

Engineers Operation and Maintenance Manual.

INTRODUCTION

Saw Mill River

The flood protection project is located on the Saw Mill River in the Village of Ardsley. It begins 1,250 ft above the Ashford Ave bridge and continues downstream to the Saw Mill River Parkway. The drainage area for the project area is 20.7 square miles. The project consists of an upstream, middle and downstream reach. The upstream reach has a relocated channel, flood walls, interceptor ditches, drainage structures and ponding areas. The middle reachhasnon-structural flood proofing on three structures. The downstream reach has an improved channel.

A project plan consisting of maintenance, operation and emergency programs is necessary to provide safe and reliable flood protection. Regular maintenance is vital for ensuring the performance and service life of the flood protection project. Maintaining the project as close to as-built conditions will provide continued flood protection benefits to the community. The readiness of the project to perform during high water or a flood event is dependent on the level of maintenance and also the projects' condition. Effective and efficient operation of the flood control project maximizes the projects performance while minimizing potential damage during high water or a flood event. The emergency program provides a strategy for conducting actions and response before, during, and after high water or a flood event.

This manual provides information on what is needed to maintain, operate and perform emergency procedures in order to provide flood protection to your community. This manual should be used as a supplement to the 1989 Army Corps of Engineers Operation and Maintenance Manual.

CONTENTS |

MAINTENANCE Channels Flood Walls Drainage Structures Ponding Areas Interceptor Ditches Flood Proofing	Page 1 Page 2 Page 2-3 Page 4 Page 4-5 Page 5
OPERATION Channels Flood Walls Drainage Structures Ponding Areas Interceptor Ditches Flood Proofing	Page 6 Page 6 Page 6 Page 6 Page 6 Page 6
EMERGENCY Preliminary Work Operation of Drainage Structures Precautionary Measures Patrol Recovery	Page 7 Page 7 Page 7 Page 7 Page 7
EXHIBITS Typical Drainage Structure & Leveed River Concrete Walls Sand Boils Sand Boil Containment Seepage and Sloughs Scour Overtopping Flood Proofing	E 1 E 2 E 3 E 4 E 5 E 6 E 7-8 E 9
CONTACTS NYS DEC Emergency Contacts Region 3 Flood Protection Projects	C1 C2-C3
INSPECTION Channels, Flood Walls, Drainage Structures Ponding Areas, Interceptor Ditches, Flood Pr	Sheet 1 roofing Sheet 2
GLOSSARY	
1989 ARMY CORPS O & M MANUAL	
ΜΛΟς	

MAPS

Saw Mill River

MAINTENANCE

Channels

River channels are modified to improve their capacity to carry flood flows. All channels must be maintained as constructed in such a manner to insure their capacity to carry flood flows and to maximize the life of the project.



FloodWallalongBlow-offchannel



Concretechannel, upstreamreach



Riprappedchannel,downstreamreach

Blow-off Channel - Upstream Reach

The blow-off channel begins at the NYC Aqueduct Blow-off Tunnel outlet and extends 441 ft to the Saw Mill River.

Concrete Channel - Upstream Reach The U-shaped concrete channel transitions from the end of the flood wall and extends 159 ft downstream to the Old Ashford Ave bridge.

Riprapped Channel - Downstream Reach

The riprapped channel begins from just below the Elm St bridge and extends 220 ft downstream. The left bank is protected with 15" of riprap and the right bank with 12".

Inspection and Maintenance Duties

- Check concrete channel for chips or cracks and repair accordingly.
- Inspect construction joints of concrete channel to assure that caulking materials are in place and in good condition.
- Report settlement or shifting of concrete channel walls to NYS DEC and the Army Corps of Engineers.
- Keep riprapped channel free of woody growth and repair defective areas such as displaced riprap and erosion.
- Keep all channels free of trash, debris, trees or other vegetation, shoals and unauthorized encroachments.
- Prohibit snow piles against channel or from being dumped over them.
- Prohibit fires against the channel walls.

MAINTENANCE

Flood Walls

Flood walls prevent flood waters from reaching protected areas and are constructed where space is limited for levees.



FloodWallalongrelocatedchannel

The project consists of 0 to 15fthighT-type flood walls extending 403 ft along the left bank of the blow-off channel. There is also 14 to 16 ft high L-type flood walls beginning at the end of the Ltype flood wall of the blow-off channel and extending 436 ft downstream on the left bank of the relocated channel. The flood wallshave footings 5 ft below grade.

