

City of New Bedford, MA

## Turner Pond Dam

State Dam ID# 6-3-201-\_\_\_\_\_

NID ID#: MA01152

November 2014



# *Operations and Maintenance Plan*

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Date Last Revised: November 2014

## Location of Dam Operations and Maintenance Plan:

City of New Bedford  
Department of Public Infrastructure  
1105 Shawmut Avenue  
New Bedford, MA 02746

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# Section 1

## Introduction

### 1.1 Purpose

This Operation and Maintenance (O&M) Plan provides relevant engineering data and guidelines for the proper operation, care, and maintenance of the Turner Pond Dam (Dam) located in the City of New Bedford, Massachusetts and Town of Dartmouth, Massachusetts. This O&M Plan has been prepared in accordance with the requirements of the Department of Conservation and Recreation (DCR), Office of Dam Safety (ODS). This manual was prepared for the City of New Bedford, Department of Public Infrastructure (DPI), as owner of the Dam. The goals of the O&M program are to help ensure safe operation of and extend the life of the Dam, protect the environment and owner's investment, and meet legal and social obligations. This document should be periodically reviewed and updated as necessary to ensure accuracy of all Dam information and Damtender/Dam owner contact information.

### 1.2 Dam Description

The Turner Pond Dam is located within the City of New Bedford and Town of Dartmouth in Bristol County, Massachusetts, northwest of the New Bedford Regional Airport. The Dam impounds Turner Pond, on the southern edge of Acushnet Cedar Swamp, which comprises the main headwater of the Paskamansett River. A Locus Plan and Site Sketch are included in Appendix A. The crest of the Dam supports a two lane, asphalt, public roadway, Old Plainville Road in New Bedford and Old Fall River Road in Dartmouth. Per the November 2013 inspection conducted by CDM Smith, Turner Pond Dam can be considered a large size structure in accordance with DCR ODS classification, under Commonwealth of Massachusetts dam safety rules and regulations stated in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002. Appendix C includes 302 CMR 10.00.

### 1.3 Dam Caretaker/Owner

The current Dam Owner is the City of New Bedford Department of Public Infrastructure. The Dam was previously owned by the Massachusetts Department of Conservation and Recreation. Ownership of the Dam was transferred from the DCR to the City of New Bedford. The reason for the transfer in ownership and date on which the ownership transferred is unknown. The September 2006 report by Pare documented DCR as the Dam's owner, however a Dam Registration Form (DRF) was completed by the City of New Bedford in February 2006. Acceptance of the DRF was received from the DCR ODS in October 2009. According to the Dam Registration Certificate the Dam is located on DCR property.

A Dam caretaker should be assigned to be in charge of implementation of the O&M plan as directed herein. This person shall be responsible for ensuring that all scheduled inspections and maintenance are carried out in a timely fashion and properly documented and retained as a record. Currently, Mr. Charles F. Kennedy of the Department of Public Infrastructure, 1105 Shawmut Avenue, assumes this responsibility (508) 509-6929.

### 1.4 DCR Hazard Potential Classification

The crest of Turner Pond Dam supports Old Fall River Road and Old Plainville Road. Two overhead electric utility lines run along the crest of the Dam and based on placards posted on the utility poles, there may also be gas and fiber optic lines that run through the embankment of the Dam.

Downstream of the Dam is a low lying flat area that encompasses the Apponagansett Swamp and Paskamanset River. The Apponagansett Swamp covers an area of over 1,000 acres and extends south from Turner Pond Dam to the Smith Mills section of North Dartmouth near Route 6. There are several nature trails and utility easements for Algonquin Gas Company and the City of New Bedford located within the Apponagansett Swamp. The New Bedford Regional Airport is located about 1.5 miles southeast of Turner Pond Dam. The airports runway is elevated above the surrounding area, out of the flood plain. Route 195 is located about 2 miles downstream of the Dam where there is a culvert that passes under the highway embankment. A few residences are located downstream on upland ridges out of the low area.

Failure of Turner Pond Dam may damage and close Old Fall River Road/ Old Plainville Road, damage and/or interrupt various utility services (i.e. electric, gas, fiber optic, etc.), and/or cause minimal property damage to others. Loss of life would not be expected from failure of this Dam.

