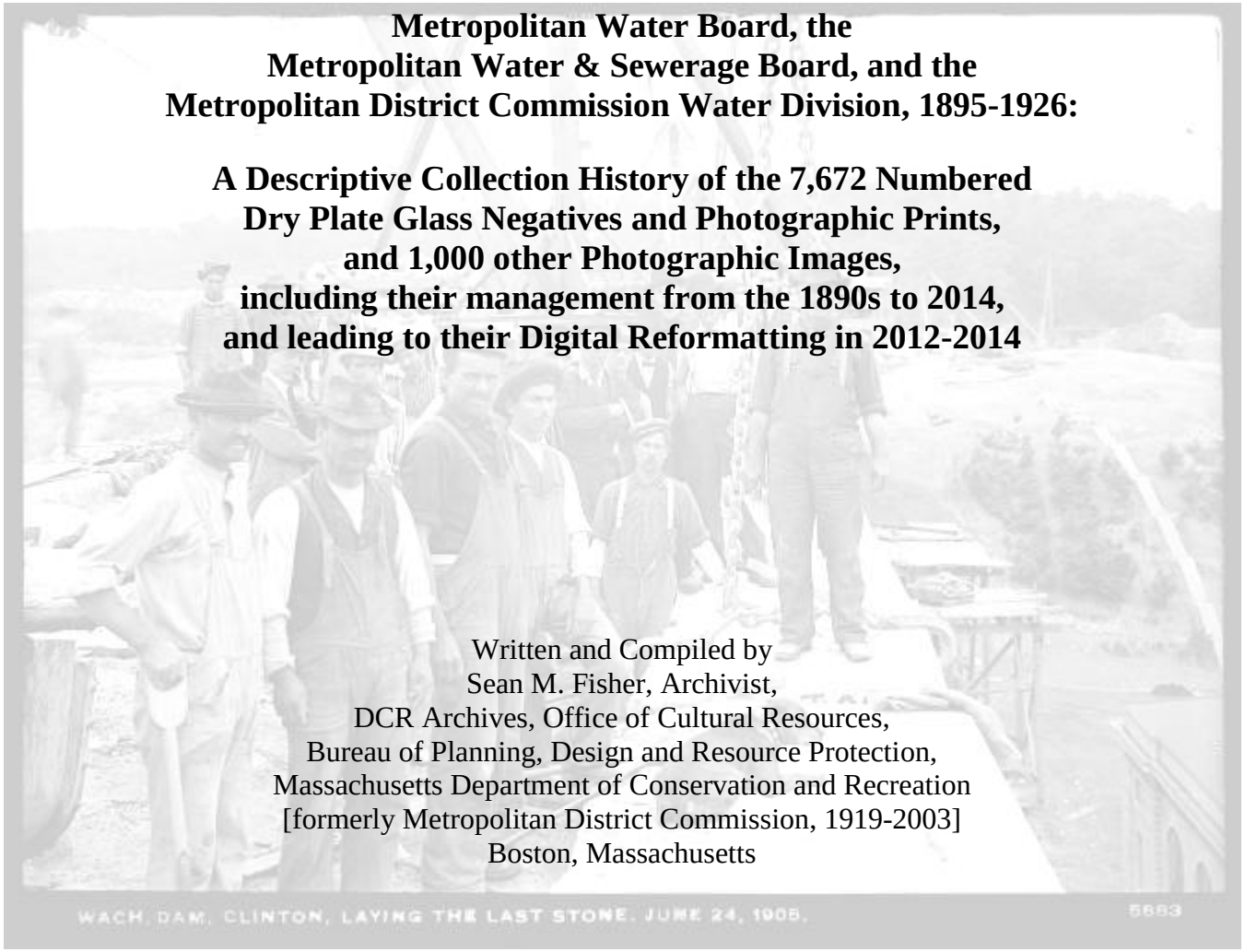
dcr
Massachusetts

The Archival Preservation and Digital Access of the Photographs Created by the Metropolitan Water Works of the Massachusetts Metropolitan Water Board, the Metropolitan Water & Sewerage Board, and the Metropolitan District Commission Water Division, 1895-1926:

A Descriptive Collection History of the 7,672 Numbered Dry Plate Glass Negatives and Photographic Prints, and 1,000 other Photographic Images, including their management from the 1890s to 2014, and leading to their Digital Reformatting in 2012-2014



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1. Collection Description Summary

Collection Title
Massachusetts Metropolitan Water Works Photograph Collection, 1876-1930 (bulk, 1895-1921)

- also known as the Metropolitan District Commission, Water Division, Metropolitan Water Works Photograph Collection, 1876-1930 (bulk, 1895-1921)

Collection Description
As part of its function to design, construct, maintain and operate a Metropolitan Water Works system as authorized by the Massachusetts Acts of 1895, chapter 488; Acts of 1901, chapter 168; and Acts of 1919, chapter 350, section 123, the Massachusetts Metropolitan Water Board (1895-1901), the Metropolitan Water and Sewerage Board, Water Works Division (1901-1919), and, later, of the Metropolitan District Commission, Water Division (1919-1985), photographs were created to document the real estate takings for, and the construction and operations of the Metropolitan Water Works system.

The name "Metropolitan Water Works" is designated for the system in section 3 of the 1895 Act, chapter 488, as is the name "Metropolitan Water District".
http://archives.lib.state.ma.us/actsResolves/1895/1895acts0488.pdf

The 1895 Act that established the Metropolitan Water Board also authorized (in section 10) the MWB to take control of maintenance and operations of portions of the Boston Water Board's Water Works system, from Chestnut Hill Reservoir and westward to the Sudbury River Watershed, and northward to Spot Pond (Stoneham) and Upper Mystic Lake (Winchester). Through this, the MWB and MWSB inherited some (but not all) photographic collections created by the Boston Water Board, and created by the City of Boston Engineering Department for the Boston Water Board.

This collection includes the photographic documentation of the Boston Water Board's construction between 1890 and 1895, representing the Hopkinton Reservoir and Dam, and Sudbury Reservoir and Dam; and the photographic documentation of the Metropolitan Water Works (MWW) System through three successive state agencies between 1895 and 1926.

The MWW photographs document the real estate takings for and construction and operations of the Wachusett Reservoir, Wachusett Dam, Wachusett Aqueduct, Sudbury Reservoir, Sudbury Dam, Weston Aqueduct, Weston Reservoir, and the expansion of a water supply distribution system throughout metropolitan Boston (pipe lines, pumping stations, reservoirs, standpipes).

Additional major facilities in this collection include water supply and distribution reservoirs of Ashland Reservoir, Ashland Dam, Bear Hill Reservoir, Bellevue Reservoir (standpipe), Chestnut Hill Reservoir, Fells Reservoir, Forbes Hill Reservoir (standpipe), Framingham Reservoirs, Framingham Dams, Lake Cochituate, and Spot Pond; and the water supply aqueducts of Cochituate Aqueduct and Sudbury Aqueduct. Pumping stations represented in this collection include the Arlington Pumping Station, Chestnut Hill Pumping Stations, Hyde Park Pumping Station, and Spot Pond Pumping Station; and pumping engines within these facilities. Other documented facilities include Upper Mystic Lake, Mystic Reservoir, Mystic Pumping Station, Waban Hill Reservoir, Chelsea Reservoir, pipe yards; and gatehouses associated with all MWW facilities.

Other subjects include Spot Pond Brook, forestry management around Wachusett Reservoir; gypsy moth control around Spot Pond; sanitary improvement and protection of the watersheds, including Clinton sewerage treatment; filter beds; and brook and swamp drainage management; hydroelectric power plants and electrical transmission from MWW; pipe breaks along the distribution pipe lines; and employee houses, offices, and garages of the MWW. Early agency motorized vehicles are also documented. The issue of electrolysis per the effects upon iron water pipes of the underground electric currents from street railway systems is documented. Railroad relocation is documented.

The images of real estate takings include residential homes and buildings; businesses; mills; town buildings; schools; churches; cemeteries; and railroad stations. In the construction images, contractor's workers camps; and laborers of various race and ethnicity are documented. Views of construction include images of streetscapes. An array of engineering maps, plans, architectural renderings, diagrams, graphs, and tables are included. Engineering equipment, and experiments in load testing for the Wachusett Dam are documented

MWW facilities in about 50 Massachusetts cities, towns, and Boston neighborhood districts are represented in this collection. In 1990, all surviving Boston/Metropolitan Water Works facilities that date between 1848 and 1926 were added to the National Register of Historic Places, as a Thematic Resource Area and a Linear District.

The collection includes various photographic formats, including dry plate glass negatives, glass lantern slides, and photographic prints, with and without support backing materials.

Accession of Collection

This collection includes accessions to the Massachusetts State Archives from the Metropolitan District Commission (1980), the Massachusetts Department of Conservation and Recreation (2014), and the Massachusetts Water Resources Authority (2014). The 1980 accessions and the 2014 accessions were physically integrated in fall 2014, restoring the complete MWW Photograph Collection.

Archival Preservation of Collection

Generally, the glass plate negative portion of the collection was archivally cleaned and rehoused between 2000-2001, and the loose photographic prints archivally rehoused between 2001-2006; all work of this nature was led and managed by the MDC/DCR Archivist.

Digital Imaging of Collection

The entire collection (except duplicates) was digitized by Boston Public Library Digital Services, through Digital Commonwealth, between 2012-2014. The Massachusetts Department of Conservation and Recreation (specifically the DCR Archives), and the Massachusetts Water Resources Authority (specifically the MWRA Library) jointly managed the digital imaging process for this collection, on behalf of the Massachusetts State Archives.

Quantities of Photographic Formats in the Collection

- about 7,841 negatives (about 7,839 dry plate glass negatives; 2 film negatives);
- 618 glass lantern slides;
- 71 bound volumes of photographic prints;
- about 994 loose photographic prints.

Sizes of Photographic Formats in the Collection

- dry plate glass negatives (87, 4" x 5");
- dry plate glass negatives (51, 5" x 7");
- dry plate glass negatives (12, 5" x 8");
- dry plate glass negatives (7,558, 6.5" x 8.5");
- dry plate glass negatives (134, 8" x 10");
- film negative (3" x 3.5");
- film negative (7 13/16" x 39.50");
- glass lantern slides (3.25" x 4");
- loose photographic prints (various sizes, but no larger than 28" x 23").

Other records in MWW Photograph Collection

- 20 volumes of annotated MWB/MWSB Annual Reports, with MWW image Nos.;

- annotated halftone tearsheets from MWB/MWSB Annual Reports, with MWW image Nos. (1.5 sets);
- documents, MWW lantern slide lists (27-page document; 23-page document; other lists totaling 11 pages);
- documents (1975), regarding key to 1919 photograph of employee outing;
- a selection of annotated photo envelopes (photocopied onto archival paper from original envelopes);
- 8 printing blocks/plates of MWW images, for publishing in annual reports and other printed matter.

2. Introduction

In 1999, Archivist Leslie P. Wilson, of the Concord Free Public Library of Massachusetts, wrote an article in the *Concord Saunterer* describing the Herbert Wendell Gleason (1855-1937) Negative Collection.[1] Leslie sub-titled the article "Odyssey of a Collection." During the course of sixteen pages, Leslie vividly details how the Library came to possess 6,500 dry plate glass and nitrate film negatives created by landscape photographer Gleason between 1899 and 1937. The story is an odyssey, and so is the story of the 8,000-plus images created by the Metropolitan Water Works between 1895 and 1926.

In the article's section entitled "Lessons of the Odyssey," Leslie writes:

> "Full research usefulness cannot be achieved until a collection has been organized, identified, documented, adequately described, and physically protected from the damage that use will cause. Responsible curatorship demands that a rich collection like the Robbins-Mills be approached as a unified whole rather than as an accumulation of individual parts. Private ownership of such a collection unavoidably fosters a temptation to focus on the high spots at the expense of the whole. . . . In any organic archival collection, the importance of individual items is greatly enhanced by their connection to the whole, by the context which other related items provide. Moreover, the collection in its entirety provides insight into broader topics of inquiry than individual items can illuminate."[2]

These words accurately describe the essence of archival management and what I set out to accomplish for the photographic and textual archival records of the Metropolitan Water Works.

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Between 1895 and 1906, the Commonwealth's Metropolitan Water Works (MWW) created more than 6,000 photographs to document the real estate takings for and construction of the Wachusett Reservoir/Dam/Aqueduct, Sudbury Reservoir/Dam, Weston Aqueduct/Reservoir, and the expansion of a water distribution system. Approximately 2,000 more photographs were created between 1907 and 1926 to document additional construction during those years, and operations of the system. The entire photographic work was created using dry plate glass negative camera technology.

By the 1920s (and likely as early as 1911), nearly the entire collection of nearly 8,000 dry plate glass negatives (hereafter called the 7600 Series because the numbered negatives range from 1 through 7672; plus unnumbered and rejected negatives) had been moved to one of the two Chestnut Hill Pumping Stations, Brighton. In 1964, a representative from the Division of Mechanical and Civil Engineering of the Smithsonian Institution's National Museum of American History visited these pumping stations and saw this negative collection. Immediately understanding the value of the collection, the Smithsonian Institution requested that the MDC Water Division loan the negatives to them. The Water Division agreed, minus approximately 800 negatives that were kept at the pumping stations. The Institution rehoused and reboxed the negatives.

During the late 1980s, the Smithsonian Institution requested that the MWW dry plate glass negative collection be returned to the MDC. The negatives were transferred to the MDC and placed in its Archives in 1990. These negatives were in the MDC Archives when I began working for the MDC in August 1992, as their Archivist.

Since the negatives nos. ranged from 1 through 7672, and I estimated that the MDC Archives was holding approximately 6,000 of them, I wondered if other negatives from this series were held elsewhere. During the course of the 1990s, I came to learn that the Massachusetts Water Resources Authority (MWRA) Records Center,

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[1] Leslie P. Wilson, "The Herbert Wendell Gleason Negatives in the Concord Free Public Library: Odyssey of a Collection," *The Concord Saunterer* N.S. 7 (1999), 175-199. The *Concord Saunterer* is published by the Thoreau Society, Inc.
[2] Wilson, "Gleason," 189-190.

West Boylston Historical Society, and the Boylston Historical Society had additional negatives from this series. Furthermore, in addition to the Massachusetts State Archives (MSA), the MWRA Library, Boylston Historical Society, and the Beaman Memorial Public Library, West Boylston, held the bound volumes of photographic prints from these negatives. The Clinton Historical Society also held loose prints from the same series.

For seven years, I was waiting for an opportunity to archivally rehouse the 7600 Series collection. From 1995-1999 I had designed and implemented a methodology to archivally clean and rehouse dry plate glass negatives, and wanted to apply it to this collection. The opportunity came in fall 1999. The Massachusetts State Archives, through its Massachusetts State Historic Records Advisory Board (MSHRAB), was in the middle of its Documentary Heritage Grants Program, a program funded by the National Historical Publications and Records Commission (NHPRC) and the Commonwealth of Massachusetts. I had developed a good working relationship with the Superintendent of the MDC Division of Watershed Management (DWM) Wachusett Section and with the Section's staff, archiving the Section's permanent records and reformatting three volumes of MWW newspaper scrapbooks.

On December 26, 1999, I began writing a grant funding proposal within the parameters of the MSHRAB's 1999 Strategic Plan. A few months later, I had drafted a project proposal, summarized as follows:

> With cooperation from and collaboration of the MDC Office of Policy, MDC Division of Watershed Management, MWRA Library & Records Center, Mass. State Archives, Boylston Historical Society, Clinton Historical Society, West Boylston Historical Society, and the Beaman Memorial Public Library, West Boylston, archivally clean and rehouse all 8,000-plus MWW dry plate negatives and sequentially merge them together. Reformat this whole collection using 35mm continuous tone microfilm and digital imaging, and provide each collaborating repository with a complete set of the reformatted images, and archive the whole original collection at the State Archives. Create a relational database of the whole collection.

In early April 2000, the MDC DWM and the Office of Policy, followed by a vote of the MDC Commission on April 13, authorized me and the Superintendent of the DWM Wachusett Section to proceed with obtaining collaboration approval from the Board of Trustees of the four local repositories. In June 2000, 3 of the 4 boards approved the project proposal. Also in June, the MWRA approved its cooperation and collaboration. I was also authorized to proceed with ordering archival supplies through MDC DWM / MWRA funds.

In 2000 through 2003, these photographs were archivally preserved and the information for each image entered into a relational database. After a 9-year hiatus for a variety of reasons, the MWRA encouraged me to join them in a joint effort to have the MWW Photograph Collection digitally scanned through the relatively newly formed partnership between Digital Commonwealth and the Boston Public Library (BPL) Digital Services Unit.

In summer 2012, the MWRA (through its Library) and DCR (through its Archives) jointly submitted an application for free digital services by Digital Commonwealth / BPL; a project in which also generated excitement by the BPL Digital Services Team, and also was supported by the MA State Archives.

Between 2012 and 2014, all known Boston Water Works / Metropolitan Water Works (B/MWW) photographic images held by DCR, MWRA, and the MA State Archives were digitally scanned by BPL Digital Services.[3] At MWRA/DCR, this was a team effort by MWRA Librarian Rebecca Kenney and this author, as we managed logistics and metadata. We also were supported by MWRA Communications Officer Barbara Allen, and MA State Archives Quality Control Archivist Wallace Dailey.

[3] Excluding individual stereoviews of the 1875-1880 construction of the BWW Sudbury River Conduit that DCR, MWRA and MA State Archives holds; and excluding individual photographic negatives and prints of microscopical organisms created by the BWW Biological Laboratory (at Chestnut Hill Reservoir) in the early 1890s, and held by the DCR Archives.

This is the story of why these photographs were created, the people who made these photographs and the equipment they used to create them. This is also a story of how these photographs were managed throughout the twentieth century, creating an opportunity to make them digitally accessible in the twenty-first century.

Since the MWW absorbed two of three divisions of the Boston Water Board in 1898, including facilities dating as far back to the first construction period of 1846-1848, the MWW inherited some of their photographs as well. An entire section is devoted to the visual and photographic record created for the BWW between 1846 and 1898.

Many types of the MWW's archival records were used to research this history: correspondence and reports, field notebooks, newspaper scrapbooks, minutes, diaries, employee history cards, and annual reports. However, a significant amount of additional archival records created by the MWW remains partially cataloged or uncataloged at the MWRA Records Center. This uncataloged collection, encompassing an unknown quantity of boxes, could provide even more historical context to not only the photographic collection but also to the organizational and engineering history of the B/MWW itself.

There are many unanswered questions. For some questions, answers will be discovered with additional research. For many other questions, we will never know the answers because 100% of the MWW's archival record is not extant and neither is the equipment used to create these photographs. Even more answers to questions were lost when those people who made decisions pertaining to the photographic work and those who made the photographs died.

Following many years of intermittent research on and off “state government time”, I present the history of the 1895-1926 photograph collection created by the Metropolitan Water Works. Much of this history was compiled in the early 2000s, with subsequent updates since that time. This history will be occasionally updated as new interpretive information is located.

Note: In July 2003, through Massachusetts Acts of 2003, chapter 41, the Metropolitan District Commission (MDC) was abolished after 84 years, and merged with the Commonwealth’s other state parks agency (for state forests and parks outside of the Metropolitan District), the Department of Environmental Management (DEM), to form the newly created Department of Conservation and Recreation (DCR). The MDC’s Division of Watershed Management (DWM) was reorganized as the Office of Watershed Management in the Division of Water Supply Protection (DWSP) within the Department of Conservation and Recreation. All project work through June 2003 is referenced as MDC and DWM. Project work beginning July 2003 is referenced through DCR and DCR DWSP, Office of Watershed Management (OWM). In 2003/04, the MDC Archives was renamed DCR Archives.

3. Dry Plate Glass Negative Collections of Metropolitan Water Works Photographs

A. 7600 Metropolitan Water Works Series

Between 1895-1921[4], the Metropolitan Water Board (1895-1901), the Water Works Division of the Metropolitan Water and Sewerage Board (1901-1919), and the Water Division of the Metropolitan District Commission (1919-1985)[5] created 7,672 'numbered' dry plate glass negatives (hereafter cited as the 7600 Series). Systematic photographic work began on Monday, March 9, 1896 beginning with No. 52, according to the photographer's field notebooks. The last dated negative is No. 7672 (June 13, 1921). Approximately 80% (6,100) of the 7,672 negatives were photographed through 1906, the year in which most of the construction of the Metropolitan Water Works system as outlined in the 1895 plan[6] was completed.

Nearly all of the approximately 7,672 dry plate glass negatives measure 6.5" x 8.5". Approximately 49 (the first 49) measure 5" x 8". These first 49 were likely photographed in 1895.[7]

Approximately 96.6% of the images are landscape in orientation. Only approximately 259 images are of portrait orientation, though the caption and negative number may be portrait, landscape or a combination of both.

There are a total of 69 images in which 2 or 3 images form a panorama.

Between ca. 1911 and 1964, nearly all of these dry plate glass negatives were housed at one of the Chestnut Hill Pumping Stations in the Brighton section of Boston. Between 1964 and 2014, the plates have a unique history, as outlined in another section.

In 2000, the repositories that held the plates were divided as follows:[8]

• MDC Archives:	5,905	
• MWRA Library and Records Center:	816	(held 2 of the 5" x 8" plates)
• West Boylston Historical Society:	489[9]	
• Boylston Historical Society:	94[10]	(held 10 of the 5" x 8" plates)
Total:	7,304 (7,291: excludes the 13 duplicates)	

Between Nos. 1 and 7672, only 14 numbers were not used[11], making the total number of possible numbered negatives 7,658. However, there are 13 duplicate negatives, increasing the total to 7,671. Furthermore, there are

[4] 1921 and 1926 are used interchangeably in this report to mark the end of the MWW dry plate glass negatives. While the numbered series ends in 1921, a few unnumbered MWW dry plate glass negatives date from ca. 1925 with the completion of the Arlington Reservoir. The year 1926 is also a useful demarcation since in 1926 a parallel agency was established to construct the Quabbin Reservoir. In January 1928, the Metropolitan District Water Supply Commission (MDWSC) began photographic work of construction progress. More than 9 photographers were used between 1928 and 1940, and approximately 15,000 photographs were taken. Today, these photographs are owned by DCR and the MA State Archives.
[5] Hereafter cited as the MWW (Metropolitan Water Works). The name "Metropolitan Water Works" is designated for the system in St 1895, c 488, s 3, as is the name "Metropolitan Water District".
[6] House No. 500: *Report of the Massachusetts State Board of Health upon a Metropolitan Water Supply, February 1895* (Boston: Wright & Potter, 1895).
[7] Compare No. 20 with figure 2 in W. O. Crosby, "Geology of the Wachusett Dam and Wachusett Aqueduct Tunnel of the Metropolitan Water Works in the Vicinity of Clinton, Mass.," *Technology Quarterly* 12 (June 1899): figure 2 and p. 78 [pp. 68-96].
[8] Total numbers include 13 duplicate negatives: 12 from the MDC Archives, and 1 from the MWRA Records Center.
[9] The West Boylston Historical Society's 16-page typed list totals 490 negatives. However, 5 negatives were omitted from the list (495), 3 negatives were noted as missing but were not (498), and 9 negatives on the list are not extant (489).
[10] The Boylston Historical Society's 5-page typed list also lists 94 negatives.
[11] Nos. 8, 15, 42, 43, 44, 45, 46, 47, 48, 49, 660, 4683, 4858, 4884.

14 additional negatives that were captioned and numbered but had duplicate numbers and different images with 14 other numbers and not in bound volumes of prints, increasing the total to 7,685.

Using the 7,658 figure, then:

- MDC Archives held: 76.95% (5,893: excludes the 12 duplicates)
- MWRA: 10.64% (815: excludes the 1 duplicate)
- WBHS: 6.38%
- BHS: 1.22% (both historical societies combined: 7.6%)

Total: 95.19%

Missing: 4.81% (367 negatives)

All of the MWW 7600 Series plates were archivally cleaned and rehoused in 2000-2001.[12]

In July 2014, a private citizen offered thirteen (13) original 6.5" x 8.5" MWW glass plate negatives from the 7600 Series to the Massachusetts Historical Society (MHS). MHS contacted the DCR Archivist, and in August, I met with both MHS and the donor to review the negatives. The donor did not recall how her family acquired the negatives, but upon learning of how they fit into the whole MWW glass plate negative collection, they were donated to DCR in September 2014, for integration into the whole collection.[13] These negatives were archivally cleaned and rehoused in September 2014.