Inspection and Maintenance Duties

- Check flood walls for chips or cracks and repair accordingly.
- Inspect construction joints of flood walls to assure that caulking material is in place and in good condition.
- Report settlement or shifting of flood walls to NYS DEC and the Army Corps of Engineers.
- Keep flood walls free of trash, debris, trees or other vegetation, and unauthorized encroachments.
- Clean, paint and repair fence on top of flood wall as needed.
- > Prohibit snow piles against flood walls or from being dumped over them.
- Prohibit fires against the flood walls.

Drainage Structures

Drainage structures carry storm water runoff from the protected area through the channel or flood wall to the river. A drainage structure is commonly provided with an automatic flap gate and back-up sluice gate in a concrete manhole. The flap gates close during high water levels to protect against backwater flow. The manual sluice gates provide backup protection against backwater flow if the flap gate does not function properly. Under favorable water levels, runoff is collected by ditches, swales, and drop inlets then discharged through the drainage structures to the river. During high water conditions gravity flow through the drainage structures is not possible, so the interior runoff is collected in the ponding areas.

MAINTENANCE

DrainageStructure1



DrainageStructure2(notvisible,under abutment)



DrainageStructure4(sameas DrainageStructure3)

Drainage Structure 1

- Upstream of Ashford Ave at ponding area 1
- ▶ 4'x4' control manhole
- ▶ 15" diameter gravity culvert and flap gate
- ▶ 15"x15" manually operated sluice gate
- Invert outlet elevation: 123 ft above MSL

Drainage Structure 2

- Located at Old Ashford Ave
- 4.5'x4' control manhole
- > 24" diameter gravity culvert and flap gate
- Invert outlet elevation: 126 ft above MSL

Drainage Structure 3 and 4

- Located on the left bank of ponding area 2
- 4'x5' control manholes
- ▶ 36" diameter gravity culvert and flap gates
- ▶ 36"x36" manually operated sluice gates
- DS3-Invert outlet elevation: 122.7 ft above MSL
- DS4-Invert outlet elevation: 122.7 ft above MSL

Inspection and Maintenance Duties

- Keep inlet and outlet culverts free of trash, silt and debris.
- Check drainage structures and headwalls for cracking, spauling, and chipping of concrete.
- Maintain flap and sluice gates free of obstructions, in proper alignment and operating freely.
- Clean and paint trash racks, metal railings and manhole covers as needed.
- Examine, oil and trial-operate sluice gates once every 90 days.

Drainage Structures

MAINTENANCE

Ponding Areas

Ponding areas hold overland flow and storm water until high water levels in the river recedes. The water in the ponding area is released into the river through the drainage structures.



PondingArea2



PondingArea1

Ponding Area 2 issurrounded by a parking lot and a concrete flood wall. The parking lot is part of the FPP and flooding is imminent during high water. The maximum ponding elevation is 127.2 ft above MSL and the peak flow (100 yr) is 97.5 cfs..

Ponding Area 1 is downstream from ponding area 2 and is between Old Ashford Ave and the Ashford Ave viaduct. It is surrounded by a 4 ft high chain link fence.

Inspection and Maintenance Duties

- Keep free of trash, silt, debris, trees or other vegetation, and unauthorized encroachments.
- Maintain grass height in ponding areas at 12" or less.
- Clean, paint and repair fence as needed.

Interceptor Ditches

Interceptor ditches carry surface runoff within the protected area. The sides of ditches are seeded with fine lawn grasses and/or lined with riprap.



Interceptor Ditch 2 is 370 ft long, with a 5 ft wide channel. It carries flow from the end of a stream to Inlet Structure 1 which transitions into a 140 ft long 60" pipe. The pipe joins the NYC blow-off tunnel via a 6 ft square vertical shaft.

Interceptor Ditch 1 is 450 ft long with a 2 ft bottom width, trapezoidal in shape and covered

with riprap. It carries surface runoff to the Saw Mill River that collects in Drop Inlets 1 through 5 on Heatherdell Rd.

MAINTENANCE

InterceptorDitch2

Interceptor Ditches

- Inspection and Maintenance Duties
- Maintain slope to assure free drainage.
- Keep ditches and drop inlets free of trash, silt, debris, trees or other vegetation and unauthorized encroachments.
- Keep riprapped channel free of woody growth and repair defective areas such as erosion or displaced riprap.

