</b>	
a. Vertical Alignment	Overall good condition. No signs of movement.
b. Horizontal Alignment	Overall good condition. No signs of movement.
c. Surface Cracks	None observed
d. Settlement	None observed
e. Unusual Conditions	The crests of the earthen dikes are narrow (Approx. 6 feet wide). There is a slate stone path along a good portion of the crest of the right embankment. Some large trees and woody vegetation near the crest of the right embankment. There is a chain link security fence along the crest of the left embankment.
<b>3. Upstream Slope</b>	
a. Slope (Estimate) (H:V)	Approx. 3H:1V or less.
b. Trees, Undesirable Growth or Debris, Animal Burrows	Significant trees and woody vegetation along the upstream slopes of the right embankment. Trees have been removed from the left embankment. A wooden fence has been installed at the junction with the right embankment and right masonry dam.
c. Sloughing, Subsidence or Depressions	Minor erosion and/or depressions observed at the right embankment. Minor erosion along wooden fence at right embankment near masonry dam.
d. Slope Protection	Upstream slopes lined with riprap
e. Surface Cracks or Movement at Toe	None observed
f. Unusual Conditions	A couple access stairs have been installed at the right embankment for recreational access to the reservoir. oo
<b>4. Downstream Slope</b>	
a. Slope (Estimate) (H:V)	Varies from 1.5H:1V to 3H:1V. Flatter at the far right end.
b. Trees, Undesirable Growth or Debris, Animal Burrows	A few large trees along the right embankment. Trees have been removed from the left embankment.
c. Sloughing, Subsidence or Depressions	Very minor erosion observed at a few locations.
d. Surface Cracks or Movement at Tow	None observed
e. Seepage	None observed
f. External Drainage System (Ditches, Trenches, Blanket)	N/A
g. Condition Around Outlet Structure	N/A



h. Unusual Conditions	A townhome development was constructed in the 1980's just downstream of the right embankment. Some of the downstream slopes may have been filled in due to the development.	
<b>5. Abutments and Toe Area</b>		
a. Erosion at Contact	None observed	
b. Seepage or Wet Area Along Contact	None observed	
c. Signs of Movement	None observed	
d. Depressions, Sinkholes	None observed	
e. Unusual Conditions	None	
<b>6. Seepage and To Drain / Relief Well Flow Summation</b>		
<b>Location</b>	<b>Estimated Flow</b>	<b>Color (Turbidity)</b>
None		

## EXAMINATION OF CONCRETE AND MASONRY DAMS

<b>1. Description of Structure</b>					
a. Type of Dam (Gravity, Arch, etc.)		Stone blocks and mortar approx. 675 feet long and maximum 30 feet high. Stone cap along the crest,			
b. Internal Drainage System		Unknown			
c. Movement (Horizontal and Vertical Alignment)		None observed. Good condition.			
d. Miscellaneous		Gate house/stone building approx. 150 feet from the right end. Primary spillway approx. 265 feet from the left end. Rock outcrop is visible for a segment of the dam on the upstream side.			
<b>2. Upstream Face</b>					
a. Condition of Concrete or Masonry		Some cracked stones and missing mortar at a few locations.			
b. Cracking/Spalling		None observed where visible			
<b>3. Downstream Face</b>					
a. Condition of Concrete or Masonry		Some cracked/chipped stones and missing mortar at a few locations. Vines and significant vegetation cover the face of the dam to the right of the gate house.			
b. Cracking / Spalling		Some cracked/chipped stones were observed			
	Location	Orientation	Length	Width	Type
c. Leakage Through Dam (Location and Estimated Flow)		Seepage/wet spot observed approx. 40 feet to the right of the spillway. Seepage was observed on the face of the gate house at a few locations. Seepage/wet spots observed at the left and right joints with the primary spillway.			
<b>4. Crest</b>					
a. Condition of Concrete or Masonry		Overall good condition. There is a chain link security fence along the crest of the dam. The fence is damaged or missing in a few locations.			
b. Cracking / Spalling		None observed			
a. Signs of Movement		None observed			
b. Differential Movement		None observed			
<b>5. Galleries – Not Applicable</b>					
a. Cracking					
	Location	Orientation	Length	Width	Type
b. Differential Movement (Joint or Crack Separation)					
c. Leakage into Galleries (Location and Estimated Flows)					
d. Condition of Gallery Drains					
<b>6. Foundation</b>					
c. Condition of Rock or Concrete Lining		Not visible			
d. Cracking		Not observed			
e. Signs of Movement		Not observed			
f. Seepage (Location and Estimated Flow)		Not observed			
<b>7. Abutments and Toe Area</b>					
a. Seepage or Wet Areas		A soft/wet spot was observed in the downstream toe area approx. 20 feet to the left of the primary spillway.			
b. Signs of Movement		None observed			
c. Cracking		None observed			
d. Erosion		None observed			
e. Unusual Conditions		There is a walking trail approx. 20 feet downstream of the toe of the dam. Approx. 100 feet to the left of the gate house, an 8"± cast iron pipe crosses the walking trail. The pipe appears to be coming from the masonry structure and discharges approx. 40 feet downstream of the dam. There was minor flow discharging from the end of the pipe (0.25 gal/min).			