B. Miscellaneous Views, 1897-1898 (unnumbered)

There are 40 unnumbered 6.5" x 8.5" dry plate glass negatives dating from 1897-1898 documenting the residential and commercial built landscape of Clinton, Boylston, and West Boylston, and documenting the Italian work camps the MWB contractors formed. These plates were archivally cleaned in summer 1995 and rehoused in winter 2001. In 2000, they were held by the MDC Archives.

C. Miscellaneous Views (unnumbered)

There are approximately 217 dry plate glass negatives that were not originally assigned a number and a caption but the subject matter is clearly MWW between the 1895-1926 period; about twelve of these include the original kraft paper envelope with descriptive information. These images range from photographs, engineering plans, maps, charts, and tables. Most of the photographs date beginning from the mid-late 1910s. Many of the negatives are "similar" to specific groups of photographs and were likely rejected from receiving a negative number. There are photographic prints that were treated in the same manner.[14] Of the 217 plates, 189 measures 6.5" x 8.5"; 24 measure 8" x 10"; and 4 measures 4" x 5". Those plates at the MDC Archives were archivally cleaned in summer 1995 and rehoused in winter 2001. Those plates at the MWRA Records Center were archivally cleaned and rehoused in winter 2001. (MDC Archives: 85; MWRA Records Center: 132)

[12] Five plates were only cleaned 50%, leaving the left side uncleaned: Nos. 3177, 3196, 5548, 7263 and 7269. This was done to have samples of the difference between unclean and clean dry plate glass negatives.

[13] The negatives are Nos. 293, 501, 514, 572, 1086, 4867, 4870, 4871, 6312, 6317, 6318, 6319, and 6346, dating from 1896-1909; all in good condition. Potentially, a relative of the family worked for either the MDC or MWRA.

[14] In a July 23, 1903 internal letter from the Chief Engineer's Office to MWW photographer George P. Goodman, it is noted that the MWW "negative numbers are given at the right of the title, those not numbered being made from miscellaneous negatives, designs, drawings, etc." See MWW, Letterpress copybook of Outgoing Correspondence from the Chief Engineer, Vol. 14, p. 869, July 23, 1903. DCR Archives.

In early spring 2002, the MWRA located 3 crates of dry plate glass negatives in the third floor attic of the Mystic Shops, Somerville. Approximately 218 dry plate negatives were within these crates, though only approximately 118 were salvageable. Of these, only 27 pertained to the MWW. In September 2002, these plates were archivally cleaned and rehoused.[15] The plates likely had been stored at Mystic Shops since the early 1920s when the MDC Water Division converted the attic into records storage (see note no. 253).

By 1907, there was only one MWW photographer (Oliver Tryon) and his duties were split with blueprinting. Beginning in ca. 1912, Tryon also functioned as a photographer for the Metropolitan Sewerage Works. This joint service to the two divisions continued until he was laid off in 1921. It is likely that as a result of working in these three areas that the work of numbering and captioning all the negatives was not as comprehensive as in the past. Some of these negatives may also have been rejected images, but not discarded. However, the real reason why the photographs in this group were not assigned a caption and number may never be known.

D. Engineering Plans (unnumbered)

There are 51 unnumbered 5" x 7" dry plate glass negatives reproducing engineering plans. The plans date from 1894-1899 and none of them have a plan accession number. The plans represent construction of the Wachusett Aqueduct, Wachusett Dam, Clinton Sewerage, Marlborough Filter Beds, Sudbury Reservoir (from Boston Water Board), Sudbury Dam, and various facilities of the Distribution Department. These plates were archivally cleaned and rehoused in summer 2000. In 2000, they were held by the MDC Archives.

As an engineer noted in 1884:

> "Drawings can be quickly photographed and reduced in this manner to a small scale, and made to uniform size, so that they will occupy but little room, and still all the details be sufficiently well preserved to make working drawings from them if necessary. These photographs are also exceedingly convenient for an engineer who is superintending the building of machinery, saving him the bother of carrying a large drawing."[16]

E. Glass Lantern Slides

There are 618 glass lantern slides (3.25" x 4"). Approximately 447 of these are a lantern slide format of negatives from the 7600 Series. Of the remaining 171, approximately 25 are a lantern slide format of photographs that appear to be unnumbered. There are 2 lantern slides of design drawings, and approximately 144 are lantern slides of plans, maps, diagrams, and tables. Nearly all of these lantern slides were found in their original lantern slide cases of which there are 11. These cases are divided as follows (with original MWW abbreviations for each category): Distribution Department (DD), Maps, Miscellaneous (MISC), Sudbury Aqueduct (SA), Sudbury Reservoir (SR), Tables (TAB), Wachusett Aqueduct (WA), Wachusett Dam (WD), Wachusett Reservoir (WR), and Weston Aqueduct (West. A). Approximately 53 lantern slides were located in their original photographic supply boxes at the MWRA Sudbury Dam offices, Southborough. Each slide includes a label with one of the designations (those in parenthesis here) on it followed by a number running sequentially from 1 to the last number of the set (38 lantern slides are not labeled in this manner; they are not labeled). The collection of 618 lantern slides includes 37 duplicate lantern slides, and 5 triplicates. The lantern slides were archivally cleaned and rehoused in Mylar envelopes in summer 2000 and fall 2001. During this process, 31 were found to be cracked, and 2 broken into multiple pieces. In 2000, 565 were held by the MDC Archives, and 53 were held by the MWRA Records Center.

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[15] See my September 30, 2002 "Report of the Archival Examination, Cleaning, Rehousing, and Identification of the Dry Plate Glass Negatives that were found at the Mystic Shops, Somerville." Another 55 plates are of MWW engineering plans.
[16] D. C. Humphreys, "Engineering Photography," *Journal of the Association of Engineering Societies* 3 (May 1884): 117 [110-119].

Associated with this collection of lantern slides is a 27-page typed list of the lantern slides. This list, likely created during the 1910s by the MWW, lists 569 slides.[17] The list is divided in the same manner as are the slides described above. For each slide, the slide number is given, followed by the image title and the negative number of the dry plate negative. The cover title reads: "List of Slides." In pencil at bottom right, reads "Stored at Chest. Hill." (MDC Archives)

A second "List of Slides" spans 23 pages, is both typed and handwritten, and dates earlier than the 27-page version, with more handwritten entries. This list, which has no cover (but is entitled "List of Slides") was found amongst the MWW correspondence records that the MWRA Records Center transferred to the DCR Archives between 2006-2009.

Finally, there are 11 pages of lantern slide lists that document slides that were sent or received between MWW offices. One list is dated September 9, 1897, five lists are dated between 1929-1934, and one list is undated. (MDC Archives)

F. 4" x 5" Glass Negatives that Match the Lantern Slides (unnumbered)

The 27-page lantern slide list created in the 1910s references a negative number for each image used from the 7600 Series. In addition, many lantern slides were created of images not from the numbered negatives. In these cases, the image (a photographic print, a map, a plan, a table, etc.) was likely photographed using 4" x 5" dry plate glass negatives in order to come closest to the size of the lantern slide. It is for this reason that 73 4" x 5" plates match lantern slides of the approximately 175 slides not from the 7600 Series. Another 4 are 'similar' to specific lantern slides, and 7 are unique MWW images. These plates were archivally cleaned and rehoused in fall 2000 - winter 2001. In 2000, 84 were held by the MWRA Records Center.

G. 1897 Wachusett Dam Load Testing Experiment

There are 109, 8" x 10" MWW dry plate glass negatives that represent the photographic record of an 1897 experiment "to determine the distribution of the stresses in masonry dams resulting from the external loads."

These plates were mostly all enclosed in their original kraft paper envelopes (91) and housed on their long side in the original wooden crate. The crate had a label on it that read, "Nos. 14 to 100 inclusive / #58 broken".[18] We know the provenance of these plates because 6 prints from these plates are held at the State Archives as part of a MWW report that accompanies the prints.[19] This volume was one of hundreds of letterbooks and letterpress copybooks of MWW correspondence the MDC Archives transferred to the State Archives in 1997. There are six photographic prints (6.5" x 8.5") attached to this thirty-page report written to Chief Engineer Frederic P. Stearns (1851-1919) from Principal Office Assistant Reuben Shirreffs (1852-1904)[20], who led the studies, and dated February 20, 1899. Within this report, there are nine typewritten pages and nineteen pages of linen sheets of tables.

The prints found in the report are Nos. 25, 27, 30, 35 (noted on back), and two unnumbered (one of which is of a plan drawing). The report states that, "It was desired to measure the movements of various points vertically and horizontally (when the model was in normal position) under different conditions of loading, inferring the stresses

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[17] From this list, approximately 24 lantern slides are not extant: DD29, 101-107, 118, 132, 147; WR48, 52, 122, 123; WA35, 36; WD11, 15, 29, 31; WestA10, 11; and Misc16.

[18] The crate was photographed in 2000, and discarded in 2001.

[19] MWW, General Reports from the Principal Office Assistant of the Engineering Office Force to the Chief Engineer, Letterbook, Vol. 1, pp. 194-223. Massachusetts State Archives (hereafter cited as MSA), Records Series EN4.07/2105X.

[20] See Obituary, "Reuben Shirreffs," *Journal of the Association of Engineering Societies* 34, No. 1 (January 1905): 12-14. Shirreffs was employed as the Principal Office Assistant, in charge of designing and drafting force, November 1895 – February 1899.

by direct proportion from these movements. After considering the matter it was determined, in order to avoid the tedious process of making a great many careful measurements during the experiment, to make photographic plates and measure these at leisure afterword."[21] The report continues with a description of the camera setup.[22] The 1897 MWB Annual Report alludes to the experiments.[23]

Most of the original paper enclosures include engineering data written on them on the front, describing what is taking place in the photograph. These envelopes were photocopied onto archival paper in winter 2001 for preservation purposes. Each envelope also includes the number (ranging from 14-177) and most often the date (all from 1897). The number and the date are handwritten on the emulsion side, thus reversed when viewed with the emulsion side down. These plates were archivally cleaned and rehoused in winter 2001. During this process, 26 of the 109 were found to exhibit at least one condition problem. In 2000, they were all held by the MWRA Records Center.

[21] p. 195 of the volume; p. 2 of the report.
[22] Unfortunately, the report does not provide the name of the camera; it only notes that "the camera was a specially made rigid box, designed to eliminate possible errors which might result from movement of a bellows camera." The report also notes that a "Turner-Reisch Anastigmat lens of 10 ½" focal length" was used." See p. 195 of the volume; p. 2 of the report.
[23] *Third Annual Report of the Metropolitan Water Board, for 1897* (1898), 101.

4. The Uniqueness of the MWW Photograph Collection in Relationship to Similar Collections throughout the United States: Preliminary Findings

In December 1964, Robert M. Vogel, Curator of Heavy Machinery for the Division of Mechanical and Civil Engineering at the Smithsonian Institution's American Museum of National History, wrote to MDC Water Division Chief Engineer Harold J. Toole (1903-1981) and noted upon examining the MWW 7600 Series dry plate glass negatives that it "is of a greater historical importance and interest than I first imagined. The amount of detail of the construction scenes recorded by the photographer is astonishing, forming a record of such work that, so far as I know, is absolutely unique in its scope."[24]

Mr. Vogel's remark of uniqueness is still valid 50 years later. Mr. Vogel's perspective was in the context of engineering photography and history. In November 2003, Robert L. McCullough, Assistant Professor of History and Historic Preservation at the University of Vermont, reviewed the MWW Wachusett real estate taking photographs and claimed in an extensive letter that the images are "unmatched by anything I have encountered in nearly two decades of studying American landscape history."[25]

While this type of application of photography in engineering (construction progress photography) was not unique across the United States in the 1890s-1920s, today, few examples of similar collection size and scope are extant.

In 2002/03 and in 2014, this author made a series of inquiries about similar water works 1890s-1920s glass plate negative collections, in addition to searches through the Internet, and standard bibliographic searches using various online tools such as OCLC/WorldCat and NUCMUC Union Catalog.

The following cities have, at some level, similar collections:

- Chicago, IL (for sewerage, not water works);
- Philadelphia, PA;
- New York City;
- Seattle, WA;
- Waltham, MA;
- Newton, MA;
- Louisville, KY;
- Cleveland, OH.

The largest similar collection is the construction progress photographs of the Sanitary District of Chicago (est. 1889), that document "construction of the Chicago Area Waterway System, construction of wastewater treatment facilities, bridges, powerhouses, electrical transmission lines, and surveys of various communities and areas in and near the Illinois River Valley." This collection represents approximately 14,000 dry plate glass negatives dating from 1890 to about 1930. This collection has been passed down through two successor independent government bodies, the Metropolitan Sanitary District of Greater Chicago (1955-1988) and the Metropolitan Water Reclamation District of Greater Chicago (1988-present). In the early 2000s, a small percentage of this collection was digitally scanned (at low resolution), and, afterwards, the full collection was transferred to the Illinois State Archives in Springfield (200 miles away) for better preservation.

As part the Sanitary District's 125th Anniversary in 2014, the Illinois State Archives and the MWRDGC partnered to begin a new digital imaging project for the entire collection, a project which is being led by the MWRDGC Public Affairs Office. Similar to the MA MWW Photograph Collection, for the Sanitary District of Greater

[24] MDC Water Division (Boston Office) Records, Microfilm, Roll 101, Smi-Smz 1965. DCR Archives.
[25] Robert L. McCullough to Sean M. Fisher, January 15, 2004, letter. DCR Archives.

Chicago, the agency's field notebooks from the photographers also survive, and are being used to help catalog the photographs.[26]

The Philadelphia Water Department (PWD) Archives holds a collection of 3,276 glass plate negatives of water works construction between 1880s and 1905, along with hundreds of vintage photographic prints. According to Adam Levine, a consultant historian to the Philadelphia Water Department, "For years these glass negatives, stored in a City pumping station, were known only to a few engineers in the PWD Construction Division. Bob Walker, PWD's first manager of public relations, and his assistant, graphic artist Bernie Rosenberg, were let in on this secret in the early 1980s. They were amazed by what they found: scores of wooden boxes holding thousands of fragile negatives that, when closely examined, yielded a treasure trove of information. All told, Bob and Bernie rescued 3,276 negatives, each of which has since been cleaned, catalogued, and scanned at high resolution. The best of those images--almost 1,600--are now posted on the PhillyHistory.org website, created and maintained by the City of Philadelphia Department of Records."[27] The collection has since been renamed the "Pauline and Daniel Greene Glass Plate Negative Collection." A summary of the collection's preservation is available online, and a portion of Philadelphia's story is similar to the Massachusetts MWW Photograph Collection.

While the collection remains with the PWD Archives, PWD is interested in transferring the collection to the Philadelphia Department of Records / Philadelphia City Archives sometime in the future.[28]

Those of the New York City water supply system (the water works system type that most resembles the MA MWW) are mostly divided between the New York City Municipal Archives, and the Archives of the New York City Department of Environmental Protection (NYC DEP), the agency that operates that system.

The NYC Municipal Archives holds about 331 glass plate negatives from NYC DEP's predecessor agency, the NYC Board of Water Supply, dating from the 1890s-1920s, which were transferred to them in 1988 from the Museum of the City of New York. There are also about 108 glass lantern slides of water works construction. Between 2011 and 2014, the glass plate negative collection within the Municipal Archives (20,000) was digitized, and are now available online.[29]

This is author is awaiting information from NYC DEP Archives regarding quantities in their collection.

The Seattle (WA) Municipal Archives holds approximately 4,200 photographs created by the Seattle Water Department from 1900-1930. The Seattle Municipal Archives also holds thousands more photographs from the Engineering Department, including water works.[30]

The Waltham (MA) Public Library holds a collection of glass plate negatives created by the Waltham Public Works Department of water works facilities between 1888-1917.[31] The Newton (MA) Historical Society holds a

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[26] Author contacted MWRDGC in 2002, and made a follow-up inquiry in 2014. E-mail communication, Dan Wendt, MWRD Assistant Public Affairs Specialist to Sean M. Fisher, August 22, 2014. See also, http://www.mwrd.org/irj/portal/anonymous?NavigationTarget=navurl://138bf9fb3cd95634e37c28ef50eccef1

[27] See http://www.phillyh2o.org/PWDPhotos.htm.

[28] E-mail communication, Adam Levine to Sean M. Fisher, August 23, 2014. The Philadelphia Water Department maintains an Archives which holds additional records of the Philadelphia Water Department. Site visit made by author, November 25, 2003. The Philadelphia City Archives also holds an extensive collection of Philadelphia Water Department records (Record Group 91) from the 19th century and early 20th century. http://philawater.pastperfect-online.com/ (2012)

[29] See http://albumenworks.wordpress.com/2014/04/; http://www.nyc.gov/html/records/html/gallery/home.shtml (see sub-heading under "DEP Board of Water Supply"); http://nycma.lunaimaging.com/luna/servlet/RECORDSPHOTOUNITARC~6~6

[30] http://www.cityofseattle.net/cityarchives/Research/photocoll.htm (2012)

[31] http://waltham.lib.ma.us/localhistory/index.php; http://waltham.lib.ma.us/localhistory/archives.php

collection of 1,970 glass plate negatives from the Newton Engineering Department, of which approximately 162 pertain to water works.[32]

The Louisville Water Company (est. 1860) has archival photographic collections within its offices, and at the University of Louisville Libraries, Archives and Special Collections Department, Photographic Archives Department. While there are minimal glass plate negatives in either collection, there are about 551 images that date between 1859 and 1930 (at the University); and about 395 images that date between 1860 and 1930 (at LWC). However, many of these images may be copy prints, and it is not known what percentage are original photographic prints.[33] In addition to the LWC photographs, the University's Photographic Archives Department also holds many images of LWC facilities taken privately, across numerous collections.

In June-July 2002, I conducted an informal telephone survey of various municipal water works agencies from St. Louis and eastward[34] pertaining to collections of construction progress photographs from the 1890s-1920s of operating facilities in the context of our country's new security environment after September 11, 2001.

In 2002, the Cleveland Water Department had an informal archives overseen by an Assistant Commissioner of Engineering. At that time, most of the agency's archival records remained within the agency. There are tens of thousands of photographs, some of which are glass plate negatives. Some of the photographs have been digitized, of which some from the 1910s have been placed on their website.[35]

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[32] Telephone conversation with Susan Abele, Curator of Photographs & Manuscripts, August 2003. The collection also includes an original card index to the photographs. Incidentally, the Newton Historical Society also holds the camera that took these photographs, and was exhibited in the Society's 1998 exhibition entitled "Public Works, Public Workers." The camera was made by the Rochester Optical and Camera Company and its model name is Empire State, a model manufactured between 1894 and 1914. This specific model was for 8"x10" plates. However, the Newton Water Works began photographing construction work in 1890 (Waban Reservoir), using 5"x8" plates. Newton's camera only has an "Empire State" identification tag on front below the lens; there is no other identification tag/mark on the camera attributing it to Rochester Optical. See James M. McKeown and Joan C. McKeown, eds., *McKeown's Price Guide to Antique and Classic Cameras, 2001-2002*, 11th ed. (Grantsburg, WI: Centennial Photo Service, 2001), 575-577 (and the 10th edition, published in 1996, for 1997-1998, pp. 378-380). As of 2014, the official name of the collection is "Newton Engineering Department Photograph Collection, 1890-1948"; http://www.historicnewton.org/.

[33] E-mail correspondence, Jay R. Ferguson, Education Program Specialist, Louisville Water Company, to Sean M. Fisher, September 3-4, 2014. See also, http://louisville.edu/library/archives/photo; and, http://www.louisvilleky.gov/LWC/Out+of+the+Archives/.

[34] St. Louis; Chicago; Cleveland; Louisville, KY; Baltimore; Philadelphia; New York City; and Hackensack/Oradell, NJ. I contacted the Cincinnati Water Works in June 2003.

[35] www.clevelandwater.com/Historical/Baldwin/Reservoir/BaldwinConstruction.html (2002); http://www.clevelandwater.com/who-we-are/history (2014).

5. Who took these 7,672-plus Photographs?

In *The Power of Photography: How Photographs Changed Our Lives*, Vicki Goldberg explains that, "Just before and after the turn of the [20th] century, government institutions and academic disciplines increasingly depended on systematized collections of photographic examples . . . . The police, the patent office, military intelligence, art historians, anthropologists, medical researchers, and other branches of work and knowledge made photographic files central to their operations."[36]

Too often, archivists ignore who took the photographs of these types of images within their collections. Through primary research (including using Ancestry.com; FamilySearch.org; and FindAGrave.com), it is possible to locate biographical information of local photographers and institutional photographers for the purpose of better describing their technical and creative works. Through researching the basic biographical information of the MWW photographers, I have also located the role of photography within the practice of engineering and in the organization of the MWW itself. This story of the application of photography through the engineering of the Boston Water Works and the Metropolitan Water Works is likely similar to the story found in the engineering of other water works systems across the country.

A. Background

Drawing Construction Progress

The MWW photographic collection includes a 6.5" x 8" photographic print mounted on cardboard of civil engineer Marshall M. Tidd (1827-1895). The viewer knows it is Tidd because the gentleman is in his office and in the background, the office window reads "M. M. Tidd. / Civil Engineer." An account of his career as told in his memoir published in the *Transactions of the American Society of Civil Engineers* does not indicate any work for the City of Boston (Cochituate Water Board or the Boston Water Board) or for the Mystic Water Board (Charlestown).[37] Life-long BWW and MWW civil engineer Dexter Brackett co-wrote the memoir and thus may have been a colleague or friend of Tidd's. In fact, the photograph is one of the few items in the collection that appear to have no direct relationship to the BWW/MWW system.

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[36] Vicki Goldberg, *The Power of Photography: How Photographs Changed Our Lives* (New York: Abbeville Press, 1991), 61. See also Ralph Greenhill, *Engineer's Witness* (Toronto: Coach House Press; Boston: David R. Godine, 1985). Greenhill's book provides excellent examples of construction progress photography from the 1840s to 1890s. Unfortunately, he does not include any historical interpretative context in his book for the history of graphically recording construction progress from either the engineering or photography perspective.

[37] "Memoir of Marshall Martain Tidd," *Transactions of the American Society of Civil Engineers* 37 (July 1897): 568-570. See also Obituary, *Boston Transcript*, August 21, 1895, p. 10, c. 1; Obituary, *Woburn Journal*, August 23, 1895, p. 2, c. 7; and Obituary, *Journal of the New England Water Works Association* 10 (September 1895): 76. Five of Tidd's 1847 watercolors of the Lawrence dam are held by the Library of the Museum of American Textile History, Lowell, MA; see Sally Pierce and Catharina Slautterback, *Boston Lithography, 1825-1880: The Boston Athenaeum Collection* (Boston: Boston Athenaeum, 1991), 156-157. The photograph in the MWW photographic collection was taken by Baldwin Coolidge (1845-1928) in August 1895, only days prior to Tidd's death on August 20th (Coolidge Negative No. 7780). Tidd's office was located at 10 Tremont Street, Room 76, Boston, while Coolidge's office was at 146 Tremont Street. Regarding Coolidge, see Susan Fletcher Witzell, et. al., *New England Views: The Photography of Baldwin Coolidge* (Woods Hole, Mass.: Woods Hole Historical Collection, 1998), see especially pp. x-xvi, 164-165, 169; and Ellie Reichlin, "Double Exposure: Baldwin Coolidge and William Sumner Appleton," *Old-Time New England* 69 (Winter-Spring 1979): 34-43. Incidentally, Coolidge's great-grandfather was Loammi Baldwin (1745-1807), the builder of the Middlesex Canal (built 1795-1803; in operation 1803-1853), the company which Tidd, at age 16 (1843), went to work for. All three men were from Woburn, Massachusetts. See also, Tidd's drawings in "Up the Magalloway River in 1861," by Marshall M. Tidd, at Bangor (Maine), Public Library, Special Collections Department (Local History Manuscripts); partly edited by Benton L. Hatch and L. Felix Ranlett, and reprinted in *Appalachia*, December 1957 (part 1) and June 1958 (part 2), journal of the Appalachian Mountain Club. Tidd also made nine woodcuts in 1859 intended for the 1860 edition of Lucy Crawford's 1846 *History of the White Mountains*, which survive in the Papers of Lucy Crawford, 1797-1978, MS-626 (Box 4), Rauner Special Collections Library, Dartmouth College, Hanover, NH.