Flood Proofing

The middle reach, located between the Rt 87 and the Ashford Ave viaduct, consists of non-structural flood relief for 3 structures.

Structure 1 is a restaurant with the first floor above the design flood. The basement level is subject to frequent flooding. The structure is protected against a flood to the elevation of 131 ft (70 yr flood). Closure of the depressed driveway is accomplished by providing a low wall and retaining wall to which the stop logs are placed to reach an elevation of 131 ft. There are also provisions for a watertight door and a sump pump. **NOTE:** This building no longer has flood proofing.

Structure 2 is a two-story residential/commercial structure with a concrete garage. There are 2.5 ft of stop logs for the garage doors, a check valve on the line running from the floor drain and patching of the west side of the building. There are also watertight doors, glass bricked windows, and patching of the inner wall of the basement. **NOTE:** This building no longer has flood proofing.

Structure 3 is a one-story commercial structure adjacent to a cement block garage. Two watertight doors and three storage structures for the garage doors are provided.

Inspection and Maintenance Duties

- The cost of maintenance and replacement of sump pumps, flood panels, and stoplogs is the responsibility of the Village of Ardsley.
- Routine operation and maintenance is the responsibility of the owner.

OPERATION

Saw Mill Řiver

Prior to high water conditions, inspect flood control project. Take measures to insure the availability of adequate labor and materials to meet all contingencies and take immediate steps to correct any dangerous condition.

Channels

Inspect channels before and during high water conditions to locate drift material along banks, bridges and outlet structures.

Flood Walls

Inspect flood walls before and during high water conditions to locate possible leakage or seepage at: construction joints, underneath the walls, points of transition between bridge abutments and walls.

Drainage Structures

Prior to high water conditions, inspect all flap gates to make sure that they are properly closed. Many of the flap gate outlets become submerged with only a moderate rise in river stage. Therefore, it is necessary to perform any servicing prior to emergency conditions. **NOTE:** Sluice gates are for emergency use and are only to be closed when the flap gates are known to be malfunctioning. An indication of a flap gate malfunction would be water flow from the river side into the protected area.

Ponding Areas

Ponding areas usually require little attention during flood periods. Prior to high water conditions evacuate the parking lot behind ponding area 2 and block roads that are prone to flooding. There is a water pump for use at ponding area 2. It is the Village of Ardsley's responsibility to monitor the water level in ponding area 2 and prepare to operate the pump.

Interceptor Ditches

Inspect interceptor ditches and drop inlets before and during high water to clear trash and debris. Special attention should be given to interceptor ditch 2 because of its high left bank. There is the possibility of a sand boil through the embankment which could lead to a blow out.

Flood Proofing

Operation is the responsibility of the local property owner of each structure.

EMERGENCY

Saw Mill Řiver

This section provides emergency information of the various problems that arise during flood periods. It is the Superintendent's responsibility to monitor the river level. One staff gage is located in the channel by Ardsley Square and the other is on the flood wall at drainage structure 3. Provide key personnel with this manual.

Preliminary Work

- Check the condition of all drainage structures, flood walls and riprap.
- Locate encroachments that could hinder operation.
- Establish possible detours, a communication source and locate relief organizations.

Operation of Drainage Structures

It is important that each flap gate is free of obstructions so it closes properly. Back flow into the ponding area indicates a malfunction. If the flap gate fails to work, close the adjacent sluice gate. If any sluice gate is closed during a high water event, it should be opened after the water level on the river side of the levee has receded to 120 ft above MSL.

Precautionary Measures

After determining that all gates are closed and are operating properly, check all drainage ditches and inlets for obstructions.