In accordance with DCR classification procedures, under Commonwealth of Massachusetts dam safety rules and regulations stated in 302 CMR 10.00 as amended by Chapter 330 of the Acts of 2002 , Turner Pond Dam is classified as a significant hazard potential dam.

## Section 2

### Dam Data

Dam Name: Turner Pond Dam

Dam State Identification Number: 6-3-201-

NID Number: MA01152

Dam Hazard Classification: Significant

Date of Last Hazard Classification Verification: November 4, 2014

Dam Location: New Bedford, MA and Dartmouth, MA

Latitude: N 41° 40' 43.5" Longitude: W 70° 58' 37.4"

Dam Type: Earthen Embankment w/ Concrete Spillway and Side Discharge Channel

Year of Original Construction: Unknown (Box Culvert constructed in 1949)

Year of Last Construction Activity: Unknown

Name of last Engineer and Builder: Unknown

Dam Use(s): Conservation and Recreation

Dam Owner(s) Name: City of New Bedford, Massachusetts, Department of Public Infrastructure (DPI), (previously owned by Massachusetts Department of Conservation and Recreation [DCR])

Dam Owner(s) Mailing Address: 1105 Shawmut Avenue, New Bedford, MA 02746

Dam Owner(s) Telephone Number: 508-979-1556

Dam Owner(s) Facsimile Number: 508-961-3054

Dam Owner(s) E-Mail: ronaldl@newbedford-ma.gov

Impoundment Name: Turner Pond

River Name: Paskamanset River

Associated wetlands and other natural resources of special concern: Acushnet Cedar Swamp State Reservation (upstream of end of Turner Pond); Flora B. Pierce Nature Trail and Apponagansett Swamp (downstream of Turner Pond Dam)

Dam Structural Height: 14.3 feet

Dam Hydraulic Height: 7.9 feet

Dam Crest Length: 493 feet

Dam Crest Width: 35 feet

Normal Pool Elevation: 67.0 feet (set by stoplogs)

Maximum Pool Elevation: 70.4 feet

Normal Pool Surface Area: 86.6 acres

Maximum Pool Surface Area: 1136.6 acres

Maximum Impoundment Volume (at top of Dam, El. 70.4): 2426 acre-feet

Normal Impoundment Volume (at normal pool elevation, El. 67.0): 346 acre-feet

All Towns/Cities within downstream inundation zone: New Bedford, MA and Dartmouth, MA

Spillway Design Flood: 500 year storm

Auxiliary/ Emergency Spillway Elevation: 67.0 feet

Primary Spillway Type: Uncontrolled Ogee Weir

Auxiliary Spillway Type: Sharp Crested Weir with Flashboards

(Datum used: National Geodetic Vertical Datum of 1929 [NGVD29])

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## Section 3

# Dam Operation and Maintenance

Primary person responsible for Dam Operations: Ronald Labelle, Commissioner, City of New Bedford, Department of Public Infrastructure: (508) 979-1556

## 3.1 Glossary of Terms

A full glossary of terms can be found in Appendix D Common Dam Safety Definitions.

## 3.2 Operation

Proper operational procedures are extremely important in maintaining a safe structure. The Dam is being operated by the City of New Bedford, Department of Public Infrastructure. The operation of the Dam includes observing and maintaining lake levels; maintaining, raising, and lowering stop logs; and keeping records. Special operational procedures will be followed during an emergency (see Section 3.2.2 Emergency Conditions).

### 3.2.1 Operational Procedures and Maintaining Pond Levels

The Turner Pond Dam inspection schedule is defined in this Plan. Flow conditions should be routinely monitored weekly and day by day when high flow conditions exist.