What is striking about this photograph is the subject. According to the ASCE memoir, Tidd

> "began his engineering experience as an assistant on the construction of the dam across the Merrimack River at Lawrence, Mass., under Charles S. Storrow, Hon. M. Am. Soc. C. E. This was before the days of photography, and one of Mr. Tidd's duties was to make freehand sketches showing the condition of the work at the end of each month. After the completion of the Lawrence dam he was occupied in drawing on wood and stone for illustrations of machines and mechanical devices. This business he followed for about 25 years, until the introduction of cheaper processes, and the increase in his more strictly civil engineering work caused him to abandon it. He displayed much ability in the use of pen, pencil and brush, his drawings being remarkable for their extreme accuracy and fineness of detail."

More directly related to the MWW are the construction progress drawings of the Mystic Water Works for Charlestown, MA (1862-1865) made by Roberdeau Buchanan (1839-1916).[38] In a 1917 article in the *Medford Historical Register*, the author describes that Buchanan made a record of the construction: "It is illustrated by accurate drawings of the entire work, explanatory of the text of his record, and is now in the office of the Metropolitan Water Commission, by whose courtesy we were permitted to examine its interesting pages and compile this account."[39]

While the volume that the author refers to is not extant, the Library of Congress Manuscript Division holds an additional volume that Roberdeau donated to them in 1909.[40]

The Application of Photography in Engineering

In 1884, D. C. Humphreys, a member of the Engineers' Club of St. Louis, gave a "progress report" on the application of photography for use in engineering. Following a lengthy description of the types of equipment and supplies needed, Humphreys writes:

> "In visiting engineering works, completed or under construction, much has frequently to be learned in a short time. A few photographs of the general plan, interesting details and machinery used in construction, showing methods of doing work, would be of incalculable value. The advantage in an engineer's being able to take the views himself instead of buying them consists in his being able to get just what he wants without being bothered with that which can be of no value to him. Besides, it will frequently happen that there is no professional photographer near. If an engineer is in charge of construction and wishes to report progress either to a chief or board of directors, a photograph is the most accurate and trustworthy method of showing the exact condition of the work. In this case a boy could easily be taught to do the drudgery connected with

[38] Buchanan, a graduate from the Lawrence Scientific School of Harvard College in 1861, reported to the Harvard Alumni Association, in a letter dated October 19, 1909, in which he states that after graduation, he practiced civil engineering; was between 1862-1865 an assistant for the Charlestown Water Works construction; 1867, in charge of the extension to Chelsea for the CWW; and between 1865-1872, a civil engineer in Charlestown. Student Biographical Folders, Harvard University Archives, Cambridge, MA. Buchanan authored the *Report on Bridge Construction, and Inverted Syphons, for Supplying the City of Chelsea with Water* (1868). See also *Who Was Who in America*, Vol. 1, p. 160. In 2002, the MWRA located a very large tablet mounted into a wall in the Mystic Pumping Station (aka Mystic Shops), Somerville. Buchanan's name is inscribed as an engineer under the Southerly Division. The MWRA restored the tablet and installed it in the lobby of its Chelsea office building.

[39] Moses W. Mann, "Medford's Disused Subway," *Medford Historical Register* 20 (January 1917): 2 [1-5]. The author inaccurately identified the agency name and likely meant the Metropolitan Water and Sewerage Board, Water Works Division. Unfortunately, this item is missing from the MDC Archives, though it could be held by the MWRA Library and Records Center. (unlikely though). It is also not at the MA State Archives.

[40] Roberdeau Buchanan Papers, 1862-1865 (LC Control No. mm 82082073), Library of Congress, Manuscript Division, Washington, D.C. The collection consists of one bound volume. Curator John Sellers communicated to me that in 1909 Buchanan donated this volume to the Library of Congress; telephone conversation, October 10, 2002.

developing and printing."[41]

In 1895, John W. Alvord (1861-1943) of Chicago, and the Chief Engineer of the World Columbian Exposition Buildings and Grounds from 1890-1893, wrote that:

> "the science of taking a good picture comes naturally and easily to the engineer to whom optics are not that deep mystery that they are to the ordinary individual, and the chemistry is his delight if he is versed in that branch of knowledge. As to the manipulation of the instrument, he who has adjusted the transit under difficulties too numerous to mention need not tremble at a camera. . . . Reminiscences of hard days in the field, or various and interesting stages in construction, of record of machinery or structures which ordinarily he can only glance at, all these become fixed for him in his record album, or perhaps for part of his report to his company or client."[42]

Alvord goes on to say that the engineer should "expect failure" during the "first few months" of applying photography in one's work. Alvord recommends folding cameras that use dry plates, not the snap shot cameras that had been available since the late 1880s. As to the plate size, while he recommends 5" x 7" or 5" x 8", Alvord believes "a 6½x8½ camera with its extra plate holders and other accessories is about as heavy and bulky as is desirable for one man to carry with convenience." Alvord also recommends that the engineer do one's own developing and printing, though he should consult with a local photographer at the start. Alvord devotes the latter part of the article to the application of photography in engineering work:

> "The uses, by the way, of a record set of negatives on construction, carefully dated, are innumerable, and no important work should be without them. If they are taken by the engineer in charge, his testimony in court as to the facts and date is all that is necessary. The sanitary district of Chicago has an engineer especially appointed to keep a record set of photographs of the progress of the contractors on the channel, and he does nothing else as I am given to understand."[43]

O. H. Skidmore of the Utah Society of Engineers gave a testimony of the importance of progress photographs in 1909:

> ". . . most valuable for record purposes, is a complete photographic equipment. As the work on any public improvement is susceptible to many law suits, just and unjust, photographs are taken during various stages of work. These progress photographs are undoubtedly the best witnesses the city can have. There are at present on file, indexed similarly to the other records, 1,873 negatives in two sizes – 6 in. by 8 in. and 8 in. by 10 in. These photographs have paid for themselves many times over by the winning of suits by the city through these mute witnesses."[44]

Prior to the MWB creation in 1895, photographic work for the Boston Water Board (BWB) was hired out to photographers with their own photography businesses. For the 1875-1880 Sudbury River Conduit construction,

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[41] D. C. Humphreys, "Engineering Photography," *Journal of the Association of Engineering Societies* 3 (May 1884): 116-117 [110-119]. Unfortunately, I was unable to locate in the engineering literature any further articles pertaining to engineering photography until 1909. See, for example, William Munson Christie, "Engineering Photography," *Engineering Record* 59 (April 3, 1909), 454-457; and Stewart L. Jeffrey, "Photography for the Engineer," *Engineering News* 65 (April 6, 1911), 407-409, and the responses to the latter: May 11, pp. 575-576; and June 8, pp. 699-700. See also Emile Low, "Photography for the Engineer," *Engineering News* 65 (June 29, 1911): 792-793; and Lyman B. Jackes, "Engineering Photography," *The Canadian Engineer* 22 (March 7, 1912): 370-374.

[42] John W. Alvord, "Photography for Engineers," *Tenth Annual Report of the Illinois Society of Engineers and Surveyors* (1895): 116 [115-119].

[43] Alvord, "Photography for Engineers," 118.

[44] O. H. Skidmore, "The Filing System of Records in the Engineering Department of Salt Lake City," *Journal of the Association of Engineering Societies* 43 (August 1909): 75 [72-76].

three photographers were hired: the distinguished photographer from Salem, MA, Edwin N. Peabody (1846-1920); William H. Barritt (1848-1920), of Hyde Park; and the famous Boston photographer James W. Black (1825-1896). During the 1890-1895 period, the BWB likely hired the services of David W. Butterfield (1844-1933), a Boston/Cambridge photographer who was often hired to photograph engineering construction work in the area at that time. These photographers and their work for the BWB are addressed in detail in a later section.

The MWB was the last of the three Massachusetts state government metropolitan (Boston) agencies to be organized. The Metropolitan Sewerage Commission (MSC) was created in 1889, and hired its first photographer as a part-time employee circa 1893 (see note no. 95). The Metropolitan Park Commission (MPC) was created in 1893, and through its landscape architecture consultant, Olmsted, Olmsted & Eliot, hired out photographic services to both David W. Butterfield (1844-1933) and to Boston's internationally acclaimed maritime photographer Nathaniel L. Stebbins (1847-1922).[45] The MPC did not employ a staff photographer until circa 1905 (one of the part-time photographers who had come from the MSC).

Between 1903 and 1910, the Charles River Basin Commission (CRBC) hired out the photographic service of Luther H. Shattuck (1878-1960)[46], a professional Boston photographer (through about 1912), to photograph the construction of the Charles River Dam. [47] The CRBC's Chief Engineer was Hiram A. Miller (1853-1923), the former MWW Reservoir Department Engineer who supervised one of the MWW photographers (see George P. Goodman below); and its Principal Office Assistant was John N. Ferguson (b. ca. 1872; d. between 1948-1955), who held the same function at MWW, before resigning to take the CRBC position. In working for and writing on behalf of MWW Chief Engineer Stearns, Ferguson also likely had first-hand knowledge of the MWW photographic work.[48]

Those persons employed for the MWW's photographic work fit into three different categories: freelance photographers hired occasionally; engineers and junior engineering assistants pressed into photographic work; and professional photographers hired as part of the staff.[49]

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[45] Nathaniel L. Stebbins (1847-1922) did take at least two photographs for the MWW of the Metropolitan Water & Sewerage Board. An 8" x 10" print, supported on mounting board, of the completed Spot Pond Pumping Station, Stoneham, and is in the MWW Photograph Collection. Stebbins' negative number on the print is 11798. According to Stebbins' Negative Daybooks held by the Historic New England Library and Archives, Boston, No. 11798 was taken on November 5, 1900 for Shepley Rutan & Coolidge (the architects of the building). No. 11799 (not extant) is of same building but from a different location. See also Ronald Polito, ed., *A Directory of Massachusetts Photographers, 1839-1900* (Camden, Maine: Picton Press, 1993), 125, 162.

[46] See obituary, *Boston Herald*, March 11, 1960, p. 20, c. 3. For Shattuck's CRBC photographic work, see at the MA State Archives the CRBC Records: Charles River Basin Commission, Minutes, Vol. 1, pp. 41-42; Charles River Basin Commission, Photographs, 1904-1910 (Records Series EN4.09/2299X; 990 numbered photographs in the same style as the MWW photographs). The CRBC Annual Reports, 1904-1910, annually include references to Shattuck's photographic work.

[47] Other Boston photographers who were employed to record construction progress at the turn of the twentieth century include Rudolph D. Maier (1880-1945) for the West End Street Railway Company (later Boston Elevated Railway Company), and Paul W. Rowell (1859-1953) for the Boston Elevated Railway Company. These photographic collections are located at the Historic New England Library and Archives, Boston, and at The Bostonian Society Library. See Kim Sichel, *Black Boston: Documentary Photography and the African American Experience* (Boston: Boston University, 1994), 7-8, 17, 29. For Paul Rowell, see Obituary, *Lynn Daily Evening Item*, April 6, 1953, p. 2, c. 1. This obituary for Rowell does not make any reference to the fact that he was employed by the Boston Elevated for most of his career. No obituary can be located for Maier in the Boston newspapers except for his death notice; see *Boston Herald*, June 16, 1945, p. 5, c. 2. The death certificates for both men list the Boston Elevated as their employer, and Rowell's occupation on the certificate is photographer. See Massachusetts Death Certificates, 1945, Vol. 16, p. 346; and 1953, Vol. 84, p. 311.

[48] For Hiram's and Ferguson's CRBC appointment and background, see "Dam Commission Makes Appointments," *Cambridge Tribune*, September 12, 1903, p. 2, c. 2.

[49] The phrase "engineers pressed into photographic service" is credited to Nancy Sheehan, "Glass from the Past," *Worcester Telegram & Gazette*, October 20, 2000, Section C, pp. C1, C8.

B. MWW Archival Records Document the Names of the Photographers

Like the MWW Resident Engineers, the MWW photographers carried with them in the field "Engineering Field Notebooks" to record each photograph. In the 1990s, nine of these notebooks were found extant along with the other hundreds of engineering field notebooks at the MDC Division of Watershed Management, Wachusett Dam Administration Office, Clinton.[50] The Notebook Nos. for those that recorded the photographs includes 143, 403, 411, 438, 469, 560, 577, 717, and 727. Generally, Photo Nos. 52 (March 9, 1896) through 4450 (July 16, 1902) are recorded in these notebooks, with some number sequences missing and likely recorded in field notebooks that are not extant. It is not known if the notebooks for Nos. 1-51 and 4450 to 7672 are extant or if these photos were not recorded in this manner. The card index to these notebooks (also found at the Wachusett Dam Administration Office, Clinton) includes 2 index cards under the subject heading 'photographs'; only these nine volumes are listed.

The following fields of information is recorded for each page in the notebook: date; location; [person] "in charge"; assistants (usually left blank); and subject. The following fields of information is recorded for each image: number; location; subject; holder; time; stop; weather (including time); lens; and remarks.

At the beginning of each volume, there is a page that provides a list of all previous volume numbers for the photographs. At the end of each volume there is a page index to the photographs based on the main location.

Nearly all of the photographs have "In charge" John L. Hildreth, Jr. (1896-1899); Charles W. Tarr (1898); or George P. Goodman (1900-1902). They break down as follows:

1. John L. Hildreth, Jr. in charge March 1896 – June 1899 (Vols. 143 – 438);
2. Charles W. Tarr in charge May 1898 (Vol. 438);
3. George P. Goodman in charge April–May 1900 (Vol. 469, pp. 60-70);
4. Tarr in charge from Nos. 1666-2550 (Vols. 560 and 577; 1898; Real Estate), except some by Hildreth between Nos. 1936-2473 (Vol. 438); and Nos. 3082-3105 (Vol. 469, p. 57);
5. Goodman in charge May-Oct. 1900 (Vol. 577, p. 23 – Vol. 727, p. 49);
6. Edward S. Larned[51] in charge April 29-30 and May 6 and 31, 1901, and Goodman assisting (Vol. 717, pp. 40-43, 47-49, 54-55).

Occasionally, Hildreth, Tarr and Goodman employed assistants to help. These persons usually were engineering instrumentmen, inspectors, or engineering assistants. Their names can be found in the "assistants" field.

According to these volumes, seven other persons also took photographs:

1. David W. Butterfield (1844-1933) took 17 photographs on April 20, 21, 28, and May 17, 1897: "Picture 14" x 17" taken by D. W. Butterfield"[52];
2. Dan B. Clark (1870-1904)[53], Division Engineer: "These three Plate Nos. 1178, 1179, & 1180 are enlargement from 5" x 7" negatives made by D. B. Clark"[54];
3. William L. Kimball, Masonry Inspector: "This is a copy of a 5x7 taken by Kimball July 8, 1897"[55];
4. George T. Barker (1862-1918; Malden Engineering Department, inspector): "These plates are reduced from

[50] On loan to the MDC/DCR Archives. The DCR Office of Watershed Management, Wachusett Reservoir Watershed Office is now located in West Boylston, where the main collection of the engineering field notebooks are located.
[51] Larned was employed from 1896-1902 in the Sudbury Department, and his final position was Principal Assistant Engineer. He may have been born in 1866, but his life dates are unknown, and is not to be confused with others of the same name across the United States. He was still living in the Boston area in the early 1920s.
[52] MWW, Field Notebook No. 411, pp. 26-27, 30.
[53] See "In Memoriam: Daniel Baker Clark," *Transactions of the Association of Civil Engineers of Cornell University* 12 (1903-1904), xlii.
[54] MWW, Field Notebook No. 411, p. 35.
[55] MWW, Field Notebook No. 411, p. 44. Wachusett Aqueduct, Vol. 2, Table of Contents notes for No. 1232: "This is an enlargement from a 5"x7" negative, taken by W. L. Kimball."

8" x 10" made by Geo. T. Barker, Malden, Mass., Nov. 22, 1897"[56];
5. George F. Marlowe, Draftsman (1877-1955)[57]: "Photos at Wachusett Dam by Mr. Marlowe, Mar. 2, 1900"[58];
6. "Oct. 10th taken by Met. Sewerage photographer"[59];
7. Harold W. Horne, Instrumentman (1873-1928): "June 14, 1899 Negatives made by Mr. Horn"[60].

In addition, the bound volumes of the 7600 Series MWW prints indicates that MWW Division Engineer Charles W. Sherman (1870-1958)[61] took four photographs of the Pegan Filters Pumping Station in April, May and July 1903 (see the table of contents in the volume entitled "Marlborough Brook and Pegan Filters and Improvement of Lake Cochituate, Vol. 1"). These four images were never assigned a number and were bound between Nos. 5354 and 5355.

According to the *Register of Engineers and Engineering Assistants Employed Upon the Metropolitan Water Works During Construction, Boston, Massachusetts, 1895-1906*, four persons are listed as photographers: Lawrence X. Champeau, Walter Gardner, George P. Goodman, and Oliver Tryon.[62]

This pamphlet not only lists last position held within the MWB/MWSB, MWW but also current employer if not employed by the MWSB, MWW in 1911. Champeau was an Assistant Photographer in 1903 and in 1911 was a Photographer of Paintings in New York City. Gardner was Photographer from 1902-1905. Goodman was Draftsman and Photographer from 1900-1906. Tryon was Photographer from 1902-1910, and still working for the MWW.

The MDC Archives had also archived to the MA State Archives the Employee History Cards of the Water Works Division of the MWB and the MWSB.[63] The employee history card for J. L. Hildreth, Jr. lists him as a draftsman and photographer when he began work for the MWB on September 4, 1895. His entry in the 1911 Register lists him as an Assistant Engineer and working for the MWB from 1895-1903. In 1911 he was an Assistant Engineer for the New York Board of Water Supply. Tryon's card lists him as a photographer from February 1905 to June 1920, concurrently serving as blueprinter from 1913-1920. He began work for the Water Works Division in 1902 as a messenger. No cards are extant for Champeau, Gardner, Goodman, Larned, Tarr, and for Clark and Marlowe; Horne's card is extant.

In addition to the above documents, a significant quantity of MWW correspondence is extant along with indexes to correspondence. The following biographical descriptions are drawn from the MWW's extant archival record.

John L. Hildreth, Jr.
Born in 1870, Hildreth was the son of Dr. John L. Hildreth (1838-1925), a prominent Cambridge physician. Hildreth, Jr., graduated from Dartmouth College in 1892 (Litt. B.), received his A.B. from Harvard University a year later, and briefly attended MIT without receiving any degree. In his 1899 report to the Dartmouth Class of 1892, Hildreth states that, "In September [1895] I left [MIT] and went to work for the Metropolitan water board in

[56] Obituary, *Boston Transcript*, November 30, 1918, part 2, p. 5, c. 1-2. MWW, Field Notebook No. 438, p. 10, Nos. 1439-1444.
[57] See, "Babson College History: George Francis Marlowe, Jr.," a July 21, 2009 blog entry by R.C. Rybnikar at http://babsonhistory.blogspot.com/2009/07/george-francis-marlowe-jr.html.
[58] MWW, Field Notebook No. 469, p. 57, Nos. 3106-3111.
[59] MWW, Field Notebook No. 717, p. 4, Nos. 3548-3551 (October 10, 1900). Likely taken by Walter Gardner.
[60] MWW, Field Notebook No. 717, p. 31, Nos. 3739-3744. Harold W. Horne also served as Division Engineer for the MDWSC, Wachusett-Coldbrook Tunnel Division, for the construction of the Quabbin Aqueduct, 1926-1928.
[61] E. Sherman Chase, "Memoir of Charles W. Sherman," *Journal of the New England Water Works Association* 72 (March 1958): 74-75.
[62] *Register of Engineers and Engineering Assistants Employed Upon the Metropolitan Water Works During Construction, Boston, Massachusetts, 1895-1906* (Clinton, Mass.: W. J. Coulter Press, for the Metropolitan Water and Sewerage Boar, January 1, 1911). MSA, Records Series EN4.05/2123X.
[63] MSA, Records Series EN4.05/2123X.

the Boston office. Here I remained till next spring, when I was transferred to the Clinton office, where I am still. Since I have been in the employ of the state I have done some photographic work besides that of regular engineering, and just at present I am doing the gauging of the Nashua river and the recently completed Wachusett aqueduct."[64] Later reports to his class confirm he left the MWW in 1903.[65]

Hildreth's reports to his Harvard Class of 1893 do not reference any photographic work for the MWB/MWSB.[66] The 3rd Report (1903) notes that Hildreth was employed as an Assistant Engineer on the Weston Aqueduct for the MWSB from 1901-1903. Neither the Class of 1893 Personal File for Hildreth nor his biographical file in the Harvard University Archives provides additional information for his tenure with the MWW.[67] Hildreth died on December 3, 1920.[68]

On August 26, 1895, Distribution Department Engineer Dexter Bracket writes to John L. Hildreth, Jr., at his Cambridge address, asking Hildreth to see him "in regard to your ability to do photographic work."[69] In writing to MWB Chief Engineer Frederic P. Stearns, MWB Secretary William N. Davenport describes that Hildreth was appointed to the MWB on September 10, 1895 at $2.00 per day "with the understanding that if he is found competent to do satisfactory photographic work, as suggested in your favor of the 10th inst., that he is to go to Clinton and work under Mr. Richardson's direction [Dam and Aqueduct Department Engineer], and then, if you so recommend, the compensation will be increased to $2.50 per day."[70] Unfortunately, Stearns' September 10, 1895 letter is not extant.

Ten days after his appointment, on September 20, Brackett again writes to Hildreth, instructing Hildreth to meet with "Mr. Nelson at Thurston's, No. 50 Bromfield St." on the following day, a Saturday. Hildreth is also instructed to show Mr. Nelson the room on the 5th floor at No. 3 Mt. Vernon Street that has been designated as the dark room. Hildreth is also to obtain from Mr. Nelson "a detailed list of all articles which Mr. Nelson may select, in order that we may prepare a proper requisition for the same."[7172]

Hildreth's initial engineering work included making calculations as indicated in some Calculation Books dating from 1895-1897.[73] Hildreth is additionally assigned as draftsman in March 1896. Sudbury Department Engineer Desmond FitzGerald noted in June 1896 that "Mr. Hildreth now does very good [photographic] work."[74] By June 1899, in addition to his photographic work for nearly all the engineering departments, Hildreth was also assigned the task of Nashua River and aqueduct gauging work.[75] On November 16, 1900, Hildreth is reassigned to the

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[64] Dartmouth College Class of 1892, *Report: Class of '92* (1899), 28-29. Dartmouth College Archives, Hanover, NH.
[65] Dartmouth College Class of 1892, *Twentieth Reunion, 1892-1912* (1913), 9; *Thirtieth Reunion, 1892-1922* (1923), 59-60. Dartmouth College Archives, Hanover, NH.
[66] *Harvard College: Record of the Class of 1893, Secretary's Report No. 2* (Cambridge, Mass.: Harvard University Press, 1899), 79; *Harvard College: Class of 1893, Third Report, Decennial* (Boston: Rockwell & Churchill, 1903), 113; and *Harvard College: Class of 1893, Secretary's Seventh Report* (Cambridge, Mass.: Crimson Printing Co., 1923), 149-151. Harvard University Archives, Cambridge, MA.
[67] Class Secretary Personal Folders; and Student Biographical Folders, Harvard University Archives, Cambridge, MA.
[68] Obituary, *New York Times*, December 4, 1920, p. 13, c. 5; Obituary, *Cambridge Chronicle*, December 11, 1920, p. 1, c. 3; and "John Lewis Hildreth, Jr. died," *The Harvard Graduates' Magazine* 29, No. 115 (March 1921), pp. 466-467. Buried at Moravian Cemetery, New Dorp (Richmond County), NY. See www.findagrave.com.
[69] Dexter Brackett to John L. Hildreth, Jr., August 26, 1895, in MWW Outgoing Correspondence from Distribution Department Engineer, Letterpress Copybook, Volume 1, August 1895 to December 1896, p. 16. DCR Archives.
[70] MWW, Letters from Secretary, Letterpress Copybook, Vol. A, p. 70. MSA, EN4.05/2096X.
[71] Dexter Brackett to John L. Hildreth, Jr., September 20, 1895, in MWW Outgoing Correspondence from Distribution Department Engineer, Letterpress Copybook, Volume 1, August 1895 to December 1896, p. 39. DCR Archives.
[72] John H. Thurston (1852-1927), a photographic supplier at 50 Bromfield Street, Boston, was a founder of the Boston Camera Club (Boston Society of Amateur Photographers, est. 1881; and renamed Boston Camera Club, 1886).
[73] Index to Calculation Books, small books, Wachusett, MWW, Wachusett Section Administration Office, West Boylston. This Office also holds the Calculation Books referred to in the Index volume.
[74] MWW, Letters from the Sudbury Department, Letterpress Copybook, Vol. 1, p. 204. MSA, EN4.07/2098X.
[75] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 6, p. 17. MSA, EN4.05/2103X.

newly created Weston Aqueduct Department as an Assistant Engineer under Department Engineer Horace Ropes. During the 1899 and 1900 period, it is unclear what percentage of the photographic work was done by Hildreth.