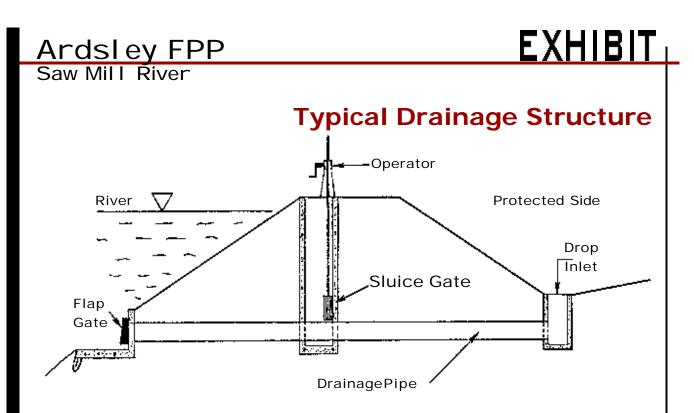
Patrol

After preliminary work iscompleted, continuous patrol should be maintained during flood to locate:

- Leakage at flood wall joints
- Seepage underneath walls or interceptor ditch 2
- Sand boil formation at interceptor ditch 2
- Low areas of that may be overtopped
- Leakage at drainage gates and along culverts and sewer pipes
- Any obstruction or condition that might endanger the channel, drainage ditches, drop inlets, manholes, catch basins, and the operation of drainage structures.

Recovery

After water level has reached non-damaging levels conduct a full inspection. Open any sluice gates that may have been closed.



Cross Section - Typical Leveed River

Monitor Stage

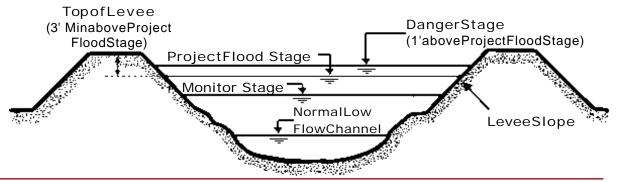
The stage at which patrol of flood control project levees by the responsible levee maintaining agency becomes mandatory, or the stage at which flow occurs into bypass areas from project overflow weirs.

Project Flood Stage

The stage at which the flow in a flood control project is at maximum design capacity (US Corps of Engineers "Project Flood Plane"). At this level there is a minimum freeboard of 3 ft to the top of levees.

Danger Stage

The stage at which the flow in a flood control project is greater than maximum design capacity and where there is extreme danger with threat of significant hazard to life and property in the event of levee failure. This is generally 1 ft above project flood stage.

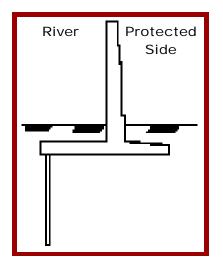


EXHIBIT

Concrete Walls

Leakage at flood wall joints

Leakage at construction joints is a common occurrence. Water leaking through the construction joints is not dangerous. Mark each spot so they can be repaired when the water has receded.

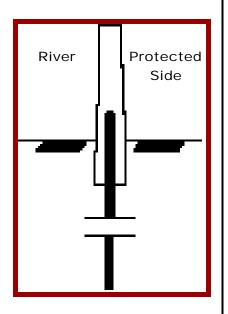


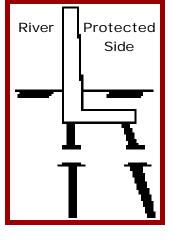
T-Type Wall

T-type wallsconsist of a concrete vertical wall and a base slab which form an inverted T. The wall gets most of its stability from the earth resting on the landside of the base. A vertical base key is sometimesused to increase resistance to horizontal movement. The T-type wall is usually the most economical type of wall and is more widely used than any other type.

I-Type Wall

I-type walls consist of driven sheet piles capped by a concrete wall. I-walls are most oftenused in connection with levee and T-wall junctions or for protection in narrow restricted areas, particularly where building improvements along the river banks require that existing channel alignment be preserved.