## EXAMINATION OF SPILLWAYS AND OUTLET WORKS

<b>1. Type(s) and Description of Spillway(s)</b>	
a. Primary	Stone block spillway 30 feet wide with crest elevation 4 feet lower than the crest of the masonry dam. Spillway crest is 6 feet wide then slopes off at approximately 2 vertical to 1 horizontal.
b. Secondary (auxiliary)	None
c. Emergency	None
d. Other	Low-level outlet gate house is sealed up and not functioning.
<b>2. Entrance Channel</b>	
a. Description	Spillway is directly adjacent to Impoundment area (Reservoir No. 1)
b. Vegetation (Tess, Brushes)	None
c. Debris	None
d. Channel Side-Slope Stability	N/A
e. Slope Protection/Erosion	N/A
f. Unusual Conditions	None
<b>3. Spillway Crest</b>	
a. Description	Stone block
b. Condition of Material	Appears good. The was flow over the spillway crest at the time of inspection.
c. Signs of Movement	None observed
d. Joints	Good Condition where visible
e. Unusual Conditions	There is a steel handrail across the crest of the primary spillway that may collect debris and impact the hydraulic capacity.
<b>4. Drop Box – Not Applicable</b>	
a. Description	
b. Condition of Material	
c. Signs of Movement	
d. Joints	
e. Floor	
f. Unusual Conditions	
<b>5. Spillway Wing Walls</b>	
a. Description	Stone block walls
b. Condition of Material	Fair condition. Some undermining of the spillway wing walls was observed along the right side near the downstream footbridge. Some loose/missing stones at the downstream end of the spillway wing walls near the stilling basin.
c. Signs of Movement	Minor shift/tilt of the wall was observed along the downstream left side due to a couple large trees growing adjacent to the walls.
d. Joints	Fair condition. Some missing mortar at some of the joints.
e. Drains	None observed
f. Unusual Conditions	There is a footbridge crossing the spillway chute approximately 30 feet downstream of the dam. Stone blocks about 4 feet high have been installed at the wing walls adjacent to the spillway crest.
<b>6. Downstream Apron – Not Applicable</b>	
a. Description	
b. Condition of Material	
c. Signs of Movement	
d. Unusual Conditions	
<b>7. Culverts – Not Applicable</b>	
a. Description	
b. Condition of Material	
c. Joints	
d. Signs of Movement	
e. Seepage	
f. Unusual Conditions	

EXAMINATION OF SPILLWAYS AND OUTLET WORKS CONT'D

<b>8. Trash Racks – Not Applicable</b>		
a. Description		
b. Condition of Material		
c. Unusual Conditions		
<b>9. Chutes</b>		
a. Description	The bottom of the spillway chute/channel is lined with stone block and extends approximately 45 feet downstream of the spillway.	
b. Condition of Material	Some cracks were observed in the stones along the bottom of the channel. There is erosion and sliding of the bottom and sides of the channel at the downstream limits.	
c. Signs of Movement	It appears that the spillway channel at the downstream limits is eroding and collapsing into the stilling basin/plunge pool. Possible undercutting of the spillway chute at the downstream limits.	
d. Unusual Conditions	There is a footbridge crossing the spillway chute/channel approximately 30 feet downstream of the dam.	
<b>10. Stilling Basin</b>		
a. Description	Natural plunge pool at the downstream limits of the spillway channel into the discharge channel.	
b. Condition of Material	Good condition. Part of the natural downstream channel	
c. Signs of Movement	None observed. Appears stable	
d. Erosion	Some erosion of the embankments adjacent to the spillway wing walls	
e. Unusual Conditions	Some woody debris was observed.	
<b>11. Exit Channel</b>		
a. Vegetation (Trees, Brushes)	Natural stream with trees and brush along the banks.	
b. Debris	Woody debris and fallen trees	
c. Channel Side-Slope Stability	Natural channel with trees and brush along the banks.	
d. Erosion	Minor erosion along the channel banks	
e. Unusual Conditions	None	
<b>12. Low Level Outlet</b>		
a. Description	Gate house structure, not functioning	
b. Condition	The gate house is sealed up with concrete/cmu blocks	
c. Trash Rack	N/A	
d. Leakage	Location	Estimated Flow
None		
e. Unusual Conditions	Low level outlet is completely sealed up. There was standing water observed on the floor of the valve chamber located at the dam toe, which was observed through a partially ajar steel access door. The source of the water is not discernible as the water appears stagnant.	
f. Was the low-level outlet operated during the inspection?	No. Low-level outlet is not operational	
g. Were there difficulties operating the low-level outlet?	N/A	
h. When was the low-level outlet last operated?	N/A	
i. Miscellaneous	None	
<b>13. Stilling Basin for Low Level Outlet – Not Applicable</b>		
f. Description		
g. Condition of Material		
h. Signs of Movement		
i. Erosion		
j. Unusual Conditions		
<b>14. Exit Channel for Low Level Outlet – Not visible</b>		
a. Description		
b. Vegetation (Trees, Brushes)		
c. Channel Side-Slope Stability		
d. Erosion		
e. Unusual Conditions		