The MWB annual reports notes Hildreth's name several times, but none in the context of the photographic work (the photography work itself is rarely referenced). In fact, photographer as a job classification was not identified as a category of employment within the engineering force. An annual report notes that Hildreth was in charge of the gaugings and investigations for the Wachusett Dam and Aqueduct Department beginning February 1898.[76] In 1899, Hildreth continues to be in charge of river and aqueduct gaugings.[77] As noted earlier, on November 16, 1900, Hildreth was transferred to the Weston Aqueduct Department, and was in charge of the gaugings until that date.[78]

On May 7, 1903, Hildreth resigned from the MWW on account of illness. At the time of his resignation, Hildreth had risen to the "head of a division party giving lines and grades, ranking next to the division engineer."[79]

The MWW photographic work generally, and Hildreth's work specifically, was reported in the local and Boston newspapers throughout the 1895-1899 period.[80] The *Boston Herald* reported on September 30, 1895 that:

> "in connection with this a great deal of photographing is to be done, and the number of pictures to be taken will run up into the thousands. Every house and farm that will be affected will be put on record by old Sol himself, and the progress of the work also similarly recorded. Some experimental views have been taken, and a regular photographic force will soon be selected and a thorough outfit of materials and working rooms be installed. This sort of a record of progress will be not the least valuable of the many records of this great work."[81]

On December 17, 1896, the *Clinton Enterprise* reported that "Hildreth, photographer for the metropolitan water board, who has been taking views in the upper part of the basin in Oakdale and West Boylston, has nearly completed his work, so far as taking pictures of buildings and landscapes."[82] A few weeks later, the *Enterprise* noted that Hildreth "is amassing a most interesting collection of photographs of the district which is to be flooded. In some cases as many as four views have been taken of one house. The idea apparently is to have the photographs as evidence in case of condemnation proceedings, but that fact removes none of the attractions from the pictures."[83]

During the January 29, 1897 Open House of the new MWW Clinton Office at the corner of Walnut and Prospect Streets, Hildreth made the photographs available for the public to view. Prior to the Open House, the *Clinton Enterprise* reported that there would be on exhibit approximately "50 books containing in all about 900

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[76] *Fourth Annual Report of the Metropolitan Water Board, for 1898* (1899), 80.
[77] *Fifth Annual Report of the Metropolitan Water Board, for 1899* (1900), 91.
[78] *Sixth Annual Report of the Metropolitan Water Board, for 1900* (1901), 108.
[79] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 11, p. 123-124. MSA, EN4.05/2103X.
[80] The MDC Archives held 3 volumes of newspaper scrapbooks created by the MWB. These were archivally reformatted in 1999-2000 using preservation facsimile technology. Three reformatted sets were printed and bound. One set resides at the DCR, WSP, OWM, Wachusett Section Administration Office, West Boylston, and a second set resides at the DCR, WSP, OWM, Wachusett Rangers Office (Clinton). The third set and the original volumes were held by the MDC Archives but were transferred to MA State Archives in 2005/06 (but remain uncataloged by them). At least four additional original newspaper scrapbook volumes (and their separately bound indexes) created by the MWB were held at the MWRA Records Center, and transferred to the DCR Archives in 2006. Those formerly at the MWRA have not been reformatted yet.
[81] MWW, Newspaper Scrapbook, 1895-1900 Vol., p. 4, c. 1, *Boston Herald*, September 30, 1895. DCR Archives.
[82] MWW, Newspaper Scrapbook, Vol. 1, p. 183, c. 3, *Clinton Enterprise*, December 17 [or 12], 1896. MDC Archives (now MA State Archives).
[83] MWW, Newspaper Scrapbook, Vol. 2, p. 18, c. 2, *Clinton Enterprise*, January 9, 1897. MDC Archives (now MA State Archives).

photographs."[84] The *Boston Herald*, in reviewing the Clinton Office, noted:

> "The third floor has storerooms and a photographing room and dark room. . . . Every building affected by the work has been photographed from a number of different points of view; every estate also. Landscape views have been taken. Construction is recorded in this accurate manner, the headhouse, all appliances, machinery and everything that bears on the work being recorded by the camera. The collection is classified, numbered and titled for ready reference, and number nearly 1000 views, but this number will be doubled before the work is completed."[85]

At an art exhibition at the National Bank building in Worcester in December 1899, the *Worcester Telegram* reported that the "official photographs of work on the Wachusett reservoir are of special interest."[86]

Charles W. Tarr

Charles W. Tarr (1876-1969?[87]) was born in 1876 in Lawrence, MA, and a 1895 graduate of the Philips Academy, Andover, MA. Tarr is listed in the 1911 MWW Register as being employed from 1897-1903 and his final position was Instrumentman. Tarr began work for the MWW on April 21, 1897.[88] Assigned to the Reservoir Department at the MWW, he progressed from apprentice, to rodman, to leveler through 1901.[89] In May 1898, Tarr is listed as both a rodman and photographer.[90] Reservoir Department Engineer Hiram A. Miller writes to Chief Engineer Stearns that he has "arranged to assign him [Tarr] to the photographic work. This work should have a little more than the ordinary salary attached to it on account of its not being strictly engineering work."[91] Possibly in reference to Tarr, Dam and Aqueduct Department Engineer Thomas F. Richardson writes to Chief Engineer Stearns in June 1899 that "it is somewhat difficult to get men to do this kind of work [photographic] and have them contented to remain at it, as most of them consider that they are getting out of regular engineering work."[92] In 1911, the Register lists Tarr as working as an Assistant Engineer for the Department of Water Supply, Gas & Electricity, New York City. This is confirmed by the Academy's file for Tarr, indicating that he was employed as a civil engineer by the New York City Board of Water Supply.[93]

George P. Goodman

George P. Goodman (1874-1941) was born in Montreal, Quebec (Canada) in 1874. Likely in the late 1870s or early 1880s, Goodman's family moved to Malden, MA. George P. Goodman's first entry in the *Malden City Directory* is in 1895 and he is listed as a photographer. The 1895 *Malden City Directory* lists him as working as a photographer at 110 Boylston Street, Boston, and the 1898 edition lists him as working as a photographer at 20 Beacon Street (offices of the Boston Transit Commission), Boston. The 1902 edition indicated that Goodman "removed to Clinton" and is not listed in the 1904 and 1906 *Malden City Directories*. The 1901 through the 1906 *Clinton City Directories* lists Goodman as being employed by the Metropolitan Water Works as a civil engineer. The 1907 *Clinton City Directory* indicates that Goodman "rem to Malden." Goodman is listed in the 1908 *Malden City Directory*, working as a civil engineer, and living at the same address he was living at in the 1900 *Malden City Directory*. Goodman is then listed in the *Malden City Directories* through 1941, always as a civil engineer, with the 1943 edition listing his death date. Goodman died on December 24, 1941. Goodman's obituary in the *Malden Evening News* does not make any reference to his photographic work; only that he was "a civil engineer

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[84] MWW, Newspaper Scrapbook, Vol. 2, p. 31½, c. 2, *Clinton Enterprise*, January 27, 1897. MDC Archives (now MA State Archives).
[85] MWW, Newspaper Scrapbook, 1895-1900 Vol., p. 74, c. 3, *Boston Herald*, March 21, 1897. DCR Archives.
[86] MWW, Newspaper Scrapbook, 1899-1900 Vol., p. 101, c. 3, *Worcester Telegram*, December 15, 1899. DCR Archives.
[87] Died possibly on July 14, 1969, Los Angeles, CA.
[88] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 4, p. 136. MSA, EN4.05/2103X.
[89] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 8, p. 175. MSA, EN4.05/2103X.
[90] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 4, p. 120. MSA, EN4.05/2103X.
[91] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 4, pp. 134-135. MSA, EN4.05/2103X.
[92] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 6, pp. 17-18. MSA, EN4.05/2103X
[93] Class of 1895, Charles W. Tarr file, Phillips Academy Archives, Andover, MA. See also, biography of Tarr under the Personals, in *Fire and Water Engineering* 67, No. 13 (March 31, 1920), p. 693.

on tunnel construction in New York and Boston."[94]

According to the Annual Reports of both the Metropolitan Sewerage Commission (MSC) and the Boston Transit Commission (BTC), Goodman was employed as a photographer, part-time, circa 1894-1895 and 1895-1898 respectively.[95] Goodman also returns to the Boston Transit Commission as a photographer for the years 1910/11, 1913/14, and 1915/16.[96]

In April 1900, Goodman applies for the position of photographer to the MWW, and is hired one month later as both photographer and draftsman assigned to Miller's Reservoir Department, working out of the MWW Engineering Clinton Office. His references included BTC Chief Engineer Howard A Carson, MSC Chief Engineer William M. Brown, and MWW Distribution Department Engineer Dexter Brackett.[97] Between May 1900 and November 1902, Goodman was in charge of the MWW photographic work, until Walter Gardner was appointed in charge of all photographic work for both the MWW and the MSW.[98] During the summer of 1904, Goodman is hospitalized, and when he is working, he is mostly doing so as a draftsman.[99] Goodman resigned in September 1905 to accept another position, but discontinued that work on account of his health. Dam and Reservoir Department Engineer Richardson rehired him for photographic work and for computations connected with final estimates; he resumed work in November 1905.[100] However, in January 1906 Goodman is forced to take a leave of absence on account of his health. In April 1906, Goodman is dismissed. It is uncertain how much photographic work Goodman did between November 1902 and April 1906.

Walter Gardner

Walter Gardner (b. 1861), of Gloucester, MA, is listed as a photographer beginning with the 1890 *Gloucester City Directory*.[101] In about 1893, Gardner opened "a studio at 120 Main Street [Gloucester] for portrait photography, in connection with his landscape and outdoor business."[102] Between 1894 and 1897, he took photographs of the Gloucester Water Works.[103] At about 1900, he is employed by the MSC as a photographer, and in November

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[94] "Geo P Goodman Taken by Death," *Malden Evening News*, December 26, 1941, p. 5, c. 2.

[95] See *Sixth Annual Report of the Board of Metropolitan Sewerage Commissioners, for 1894* (1895), 134; and *Seventh Annual Report of the MSC, for 1895* (1896), 116. Goodman's photographic work for the Boston Transit Commission is confirmed by the 1st, 2nd and 3rd Annual Reports of the Boston Transit Commission. In these reports, Goodman is listed as photographer and no other person is listed as such. These annual reports are filled with photographic plates of the construction of the Boston subway. Goodman likely got the job as a result of MSC Chief Engineer Howard A. Carson moving on to BTC Chief Engineer beginning September 1894. For a few years, Goodman worked as a photographer simultaneously for the MSC and the BTC. A list of engineering assistants is not published after the 3rd Annual Report. See *First Annual Report of the Boston Transit Commission for 1894-1895* (1895), 35; *Second Annual Report for 1895-1896* (1896), 23; *Third Annual Report for 1896-1897* (1897), 25. There is only one other photographer listed in the MSC Annual Reports: Frank J. Nowell (1853-1921). Nowell was employed by the Metropolitan Sewerage Commission from 1890-1897, and by the Metropolitan Park Commission (MDC beginning 1919) from 1897 and until his death in 1921. At the MSC, Nowell worked as a draftsman and a photographer (*Fifth Annual Report of the MSC, for 1893* [1894], 28; and *Sixth Annual Report of the MSC, for 1894* [1895], 134). At the MPC, Nowell worked as a draftsman according to his MPC Employee History Card. According to an obituary, Nowell "was an accomplished photographer, having done a great deal of very efficient work of this character for the Metropolitan Park Commission"; see memoir of Nowell, *Journal of the Boston Society of Civil Engineers* 11 (May 1924): 234-235.

[96] *Seventeenth Annual Report of the Boston Transit Commission for 1910-1911* (1911), 127; *Twentieth Annual Report of the Boston Transit Commission for 1913-1914* (1914), 171; and *Twenty-Second Annual Report of the Boston Transit Commission for 1915-1916* (1916), 66.

[97] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 7, pp. 16-17. MSA, EN4.05/2103X.

[98] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 10, p. 191. MSA, EN4.05/2103X.

[99] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 14, pp. 75-76. MSA, EN4.05/2103X.

[100] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 15, p. 157. MSA, EN4.05/2103X.

[101] Polito, *Directory of Massachusetts Photographers*, 260, 262.

[102] *Wilson's Photographic Magazine*, Vol. 30 (April 1893), 186.

[103] See W. Gardner Photograph Album of 51 Photographs, "Photographs of water works, 1894-1897", Catalog No. CC237, Gloucester City Archives, Gloucester, MA. Possibly, the Cape Ann Museum Library and Archives, and the Sawyer Free Library (both in Gloucester) have duplicate volumes.

1902, is given charge of the photographic work for both the MWW and MSW.[104] Throughout November 1902, Gardner assesses the current state of photographic work by the MWW, and submits a report to Chief Engineer Stearns in early December 1902 (see Photographic Equipment Section below). Unlike his predecessors, Gardner was based at the MWSB Boston Office. Gardner had charge of the photographic work until his services were discontinued beginning January 1905.

According to the 1907 *Boston City Directory*, Walter Gardner was employed as a photographer.[105] In the 1911 *Boston City Directory*, Gardner was partnered with Morse (Gardner-Morse Co.) in a photographic studio.[106] In the 1915 *Boston City Directory*, Gardner was now partnered with Sprague (Gardner & Sprague Inc.) in a photographic studio.[107] In the 1920 *Boston City Directory*, Gardner has returned as an independent photographer, and was listed as such through the 1932 *Boston City Directory*; Gardner is not listed in the 1933 Directory. His death has yet to be located.

Lawrence X. Champeau

Lawrence X. Champeau (1882-1959[108]) was appointed Assistant Photographer on January 8, 1903.[109] In April 1903, Champeau's work was rated as satisfactory.[110] However, Champeau was dismissed in November 1903 on account of the lack of photographic work needed.[111] The 1911 Register notes that Champeau is Photographer of Paintings in New York City. New York City *City Directories* throughout the 1910s-1930s occasionally list Champeau and his business Champeau Studios. The 1925 edition also notes an additional residence: Lakeport, New Hampshire.

Lakeport is north of Laconia, and is included in Laconia City Directories. Champeau's first listing in the *Laconia City Directory* is in the 1939 edition. Here, Champeau is listed as having a summer residence in Lakeport (Endicott Weirs) and a winter residence in New York City. Champeau is married and his wife's name is Annie W. The following *Laconia City Directory*, 1942, notes that Champeau owns a summer cottage (along Endicott Weirs), and his winter residence is at 57 East 56th Street, New York City. The 1956 Laconia City Directory notes that Champeau is retired, residing in the summer now in Laconia and residing in the winter in Upper Montclair, New Jersey.[112]

I have located a number of references in the *New York Times* and the *Christian Science Monitor* between 1914 and 1930 that credits Lawrence X. Champeau or Champeau Studios for photographing art work.[113]

Apparently, Champeau became a photographer of some recognition. The University of Texas at Austin, Harry Ransom Humanities Research Center, Photography Collection, holds eleven gelatin silver prints (not of MWW) taken by Lawrence X. Champeau.[114] Both the Smithsonian Institution Anthropology Library, Washington, D.C., and the Claremont Colleges Honnold/Mudd Library, Special Collections, Claremont, California, hold a portfolio of 35 photographs of ceramic ware by Champeau of Champeau Studios, New York.

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[104] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 10, p. 191. MSA, EN4.05/2103X.
[105] *Boston City Directory*, 1907, p. 692.
[106] *Boston City Directory*, 1911, pp. 775, 2269, and 2809.
[107] *Boston City Directory*, 1915, p. 3012.
[108] Buried at Riverside Cemetery, Plymouth (Grafton County), NH. See www.findagrave.com.
[109] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 11, p. 10. MSA, EN4.05/2103X.
[110] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 11, p. 103. MSA, EN4.05/2103X.
[111] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 12, p. 89. MSA, EN4.05/2103X; see also MWW, Weekly Reports from the Engineering Office Force to the Chief Engineer, Vol. 5, November 28, 1903, p. 2. DCR Archives.
[112] Laconia City Directories. New Hampshire Historical Society.
[113] *Christian Science Monitor*, January 31, 1914, p. 19; *New York Times*, January 24, 1915, p. RP2; March 26, 1916, p. PS2; May 21, 1916, p. SM16; February 16, 1917, p. 10; and March 23, 1930, p. RP15.
[114] http://norman.hrc.utexas.edu/photoPublic/fullDisplay.cfm?CollID=1055

Oliver Tryon

On May 14, 1902, Oliver Tryon (1883-1922) was appointed a messenger in the Boston Office for the MWW, having only attended high school for 2.5 years.[115] He had been recommended by MWW draftsman William E. Whittaker, whom Tryon's sister Bertha would later marry.[116] Later in 1902, Tryon was assigned to the Blueprint Room, and in November 1902 was assigned to mounting work.[117] In December 1903, Tryon was given charge of the Blueprinting Room. One year later, December 1904, Tryon was assigned as assistant to photographer Gardner, and one month later, was in "charge of all photographic work, such as titling and printing from negatives." Tryon's supervisor, Assistant Engineer Samuel E. Killam, writing to Chief Engineer Stearns, notes that "he has also taken several photographs and I think that he will be able to take all the pictures needed on the work of the Distribution Department. He is willing and ambitious and his work has been very satisfactory. I would recommend that his title be changed from that of Messenger to Photographer."[118] Gardner assists Tryon with the transition throughout January 1905. Writing one month later, in February 1905, Killam writes to Chief Engineer Stearns that Tryon "has been willing and ambitious and has spent much time on his work outside of office hours. He has shown ability and his work has been very satisfactory."[119] Beginning in April 1913, Tryon is in charge of both the photographic work and blueprinting.[120]

In a 1917 internal report on the organization of the Metropolitan Water and Sewerage Board, the function of "Photographer and Blueprinter" is defined as follows:

> "Does all the work in connection with progress photographs of construction work including lantern-slides, enlargements, reductions, also copies of plans. Does all blueprinting including Van Dyke and black line work; mounts maps and stamps titles; binding and recovering books and folios. Has some work on the testing machine. Has clerical work in the laboratory and in the office."[121]

The Massachusetts Acts of 1910, chapter 268 authorized the Commonwealth to publish a *List of the Officials and Employees of the Commonwealth*; the first issue is the 1909-1910 (1910) edition and was published annually through 1920-1921 (1922).[122] This document confirms that the only photographer employed by the MWSB, MWW in 1910 was Oliver Tryon.[123] The 1912-1913 (1913) edition for the first time lists Tryon working as a photographer for both the MWW (and blueprinter) and the Metropolitan Sewerage Works of the MWSB.[124] According to this annual list, Tryon functions as photographer for both divisions at least through the 1916-1917 (1918) directory. Oddly, he is listed in the 1918-1919 (1920) directory only as a clerk for the Water Works.[125] Tryon is not listed in the 1920-1921 (1922) directory.

The 1916-1920 Annual Reports note that the Water Works Engineering Force "made photographs."[126]

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[115] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 10, p. 46. MSA, EN4.05/2103X.
[116] One of the MWW dry plate glass negatives in the collection is a photograph likely of William and Bertha (Bee) in front of their 58 Edward Street, Medford, house, which, according to the 1910 Federal Census, Oliver Tryon resided. William E. Whittaker (1880-1941) married Bertha Grace Tryon (b. 1881, d. after 1939) in 1905.
[117] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 11, p. 9. MSA, EN4.05/2103X.
[118] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 14, pp. 142-143. MSA, EN4.05/2103X.
[119] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 15, p. 214. MSA, EN4.05/2103X.
[120] Compare the *Eleventh Annual Report of the Metropolitan Water and Sewerage Board, for 1911* (1912), 71; with the *Thirteenth Annual Report of the Metropolitan Water and Sewerage Board, for 1913* (1914), 46.
[121] Typescript (carbon copy), "Descriptive Report on the Organization of the Metropolitan Water and Sewerage Board, June 21, 1917", p. 11 (57 pages). DCR Archives.
[122] Massachusetts State Library, Boston, MA.
[123] *List of the Officials and Employees of the Commonwealth, for 1909-1910* (1910), 106. Massachusetts State Library, Boston.
[124] *List of the Officials and Employees of the Commonwealth, for 1912-1913* (1913), 111, 119.
[125] *List of the Officials and Employees of the Commonwealth, for 1918-1919* (1920), 82.
[126] *Sixteenth Annual Report of the MWSB, for 1916* (1917), 103; *Seventeenth Annual Report of the MWSB, for 1917* (1918), 105; *Eighteenth Annual Report of the MWSB, for 1918* (1919), 111; *Nineteenth Annual Report of the MWSB, for 1919* (1920), 99; and *First Annual Report of the Metropolitan District Commission, for 1920* (1921), 144.

On July 14, 1921, the MDC Commission voted at its Commission meeting that Oliver Tryon "be discharged for purposes of economy in administration and because his services are no longer necessary . . . [effective] September 1, 1921, and that in the meantime, he be given his vacation with pay."[127] On August 10, 1921, William E. Foss, MDC Water Division Director and Chief Engineer, writes to MDC Commissioner James A. Bailey, Jr. regarding the employment status of Oliver Tryon. The letter reads as follows:

> "As Oliver Tryon has now completed his work for the Water Division, I would respectfully ask for instructions concerning the way in which the blueprinting and map mounting work of the Water Division shall be done in the future. It is my understanding that all photographic work is to be discontinued."[128]

The MDC Commission voted at its August 11, 1921 meeting that "until further orders this [photographic] work be done by forces in the Water Division."[129]

Less than one year later, on May 15, 1922, Tryon died, exactly 20 years and 1 day from the date he was appointed to the MWSB. Tryon's obituary in the *Somerville Journal* notes that "for more than twenty years Mr. Tryon was employed by the Metropolitan Water and Sewerage Board, as a photographer and clerk."[130]

Exasperated by fiscal constraints, the MWW Chief Engineer comments in his 1923 Annual Report that "recent experience has shown that under existing conditions it is impossible to maintain as effective engineering service as formerly and very difficult to do work expeditiously."[131] This likely explains why there are not any photographs of the construction of the Arlington Reservoir between 1921 and 1924.