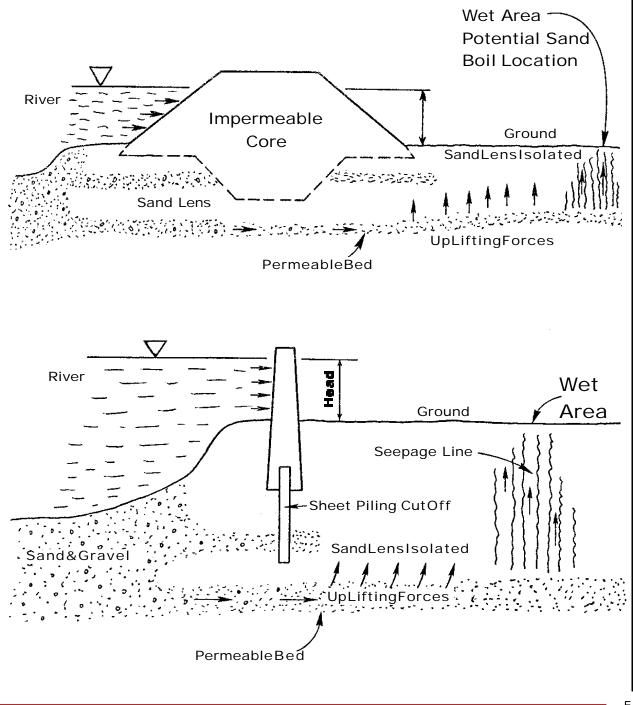
L-Type Wall

L-type walls consist of concrete vertical wall and a base slab in an inverted L on the landside. L-type walls are usually used in areas of limited space.

EXHIBIT

Sand Boils

Sand boils are a concentration of seepage in one spot, usually caused by pressure from the river on a strata of coarse sand or gravel. The land side of the levee oozes or bubbles muddy water. This can lead to a blow out.



EXHIBIT

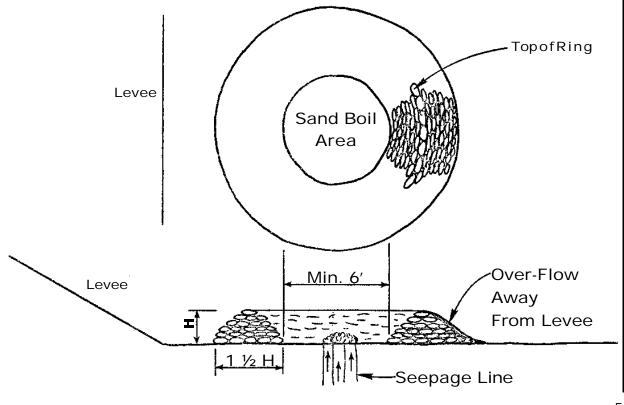
Sand Boil Containment



Sand bag rings should be constructed immediately around a sand boil. Make the sand bag ring only of sufficient height to stop the movement of the earth particles in the erupting area. The muddy, bubbling water into the sand bag ring will clear when the earth particles cease movement. Do not attempt to stop water flow because other boils may occur outside the ring. When possible divert

discharge from the sand bag ring to the nearest drainage ditch.

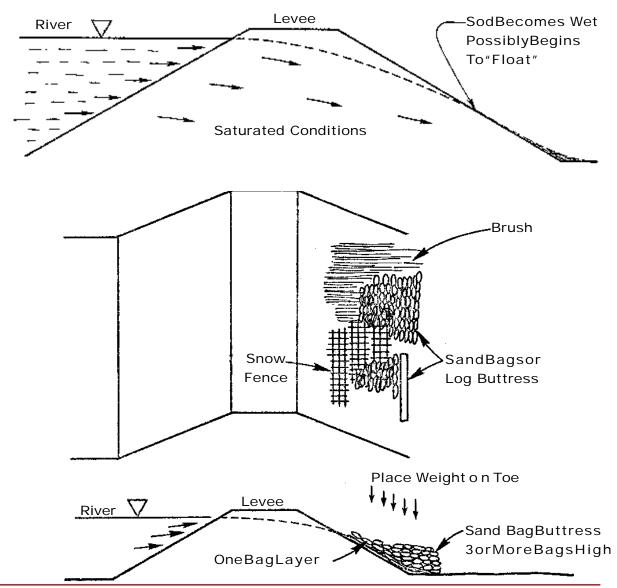
- Do not contain a sand boil if the water that is flowing is clear.
- Clear the entire area of debris where sand bags will be placed
- If the sand boil is near the toe of the levee start placing sand bags against the levee slope
- Put loose earth between all sacks.
- Stagger the sand bags over the joints.