- **Mechanical/Electrical Equipment** – No mechanical/electrical equipment is present at the Dam.
- **Stoplog Bays** – The only movable, non-permanent portions of the Dam requiring operation are two (2) 73-inch-wide stoplog bays with timber stoplogs. Stoplogs may be added or removed from the stoplog bays to lower or raise the water level of the impounded Turner Pond. The stoplogs currently in place are constructed of 4-inch by 4-inch lumber with metal eyebolts for hoisting. Hoisting stoplogs is a two-man lift and is best achieved using two manhole cover picks or similar-type equipment. Any stoplogs that fit within the bay and adequately retain water may be used if future replacement is required. Refer to Section 3.2.2 Safe Draw-Down Plan for further guidance on pond draw-down.
- **Measuring Pond Levels** – The surface elevation of the pond may be measured from the Stoplog Bay Platform. The upper surface of the Stoplog Bay Platform has a known elevation of 62.79 feet. By subtracting distance to water surface from 62.79 feet, a water surface elevation is given. This is the recommended method of measurement for monitoring pond water levels at the Dam. This may be accomplished with a measuring tape or similar measuring device. If desired, DPI may drive a stake or rod and mark accordingly off of the Stoplog Bay Platform for ease of reading.
- **Record Keeping** – Operation of the Turner Pond Dam will include keeping accurate records of Operations and Maintenance performed on the Dam. All records will be maintained by the City of New Bedford, Department of Public Infrastructure, at 1105 Shawmut Avenue, New Bedford MA 02746. Records to be retained include:

- *Inspection Reports:* Completed Inspection Checklists (completed by Dam owner/caretaker) and Phase I Inspection/Evaluation Reports and Dam Safety Inspection Checklists (completed by Phase I Dam Inspection Consultant) shall be kept on file for the City’s and DCR’s reference (either hard copies or scanned electronic copies).
- *Observations:* All observations shall be recorded. Of particular importance is the periodic observation of existing seepage to detect any changes. Photographs shall be taken for recording observations and changes.
- *Maintenance:* Written records of maintenance and major repairs shall be kept.
- *Rainfall and pool levels:* A record of the date, hour, and maximum elevation of extreme high water events and the associated rainfall should be recorded.
- *Drawdown:* A record shall be kept of the amount, rate, and reason for pool level drawdown.
- *As-Built Conditions:* A set of Project Record Drawings shall be maintained by the Dam Owner.

### 3.2.2 Safe Draw-Down Plan

The purpose of this section is to discuss the method for drawing Turner Pond down under emergency and non-emergency conditions.

- **Emergency Conditions (such as “Flood”)** – The Turner Pond Dam does not have an automated flood monitoring system. The Department of Public Infrastructure staff shall monitor weekly, monthly and seasonal weather conditions to help identify potential floodwater conditions. Flood conditions are characterized by significant increases in depth over relatively short periods of time. High water levels or increasing floodwater levels can be monitored by measuring distance to water surface from the top surface of the Stoplog Bay Platform which has a known elevation of 62.79 feet. Pond level increases in excess of 2 inches per hour require a careful evaluation. If such a situation is observed, a qualified City Representative shall monitor the situation closely and, if necessary to prevent overtopping the crest, instruct the operations staff to begin pond draw-down. In addition, the City Representative shall implement, as appropriate, the procedures specified in the Emergency Action Plan (EAP).
- **Non-emergency Conditions (such as “Repair”)** – During non-emergency conditions, if necessary, the lake shall be drawn down at a rate not to exceed 2 feet per day. In addition, the City Representative will advise downstream residents of large and/or prolonged discharges.
- **Riparian Rights** – Care should be taken when releasing water to protect the rights of downstream property owners. The system of riparian rights has been established through the courts, and permits each riparian owner to make a “reasonable” use of the water, having regard to the same rights existing for the other downstream riparian owners. The City could be legally responsible if a sudden release of water caused damages downstream. Similarly, any draw-down should take into consideration the effects, environmental or otherwise, of a decreased water level in the upstream pond.

## 3.3 Inspection

### 3.2.1 General

There is an urgent and continuing need for dam safety. Dams and lakes are important components of the national infrastructure, but the public risk in the case of a failure is great. Although there are many who are concerned about dam safety, legal and moral responsibility essentially rests with the dam owner. The dam owner can directly influence the safety of a dam. Owners can and should develop their own safety program which includes such important elements as inspection, monitoring and maintaining the structure, emergency action planning and operation. Such a program is directly related to the dam structure and its immediate environment and depends on the dam owner's knowledge of the dam and how it works.