David W. Butterfield[132]

David W. Butterfield (1844-1933) began his photography career as a daguerreotypist in 1862, following a three-year apprenticeship with the famous Boston daguerreotypists Whipple & Black. His obituaries in the Boston and Cambridge newspapers claim that he took a photograph of President Abraham Lincoln in the East Room of the White House in 1864 (at age 20!), an image which Butterfield possessed at the time of his death.[133] The obituaries also claim that he took portraits of many prominent people of the late nineteenth and early twentieth century.[134]

In addition to his portrait work, Butterfield likely conducted photographic work for government construction

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[127] MDC Minutes, Vol. 1, p. 339, no. 6. DCR Archives, Boston, MA.
[128] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 38, p. 181. MSA, EN4.05/2103X.
[129] MDC Minutes, Vol. 2, p. 14, no. 6. DCR Archives, Boston, MA.
[130] Obituary, *Somerville Journal*, May 19, 1922, p. 7, c. 1. See also the 1924 *Somerville City Directory* for Tryon's death date (here, his name is misspelled as 'Tryson').
[131] *Fourth Annual Report of the Metropolitan District Commission, for 1923* (1924), 14.
[132] Some of the information pertaining to Butterfield is repeated elsewhere in this document.
[133] See, for example, Frederick Hill Meserve and Carl Sandburg, *The Photographs of Abraham Lincoln* (New York: Harcourt, Brace & Co., 1944); and Lloyd Ostendorf, *Lincoln's Photographs: A Complete Album*, rev. ed. (Dayton, Ohio: Rockywood Press, 1998). Under what circumstance does a 20-year old daguerreotypist from Boston have the opportunity to photograph President Lincoln in the White House during the Civil War? Butterfield describes his 1864 visit with President Lincoln in "Blends Washington's Picture with Lincoln's / Roxbury Man Has Photograph of Great Emancipator He Made in 1864," *Boston Globe*, February 22, 1932, p. 2, cols. 3-4. The presumed 1864 Butterfield image of Lincoln is published in Guy Richardson, *My Abraham Lincoln: Radio and Other Addresses* (Boston: Baker & Taylor Co., 1937), see frontispiece and pp. 110-112 for an explanation of the image. A printing of this same Lincoln photograph attributed to David W. Butterfield was sold on eBay (online auction), December 31, 2012. Butterfield also copy photographed an 1863 Alexander Gardner photograph of President Lincoln; see, at the Boston Athenaeum, Prints and Photographs Department http://cdm.bostonathenaeum.org/cdm/singleitem/collection/p15482coll7/id/17/rec/6; http://catalog.bostonathenaeum.org/vwebv/holdingsInfo?bibId=433803.
[134] Obituary, "David W. Butterfield," *Cambridge Chronicle*, November 17, 1933, section B, p. 2, c. 7; Obituary, "David W. Butterfield Was Prominent as a Photographer," *Boston Transcript*, November 11, 1933, p. 8, c. 5-6; evening ed., p. 4, c. 5. See also Thomas Weston Fels, *O Say Can You See: American Photographs, 1839-1939—One Hundred Years of American Photographs from the George R. Rinhart Collection* (Cambridge, Mass.: MIT Press, for The Berkshire Museum, 1989), 60-61, 128. See also Polito, *Directory of Massachusetts Photographers*, 37-38, 194.

projects in the 1880s through the early 1900s. A photograph by Butterfield of the completed Harvard Bridge (photographed in 1891 or 1892) is in the Harvard Bridge Commissioners' Final Report.[135] He made photographs for the landscape architectural firm Olmsted, Olmsted & Eliot and for the Metropolitan Park Commission (MPC), a client of the Olmsted firm. Between 1894 and 1904, Butterfield made photographs for the MPC, especially those needed by its Claim Department.[136] On September 19, 1905, the Charles River Basin Commission authorized Butterfield "to make a large photograph of the Basin in its present condition."[137] Butterfield conducted photographic work of some nature for the Cambridge Bridge Commission, either for the construction progress photographs from 1900-1907, or for the completed construction photographs in 1907.[138]

Boston Water Board photographs taken from 1890 through 1896 were likely made by Butterfield, and he may have taken photographs for the BWB even earlier. In 1939, the City Hall Annex offices of the Water Division, Public Works Department held a Butterfield photograph of the Chestnut Hill High Service Pumping Station.[139] Within the collections of MWW bound volumes of prints at both the State Archives and at the MWRA Library, there is one volume entitled "Reservoirs of the Sudbury System." There are 102 4.5" x 7.5" prints bound in the same manner as the MWW prints (nos. 9700-9801 in the database). Like the MWW volumes, there is a typed table of contents, numbered from 1 to 102. These prints document the construction of the Hopkinton Dam (1890-1892), Hopkinton Reservoir (1892-1893), Sudbury Reservoir (1894, 1896), and Sudbury Dam (1894-1896) during 1890-1896. Related to this volume is an oversized mounted print of construction of Hopkinton Dam in 1890 (no. 9905 in the database). On the board at the lower left corner of the print is typed "D. W. Butterfield, Photographer and Publisher, Cambridge, Mass." This image is similar to print No. 14 in the volume described above (Hopkinton Dam, southerly end looking north).

Further evidence is provided by a June 16, 1896, letter from Desmond FitzGerald, MWW Sudbury Department Engineer, to his principal assistant engineer for Reservoir No. 5 (Sudbury), William C. Hall: "Whenever any more photographs are wanted at Basin 5, please communicate with me, and I will tell you about Mr. Hildreth who is with Mr. Richardson, and who can be spared any time to come down to Basin 5 for a day or two and take our views. . . and it will save hiring Mr. Butterfield."[140]

In 1893, 23 oversized photographic prints (13" x 16") were made of BWB facilities (nos. 9950-9972 in the database; other sizes are nos. 9908-9917). The subject of each print is at the bottom right corner in red, and each print is dated 1893. This same caption style is in the bound volume described above. I am attributing these photographs to the work of David W. Butterfield.

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[135] Harvard Bridge Commission, *Harvard Bridge: Boston to Cambridge, March 1892* (Boston: Rockwell & Churchill, 1892), frontispiece. This same image was also published in the *25th Annual Report of the City Engineer, Boston, for 1891* (1892), opp. p. 26. The bridge was constructed from 1887-1891, and no original photographs of its construction are extant. Today, this bridge is also known as the Massachusetts Avenue Bridge. http://archive.org/details/harvardbridgebo00bridgoog

[136] Scattered throughout the MPC Letterpress Copybooks of Letters from the Secretary are letters to Butterfield requesting him to take photographs. MSA, EN4/1055X. Some of the photographs in the MPC Annual Reports were made by Butterfield.

[137] Charles River Basin Commission, Minutes, Vol. 1, p. 136. MDC Archives (now MA State Archives, but remains uncataloged by them). It is unknown if the photograph was made; it is not extant.

[138] According to the Cambridge Bridge Commission's final report, entitled *Report of the Cambridge Bridge Commission and Report of the Chief Engineer Upon the Construction of Cambridge Bridge* (Boston: City of Boston, Printing Department, 1909), photographs were "made in connection with the preliminary studies for the bridge, and during construction to serve as records of the progress of the work" (p. 142). However, Schedule G of the itemized tables of expenditures (Item 320) does not indicate to whom payment was made to for these photographs. The construction progress photographs (all cyanotypes) are extant at the MSA (CO33/1609X). In September 1907, nine photographs of the completed bridge were made (eight of these are in the 1909 Report). Within a CBC 1909 document, both Butterfield and Whitney & Son are identified as providing photographs. Since 1927, this bridge has been known as the Longfellow Bridge.

[139] MSA, SC1/167X, Boxes 57-58, City of Boston, Public Works Department, Water Division, No. 86. The photograph measured 16"x20.5".

[140] MWW, Letters from the Sudbury Department, Letterpress Copybook, Vol. 1, p. 204. MSA, EN4.07/2098X.

Since the construction work of the Harvard Bridge Commissioners, Boston Water Board, and the Cambridge Bridge Commission was all conducted under the direction of the City of Boston Chief Engineer and its Engineering Department, Butterfield may have conducted photographic work through this Department rather than with the individual agencies.[141] However, Butterfield's relationship with these agencies may never be known in further detail.

Butterfield made a series of photographs for the MWW in 1897. According to the MWW Field Notebooks, Butterfield took 17 photographs on April 20, 21, 28, and May 17, 1897, and were printed to 14" x 17" size.[142] Strangely, the MWB did not approve of this work until its May 25, 1897 meeting when it authorized the Chief Engineer "to procure sets of large photographs of territory to be included within the Nashua Reservoir."[143] In yet another unusual development, in 1916, the MWW made photographs from similar viewpoints as those from Butterfield's 1897 photographs. However, the MWW thought that Butterfield's views were made in 1896 and dated them as such when these 20th anniversary (19th anniversary in fact) then-and-now photographs were made and both sets captioned and bound.[144]

Initially, Butterfield is asked to take these views for the MWW in November 1896, but likely due to the lateness of the season, they were taken in April and May the following year.[145]

Remarkably, a letter describing the MWW's instructions to Butterfield about printing survives in the MWW correspondence. In a letter to Butterfield dated May 29, 1897, MWW Chief Engineer Stearns requests Butterfield "print six copies of each photograph, three to be mounted on cardboard like the samples, and three to be mounted on cloth with a sufficient margin on the left hand edge so that they can be bound."[146] Photographic prints representing these two examples survive in the MWW Photograph Collection.

In one of these 1897 photographs (No. 7299; and original as no. 9406 in database), a man is seated at a rock ledge overlooking the reservoir site. He is writing in a notebook. I believe this may be MWW photographer Hildreth, writing in the field notebook, while accompanying Butterfield.[147]

In the fall of 1899, the MWW request that Butterfield photograph Spot Pond and the Fells Reservoir, and that these images should be 14" x 17" in size.[148]

Whitney & Son

Horace Webster Whitney (1837-1904) established a photography business in Cambridge in 1872, and his son

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[141] The City of Boston maintained a City Engineer and Engineering Department from 1850-1911: E. H. Chesbrough, 1850-1855 (1813-1886); James Slade, 1855-1863 (1816-1882); N. Henry Crafts, 1863-1872 (1828-1908); Joseph P. Davis, 1872-1880 (1837-1917); Henry M. Wightman, 1880-1885 (1840-1885); William Jackson, 1885-1910 (1848-1910); and Louis K. Rourke, 1910-1911. From *Annual Report of the Engineering Department, for 1910-1911* (1911), 65.

[142] MWW, Field Notebook No. 411, pp. 26-27, 30.

[143] MWB Minutes, Vol. 2, p. 401. MSA, EN4.08/2092X.

[144] Nos. 7287-7309, Wachusett Department, Volume 1. See August 2, 1916 letter to Chief Engineer Foss regarding the original titles of 12 oversized photographs that photographer David W. Butterfield took in 1897 of the Wachusett Reservoir project, and suggested titles for the photos taken in 1916 from similar perspectives (Nos. 7287-7308 in the 7600 Series); in MWW, General Letters/Reports (not weekly reports) from Wachusett Department Superintendent E. R. B. Allardice to Chief Engineer, 1914-1916. DCR Archives.

[145] MWW, Letterpress copybook of Outgoing Correspondence from the Chief Engineer, Vol. 3, p. 384, November 2, 1896; see also Vol. 4, pp. 144, 213, 357, 489. DCR Archives.

[146] MWW Letterpress copybook of Outgoing Correspondence from the Chief Engineer, Vol. 3, p. 357, Stearns to D. W. Butterfield, May 28, 1897. DCR Archives.

[147] The man could be Butterfield's assistant, if he had one. On the other hand, someone familiar with the terrain had to accompany Butterfield, and no better than to have Hildreth, an engineer pressed into photographic work, accompany Butterfield.

[148] MWW, Letterpress copybook of Outgoing Correspondence from the Chief Engineer, Vol. 8, pp. 311, 317, 374. DCR Archives.

George W. Whitney (1862-1917) joined his father in the business around 1884.[149]

Within a few weeks of organizing, the MWB received an estimate from Cambridge photography studio Whitney & Son requesting "to estimate upon the photographic work that may be required by the Board."[150] The MWB filed the letter for future consideration.

In spring 1904, Whitney & Son made an enlarged photograph of No. 5476 depicting the Wachusett Dam construction[151], and is asked to make 20" x 24" prints from four dry plate glass negatives: 2 MWW, Nos. 4501 and 5309[152]; and 2 MSW, High Level Sewer, Nos. 2071 and 2112.[153]

At some point, Whitney & Son was contracted to photograph some of the completed water works facilities. Supported on mounting board, there are prints of Spot Pond Pumping Station, Spot Pond, Fells Reservoir, Chestnut Hill Low Service Pumping Station, and the Allis Engine at the Chestnut Hill High Service Pumping Station (nos. 9502-9511 in the database). Each photographic print includes the Whitney & Son blindstamp on the lower left corner. An additional mounted print of Hyde Park Pumping Station (pumping engine) was also assigned a number (No. 7393, May 1, 1917) and is bound in Distribution Department, Volume 16. The Whitney & Son blindstamp is visible at the bottom right corner, but since son George W. Whitney died in January 1917, the photograph was likely taken by the firm's successor.[154]

Charles L. O'Toole

Though Oliver Tryon was headquartered in the Boston Office, he would make trips throughout the MWW system to do photographic work. However, by 1916, Tryon, with his increased responsibilities, had difficulty scheduling needed photographic work in the Wachusett Reservoir area, and the services of a local photographer was sought. On April 24, 1916, Chief Engineer Foss informed Wachusett Department Superintendent Allardice that he desires "eleven views of the Wachusett Reservoir, when full, for comparison with similar views showing the site before construction work was begun" to be "taken this spring . . . on our standard 6 ½-inch x 8 ½-inch plates, so that they can be bound in our regular files. As our photographer might have to spend considerable time at Clinton in order to obtain satisfactory conditions, I wish you would see what arrangements can be made with local photographers to do the work."[155]

Allardice's April 25th response to Foss recommends Charles L. O'Toole (1874-1959) of Clinton.[156] Foss approves "with the understanding that the negatives are to become our property and that he is not to furnish any prints."[157] Under this arrangement, the negatives would be shipped from the Clinton Office to the Boston Office, printed by Tryon in the photograph laboratory, the prints forwarded to the Clinton Office for identification, and returned to the Boston Office.

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[149] See Horace W. Whitney (1837-1904), *Cambridge Chronicle*, December 10, 1904, p. 19, c. 2; and *Cambridge Tribune*, December 10, 1904, p. 3, c. 5. For George W. Whitney (1862-1917), see *Cambridge Chronicle*, January 6, 1917, p. 1, c. 6; and *Cambridge Tribune*, January 6, 1917, p. 7, c. 6. See also Patricia H. Rodgers and Charles M. Sullivan, *A Photographic History of Cambridge* (Cambridge, Mass.: Massachusetts Institute of Technology, 1984); and Polito, *Directory of Massachusetts Photographers*, 200-201.

[150] MWW, Letters from the Secretary, Letterpress Copybook, Vol. A, p. 14. MSA, EN4.05/2096X.

[151] This mounted photographic print of No. 5476 was held by the MWRA Records Center, and transferred to the MWW oversize photograph collection at the MA State Archives (through DCR Archives) in about 2005/06.

[152] Forbes Hill Reservoir and Standpipe/Water Tower, construction completed, portrait orientation; and Weston Aqueduct, Pipe Bridge over Sudbury River, construction completed.

[153] MWW, Letters from the Sudbury Department, Letterpress Copybook, Vol. 8, p. 797. MSA, EN4.07/2098X.

[154] The firm was "carried on by Mr. and Mrs. Umber[hine], who were intimate friends and who have been in practical charge for five years"; see *Cambridge Chronicle*, January 6, 1917, p. 1, c. 6. See also 1918 *Cambridge City Directory*, pp. 1065, 1096, 1161 (firm "succeeded by Frederick G. Umberhine").

[155] MWW, Letters from Chief Engineer, Letterpress Copybook, Vol. 28, p. 306. MSA, EN4.05/280X. These are the 19th anniversary comparison views for a then-and-now series using Butterfield's 1897 photographs.

[156] MWW, Index to Letters from Wachusett Department, 1909-1917, P: April 25, 1916. DCR Archives.

[157] MWW, Letters from Chief Engineer, Letterpress Copybook, Vol. 28, p. 313. MSA, EN4.05/280X.

O'Toole was born in 1874 in Clinton. By 1900, O'Toole became a photograph retoucher in the Jenness Studio, a Clinton studio which made artistic portraits. When the proprietor moved to Connecticut in 1901, O'Toole was named proprietor. By ca. 1910, he changed the name to O'Toole Studio. According to *Clinton City Directories*, O'Toole closed his studio ca. 1928, never to reopen it. O'Toole died in Clinton on November 5, 1959; the occupation on his death certificate is that of photographer. Unfortunately, only one of the three obituary notices in the local newspaper identity him as a photographer, and all three incorrectly identify his middle initial.[158]

From 1916 through 1919, O'Toole is authorized to conduct numerous photographic work assignments on behalf of the MWW. Examples include pine plantations; Wachusett-Sudbury Transmission Line; the 1919 panoramic view; and Wachusett Reservoir in relation to Wachusett Mountain. There were likely others (all Wachusett Watershed photographic work between 1916 and 1920?), but the February 1919 flood at the Wachusett Dam Power Station destroyed most of the Wachusett Department's correspondence up to that date.[159]

Incidentally, the 1919 flood also destroyed all the photographic images the Clinton Office had on hand; see No. 7552 for a view of the damage in the Superintendent's Office.[160]

C. Photographic Work Supervisors

Between 1895 and 1921, the MWW photographic work and the photographers were supervised by four different people: Dam & Aqueduct Department Engineer Thomas F. Richardson (1895-ca. 1899); Reservoir Department Engineer Hiram A. Miller (ca. 1899-1903); Office Assistant Samuel E. Killam (1904-1908); and Office Assistant William E. Whittaker (1908-1921).

According to the extant archival record, Killam made the most impact on the photographic work. Both Killam and Whittaker will be addressed.

Samuel E. Killam

Samuel E. Killam (1878-1942) was appointed to the MWB on August 3, 1897 as a rodman in the Distribution Department. From the start, Killam functioned both as a rodman, and as an assistant to the Assistant Engineer in charge of the General Office in Boston. In September 1903, Killam was promoted to Assistant Engineer in charge of the General Office.[161]

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[158] *Index to Births in Massachusetts*, Vol. 261, p. 300: Charles O'Toole, Clinton, born November 17, 1874. See 1900 *Clinton City Directory*, p. x; 1902 Directory, pp. 61, 103, 243; and 1929 Directory, pp. 145, 257. The 1909 *Clinton City Directory* lists Charles L. O'Toole as proprietor of Jenness Studio, artistic portraits. The 1910 *Clinton City Directory* lists it as O'Toole Studio, formerly Jenness Studio. *Town of Clinton, Deaths, 1959-1960 Volume*, 1959, p. 89: died November 5, 1959 at age 84; occupation: photographer; born in Clinton. Obituary, *Clinton Daily Item*, November 6, 1959, p. 3, c. 5, and p. 4, c. 5-6; and *Clinton Daily Item*, November 9, 1959, p. 4, c. 4. Unfortunately, all three references to O'Toole incorrectly identifies his middle initial as 'F'; only the latter obituary identifies O'Toole as a photographer.

[159] The little pre-flood correspondence that did survive, but which was severely water-damaged, is in MSA, EN4.05/2101X and EN4.05/2102X. Correspondence pertaining to photographic work and/or O'Toole is located in MWW, Letters from the Wachusett Department Superintendent to the Chief Engineer, Letterpress Copybook, 1917-1919 Volume, pp. 555, 714-716, 841-842, 854. MSA, EN4.05/2102X.

[160] MWW, Letters from the Wachusett Department Superintendent to the Chief Engineer, Letterpress Copybook, 1923-1924 Volume, p. 838. MSA, EN4.05/2102X. See also Supplement Volume of Correspondence, February 20, 1919 Report of the Accident, in the 1919-1920 Volume, pp. 1-5; and *Nineteenth Annual Report of the Metropolitan Water and Sewerage Board, for 1919* (1920), 74-77.

[161] MWW, General Reports of the Chief Engineer, Letterpress Copybook, Vol. 12, p. 12. MSA, EN4.05/2103X.

In February 1904, the photography work was placed under Killam's authority.[162] In December 1904, Killam recommended a reorganization of the photography department by terminating the photographer and training a "young man" to do the same work at a lesser salary.[163] Thus Tryon is trained and Gardner is terminated.

In July 1908, Killam was promoted to Superintendent of Pipe Lines and Reservoirs in the Distribution Department, and retained general supervision of the General Office force until William E. Whittaker replaced him later in the year.

Killam continued his rise through the ranks, becoming Superintendent of the Distribution Section (1920-1936), Deputy Chief Engineer, Water Division (1936-1938), and Chief Engineer, Water Division (1938-1942). He died in office on June 18, 1942.[164]

As is discussed in a later section, Killam also correlated the photographic plates in the annual reports with their appropriate negative numbers.

William E. Whittaker

William E. Whittaker (1880-1941) is appointed to the MWB in 1896 as a messenger/draftsman, and promoted to draftsman in 1902. In October 1908, Whittaker is promoted to Office Assistant, replacing Killam. The photographic work is retained under the Office Assistant.[165]

In 1925, the duties of the Office Assistant / Chief Clerk Whittaker are described without referencing the management of the photographic collection.[166] By January 1926, Whittaker is promoted to Assistant Sanitary Engineer and continues managing the records of the General Office.[167] By 1930, the MWW dry plate glass negative collection is in storage at the Chestnut Hill Pumping Stations, Superintendent of which, Charles P. Stuart, often receives requests from the Boston Office for specific negatives.[168] However, Whittaker retained management of the MWW lantern slide collection, a collection that Killam then Whittaker likely managed since 1904. A few lists of lantern slides that were returned to Whittaker between 1929 and 1931 are extant.[169] The lantern slide collection was eventually moved to the Chestnut Hill Pumping Stations according to the front cover of its associated 27-page typed list; the cover reads "Stored at Chest. Hill."

In 1927, Whittaker is appointed Assistant Secretary of the MDC, and in 1929, is appointed Secretary of the MDC, a position he holds until his retirement in 1940. Whittaker died on March 20, 1941.[170]

As noted earlier, Whittaker married Tryon's sister in 1905.

Additional Evidence

There is additional evidence: one loose print carries the name "Hildreth" written on back in pencil (No. 2902). Written in pencil on the back of another loose print is the following: "Enlargement by O. Tryon from negative by

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[162] MWW, Chairman's Diary, Vol. 10, p. 173. MSA, EN4.07/2094X. See also *Fourth Annual Report of the Metropolitan Water and Sewerage Board, for 1904* (1905), 103; *Fifth Annual Report of the Metropolitan Water and Sewerage Board, for 1905* (1906), 107; and *Sixth Annual Report of the Metropolitan Water and Sewerage Board, for 1906* (1907), 104.
[163] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 14, pp. 75-76. MSA, EN4.05/2103X.
[164] Karl R. Kennison and Arthur D. Weston, "Obituary: Samuel E. Killam," *Journal of the New England Water Works Association* 57 (March 1943): 76-77.
[165] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 17, pp. 140-141. MSA, EN4.05/2103X; and MWW, Employee History Cards. MSA, Records Series EN4.05/2123X.
[166] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 44, p. 73A. MSA, EN4.05/2103X.
[167] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 44, pp. 128, 185. MSA, EN4.05/2103X.
[168] MWW, Letters from the Chief Engineer, Letterpress Copybook, Vol. 42, p. 919, and Vol. 43, pp. 536, 604. MSA, EN4.05/280X.
[169] October 19, 1929; October 31, 1929; November 12, 1929; and January 28, 1931. MSA, EN4.05/2630X
[170] Obituary, *Boston Transcript*, March 21, 1941, p. 13, c. 2: began as an "office boy" at the MWB.

J. L. Hildreth, Jr." This latter print is not numbered and its caption was cut from another print and pasted at the bottom right corner; it is a detail of No. 1312.

Unfortunately, there are no MWW photographs of any of the photographers, either in portrait, group portrait, or at work. There are some photographs that capture the photographer's shadow while taking the photograph, and of his mode of transportation (see next section).

6. Description of the Photographic Equipment and Processing Methods Used to Create the Photographic Negatives and Prints of the MWW

Since none of the photographic equipment and supplies is extant, there is very little original evidence to document the photographic equipment and processing methods used to create these negatives and prints.[171]

The surviving "Weekly Reports" from the MWW Engineering Office Force to the Chief Engineer (1895-1906) and from the MWW Office Assistant to the Chief Engineer (1907-1928) provide some insight to the photographic work. However, the evidence in these letters really only begins in fall 1902, when the photographic work is led from the Boston Office rather than from the MWW Engineering Office in Clinton. The surviving "Letters" from Wachusett Dam and Aqueduct Department Engineer to the Chief Engineer (1896-1901, with gaps) also includes correspondence regarding the photographic work.