EXHIBIT

Seepage and Sloughs

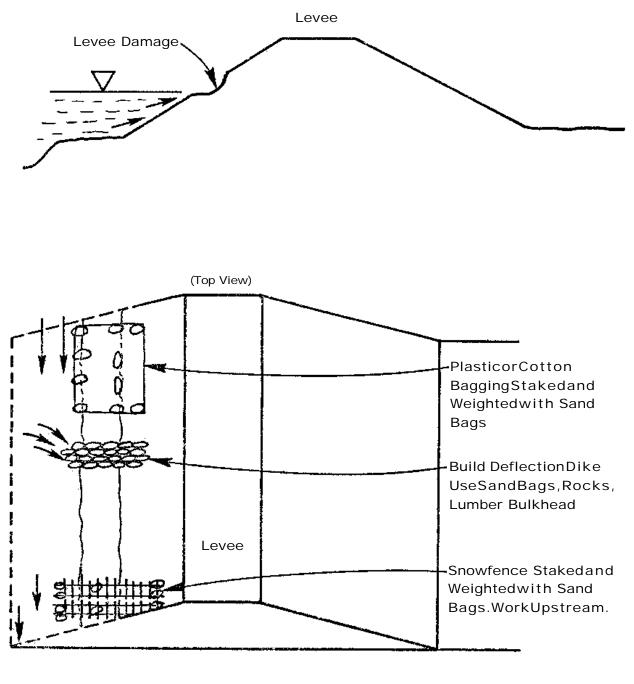
Seepage is the movement of water through levees, a dam, its foundation, or abutments of water. Areas of seepage should be checked to insure that seepage flow is not increasing or beginning to carry earth particles. If longitudinal cracks form in the slope, a slough or slide may be imminent. Corrective measures should be started immediately. A brush or snow fence should be weighted down on the levee toe. Be sure to allow drainage under the material. Do not place weight on the top of the levee because failure may be accelerated.



EXHIBIT

Scour

Scour is erosion of the levee on the river side of the project caused by rapid flow of water. Scouring often occurs at walls, changes in the channel, bridges, and pipes protruding into the river. Monitor the progress of the scour and use deflection dikes, snow fencing and other material to prevent further erosion.



Saw Mill Řiver

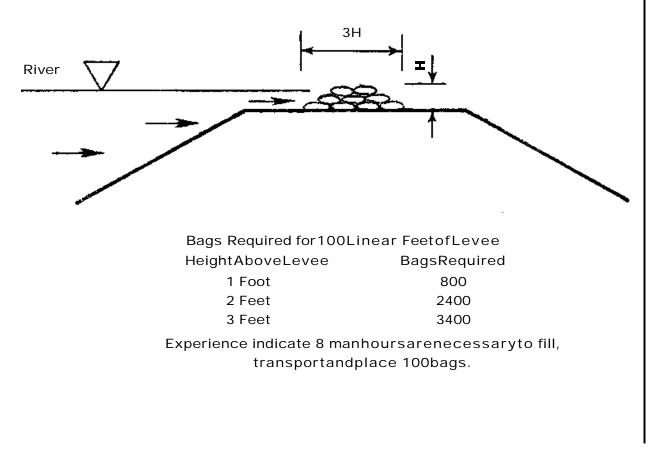
EXHIBIT

Overtopping

Overtopping is the flowing of water over the levee crown. The water level can rise very rapidly, therefore, it is considered impractical to develop extensive overtopping measures. Overtopping will generally be caused by

- unexpected rainfall, faster than expected rainfall, faster than expected snow melt, and ice and debris blockages, which cause a much higher stage than anticipated
- insufficient time to complete the flood barrier (see below and E8)
- unexpected settlement of the barrier

Generally, the flood barriers are constructed 2 ft above the crest prediction. Capping should be done with earth fill or sandbags, using the following construction procedures.