## EXAMINATION OF OTHER FEATURES

<b>1. Instrumentation</b> (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, etc.)	
Location	Condition
None	
<b>2. Reservoir</b>	
a. Slopes	Natural mild slopes with vegetation
b. Sedimentation	None observed
c. Unusual Conditions which Affect Dam	None
d. Unusual Conditions	None
<b>3. Appurtenant Structures</b> (Power House, Gatehouse, Penstocks, Water Supply, etc.)	
Description	Condition
None	
<b>4. Emergency Action Plan</b>	
a. Date of approved plan	September 2013
b. Date of plan revisions	November 2016, A Revised EAP is currently under development
c. Is the notification flowchart complete and current?	Notification flowchart will be updated with the revise EAP under development.
d. Is inundation mapping or a description included?	Yes
e. When was the plan last tested?	Unknown
f. Present Hazard Classification	Class C – High Hazard Dam
g. Changes in downstream Land Use and habitation	None
h. Is present classification appropriate	Yes

# Appendix C - Photographs

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 1: Downstream view of the low-level outlet gate house structure located about 150 feet from right side end of masonry dam section.



Photo No. 2: Right section of masonry dam looking from downstream. Note significant vegetation growth.

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 3: Toe of masonry dam along the right side. Note significant vegetation growth.



Photo No. 4: Left side of the masonry dam looking from the gate house.





Photo No. 5: View of the primary spillway. Note the wrought iron fence along the crest of the spillway.



Photo No. 6: View of the primary spillway chute and left spillway wing wall.



Photo No. 7: View of the downstream end of the primary spillway chute. Note the cracking in the concrete of the chute.



Photo No. 8: View of the downstream end of the primary spillway chute. Note the deterioration and erosion of the concrete.

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 9: View of the downstream plunge pool and discharge channel of the primary spillway.



Photo No. 10: View of masonry dam left side of the spillway.

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 11: View of access stairs to the crest of the masonry dam along the left side. Note the torn/damaged chain link fence.



Photo No. 12: View of the masonry dam from the left end looking towards the primary spillway.

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 13: Masonry dam abutment to left earthen dike.



Photo No. 14: View of the upstream slope of the earthen dike at the left side.

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 15: View looking across the crest of the masonry dam from the earthen dike at the left side.



Photo No. 16: View of the reservoir from the masonry dam left of the primary spillway.

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 17: View of the right earthen dike looking from the right end of the dam.



Photo No. 18: View of right earthen dike looking towards the abutment with the right masonry dam. Note the town house complex immediately downstream of the dam.

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 19: View looking across the right earthen dike from the abutment with the right masonry dam. Note trees along the upstream slope and crest.



Photo No. 20: Typical erosion/depressions observed along the earthen dike at the right side.





Photo No. 21: Typical stairs along the right earthen dike providing access to the lake.



Photo No. 22: Minor erosion observed at the abutment between the masonry dam and the right earthen dike.



Photo No. 23: View of the valve operator inside the low-level outlet gate house. Valve is inoperable.



Photo No. 24: Minor seepage observed along the upstream face of the low-level outlet gate house.



Photo No. 25: Typical chipped/missing mortar along the downstream face of the masonry dam. Note minor seepage/wet spots near the toe of the dam.



Photo No. 26: Minor seepage/wet spots observed along the downstream joints of the primary spillway wing walls and the masonry dam on the right side.

**Reservoir No. 1 Dam  
City of New Rochelle and Town of Eastchester  
Westchester County, NY  
Photos taken December 10, 2019**



Photo No. 27: View of the pedestrian bridge crossing the primary spillway chute a few feet downstream of the dam.



Photo No. 28: Minor seepage/wet spots observed along the downstream joints of the primary spillway wing walls and the masonry dam on the left side.



Photo No. 29: Undermining of the primary spillway wing walls along the right side.



Photo No. 30: Erosion and collapsing of the concrete at the downstream end of the primary spillway chute.



Photo No. 31: Upstream face of the masonry dam left of the primary spillway.