Extant are two sets of completed worksheets of the MWW's inventory of property of the Sudbury Section dated January 1, 1922 (40 pages) and January 1, 1923 (49 pages).[172] The pre-printed list of property generally represents what can be located throughout the water works system. Under the main heading of 'engineering and scientific instruments and supplies,' there is a sub-heading for 'photographic outfit'.[173] The following categories are listed:

Cameras, Blair, universal, 6½ x 8½,
Carrying case for camera,
Carrying case for plate holders,
Chemicals,
Color screen,
Drying racks,
Exposure meter,
Fabric, focusing cloth, etc.,
Flash lamp, Prosch,
Lenses, Cooke, Series 5, 11 inch,
Cooke, Extension, Series 5,
Goerz, Series 3, No. 5,
Voight, No. 3, W. A.,
Morrison, W. A.,
Mounting rollers,
Photoscripts, sets,

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[171] In addition to the publications that are cited in this section, the following publications have also been useful: Gordon Baldwin, *Looking at Photographs: A Guide to Technical Terms* (Malibu, CA: J. Paul Getty Museum, 1991); Brian Coe and Mark Haworth-Booth, *A Guide to Early Photographic Processes* (London: Victoria and Albert Museum, 1983); Helmut Gernsheim and Alison Gernsheim, *The History of Photography: From the Camera Obscura to the Beginning of the Modern Era* (New York: McGraw-Hill Book Co., 1969); George Gilbert, *Collecting Photographica: The Images and Equipment of the First Hundred Years of Photography* (New York: Hawthorn Books, Inc., 1976); Chris Howes, *To Photograph Darkness: The History of Underground and Flash Photography* (Carbondale: Southern Illinois University Press, 1989); Rudolf Kingslake, *A History of the Photographic Lens* (San Diego: Academic Press, Inc., 1989); James M. Reilly, *Care and Identification of 19th-Century Photographic Prints* (Rochester, NY: Eastman Kodak Co., 1986); William Welling, *Collectors' Guide to Nineteenth-Century Photographs* (New York: Macmillan Publishing Co., 1976); William Welling, *Photography in America: The Formative Years, 1839-1900* (New York: Thomas Y. Crowell Co., 1978); and Camfield Wills and Deirdre Wills, *History of Photography: Techniques and Equipment* (London: Hamlyn, 1980).

[172] These two documents were found in the trash at the MWRA Records Center in February 2001 by the author during a routine project visit. The items were saved and currently reside in the DCR Archives.

[173] Metropolitan Water Board, Inventory and Property Return, Sudbury Section, January 1, 1922 (form date, October 1914), p. 6; and Metropolitan District Commission, Water and Sewerage Divisions, Annual Inventory and Property Return, Metropolitan Water Works, Sudbury Section, January 1, 1923 (form date, January 1923), p. 6.

Plate holders,
Plates,
Printing frames,
"Spred lite" flash lamp,
Shutters, Volutte,
    Thornton-Pickard,
    Low, Kazoo,
Trays,
Tripods,
Washing boxes,

The italicized items may represent 'expendable material.' According to the 1922 inventory, the Sudbury Section office had only 1 drying rack and 1 mounting roller on hand. The 1923 inventory was unchanged. It is likely that the photographic outfit would have been stored at either the Boston Office, Mystic Shops or at one of the Chestnut Hill pumping stations.

A. Camera

The MWB likely purchased its photographic outfit in 1895, between July 19 and November 30. As indicated in their First Annual Report, $1,001.68 was expended on "books, maps, photographic and miscellaneous supplies."[174] In the Board's list of assets for the years 1899, 1900 and 1901, a single 'photographic outfit" is indicated.[175]

As indicated in the above property inventory, the MWW may have used a Blair, universal, 6½" x 8½" format camera. Blair is in reference to Thomas H. Blair (1855-1919), a camera manufacturer and retail seller in Boston. Blair sold cameras under the name of Blair Camera Company (est. 1886 in Boston) and American Camera Manufacturing Company (est. June 16, 1896 in Northborough, MA).[176] An examination of catalogs dating around 1895 from Blair Camera Company in the Technology Division of the International Museum of Photography and Film at the George Eastman House, Rochester, NY, does not include a camera entitled 'universal.' In fact, I cannot locate any reference to a 'universal' camera in relationship to Blair.[177]

However, the Rochester Optical Company (est. 1883 in Rochester, NY) introduced a camera named Universal in 1888 and was available in a variety of formats, including 6½" x 8½".[178] In fact, the only other known surviving

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[174] *First Annual Report of the Metropolitan Water Board, for 1895* (1896), 12.
[175] *Fifth Annual Report of the Metropolitan Water Board, for 1899* (1900), 67; *Sixth Annual Report of the Metropolitan Water Board, for 1900* (1901), 71; and *First Annual Report of the Metropolitan Water and Sewerage Board, for 1901* (1902), 40. In the *First Annual Report of the MWSB*, the Sewerage Works also report a single photographic outfit as an asset (p. 59).
[176] Blair established the Blair Tourograph and Dry Plate Company in Boston on January 5, 1882, and changed the name in 1886 to Blair Camera Company (see St. 1886,c 43); the company was dissolved in 1904. The American Camera Manufacturing Company was dissolved on January 6, 1908. Courtesy Card File, Corporations Division, Secretary of State, Commonwealth of Massachusetts, Boston. See also Polito, *Directory of Massachusetts Photographers*, 164.
[177] Jerry Smith, "Thomas H. Blair: The Man Who Might Have Been King," *Photographica* 12 (November 1980): 9-12. This same article was republished in *Photographic Canadiana* 7 (May-June 1981): 3-9. William Marder and Estelle Marder, *Anthony, The Man, The Company, The Cameras: An American Photographic Pioneer* (Pine Ridge Publishing Co., 1982), see especially pp. 276-281; and Reese V. Jenkins, *Images and Enterprise: Technology and the American Photographic Industry, 1839-1925* (Baltimore, MD: Johns Hopkins University Press, 1975). See also James M. McKeown and Joan C. McKeown, eds., *McKeown's Price Guide to Antique and Classic Cameras, 2001-2002*, 11th ed. (Grantsburg, WI: Centennial Photo Service, 2001), 46-47, 100-102; and Lawrence B. Romaine, *A Guide to American Trade Catalogs, 1744-1900* (New York: R. R. Bowker Co., 1960), 262, 264. By 1900, George Eastman, of Eastman Kodak Company, had purchased both Blair Camera Co. and American Camera Manufacturing Co. from Blair.
[178] McKeown, *McKeown's Price Guide*, 575-577 (there is no photograph of the camera in the 11th edition; the 10th edition, published in 1996 for 1997-1998 includes a photograph: p. 380).

MWW "Property Return" inventory are those from various departments and engineers in the Boston Office, for the quarter ending December 1, 1896. On these pre-printed forms, the camera listed under the "Photographic Outfit" category is identified as "Rochester camera, 6½ x 8½, and tripod."[179] However, none of the departments or engineers identify as having any photographic equipment on hand.

There is a possibility that the MWB bought the ROC's Universal Camera from Blair Camera Company. The fact that in the 1890s the Newton (MA) Engineering Department used an Empire State model camera made by the Rochester Optical and Camera Company may also suggest that the MWW's Universal camera was made by Rochester Optical.[180]

The question remains who recommended what photographic outfit and supplies for the MWB to purchase. The surviving MWW correspondence provides at least one indication. As described earlier, ten days after Hildreth's appointment, on September 20, 1895 Distribution Department Engineer Dexter Brackett instructs Hildreth to meet with "Mr. Nelson at Thurston's, No. 50 Bromfield St." on the following day, a Saturday. Hildreth is to obtain from Mr. Nelson "a detailed list of all articles which Mr. Nelson may select, in order that we may prepare a proper requisition for the same."[181] John H. Thurston (1852-1927), a photographic supplier at 50 Bromfield Street, Boston, was one of the founders of the Boston Camera Club in 1881.

It is not known how many cameras the MWW had in their use/possession at one time. By 1903, there had to have been at least two cameras in use: one for the Clinton Office and one for the Boston Office. According to a weekly report for the week ending January 3, 1903, the Engineering Office Force was "getting estimates on cost of new photographic outfits and on allowance for old outfit."[182] Later that year, MWW was "fitting new camera."[183]

B. Negatives

The glass plate negatives used are technically called gelatin dry plate negatives, which were invented in 1871, but did not become widely in use until the early/mid-1880s. The nine field notebooks that the MWW photographers used note some details regarding the negatives. Beginning January 1898, the notebooks intermittently record in the 'remarks' column the kind of plate used. At first, the plates are cited as 'Seed's non-halation'; 'Seed's 26x'; and 'Carbutts Ortho 27.'[184] Then the names are shortened and the following descriptions are used: 'non-halation'; 'non'; '26x'; and '#27'.[185] In 1900, another plate type is referenced: '#50 Stanley.'[186]

Seed is in reference to Miles A. Seed (1843-1913) and his Dry Plate Company, St. Louis.[187] Carbutt is in reference to John Carbutt (1832-1905) and his Keystone Dry Plate Works, Philadelphia.[188] Stanley refers to the Stanley Dry Plate Company, Lewiston, Maine established by twin brothers Francis E. Stanley (1849-1918) and Freelan O. Stanley (1849-1940).[189] Non-halation plates (aka anti-halation plates) refers to dry plates that were introduced in 1893 by John Carbutt to prevent halation, a fog (or halo) affect caused by the "spreading of light

[179] MWW, Property Return, for the Quarter ending December 1, 1896. DCR Archives.
[180] See note no. 32.
[181] Dexter Brackett to John L. Hildreth, Jr., September 20, 1895, in MWW Outgoing Correspondence from Distribution Department Engineer, Letterpress Copybook, Volume 1, August 1895 to December 1896, p. 39. DCR Archives.
[182] MWW, Letterbooks of Weekly Reports from the Engineering Office Force to the Chief Engineer, Vol. 4, January 5, 1903. DCR Archives.
[183] Weekly Reports from the Engineering Office Force to the Chief Engineer, Vol. 4, September 25, 1903.
[184] MWW Field Notebook No. 438, beginning with pp. 11-12.
[185] MWW Field Notebook Nos. 438, 469, 577, 717, and 727.
[186] MWW Field Notebook No. 577, pp. 41, 45-47.
[187] Miles Ainscough Seed, *Dictionary of American Biography*.
[188] John Carbutt, *Dictionary of American Biography*.
[189] Jenkins, *Images and Enterprise*, 75.

beyond its proper boundaries" as "in photographic interiors in which are windows facing the sky, and sometimes in landscape pictures, especially during autumn and winter, when bare tree branches stand out against the sky."[190]

Orthochromatic refers to a type of dry plate that was first introduced in the United States in 1886 by John Carbutt. As Carbutt's biographer notes, "the photographic medium of the day, both wet and dry plates, rendered false color values in black and white because they were overly sensitive to blue light and insensitive to red, orange and yellow."[191] Orthochromatic plates produced "fuller ranges of response to the color spectrum."[192]

Occasionally, the photographer notes in the MWW field notebooks the use of a "color screen" for which is "used in the process of orthochromatic photography.[193]

In one of the MWW field notebooks, the photographer notes that a plate is "frilled."[194] Frilling refers to a common defect in the dry plate process when the "gelatin leaves the glass in frills or wrinkles. It generally commences at the edge of the plate, . . . usually occurs when the plate is being fixed, but is sometimes met with in developing, more especially in warm weather."[195]

The MWW photographic collection also includes an empty box labeled as "Seed's Dry Plates" from Eastman Kodak Co. The box held a dozen 3.25" x 4.25" plates. The number 23 is also a feature on a box side.

C. Conditions in which photographs were made

An examination of the 8,000-plus MWW photographs reveals that the photographers made these photographs in all types of geophysical locations and weather conditions. A notebook notes on one occasion that the "camera blew over & broke ground glass."[196]

D. Carrying Case for Camera / Plate Holders

A carrying case, either for the camera or for the plate holders, is pictured in approximately 8 of the MWW photographs.[197]

E. Photographer's Shadow and Mode of Transportation

Both the photographer's shadow and his mode of transportation are pictured in some MWW photographs. The photographer's shadow is visible in approximately 26 photographs. The mode of transportation used progressed from horse and carriage to automobile. The horse and carriage is in many Real Estate photographs, especially those numbered pre-1000s and Nos. 1080 and 2304. The horse and carriage is also in many construction photographs. During the winter, the photographer's sleigh is visible in 4 photographs (Nos. 2477-2478, 2537, 2541). The photographer's car is visible in 13 photographs. Oddly, no photographic equipment can be seen in any of the photographs in which the photographer's mode of transportation is visible.

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[190] Walter E. Woodbury, *The Encyclopaedic Dictionary of Photography* (New York: Scovill and Adams Co., 1898; New York: Arno Press, 1979), 39, 231-232. See also Jenkins, *Images and Enterprise*, 78-79; Baldwin, *Looking at Photographs*, 53; and Welling, *Photography in America*, 329. For Carbutt and non-halation plates, see William Brey, *John Carbutt on the Frontiers of Photography* (Cherry Hill, NJ: Willowdale Press, 1984), 149, 154, 186.
[191] Brey, *John Carbutt*, 137-138.
[192] Baldwin, *Looking at Photographs*, 62.
[193] MWW Field Notebook No. 403, pp. 38-41 (for example); Woodbury, *Encyclopaedic Dictionary of Photography*, 132.
[194] MWW Field Notebook No. ?.
[195] Woodbury, *Encyclopaedic Dictionary of Photography*, 216.
[196] MWW Field Notebook No. 469, p. 62.
[197] Nos. 2537, 2541, 3127, 4399 (?), 4901, 4902, 5380, 5677, and 5678.

F. Prints

As early as June 1896, Chief Engineer Stearns requested Dam and Aqueduct Department Engineer Richardson to have photographer Hildreth provide the Boston Office with two copies of each print, one for use of the Board and one for use by the Chief Engineer.[198] It is through this order that the policy of two official photographic prints derives from, and plays a significant role throughout the twentieth century life of these photographs.

The technology of making photographic prints from dry plate glass negatives underwent significant changes during the 1880s, 1890s and into the first decade of the 1900s. MWW photographers had many options, and today, it is very difficult to reconstruct all the components of the process.

While printing patterns emerge in the MWW 7600 Series photograph collection, there are exceptions. Generally, there are 4 distinct phases of print processing by the MWW:

1. gelatin silver printing-out paper (aka P.O.P.), glossy, toned (fall 1895 – fall 1902);
2. gelatin silver printing-out paper, matte (April 1899 – June 1899);
3. gelatin silver developing-out paper (aka D.O.P.), Rotox brand (fall 1902 – ca. 1920);
4. gelatin silver developing-out paper (ca. 1920-1921).

1. gelatin silver printing-out paper (aka P.O.P.), glossy, toned (fall 1895 – fall 1902)
The majority of prints from 1895-1902 are of this process. There are references in 1899/1900 MWW correspondence from the Chief Engineer's Office to MWW photographer Hildreth with references to "Aristo Platino" and "Solio" photo prints, both printing-out papers.[199]

However, a significant percentage of these are faded to some degree. The fading varies from a spot on the print to covering the entire print, and everything in between. The Wachusett Reservoir Real Estate photographs are particularly faded, as are the Wachusett Aqueduct and Sudbury Reservoir/Dam construction photographs, and those of the early stages of the Distribution Department construction.[200]

This fading is likely due to poor processing at the time of processing. While the letters from each department to the Chief Engineer are not extant, indexes to these letters are extant. The indexes from the two Clinton Office departments for the years between 1895 and 1906 are sprinkled with references to 'negatives' and 'photographs.' In a July 1, 1898 letter, Dam and Aqueduct Department Engineer Richardson writes to Chief Engineer Stearns regarding faded photographs.[201]

The fading issue prompted MWW photographer Hildreth, at Engineer Richardson's request, to investigate other photographic papers, and used No. 2134 to test these papers. They call the paper in use presently as "Solio" paper; and name three other alternatives: "Glossy Velox"; "Carbon Velox"; and "Aristo Platino". The 2-page letter/report describes the pros and cons of each, with Richardson opting for "Aristo Platino".[202]

It is not certain that these P.O.P. prints are gelatin silver; they could be collodion. Further testing using a low-power stereomicroscope (20X-30X magnification) and spot testing is required to make a better determination. As

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[198] MWW, Letters from the Chief Engineer, Letterpress Copybook, Vol. 1, p. 603. MSA, EN4.05/280X.
[199] MWW, Letterpress copybook of Outgoing Correspondence from the Chief Engineer, Vol. 8, pp. 375, 552, 900. DCR Archives. Solio prints were introduced in the market in 1892.
[200] In the Wachusett Reservoir Real Estate bound volumes of photographs, the first eight volumes have extensive fading. Vol. 9 has little fading (1200s) to no fading (1300s).
[201] MWW, Letters from Wachusett Dam and Aqueduct Department Engineer Thomas F. Richardson to Chief Engineer, 1896-1901, July 1, 1898. DCR Archives. See also, MWW, Index to Letters from Wachusett Dam and Aqueduct Department, 1895-1906, P: July 1, 1898. DCR Archives.
[202] MWW, Letters from Wachusett Dam and Aqueduct Department Engineer Thomas F. Richardson to Chief Engineer, 1896-1901, October 13, 1898. DCR Archives.

James M. Reilly of the Image Permanence Institute notes, "these two processes are often indistinguishable."[203] In 2001, I attended the IPI "Preserving Photographs in a Digital World" seminar at the George Eastman House, Rochester, and I brought along sample MWW photographs. I examined them under a 15X stereomicroscope that was available for our use. Without a control print to compare, I was unable to make a determination. The spot test was also described at the seminar: gelatin will absorb a drop of distilled water, while the drop will stay on top of collodion. I conducted this test when I returned, but without definitive results.

The brand of photographic paper the MWW used would at least determine if it is gelatin or collodion. However, no record is extant of the brand used.

However, on the verso side of No. 598 (Nashua Reservoir, Real Estate, Volume 5; MSA set) the words "Soft Fini[sh]" can be read on the photograph paper through the cloth backing. No other print within the bound volumes at the State Archives and no other loose print includes any notation on the verso side of the photographic paper that identifies the brand of paper; this print of No. 598 is the only one.

Additionally, these prints may have been enameled to prevent curling. Enameling (aka glazing or ferrotyping) was "a method of giving prints made upon smooth paper a brilliant polished surface, superior to that finish obtained by burnishing. This is effected by coating the print with a film of collodion, which not only gives it a brilliant surface, but also acts as an excellent protector."[204]

2. gelatin silver printing-out paper, matte (April 1899 – June 1899)
From April 1899 through June 1899, the MWW used a distinctive different brand of photographic paper. The paper is thinner and more flexible, and the images are of a matte finish. Negative/Print Nos. in the 2500s and 2600s in at least four bound volumes of prints include these types of prints.[205]

3. gelatin silver developing-out paper (aka D.O.P.), Rotox brand (fall 1902 – ca. 1920)
Walter Gardner's appointment in November 1902 as MWW head photographer changed everything about processing and captioning the MWW photographic prints.

Throughout November 1902, Gardner assesses the current state of photographic work by the MWW. In that month, "data for the photographer's report to Mr. Stearns on the condition of outfits, storing negatives, etc." is reported to Chief Engineer Stearns.[206]

Likely in the first week of December 1902, Gardner submitted a report of recommended changes to the MWW photographic work (report not extant).[207] Reporting about the December 11, 1902 Board meeting, Chairman Sprague notes that:

> "It was determined that the Chairman should go ahead, on general authority, to have an addition to the equipment of the photographic department in the Boston office, and have other changes made in accordance with the report of Mr. Gardner, with the assent of Mr. Stearns."[208]

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[203] Reilly, *Care and Identification of 19th-Century Photographic Prints*, 54-55: "Flowchart for Identification Guide." The book and flowchart uses 30X magnification throughout, making it difficult to compare the images with anything less. A portable 30X light scope is also useful to have on hand.
[204] Woodbury, *Encyclopaedic Dictionary of Photography*, 191-192, 203, 225.
[205] MSA set: Wachusett Reservoir, Construction, Vol. 1; Clinton Sewerage and Miscellaneous; Structures on Water Works Taken, Vol. 1; and Distribution Department, Vol. 3. MSA, EN4.05/2630X.
[206] MWW, Weekly Reports from the Engineering Office Force to the Chief Engineer, Vol. 4, November 17, 1902. DCR Archives.
[207] "General report on the photographic work of the Board" is noted for week ending December 6; see MWW, Weekly Reports from the Engineering Office Force to the Chief Engineer, Vol. 4, December 8, 1902. DCR Archives.
[208] MWW, Chairman's Diary, Vol. 9, p. 229. MSA, EN4.07/2094X.

In March 1903, the General Office in the Boston Office, in responding to an inquiry, explains to Distribution Department Engineer Dexter Brackett that, "the kind of print will be that used by the Board for its files, which at the present time is Rotox."[209]

Writing to Rotox in New York City on March 13, 1903, MWW photographer Walter Gardner describes that "after a trial of several of the developing papers that are on the market, we decided that Rotox was the best adapted to our purposes, and we have been using it for the past six months. Our prints are mounted on cloth and finally bound in volumes."[210] Gardner writes to Rotox to seek answers to a curling problem with the photographic paper.

Rotox was a brand of photographic paper introduced to the market in 1902 by the Rotograph Company, New York. It originally came in seven grades:

- Thin glossy, rose;
- Thin glossy, pensee;
- Thin matt, smooth;
- Thick matt, smooth;
- Thick matt, cream-toned;
- Thin white, rough;
- Half matt, smooth.

The company advertised Rotox as "a new slow contact paper"; "no darkroom needed"; "can be worked in gas-light or weak day-light."[211]

In 1903, Rotograph's monthly magazine, *The Photo Critic*, published numerous articles/advertisements on the benefits of Rotox paper. In one article entitled "Developing-papers vs. P.O.P." the author describes that Rotox is a new wash chloride developing-paper and compares it with P.O.P.:

> "Take into consideration the vast amount of time saved by doing away with all the previous washings that P.O.P. requires, before you can start in to tone. . . . The manufacturers of P.O.P. recommend ten changes of water [to remove all the free silver]. This is all done away with when you use Rotox papers. Then there's the toning eliminated, no gold or platinum to be used. Isn't that *casus bell*.
> Sufficient to war on P.O.P.?
> . . . The using of gas-light papers means this to you: time saved, money saved, better and more uniform results, increased capacity, and, therefore, increased profits."[212]

Another writer describes the proper way of developing using gas-light papers:

> "Their simplicity is easily demonstrated—a piece of the paper is placed in contact with a negative in an ordinary printing-frame, exposed to either weak daylight or strong artificial light, for a brief period, removed from the frame, immersed in the developer, when the picture at once appears and develops up to full strength, in this respect closely resembling the development of a platinum print; fixation and a thorough washing complete the process, the whole of which, be it noted, can be carried out in an ordinary room well lighted by either gas, oil or the electric light."[213]

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[209] MWW, Letters and General Reports from the Chief Engineer to the Distribution Department, Letterbook, Vol. 1, p. 101. MSA, EN4.07/2097X.
[210] MWW, Letterpress copybook of Outgoing Correspondence from the Chief Engineer, Vol. 14, pp. 116-117, March 13, 1903. DCR Archives.
[211] *The Photo Critic* [Rotograph Press] 2 (July 1902), inside back cover. All citations to *The Photo Critic* Courtesy Library, International Museum of Photography and Film at the George Eastman House, Rochester, NY. For a lengthy description of the use of Rotox paper, see "Rotox Paper*" The Photo Critic* 4 (April 1904), 155-170.
[212] M. H. Kuhn, "Developing-papers vs. P.O.P.," *The Photo Critic* 3 (April 1903), 264-268.
[213] John A. Hodges, "Hints on Correct Manipulations of Gaslight Papers," *The Photo Critic* 3 (February 1903).