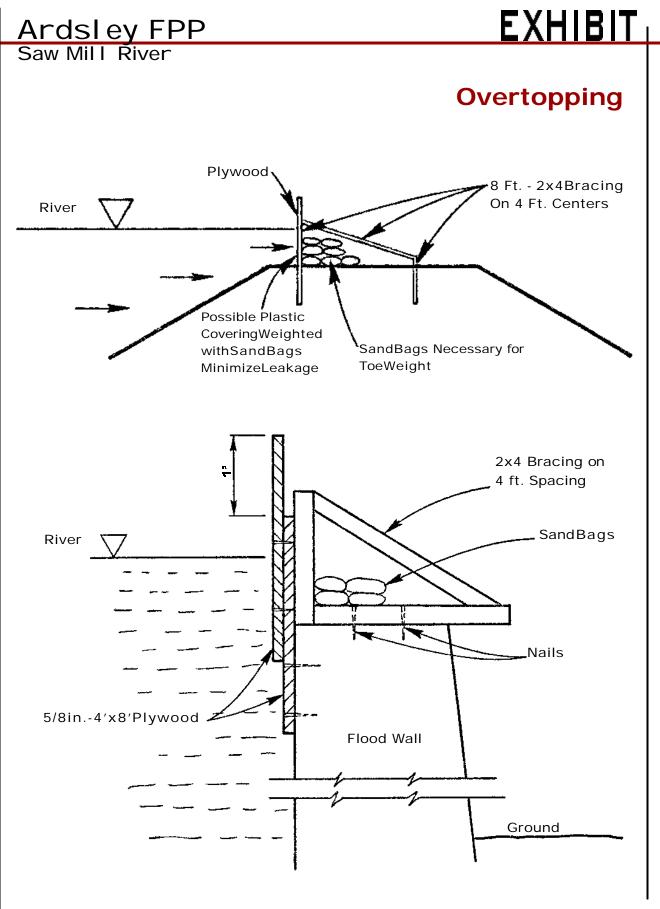
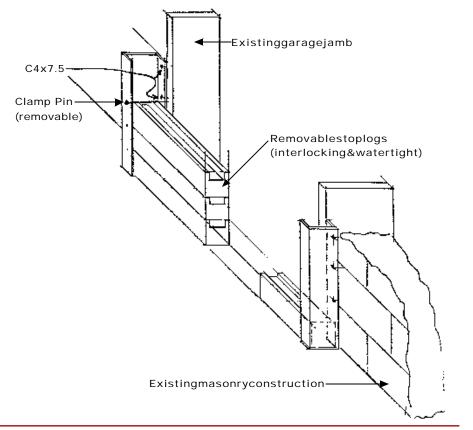


EXHIBIT Ardsley FPP Saw Mill River **Flood Proofing Typical Door** Flood Shield for Watertight Door Seal-permanently attached to shield 14 MetalFrame 7 0 Mortarbetween Steelfor masonryunits aluminum Anchors&flushhead floodshield boltsforattaching attached to frametomasonryunits framewith quickdisconnect typefastners Fillhollowmasonrywith concretearounddoorframe

Temporary Closure for Garage Door

3'



INSPECTION

Ardsley FPP Saw Mill River

Inspector(s):_____

_____Date:_____

Flood ProtectionProjectsshould beinspectedtwiceayearandrepairsshouldreceivepromptattention.

Channels Location/Comments No Yes Cracking/chipping of channel wall _____ □ Joints or caulking needs of repair _____ □ Settlement/shifting of channel □ Riprap needs repair □ Trash/silt/debris in channel Unwanted growth in channel □ Shoals in channel Unauthorized encroachments Flood Walls No Yes Location/Comments □ Cracking/chipping of flood wall □ Joints or caulking needs of repair _____ □ Settlement/shifting of channel Trash/debris on flood wall Unwanted growth on flood wall Unauthorized encroachments □ Fence needs paint/repair Drainage Structures Location/Comments No Yes □ Trash/silt/debris in inlet/outlet □ Cracking/chipping of headwall Obstruction of flap gate Trash racks/metal railings or manhole cover needs repair □ Sluice gates operate properly

INSPECTION

Inspector(s):_____

_____Date:_____

 $* Flood\ {\tt Protection} {\tt Protect$

Ponding Areas Location/Comments

- No Yes□ □ Trash/silt/debris in ponding area
- Unauthorized encroachments
- □ □ Grass needs mowing
- □ □ Fence needs painting/repair

No Yes

- □ □ Slope needs repair
- □ □ Trash/silt/debris in ditches
- □ □ Trash/silt/debris in drop inlets
- Unauthorized encroachments
- Unwanted growth in ditches
- □ □ Riprap needs repair

No Yes

- □ □ Sump pumps need replacement
- □ □ Flood panels need replacement
- □ □ Stop logs need replacement

Interceptor Ditches

Location/Comments

Flood Proofing

Location/Comments



Saw Mill River

access - the approach, entrance or exit to the top of a levee or along a channel; an access ramp or access road

channel - an open conduit either naturally or artificially created which periodically or continuously contains moving water; "watercourse," "river," "creek,""run," "branch," and "tributary" are some of the terms used to describe natural channels

embankment - fill material, usually earth or rock, placed with sloping sides and usually with length greater than height

erosion - the loss or wear of the wearing of levee or channel slopes and stream channel bottoms caused by flowing watersthatremoves sod and soil leaving a denuded surface

flap gate - a flow control device that functions as a check valve, allowing water to flow through it in only one direction. The flap gate usually consists of a flat plate that is hinged at the top of a culvert outlet. When the water rises the plate is forced closed over the culvert opening.