An effective inspection program is essential to identify problems and to provide for safe maintenance of a dam. The inspection program should involve three (3) types of inspections: (1) periodic technical inspections, (2) periodic, formal maintenance inspections, and (3) informal observations by project personnel as they operate the dam. Technical inspections involve specialists familiar with the design and construction of dams and include assessments of structure safety. Formal, maintenance inspections are performed more frequently than technical inspections in order to detect, at an early stage, any detrimental developments in the Dam; they involve assessment of operational capability as well as structural stability. The third type of inspection is actually a continuing effort by project personnel performed in the course of their normal duties. A summary of required inspections is provided in Table 1.

**Table 1. Summary of Recommended Inspection Schedule**

Inspection Type	Frequency	Items to Inspect/Monitor	Personnel
Informal	As needed	Seepage/wet areas/pool level	Damtender/Owner <sup>(1)</sup>
Formal Maintenance	Every 3 months and as needed, before and after major events (storm, earthquake, etc.)	Seepage/ wet areas/ pool level/ slides/ cracks/ rodent activity/ vegetation/ concrete surfaces/ vandalism/ slope protection/riprap and embankment erosion/ condition of vegetative cover/ stoplog bays/ outlet training walls	Damtender/Owner
Technical	Every 5 years	Dam Safety Inspection <sup>(2)</sup> (in accordance with 302 CMR 10.07)	Professional Engineer
Notes:			
1. City of New Bedford, Department of Public Infrastructure			
2. A Dam Safety Inspection was conducted by CDM Smith in November 2013.			

Visual inspections performed on a regular basis are one of the most economical means a dam owner can use to help assure the safety and long life of a dam. Visual inspections are a straight forward method that can be used by any properly trained person to make a reasonably accurate assessment of a dam's condition. The inspection involves careful examination of the surface and all parts of the structure, and its adjacent environment. An inspection should be organized and systematic. Following a consistent sequence lessens the chance of an important condition being overlooked. Reporting inspection results in the same sequence is recommended to help ensure consistent records. An accurate and detailed description of conditions observed during each inspection will enable meaningful comparison of conditions observed at different times. All measurements and observed details required to get an accurate picture of a dam's current condition and possible problems, should be recorded. This information has three elements:

- Location – The location of any questionable area or condition must be accurately described so the area or condition can be evaluated for changes over time or re-examined by experts. Photographs can be helpful in this regard.
- Extent of the Area – The length, width, and depth or height of any suspected problem areas should be determined.
- Descriptive Detail – A brief yet detailed description of any anomalous condition should be given. Some items to include are:
  - Quantity of seepage from point and area sources
  - Color and quantity of sediment in the water
  - Length, displacement and depth of cracks
  - Extent of moist, wet, or saturated areas
  - Adequacy of protective cover
  - Adequacy of surface drainage
  - Steepness or configuration of slopes
  - Apparent deterioration rate
  - Changes in conditions

A dated report should be filled out for each inspection, and should be filed along with any photographs taken (which should also be dated). In addition to inspection observations, monitoring measurements and weather conditions (especially recent rains, extended dry spells and snow cover) should also be systematically recorded and included in the inspection record. Immediately following an inspection, observations should be compared with previous records to see if there are any trends that may indicate developing problems. If a questionable change or trend is noted, a dam owner should consult a professional engineer in dam safety. Quick reaction to questionable conditions will help ensure the safety and long life of a dam and possibly prevent costly repairs.

There are at least four special times when an inspection is recommended regardless of the regular schedule.

- Prior to a predicted major rainstorm or heavy snow melt: check the spillway, outlet channel, and riprap; look for seepage throughout
- During or after a severe rainstorm or heavy snow melt: check the spillway, outlet channel, riprap, and crest and downstream slope of the earth Dam; look for seepage throughout
- During or following a severe windstorm: check riprap performance during storm (if possible) and again after the storm has subsided; note any downed trees or debris in or around the Dam area and, if necessary, schedule removal of debris and trees
- Following an earthquake in the area; make a complete inspection of the Dam and appurtenant structures immediately after the event
- If any unusual conditions are observed during an inspection, the Owner shall contact a qualified engineer to further evaluate the nature and/or criticality of the observed condition

### 3.2.2 Specific Inspection Schedule

As discussed above and summarized in Table , there are three types of recommended and/or required inspections. Each is discussed in further detail below.