In 1903, Rotograph had two agents in Boston: Ralph Harris & Co., and D. J. Lindsay & Co., both on Bromfield Street.[214]

It is unclear how long the MWW used the Rotox brand. The Weekly Reports from the MWW Office Assistant to the Chief Engineer indicate that "solio prints", "velox prints", "kresko prints", and "disco prints" were also used throughout the 1910s. However, the prints from 1903-1919 look and feel pretty much the same. These gelatin silver prints have also not faded.

It is very important to note that it would appear that due to the fading problems of the past, some of the negatives from the 1895-1902 period were printed again using the new paper. Some of these 'later' prints were bound, falsely giving the impression that D.O.P. prints were used throughout the 1895-1902 period. A good example of this double printing are two loose prints of No. 3558 (Wachusett Reservoir, October 12, 1900): one is P.O.P. glossy and toned, and the other is gelatin silver D.O.P.

4. gelatin silver developing-out paper (ca. 1920-1921)
The prints from the 1920-1921 period are less flexible and darker in contrast than those previously.

G. Other Print Types

Occasionally, blueprints (cyanotypes) were made from the plates for field use. Some of these cyanotypes are extant, and others are referred to in the field notebooks.[215] For example, on September 14, 1900, photographer Goodman notes to "make set of blue prints for field use."[216] A blue print of No. 3967 was also made.[217]

Except for the cyanotypes, nearly all of the photographic prints were mounted on a piece of cloth, possibly muslin. The cloth would cover the entire back of the print and extend 2" along the left margin. This extra area of cloth was used when the prints were bound in volumes.

Found amongst MWW photographic prints was an empty box labeled as 'Haloid Photographic Papers, Outline Special, Brilliant Soft, Semi-Matte, 8" x 10", Haloid Company, Rochester, NY (with an expiration date of January 13, 1926).' It is possible that the 8" x 10" of Arlington Reservoir, ca. 1925 (no. 8016 in database) was printed on this paper.

H. Caption Styles

All captions and numbers are black on the negatives and white on the prints. At times, the captions/numbers are difficult to read, especially if the image includes snow or a road.

The number in each numbered image in the 7600 Series is positioned at the lower right corner. Occasionally, this position was changed if the image was of a portrait orientation. The negative number is positioned in the lower left corner in some images from January 1903 (4800s; resumes at right with No. 4838).

Nos. 1 through 390 (1895 – July 24, 1896) have written captions and numbers. Typed captions and numbers begin with No. 391 (July 28, 1896).[218]

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[214] *The Photo Critic* 3 (September 1903), 547.
[215] In 2011, an intern working in the Archives Center of the National Museum of American History, Smithsonian Institution, Washington, D.C., identified 877 MWW cyanotypes in their (Boston) MWW Collection, that came to the Smithsonian Institution from the MDC Water Division as part of the 1964/65 loan.
[216] MWW Field Notebook No. 577, p. 67.
[217] MWW Field Notebook No. 717, p. 69.
[218] During a transition period, the captions alternate between written and typed. For example, No. 340 is written; No. 342 is typed; and No. 345 is written.

The inclusion of the date in the caption does not begin until No. 614 (September 23, 1896). However, the Wachusett Reservoir Real Estate images after No. 614 were not always dated on the image but were dated in the table of contents in the bound volumes.

No. 3335 (July 25, 1900), Nos. 3739 through 3741 (June 14, 1899), and Nos. 3945 through 3975 (June – July 1901) have a written negative number in the lower right corner, rather than a typed number.[219]

The captions and numbers are positioned over the image for Nos. 1 through 4600s/4700s (taken between 1895 – summer/fall 1902), except for Nos. 3548 through 3551 (October 1900). Beginning in January 1903 (4800s), a strip running across the bottom of the negative is void of any image, and the caption and number is placed here.[220] This style continues through the last numbered negative of No. 7672. Printed, the strip is black. During the transition period of summer/fall 1902, sometimes the blank strip is used with the caption and number remaining over the image, not in the strip (Nos. 4550-4800). It is possible that this new style was part of the recommendations made by MWW photographer Walter Gardner in November/December 1902. No. 5151 does not include a blank strip running across the bottom because it is dated November 25, 1902, dating from the transition period.

Between 1903 and 1922, there are a few exceptions to the style. For example, Nos. 7608-7610 (October 17, 1919) were taken by Clinton photographer Charles L. O'Toole. Here, the strip is not used and the information is written.

I. Plates with Condition Problems as seen on Vintage Prints

Some of the prints provide visual evidence that occasionally the dry plate negatives had condition problems during the time of original printing. For example, broken plates are identified through Nos. 2520, 2595, 3111, 3563, 5689, and 7520. There is significant damage to the emulsion on Nos. 1361, 1363, 1366, and 3393.

J. Glass Lantern Slides[221]

Numerous Boston photographic companies made glass lantern slides for the MWW. The majority of the lantern slides are from W. H. Lawrence and B. S. Turpin[222], Trinity Place; and S. [Solatia] M. Taylor[223], Bromfield Street. The third and fourth suppliers were A. [Albert] D. Handy[224]; and A. [Albert] T. Thompson and Company[225], Bromfield Street. There is no pattern of use of these companies; they appear to have been used interchangeably. Lantern slides from the pre-1895 period are also from Black & Co. [James W. Black], Washington Street (approximately 14 slides). Many of the pre-1895 slides came from BWW/MWW engineer Dexter Brackett, according to an undated two-page typed list.

The MWW likely also developed their own lantern slides. This may account for why some lantern slides have no label on them identifying one of the local companies noted above. Within the MWW photographic collection are a few original boxes (all empty) for "lantern slide plates." Manufacturers include: Seed Plates from Eastman

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[219] Bound in Wachusett Dam, Vol. 2, and Distribution Department, Vol. 7 only. Nos. 3958 and 3962 do not have written numbers.

[220] The first use of both the bottom strip and the caption inside it is No. 4797.

[221] Glass lantern slides are positive transparencies, in the same way as 35mm slides, and from the 1870s-1930s, were the primary format for the public presentation of "slide" shows. A lantern slide consists of two pieces of glass, sandwiched together, with the emulsion sitting on top of an inside surface of one of the glass sheets.

[222] Bradford S. Turpin (1857-1933).

[223] Polito, *Directory of Massachusetts Photographers*, 128, 155. Solatia M. Taylor (1860-1943).

[224] Polito, *Directory of Massachusetts Photographers*, 167, 173, 175. Albert D. Handy (1851-d. after 1929).

[225] Polito, *Directory of Massachusetts Photographers*, 162-163, 170-171, 174, 176.

Kodak Co.; Standard Plates from Eastman Kodak Co.; and Eastman Plates from Eastman Kodak Co. Each box held a dozen 3.25" x 4" plates.

The board of the MWW and its senior staff routinely gave lantern slide presentations to citizen groups of the progress of the construction work, and following this work, how Boston gets its water.

K. Photograph Laboratory

Between August 5, 1895 and January 1897, the MWB occupied office space in the Peirce Building, High Street, Clinton. All evidence suggests that Hildreth, assigned under Dam and Aqueduct Engineer Richardson, worked out of this location. Between 1896 and January 1897, the MWB built its own local office building, a residential-looking building along Walnut Street, at the corner of Prospect Street, Clinton. A photography lab and dark room was located on the third floor.[226]

The Clinton Office served both the Dam and Aqueduct Department and the Reservoir Department. Though the photographic work was transferred from the former to the latter ca. 1899, the laboratory remained at the Walnut Street Office.

In an 1898 magazine article that describes the MWW's office furniture, including drafting desks, drafting tables, mounting tables, plans cabinets, lighting, instrument closets and the methods used to make blueprints, there is no reference to the photograph laboratory.[227]

A second photograph laboratory was created when Walter Gardner was appointed MWW photographer in 1902. Throughout the fall of 1902, MWW carpenters renovated a room on the top floor of the MWSB Boston Office, at 1 Ashburton Place.[228]

On November 3, 1909, the staff at the MWW Wachusett Engineers Office, Walnut Street, Clinton, moved into the Wachusett Dam Lower Gatehouse.[229] The collection of dry plate glass negatives at the Walnut Street Office was shipped to Boston, presumably to the Boston Office, though its destination cannot be confirmed.[230]

By 1911, the MWW glass plate negative collection was likely stored at one of the Chestnut Hill pumping stations, and most likely at the Low Service Pumping Station. A January 1911 Weekly Report notes that "the photographer spent 1 day filing negatives at the Chestnut Hill Low-service Station."[231] The Weekly Reports thereafter are scattered with references to filing and arranging negatives at the Chestnut Hill pumping stations (with no mention of either Low or High Service), and more generally at "Chestnut Hill Station", "Chestnut Hill" or "Chestnut Hill Reservoir."

When the offices of the MWSB and the Metropolitan Park Commission (MPC) physically merged in the early 1920s following the late 1919 legislative merger of the two agencies to create the MDC, space was limited. Based

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[226] The building's blueprints are extant in the DCR Archives (3 sheets), but the floor layout does not include references to the drafting and photo lab rooms.

[227] "Office Furniture, Engineering Department, Metropolitan Water-Works," *Engineering Record* 38 (September 17, 1898): 334-336.

[228] MWW, Letterbooks of Weekly Reports from the Engineering Office Force to the Chief Engineer, Vol. 4, see October 20, 1902, and thereafter. DCR Archives. See also, MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 19, p. 16. MSA, EN4.05/2103X.

[229] The MWW Wachusett administrative and engineering office remained located in the Lower Gatehouse until 2000, a remarkable run of 91 years.

[230] MWW, Index to Letters from Wachusett Department, 1909-1917, N: November 4, 1909, and P: October 7, 1909. DCR Archives.

[231] MWW, Weekly Reports from the Office Assistant to the Chief Engineer, January 30, 1911. DCR Archives.

on where the glass plate negatives were located in 1964, in the early 1990s, and in 2002, the collection may have dispersed to two locations: Chestnut Hill pumping stations and the Mystic Shops (see note no. 253).

It is not known if the photographic camera equipment was also placed in storage or sold or discarded as surplus state property.

In a March 1926 description of the MDC Water Division offices, the photograph collection is not referenced.[232]

Unfortunately, there are no MWW photographs extant of any of the photographic equipment or of the two photograph laboratories.

[232] MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 44, pp. 217-220. MSA, EN4.05/2103X.

7. Some Observations of the Image Subjects and Some Unique Images

In the foreground or background of the photographs, there is visual evidence of a long-forgotten built environment and way of life. Streetscapes from pipe line construction and pipe break repairs shows businesses and homes in the background, sometimes with great detail. Visible in the photographs are horse-drawn vehicles; trolleys in the streets; early automobiles; bicycles; clothing and fashion, of workers and passersby; buildings no longer standing; landscapes no longer visible; business advertising signs and roadside billboards; and construction methods and practices of the time, and the use of manual and horse labor.

MWW Real Estate Photographs

The real estate photographs include residential homes and buildings; businesses; mills; town buildings; schools; churches; cemeteries; and railroad stations. Across Boylston, Clinton, Holden, Sterling and West Boylston, the construction of Wachusett Reservoir impacted 6 large mills, 8 schoolhouses, 4 churches, 360 dwelling houses, 1,700 people, 6.5 miles of railroad lines, and 19 miles of roads. Outside of the Wachusett Reservoir site, the real estate photographs include structures and landscapes along the Wachusett Aqueduct, Weston Aqueduct, the Weston Reservoir site, and the Clinton sewerage plant site.

Some General and Specific Observations

- laundry hanging on line in majority of the photographs;
- significant number of bicycles in the photographs;
- significant number with American flags;
- significant number of hitching posts;
- some hammocks in the photographs;
- some icehouses are documented, including one in operation (No. 1054);
- Barnum & Bailey Circus ad on side of barn (No. 308);
- Hood's Sarsaparilla ad (No. 1539);
- within the Wachusett Real Estate photos, there are 44 cemetery images; only 8 images showing the dismantling of a mill; and there are 10 images of schoolhouses;
- 2 images of an American Telephone and Telegraph Company Test House (Nos. 288-289);
- 5 images of the Worcester County Truant School, West Boylston (Nos. 2365-2369);
- Very few of the more than 1,400 photograph taken of the "real estate" structures show a family in front of their home. The images of families include Nos. 147, 485, 528 and 829;
- No. 705: "The headquarters of the police for the district of the Nashua Aqueduct have been maintained at West Berlin, in a building which has been leased for the purpose."; see MWB Annual Report for 1896, p. 8;
- No. 1054 shows an ice house in operation;
- A rare view of a house being dismantled (Nos. 4200-4201).

MWW Construction and Operations Photographs

It is a common myth for the construction of the Wachusett Aqueduct/Reservoir/Dam that only Italian immigrant labor was employed by the contractors. However, the surviving textual and photographic records clearly document that the contractors also employed African Americans. However, possibly only about 5 photographs depict the African Americans (Nos. 1193, 1218, 4044, 4390, 6779). About 14 images depict workers camps (commissaries), and about 19 or 20 specifically picture the Italian camps.

Some General and Specific Observations

- There is only one photograph that clearly depicts the triangulation stations erected by the MWW engineers to make surveys of the land intended for the new water works facilities in the Nashua River valley (No. 65). Four additional images include a triangulation station for the Wachusett Reservoir in the background (Nos. 2499, 2520, 3222, 3225). Triangulation stations for the Wachusett Reservoir were assigned names; I believe the name for the station at what is known today as Tower Hill (Tower Hill Botanic Garden) was 'Fitzgerald';

- No. 732: This device measured the flow of the Nashua River flowing through the dam site during the construction. In 2000, the device was found in storage in the attic of the Wachusett Dam Lower Gatehouse / Power Station, and remains in the DCR Archives, along with sample recorded sheets. The Archives also holds a blueprint sketch of the apparatus;
- No. 1092: In 1896, the MWW built an engineering field office in Clinton, in the style of a house, along Walnut Street, at the corner of Prospect Street. The 3rd Floor had a photo dark room. The MWW engineers occupied it until 1909; today, it is a private residence;
- No. 1497 includes a sunlight blueprinting apparatus, used by the MWW engineers to expose blueprints;
- No. 3186: Profile Rock, Boylston Street, Clinton; rock remains today along Rt. 62 roadside;
- No. 6017 (print version): Annotated, showing annual construction progress of the Wachusett Dam. At the time of completion in 1906, the Wachusett Dam was one of the largest masonry dams in the eastern U.S., rivaling its nearest competitor, the New Croton Dam for the New York City water supply system;
- Nos. 7551-7552: A break in a turbine at the Wachusett Dam Lower Gatehouse / Power Station flooded the main engine room, and the administrative offices on the 2nd floor, in which most records were destroyed;
- 6 images of the MA National Guard patrolling the Chestnut Hill facilities during the Boston Police Strike of 1919 (Nos. 7591-7596);
- 4 images of the "Captain's houses" in Chelsea (Nos. 6968, 6992, 7003; no. 9049);
- 27 images of the First Baptist Church ("Old Stone Church") in West Boylston (real estate, construction, operations);
- An underwater diver in a diving suit is pictured in No. 1182;
- 11 images of the gypsy moth infestation and defoliation around Spot Pond (Middlesex Fells Reservation) (Nos. 5896-5904, 6772-6773);
- about 15 images picture engineering surveyors (mostly for the Weston Aqueduct Real Estate);
- 11 images picture masted ships in the background (Distribution Department images);
- In the background of some photographs, the structures and land owned by the Metropolitan Park Commission are visible;
- 1 image of the Appalachian Mountain Club (AMC) observation tower, Bear Hill, Middlesex Fells, Stoneham (No. 5224);
- 5 images of the Norumbega Park boathouses, Newton (Nos. 4553, 4634, 4636, 5071, 5072), of which 2 images includes canoeists (Nos. 4553, 5072);
- 6 images of the Tufts College campus, Medford (Nos. 1459, 1460, 5964, 5965, 5966, 5967).

Other Unique Images Not from the 7600 Series

One specific 4" x 5" glass plate negative deserves special mention. Robert Farrington Elwell (1874-1962) was employed as a MWW office assistant working as an engineering draftsman (1897-1901), and made a "Perspective Drawing" of the Wachusett Dam in 1900 (no. 8418 in database). Elwell became a well-known illustrator/artist of the American West, and had a life-long friendship with William F. "Buffalo Bill" Cody (1846-1917), dating to the 1890s.[233]

On Saturday, October 16, 1897, the members of the Worcester Society of Antiquity took a group tour of Wachusett Reservoir/Aqueduct construction site. About 127 persons were on the tour. Nearly all of them are

[233] MWW Employee History Cards, "Elwell, Robert F." and *Register of Engineers and Engineering Assistants Employed Upon the Metropolitan Water Works During Construction, Boston, Massachusetts, 1895-1906* (Clinton, Mass.: W. J. Coulter Press, for the Metropolitan Water and Sewerage Boar, January 1, 1911), p. 10. MSA, Records Series EN4.05/2123X; Ewald A. Stein, "R. Farrington Elwell," *Arizona Highways*, Vol. 35 (October 59), 14, 23-27; Dorothy Harmsen, *Harmsen's Western Americana: A Collection of One Hundred Western Paintings with Biographies of the Artists* (Denver, Colorado: Harmsen Publishing Co., 1971, rev. ed. 1978), 74; *Who Was Who in American Art, 1564-1975: 400 Years of Artists in America, Vol. 1: A-F* (Sound View Press, 1999), 1040. Biographical entries for Elwell are published in numerous publications.

pictured in image No. 8067. The tour is described in George Maynard, "Excursion to Metropolitan Water Basin," *Proceedings of the Worcester Society of Antiquity*, Vol. 16 (1899), pp. 124-132 (see also p. 191). https://archive.org/details/worcecollections16worcuoft

Observations (after World War II)

After World War II, some of the MWW facilities documented in these photographs were transferred to the state parks agency and converted to park and recreation areas.

Other MWW facilities in these photographs have since been taken off-line, and, sometimes, dismantled.

Since 1985, the management and operations of the MWW facilities documented in these photographs has been divided amongst two state agencies, and not managed as a single integrated system in the manner it was designed and constructed.

8. History of the 7600 Metropolitan Water Works Series of Dry Plate Glass Negatives, 1958-2014[234]

By 1911, nearly the entire collection of 7600-plus dry plate glass negatives had been moved to one of the Chestnut Hill Pumping Stations (numbered 6,700s by 1911). Between 1911 and 1964, there were about four Superintendents of Pumping Stations headquartered at Chestnut Hill: Arthur E. O'Neil (1906-1922; died 1922); Charles P. Stuart (1922-1946, retired); Harry P. Morrissey (ca. 1952-1958, retired); and William J. Cooke (1958-1969, retired).[235]

In 1953, two young men in their 20s (H. Bentley Crouch and Donald S. Robinson), both railroad history buffs, walked into the MDC's Headquarters Building at 20 Somerset Street, Boston, and asked Water Division Chief Engineer Harold J. Toole if there were any photographs of the Central Massachusetts Railroad Relocation during the Wachusett Reservoir construction. The Chief Engineer had the two men view photographs from the MWW bound volumes of prints. The two men identified images they were interested in for their personal research use, and the Chief Engineer called the staff at the Chestnut Hill Pumping Stations informing them that two men would be visiting to borrow some of the MWW dry plate glass negatives in order to make prints from them. The two men visited the Chestnut Hill Pumping Stations and were handed the selected negatives, which they borrowed and returned after they had prints made from them.[236]

On April 8, 1958, James J. Matera, Superintendent of the MDC Water Division, Wachusett Section, wrote to Harold J. Toole, Division Director and Chief Engineer, regarding the Sesqui-Centennial Anniversary Pageant to be held for the Town of West Boylston on April 19th. Matera communicated to Toole that a member of the anniversary committee has requested pictures taken by the Metropolitan Water Board during the construction of the Wachusett Reservoir. Toole's April 9th (misdated as March 9th) response to Matera notes that, "I believe they [dry plate glass negatives] are stored in a room at one of our Chestnut Hill pumping stations."[237]

In April 1962, Robert M. Vogel, Curator of Heavy Machinery for the Division of Mechanical and Civil Engineering of the Smithsonian Institution's National Museum of American History (1957-1988), visited the MDC Water Division's Chestnut Hill High Service Pumping Station to view the Erasmus D. Leavitt (1836-1916) pumping engine.[238] The Museum had recently acquired over three thousand drawings of pumping engines designed by Leavitt

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[234] The majority of this section is drawn from original correspondence. The 1962-1965 correspondence is located in the microfilm collection of the MDC Water Division (Boston Office) correspondence (Roll 101) held by the DCR Archives (a duplicate set is held by the MA State Archives). The original correspondence was destroyed by the MDC/MWRA, as authorized by the Massachusetts State Archives, following the microfilming of them in 1985-1986. Some of the 1975 correspondence is located in the same microfilm collection (Rolls 101 and 117). Additional information was provided by Robert M. Vogel through telephone and written correspondence with the MDC Archives during the 1990s, and by William E. Worthington, Jr., museum specialist at the Division of the History of Technology, NMAH, Smithsonian Institution, through ongoing telephone and written correspondence with the MDC Archives between 1988 and 2003. Mr. Worthington retired May 2003, and was succeeded by Jeffrey K. Stine, Curator of Engineering.

[235] Stuart retired in 1946, after 41 years of service; see *Annual Reports of the Metropolitan District Commission, for 1940-1947* (1948), 100.

[236] Telephone conversation with H. Bentley Crouch, Weston, MA, July 25, 2003. Crouch (1928-2005) was one of the two young men. In 1974, Mr. Crouch contacted Robert Vogel at the Smithsonian Institution to obtain permission to publish 20 images Mr. Crouch had printed in 1953 in the publication *The Central Mass.* (Boston & Maine Railroad Historical Society, 1975). Mr. Crouch had learned in the early 1970s that the negatives were at the Institution. A railroad history colleague of Mr. Crouch, Rick Conard, viewed the MWW bound volumes of prints at MDC HQ when he was a high school student in 1968/69. The copy contact prints that Crouch and Robinson made are now in the H. Bentley Crouch Collection and Donald S. Robinson Collection, Walker Transportation Collection, Beverly Historical Society and Museum, Beverly, MA.

[237] MDC, Water Division, Wachusett Section, Office of the Superintendent, James J. Matera, file: West Boylston, Town of. DCR Archives.

[238] For a discussion of the 1922 proposal to establish a National Museum of Engineering and Industry within the Smithsonian Institution, see Arthur P. Molella, "The Museum that Might Have Been: The Smithsonian's National Museum of Engineering and Industry," *Technology and Culture* 32 (April 1991): 237-263; the Smithsonian's National Museum of History and Technology opened to the public in 1964 (p. 259, and see p. 259, note 55).

while he was Chief Engineer of Calumet & Hecla Company, and following Vogel's visit, he contacted the MDC to ask for reproductions of the plans for Leavitt's Chestnut Hill engine. In his response to Vogel, Allan Grieve, Jr. of the Water Division noted that, "We also have one glass slide (negative), size 6.5" by 8.5", of a photograph of this engine." The Water Division provided Vogel with a print from this negative.[239]

In April 1964, Harry H. Catching[240] of Louisville, Kentucky contacted the MDC Water Division asking permission to build an operating scale model of the Leavitt Engine located in the Chestnut Hill High Service Pumping Station. During Catching's visit to Boston to photograph the Leavitt Engine in October 1964, he was given a tour of both the High and Low Service Pumping Stations. It was on this tour that Catching saw thousands of dry plate glass negatives stored in one of the pumping stations. Catching communicated this information to Vogel. In an October 16, 1964 letter to Water Division Director Harold J. Toole, Vogel requested permission to transfer these negatives to the collections of the Smithsonian Institution's National Museum of American History. Vogel also noted that, "the manila paper negative jackets are brittle with age and almost impossible to handle without disintegration."[241] In 1994, Vogel recalled that the plates showed "no damp damage . . . and little if any breakage."