flood - a general and temporary condition of partial or complete inundation or normally dry land areas from the overflow of waters or the unusual and rapid accumulation or runoff of surface waters from any source

flood protection - a structure or work used to separate flood waters from a protected community

flood wall - usually a long steel, masonry or concrete wall builttoprotect land from flooding. Flood walls and levees confine flood flows within a specified area to prevent flooding.

left and right banks - as you face the downstream direction, the left side is the left bank and the right side is the right bank

levee - usually a long manmade embankment constructed to protect land from flooding. Flood walls and levees confine stream flow within a specified area to prevent flooding.

outlet - an opening through which water can be freely discharged from a reservoir



Saw Mill River

ponding area - an area of depression that serves as temporary holding areas until the pumping system can pump the water away

pump station - a plant built with diesel or electric powered pumps to move water for drainage or storage

riprap - a layer of broken rock placed on a riverbank to prevent erosion or scouring

sluice gate - a 4-sided water control gate, normally kept in full open position, mounted on an inlet structure that opens and closes vertically with the use of a lifting device or gate operator.

staff gage - a device for indicating the elevation of a water surface above Mean Sea Level (MSL)

surface runoff - the part of runoff which travels over the ground surface to the nearest stream

Weather Advisories

Severe Thunderstorm Watch - means that conditions are favorable for thunderstorms to produce wind gusts to 58 mph or stronger or hail to 3/4 inch or larger in the watch area. These watches are issued for 4 to 6 hours at a time and for a number of counties. Stay informed, watch the sky, and take cover if a severe thunderstorm approaches you.

Flash Flood Watch - issued whenheavy rain may develop and result in flash flooding in or near the watch area.

Flash Flood Warning - flash flooding in the warning area has developed or is imminent. Preventative measures can include: a Flood Evacuation Alert for residents to be prepared to evacuate, or a Flood Evacuation Order, a mandatory order for residents to evacuate under the authority of a State of Emergency Declaration.

Urban and Small Stream Flood Advisory - local flooding of small streams, streets, or low lying areas such as railroad underpasses is occurring or is imminent.

Ardsley, New York, Flood Control Project Contacts List 8/29/2022

<u>Contacts Region 3 FPP</u> <u>NYS Department of Environmental Conservation</u> <u>21 South Putt Corners Road</u> <u>New Paltz, New York 12561</u>

DEC Region 3 Operations

Lynn Meeker 845-256-3065 (Office) 845-242-7148 (Cell) Lynn.meeker@dec.ny.gov

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Jason Yaekel 845-256-2273 (Office) 845-443-3761 (Cell) Jason.yaekel@dec.ny.gov

DEC Region3 Water

Manju Cherian, PE-Regional Water Engineer (NP) 914-803-8137 (Office) 914-327-5664 (Cell) <u>Manju.cherian@dec.ny.gov</u>

Meena George, PE - Regional Water Engineer (WP) 914-803-8141 (Office) 914-428-2505 (Office) <u>meena.george@dec.ny.gov</u>

Berhanu Gonfa, PE- Water (WP) 914-803-8143 (Office) 347-303-5853 (Cell) Berhanu.gonfa@dec.ny.gov

<u>Contact List Albany FPP</u> <u>NYS Department of Environmental Conservation</u> <u>625 Broadway</u> <u>Albany, New York</u>

Arvind Goswami – Flood Control Albany 518-402-8186 (Office) Arvind.goswami@dec.ny.gov

Anna Servidone – Flood Control Albany 518-402-8147 (Office) Anna.servidone@dec.ny.gov <u>Contact List Corp of Engineers</u> <u>US Army Corps of Engineers</u> (New York District) <u>26 Federal Plaza</u> <u>New York, New York 10278</u>

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David DiGregorio, Highway Foreman 914-693-0117 (Office) ddigregorio@ardsleyvillage.com

Larry J. Tomasso - Building Inspector (Floodplain Ad) 914-693-1550 (Office) 914-693-6961 Itomasso@ardsleyvillage.com