#### 3.2.2.1 Informal Observations

Informal observations are completed by project personnel in the course of their normal duties and may be as simple as pulling over to quickly look over the Dam when driving near the Dam. These are the quickest, most frequent, and least comprehensive type of inspection. Informal observations do not necessarily need to be recorded unless an issue of concern is encountered. Informal observations may spur a more in depth, formal maintenance inspection if determined necessary.

#### 3.2.2.2 Formal Maintenance Inspection

Formal Maintenance Inspections are designed to be completed with minimal resources and personnel training and can be completed fairly quickly. It is recommended that these be completed every three (3) months and before and/or after significant events as needed. A significant event may include such events as rain, ice, snow, or wind storms, earthquakes, snow/ice melt, or automobile accidents along the Dam-supported public roadway. Formal Maintenance Inspections should be completed by a designee appointed by the Damtender/Dam owner (DPI). Pictures can be very helpful in documenting areas of concern. The following items should be recorded on the Formal Maintenance Inspection Checklist:

- Inspector name and title
- Date and time of inspection
- Elapsed time since last inspection
- Weather conditions and temperature at time of inspection
- Reason for inspection (regularly scheduled or significant event, and event details).
- Any additional relevant notes

Items to check during a Formal Maintenance Inspection include the following:

- Check for seepage throughout the Dam. Areas where seepage may commonly occur include along the spillway, box culvert, or toe of the earthen embankment slope. This is generally indicated by wet areas above the current water surface, water/mineral staining, and/or ice build-up (icicles) during colder weather. Record location and severity of any seepage found.
- Check pool level from the Stoplog Bay Platform using the methods described in Section 3.2.1 of this manual. Record pool level, change since last reading, and date and time of reading.
- Check stoplog bay and stoplogs for any indication of deterioration of stoplogs or missing stoplogs. The stoplogs should be exercised at least annually to ensure free movement within the stoplog bay. The procedures for safe draw-down, discussed in Section 3.2.2 of this manual, should be followed.
- Look over upstream and downstream earth embankment slopes for any indications of movement of the embankment slope. This may be indicated by the existence of a scarp near the upper portion of the slope or hummocky, slumping soil near the base of the slope. Any indications should be noted.
- All concrete surfaces should be checked for cracking and general wear. Record the location and extent (length and width) of all cracks.
- Any indications of unwanted animal activity should be noted. This is indicated mainly by animal burrows in the embankment slope or damming of the spillway or discharge channel. Record location of all indications found.
- Check for vegetation in the Dam area. Vegetation on the embankment slope should be neatly trimmed and without bare spots. The entire Dam area should be free of trees and brush and the spillway and outlet channel should be free of aquatic plants. Check for dead or leaning trees. Record the type and location of any unwanted vegetation found.
- Check entire Dam area for indications of tampering or vandalism. This may include graffiti, removed or broken stoplogs, etc. Record location and extent of any vandalism.
- Check for debris in the Dam area. This may include sediment buildup upstream of the stoplog bay, trash in the spillway, culvert or outlet channel, or trash along the roadway.
- Inspect the roadway supported by the crest of the Dam (Old Plainville Road/Old Fall River Road) for any cracking, depressions, potholes, or similar opportunities for water to permeate into and erode the Dam earth embankment. Check the verticality of utility poles and condition of the guardrail. Note any deficiencies on the inspection checklist.
- Check the upstream and downstream embankment slopes for signs of erosion. Examples of erosion include rills running downslope or a scarp caused by scour of the slope, generally due to wave action.
- Check the condition of all rip rap material along the Dam spillway and earth embankment slope. Note the location and condition of any deficiencies.
- Check the verticality and overall condition of the spillway and discharge channel training walls. Record any deficiencies. Note any stones fallen into the discharge channel from the discharge channel stone training walls.

A Formal Maintenance Inspection Checklist is included in Appendix B. This form should be completely filled out during Formal Maintenance Inspections and a copy maintained by the Damtender/Dam owner (DPI).

### 3.2.2.3 Required Technical Inspection

Massachusetts General Law (M.G.L.) c. 253 s. 46 states that every dam shall be inspected by the commissioner according to a schedule established by regulation. The schedule for dam inspection is listed in C.M.R. 10.07. As a Significant hazard classification dam, Turner Pond Dam is required to undergo a technical Dam Safety Inspection conducted by a registered professional engineer every five (5) years.

## 3.3 Maintenance

### 3.3.1 General

Dam maintenance includes both routine preventive maintenance and repair of problems as they are identified through routine inspections or otherwise. Preventive maintenance includes work performed to maintain the Dam and lake in good working condition as to prevent more harmful conditions from developing. This includes such tasks as mowing grass, repair of erosion rills, and removal of burrowing animals from the site. Maintenance that involves the repair of problems identified during inspections should also be planned out, listing the same details as needed for preventive maintenance.

Dam repairs should be scheduled based on severity of the problem, available resources, and weather conditions. For example, if a severe settlement problem is identified on the crest of the Dam, it should have a high priority since further degradation could lead to dam breaching. The cause of major maintenance items, such as excessive settlement, should be identified by a qualified dam safety professional.

### 3.3.2 Maintenance Activities

Typical routine maintenance tasks that should be performed on the Dam include the following. The maintenance activities required will be identified through periodic inspection:

#### 3.3.2.1 Maintenance of Vegetative Cover

A vegetative cover of grass or similar low vegetation should be maintained on the upstream and downstream embankment slopes. Maintaining a vegetative cover will minimize erosion of the slope. A sturdy sod, free of weeds and brush, is generally most effective. It is important that the vegetative cover be kept to a manageable level through periodic trimming. This will enable easier inspection of the embankment slope and prevent plant life from overtaking and deteriorating the condition of the Dam. Trimming of the vegetative cover should be conducted three (3) times per year. Any erosion rills in the embankment slope should be filled with compacted soil and reseeded.

#### 3.3.2.2 Removal of Brush and Trees

Any large trees or brush should be completely removed from the Dam area. Large brush and trees can inhibit line of sight to parts of the Dam and roots can grow deep into the Dam embankment and/or concrete training walls. This may lead to cracking of concrete portions of the Dam. In addition, if trees growing on the embankment are felled for any reason (i.e. windstorm, icestorm, automobile collision, etc.), the associated root balls may pull out from the Dam and/or begin to rot, leading to void spaces in the Dam embankment. Brush and tree removal should be conducted three (3) times each year.

### 3.3.2.3 Removal of Litter and Other Debris

Any litter or other debris in and around the Dam area should be removed and disposed of. In addition to being unsightly, debris can clog the spillway, discharge channels, and stoplog bays. Locations where debris may commonly be found include along the roadway on the Dam crest, in the side channel or culvert, along the embankment slope, and behind the stoplog bays. The stoplog bays may also gather a build-up of sediment on the upstream side and should be regularly cleared.

### 3.3.2.4 Roadway Improvements

Improvements to the roadway should be made as needed to ensure proper runoff along the public roadway supported by the Dam crest. This may include regrading the road, filling potholes or depressions, and sealing any cracks in the asphalt. By ensuring proper runoff, opportunities for permeation of water into the Dam, and subsequent erosion of the earth embankment, are minimized. In addition, if needed, improvements should be made to utility poles and guardrails along the roadway.

### 3.3.2.5 Removal of Burrowing Animals

Rodents such as the groundhog (woodchuck), muskrat, and beaver are attracted to dams and reservoirs, and can be quite dangerous to the structural integrity and proper performance of the embankment and spillway. Animal burrows weaken the embankment and can serve as pathways for seepage. Beavers may plug the spillway and raise the pool level. Animal control is essential in preserving a well-maintained dam and all animal burrows in the Dam area should be promptly filled with compacted fill.

### 3.3.2.6 Exercising of Stoplogs

The stoplogs should be periodically exercised (remove and replace) to maintain functionality and ensure free movement within the stoplog bays. When removed, the stoplogs should be cleaned of any algae, moss, or similar build-up to inhibit decay. Refer to Sections 3.2.1 and 3.2.2 of this document for further information on operational procedures and safe draw-down practices while removing stoplogs.

### 3.3.2.7 Masonry Repair, Sealing Cracks, Concrete Repair

Any joints or cracks in the concrete portions of the Dam (spillway structure, box culvert, etc.) should be sealed with a waterproof type sealant. This could consist of an expansion joint-type sealant for gaps between concrete sections or a cement grout for repair of cracks. Any stones that have fallen from the discharge channel training walls should be removed from the channel and placed back on the wall.

# Appendix A

## Locus Plan and Site Sketch

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