In his November 4, 1964 letter to MDC Commissioner Robert F. Murphy, Water Division Director Toole asked the Commission "to give favorable consideration to loaning this collection . . . to the Smithsonian Institution." Toole emphasized that "we seldom refer to" this collection of negatives, and that in the Boston Office there is a "duplicate set of pictures made from these glass slides, which are readily available for reference purposes and for anyone to examine who desires to do so."[242] On November 5th, the Commission voted "to approve the request of the Smithsonian Institution, dated October 16, 1964, subject to conditions outlined in Mr. Toole's report dated November 4, 1964."[243]

While not communicated in Toole's November 4th letter, Toole expressed to Vogel in his November 6th letter that the negatives of real estate photographs pertaining to the Wachusett Reservoir and Aqueduct "may not be of interest to the Institution." Vogel, agreeing with Toole, recommends in his reply of November 10th that the Institution ship the entire collection to them, cull the collection at the Institution and ship the real estate negatives back to the MDC. Though Toole agrees, William J. Cooke, Superintendent of Pumping Stations and whose office is at the Chestnut Hill Pumping Stations, is instructed to inspect the collection for any real estate negatives and to remove them before shipment; this decision would contribute to the increased condition problems associated with those plates removed from the Institution's shipment.[244]

In early December, a representative from the Institution transported approximately two-thirds of the dry plate negative collection from Boston to Washington, D.C. in a station wagon. Upon receiving this portion of the collection, Vogel is astonished: it "is of a greater historical importance and interest than I first imagined. The amount of detail of the construction scenes recorded by the photographer is astonishing, forming a record of such work that, so far as I know, is absolutely unique in its scope."[245] In July 1965, Vogel transported the remainder of the dry plate glass negatives from Boston to Washington, D.C. in a VW Microbus. During this visit, Vogel returned some of the real estate negatives to the MDC. Twenty years later, the compilers of a 1985 history of the

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[239] The dry plate glass negative for No. 7389 is not extant today. See MDC Water Division (Boston Office) Records, Microfilm, Roll 101, Smi-Smz 1965.

[240] Harry H. Catching died on March 2, 1971 (1888-1971) before completing his model of the Chestnut Hill Leavitt Engine. It remains uncompleted, and in storage through the Smithsonian Institution's National Museum of American History Division of Work and Industry (see Record Group EI-80, Leavitt Engine Collection). See Obituary, *Louisville Courier-Journal*, March 3, 1971, p. B12 and March 4, 1971, p. B13; and Obituary, *Louisville Courier-Journal*, West Kentucky Edition, March 3, 1971, p. A16.

[241] MDC Water Division (Boston Office) Records, Microfilm, Roll 101, Smi-Smz 1965.

[242] MDC Water Division (Boston Office) Records, Microfilm, Roll 101, Smi-Smz 1965.

[243] MDC, Minutes, Vol. 31, p. 262, paragraph 4.

[244] MDC Water Division (Boston Office) Records, Microfilm, Roll 101, Smi-Smz 1965. Cooke served as Superintendent from 1958 until his retirement in 1969.

[245] MDC Water Division (Boston Office) Records, Microfilm, Roll 101, Smi-Smz 1965.

MWW note that, "Perhaps a hundred or so glass plates remain here [Chestnut Hill High Service Pumping Station], uncatalogued and in poor condition."[246] These plates could be the plates that Vogel returned and/or the plates pulled by the MDC. This report also notes that in the MDC Water Division offices "there are several boxes of glass plate negatives which appear to have been made from drawings."[247] Vogel notes in his July 26th letter to Toole that they were "in the process of making record contact prints of the entire group and when this is done a listing will be made and a copy sent to you" (as required by Toole's conditions).

The Division of Mechanical and Civil Engineering of the Smithsonian Institution's National Museum of American History did replace the brittle paper envelopes with glassine envelopes, marking the negative number on the glassine. Wooden crates were constructed to hold the plates; at most 200 per crate. It is unknown whether the Smithsonian Institution contact printed each negative as it stated it would and if it created a complete list of the negatives. There is no record of the Water Division ever receiving such a list as required by the Commission vote. The Institution did contact print some of the negatives which today are located in the Museum's Record Group EI93, Mills and Factories Collection.[248]

Back in Massachusetts, the Boylston Historical Society was established in 1971 (inc. 1972) and the West Boylston Historical Society was incorporated in 1972. In 1972 and 1973, the Boylston Historical Society contacted the Smithsonian Institution regarding the making of modern prints from the Metropolitan Water Works dry plate collection. While the Smithsonian Institution did not have the negatives of any of the prints the Society was looking for, the Institution did suggest in a December 1974 letter that all real estate negatives in their possession from this collection regarding Boylston be transferred to the Society. The Institution suggested that permission from the MDC would be necessary first.[249] The West Boylston Historical Society made the same request in 1973 as their counterpart did in Boylston, and unlike Boylston, the Institution did have real estate plates pertaining to West Boylston. The Institution made the same suggestion to the West Boylston Historical Society also in a December 1974 letter.

In a February 6, 1975 letter to Robert Vogel, James Matera, MDC Water Division Director, does not object to the Institution's suggestion, "with the condition that they will be available at any later date upon our request." Vogel's February 19th reply concludes the agreement.[250]

Though Edgar A. Whitcomb (1929-2005), President of the West Boylston Historical Society, made a trip to Washington, D.C. in 1975 to pick-up the plates for both his society and for the Boylston Historical Society, miscommunication prevented him and Vogel to meet. Vogel transported the plates to West Boylston during a later trip to New England.[251]

While compiling volume one of the *Guide to Photographic Collections at the Smithsonian Institution*, the Division of Engineering and Industry of the Smithsonian Institution's National Museum of American History contacted the MDC Archives in April 1988 to report that they had located 38 wooden crates of approximately 7,000 6.5" x 8.5" dry plate glass negatives dating between 1895 and 1921 of various water construction projects of the MDC and its agency predecessors. Since the collection was on loan in order to secure better storage conditions, the Smithsonian Institution never accessioned it. However, the Smithsonian Institution did include the collection as an entry within volume one of

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[246] Martha H. Bowers and Jane Carolan, prep., *The Water Supply System of Metropolitan Boston: 1845-1947* (Wellesley, MA: Cultural Resource Group, Louis Berger & Associates, for the MDC, 1985), VI-2.
[247] Bowers, *Water Supply System of Metropolitan Boston*, VI-2.
[248] There are 128 contact prints according to an e-mail from a 2011 intern working at the Archives Center, National Museum of American History, Smithsonian Institution; see e-mail, William J. Callahan to Sean M. Fisher, March 17, 2011. DCR Archives.
[249] MDC Water Division (Boston Office) Records, Microfilm, Roll 117, Vi-Vz 1975.
[250] MDC Water Division (Boston Office) Records, Microfilm, Roll 117, Vi-Vz 1975; see also Roll 101, Smi-Smz 1975.
[251] In 2000, Edgar Whitcomb shared his story about his visit to Washington, D.C. He happened to visit both on a Saturday and on a day of a major protest rally along the Washington Mall. Vogel was not in his office on that day. I sincerely wished Edgar had lived to see the MWW Photograph Collection accessible online. It would have made him very pleased; he died in 2005.

their guide to photographic collections.[252] The entire collection of plates was returned to the MDC Archives in April 1990. At that time, the staff of the MDC Archives dubbed the collection, the "Smithsonian Collection." The plates remained in these wooden crates until the cleaning and rehousing work of fall 2000 – winter 2001. As the office of the MDC Archives was frequently moved in the 1990s, the 38 crates of plates were also moved: MDC Headquarters, 20 Somerset Street, 1st floor (4.5 years); 2nd floor (4.75 years); 1st floor (5.5 months); Charles River Upper Basin Headquarters, 1400 Soldiers Field Road, Brighton (aka the Almy's Building), 2nd floor (2 years).

When the MDC Water and Sewerage Divisions were removed in 1985 to form the Massachusetts Water Resources Authority (MWRA), the Authority's Records Center acquired by the early 1990s approximately 1,100 plates found at the Chestnut Hill High Service (and/or Low Service) Pumping Station, the Mystic Shops[253], Somerville (formerly the Mystic Pumping Station, Mystic Water Board), and at the Glenwood Pipe Yard, Medford (Distribution Department, headquarters of the northern portion of the MWW).

In January 2000, an additional 19 plates from the same MWW dry plate glass negative collection that were in the Smithsonian Institution's possession from 1965-1990 were returned to the MDC Archives. And in April 2000, an additional 3 plates were returned. All of these plates were broken in 1990 and kept behind from that year's return. In 1999-2000, they were re-discovered by the Division of the History of Technology.

In March 2011, an intern working for the Archives Center of the National Museum of American History, Smithsonian Institution contacted the DCR Archives to inquire about the MWW 1895-1921 photographic collection as the intern was processing its portion of the collection. Through these communications, it was learned that the Institution still held one (1) additional MWW glass plate negative (No. 728, broken; which was missing from the collection) and a collection of 877 cyanotypes from the MWW 1895-1921 negatives. Glass plate

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[252] See Diane Vogt O'Connor, *Guide to Photographic Collections at the Smithsonian Institution, Vol. 1: National Museum of American History* (Washington, D.C.: Smithsonian Institution Press, 1989), p. 117: Record Group EI14, Boston Waterworks Collection; and pp. 153-154: Record Group EI93, Mills and Factories Collection.

[253] Between July 1920 and February 1922, the 1864 Mystic Pumping Station, Somerville, was renovated. As a result of the 1919 merger of the MWSB and the MPC, when, in fall 1921, the MDC Parks Division physically moved into the Boston Office of the Water and Sewerage Divisions at Nos. 1 and 3 Ashburton Place, at corner of Somerset Street, space which the MWW had occupied since 1900 and the MSW since 1904, there was insufficient space to store records. The Boston Office records of the Water Division and Parks Division (not sure of the Sewerage Division) were moved to the second and third floors of the renovated pumping station, now called the Mystic Shops. See *First Annual Report of the Metropolitan District Commission, for 1920* (1921), 135; *Second Annual Report of the Metropolitan District Commission, for 1921* (1922), 2; *Third Annual Report of the Metropolitan District Commission, for 1922* (1923), 31; Foss to Bailey, March 7, 1922, in MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 39, pp. 122-123; Foss to Bailey, January 10, 1924, in MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 41, pp. 167-168; and Foss to Keniston, June 18, 1925, in MWW, General Reports from the Chief Engineer, Letterpress Copybook, Vol. 43, pp. 208-209 (MSA, Records Series EN4.05/2103X). In the early 1990s, the MWRA located the records that had been stored at the Mystic Shops for 70 years. The records (some with mold) were moved to the MWRA Records Center, Quincy Fore River Shipyard, Quincy. The majority of these records remained there to spring 2006, encompassing approximately 175 boxes, though some may have been destroyed, possibly in the late 1990s. Within the Records Center's database, these records were assigned the name 'Mystic Pumping Station' under the field of 'Originator' (which was not entirely accurate). Many, but not all, of these records were transferred to the DCR Archives in spring 2006, as the DCR Archivist could provide archival arrangement and description for multiple archival records sets that were found widely dispersed amongst so many record boxes. In early spring 2002, an additional small collection of bound volumes of correspondence and pumping station logbooks were located in the third floor attic, along with 3 crates of dry plate glass negatives, a card file drawer of employee history cards, and oversized, mounted images. In August 2002, the 3 crates of negatives were transferred to the MWRA Records Center per my recommendations of April 17, 2002. However, the whereabouts of the other archival records is unknown to me. Additionally, according to a 1981 report, the Glenwood Yard, Distribution Section HQ, held in 1981 "a very large trove of old documents and annual reports here which belongs in the future MDC Archive before it is lost or destroyed." It is unclear if the MWRA destroyed these records or transferred them to its Records Center. The Glenwood Yard buildings were vacated by the MWRA in 2002, and designated surplus property, and subsequently sold by the Commonwealth to a condominium developer (Amaranth Place). See *Proposed Operations Center--Chestnut Hill Pumping Stations: Feasibility Study, Phase II Report* (New Bedford, MA: The Preservation Partnership, for the MDC Water Division, July 1981), 19.

negative No. 728 (broken into 2 pieces) was returned to the DCR Archives in July 2013; a delay of more than 2 years. The cyanotypes remain in their collections.

As noted earlier, in July 2014, a private citizen offered thirteen (13) original 6.5" x 8.5" MWW glass plate negatives from the 7600 Series to the Massachusetts Historical Society (MHS). MHS contacted the DCR Archivist, and in August, I met with both MHS and the donor to review the negatives. The donor did not recall how her family acquired the negatives, but upon learning of how they fit into the whole MWW glass plate negative collection, they were donated/returned to DCR in September 2014.

9. Description and History of the Bound Volumes of Photographic Prints from the 7600 Series of Dry Plate Glass Negatives

The photographic prints from the MWW 7600 Series of dry plate glass negatives were arranged into 18 subject categories and bound into 69 volumes for easy reference. Most subject categories encompass more than one volume. Of the numbered images ranging from 1 to 7,672, only 21 numbers were either not used or not printed and bound into the volumes (totaling 7,651 numbered images).[254] Only 36 numbered images were printed in more than one bound volume, excluding the volume entitled "Structures of the Metropolitan Water Works," in which all 84 prints are bound elsewhere.[255] Thus, the bound volumes include approximately 7,776 [or 7,771] prints.[256]

Two official sets of the bound volumes of photographs were created.[257] One set is stamped "Board Room" on the front inside pages (representing the Board's set), while the other set is not stamped in any form, but likely represents the Chief Engineer's set. However, one set is incomplete, missing four volumes: Distribution Department, Volumes 10 and 11; Sudbury Department, Volume 1; and Structures of MWW, Volume 2. As a result, there are a total of 134 volumes extant. Given the comprehensiveness of the printing/binding work, I believe that at least two of the four volumes were printed/bound (DD, Vols. 10-11), but are not extant today.

Nearly all of the volumes were bound and identified in the exact same manner. Each volume measures 6.75" x 10". The title of the volume is stamped on both the front cover and on the spine. The same title information appears on a title page. Following the title page is a typed table of contents listing all information known about the photograph (negative number, location and subject, and date). Each table of contents is in negative number order as are the photographs in the volume. Each title page and all table of contents pages are on light blue paper. Of the 69 bound volumes of photographic prints, 68 include a table of contents, totaling 554 title and table of contents pages.[258]

In 1906, the Metropolitan Water and Sewerage Board bound four volumes of photographs from the 7600 Series pertaining to West Boylston and the vicinity and donated it to the West Boylston Public Library. There are a total of 366 images bound in these four volumes. Each presentation album, bound exactly like the official two sets, includes a bookplate that reads, "Received 1906".

During the course of the 1970s-1990s, numerous volumes of the photographs were loaned to the Boylston Historical Society, West Boylston Public Library, and the Clinton Historical Society. For example, in 1972 or 1973, James Matera, MDC Water Division Assistant Director, loaned the Boylston Historical Society eight bound volumes of the photographs. A June 1, 1973 letter from the then Boylston Historical Commission to the Smithsonian Institution states that, "The numbers listed below were taken from the table of contents of Books I through VIII, loaned to us by Mr. James Matera, Assistant Director of Waterways, M.D.C., Boston,

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[254] Nos. 8, 15, 42, 43, 44, 45, 46, 47, 48, 49, 101, 660, 4683, 4858, 4884, 7667, 7668, 7669, 7670, 7671, and 7672.

[255] Nos. 1, 2, 3, 9, 20, 21, 22, 23, 24, 2523, 2569, 2570, 2571, 2964, 2965, 2966, 2967, 2968, 2969, 2970, 2971, 2973, 5255, 5891, 5892, 5908, 5909, 5910, 5924, 5925, 5926, 5930, 6009, 6452, 6453, and 6454.

[256] Distribution Department, Vol. 17 at the MWRA includes No. 7666 (84), while the same volume at the MSA does not include this print (83). Both of these volumes include No. 7666A (Arlington Reservoir, 1925) which is not counted as part of the numbered 7600 Series. Wachusett Dam, Vol. 4 at the MSA is missing No. 5476; and Electrolysis, Vol. 2 at the MSA is missing Nos. 6333, 6334, 6455, and 6456.

[257] The Metropolitan District Water Supply Commission (MDWSC), the special construction agency (1926-1947) that built the Quabbin Reservoir and the Hultman (Pressure) Aqueduct between 1926 and 1940, created two official bound sets of their approximately 15,000 real estate, cemetery and construction photographic prints: the Chief Engineer's set and the Secretary's set. Today, the Chief Engineer's set is held by the Massachusetts State Archives and the Secretary's set is held by the DCR, Office of Watershed Management, Quabbin Administration Building, Belchertown. These photographs are in heavy use at both locations.

[258] Three additional volumes at the MSA do not include a Table of Contents, though the same volumes at the MWRA Library include the Table of Contents: Distribution Department, Vol. 17; Electrolysis, Vol. 2; and Wachusett Department, Vol. 2.

Massachusetts."[259]

On April 26, 1976, MDC Water Division Director James J. Matera wrote to James A. Cooke, Chairman of the West Boylston Historical Society communicating that the MDC is "pleased to make available for public use, volumes of the photographic records regarding the original Wachusett Watershed Development, as listed on the attached sheet. It is understood that these records will be available for all at the West Boylston Public Library. Again, the Commission is happy to make these records available with the condition that at any future date, they will be returned to the Commission upon its request."[260] An attached list dated April 7, 1976 follows and lists the titles of nine volumes.

On May 28, 1976, Muriel H. Stiles, Librarian of the Beaman Memorial Public Library, West Boylston, wrote to MDC Water Division Director James Matera acknowledging receipt of the nine volumes. Ms. Stiles wrote that "The Trustees and Staff of the Beaman Memorial Public Library are very pleased with the nine historical volumes of photographs of Wachusett Reservoir real estate. The volumes have been shelved with our historical collections and are being enjoyed by interested residents."[261] The Library did not accession these nine volumes.

On June 12, 1980, the MDC Commission voted to approve the MDC Water Division's request to transfer possession and ownership of 53 bound volumes from the MWW 1895-1921 Series (plus additional photographs after 1926) to the Massachusetts State Archives. These volumes were duplicates; the MDC's Water Division maintained the remaining volumes. The "Transfer Acknowledgement" Form indicates that "Wachusett Reservoir, Real Estate, Volume 15" [spine title] was part of this transfer. The fact that eight volumes had already been "loaned" to the BHS ca. 1972 (Vols. 1, 1-7 on spine) and the next seven "loaned" to the West Boylston Public Library in 1976 (Vols. 8-14 on spine) explains why these fifteen volumes were omitted from the 1980 transfer (there are two Vol. 1's: General Views and Real Estate).

The second duplicate set of all of these volumes remained with the MDC Water Division until 1985 when the MWRA was created by the removal of the Water and Sewerage Divisions from the MDC. MDC Water Division Chief Engineer William A. Brutsch (1940-2009) saved the set (and other contents of the Division's vault/library) from being discarded. The second set remains with the MWRA Library.

In 2000, the repositories that held bound volumes of the prints were divided as follows:

• Massachusetts State Archives:	53 (2 of which has both editions)
• Massachusetts Water Resources Authority (MWRA) Library:	64 (but 1 volume is missing)
• West Boylston Public Library:	9 (plus 4 from 1906: 13)
• Boylston Historical Society:	8
• Clinton Historical Society:	0 (loose prints only)
Total:	134 (plus 4 from 1906: 138)

No single repository held a complete set of the bound volumes, and approximately 33% of the prints are significantly faded.

Today, the spines of many of the bound volumes are in poor condition. It is common to find front and back covers and the endleaves completely torn away from the spine. Occasionally, non-library binding tape has been used to reattach the covers resulting in poor preservation management. Through a 2000-2001 grant from the Massachusetts Board of Library Commissioners, the West Boylston Public Library undertook preservation and conservation measures for its photographic collections. For the 9 bound volumes of MWW photographs loaned by the MDC Water Division in 1976, each were individually enclosed in a CONSERpHASE™ box by Bridgeport

[259] From files at the Boylston Historical Society, Letter from Norman H. French, Vice Chairman, Boylston Historical Commission to Robert M. Vogel, June 1, 1973.
[260] MDC Water Division (Boston Office) Records, Microfilm, Roll 128, WER-WG 1976. DCR Archives.
[261] MDC Water Division (Boston Office) Records, Microfilm, Roll 9, BEA-BEC 1976.

National Bindery, Inc. (Agawam, MA).

The MWW Photographic Preservation and Access Project does not address the preservation needs of the bound volumes of prints. It is unfortunate that the West Boylston Public Library made no attempt to partner with the other holders of the bound volumes to address the preservation needs of the entire collection. The Library consulted with Boston photograph conservator Paul Messier regarding the volumes.

In 2001, the MWW bound volumes of photographic prints on loan to the Boylston Historical Society and the West Boylston Public Library were returned to the MDC, and physically placed at the MA State Archives, as part of the other MDC portions of the MWW Photograph Collection. The volumes were legally transferred from DCR to the State Archives in September 2014.

By end of 2014, the Massachusetts State Archives held a full and complete set of the MWW bound volumes of photographic prints, fulfilling the intent of the 1980 transfer from the MDC Water Division. The MWRA, through its Library, retains the second original duplicate set of bound volumes of MWW photographic prints.

10. Description of Selected Numbered and Unnumbered Loose, Mounted and Oversize MWW Photographic Prints

In addition to the bound volumes of photographic prints from the 7600 Metropolitan Water Works Series of dry plate glass negatives, there are collections of loose photographic prints from these negatives, from unnumbered negatives described above, and from unnumbered negatives that are not extant. There are also photographic prints supported on mounting board from the 7600 Series, from unnumbered negatives, and from unnumbered negatives that are not extant; these are in various sizes, but mostly oversize.

In 2000, these government-created loose, mounted and oversize photographic prints from the pre-1895 Boston Water Works (BWW) era, and from the post-1895 MWW era were scattered across the MDC (Archives; Wachusett Dam Administration Office); the MWRA (Records Center); MA State Archives (likely from the 1980 transfer, and from ca. 1990 transfers from the MDC Archives); and at local history repositories such as the Clinton Historical Society (mostly from a 1904 donation by the MWSB); and the Southborough Public Library (from a 1970s donation by a son of a former MDC Water Division employee).

The collections of loose, mounted and oversize MWW photographic prints at the MDC Archives, and at the MDC Division of Watershed Management, Wachusett Dam Administration and Engineering Office were merged together in 2001, archivally rehoused, and, with the glass plate negatives, placed on loan to the State Archives. The oversized mounted photographic prints at the MWRA Records Center were archivally rehoused in the early 2000s, and merged with the MDC/DCR loan portion at the State Archive in the mid-2000s, as were the MWRA Records Center's portion of loose MWW photographic prints from the 7600 Series.

The MWRA Records Center and Library located additional loose, mounted, and oversize B/MWW photographic prints over the years, and through 2014, these were added to the project.

Here is a table that documents the approximate number of B/MWW loose, mounted and oversize photographic prints from the DCR, MWRA and MA State Archives portions in 2014.

	DCR	MWRA	State Archives	Total
loose photo prints (from 7,672 Series)	about 208	about 321	about 198	about 727
loose/mounted/oversize photo prints (not from 7,672 Series)	about 76	about 103	about 88	about 267

A selection of the unique images and sets of these loose, mounted or oversize MWW photographic prints include the following.

A. From DCR and MA State Archives (from MDC)

One (1) bound volume entitled, "Photographs Showing the Prevalence of Electrolytic Damage to Water Pipes near the Electric Railway Tracks and Power Stations in the Vicinity of Boston, Mass.," W[illiam] E. Foss, Consulting Engineer, January 1, 1907 [MWW Distribution Department Engineer]. Bound between boards, there were thirty-one (31) 6.5" x 8.5" or smaller photographic prints mounted on cloth. Of the 31, 29 are photographic prints and 2 are halftones. Of the 31, 21 are from the MWW 7600 Series[262], and the remaining 10 are from other water works systems (nos. 9141-9150 in database). Each image is numbered 1-31, hand-written in ink, at the top right corner; a circle is drawn around each number. Four prints representing nos. 14, 18, 19, and 24 are missing, but there

[262] Nos. 3540, 3544, 3733, 4067, 5104, 5181, 5359, 5409, 5558, 5589, 5734, 5740, 5741, 5809, 5829, 6004, 6028, 6048, 6050, 6055, and 6058.

are 4 unnumbered prints at end of volume. There is a typed table of contents (3 pages) in front. On the verso of 3 prints, there are newspaper clippings (nos. 15, 20, 28).

Eight (8) cyanotypes from the 7600 Series.

Two (2) cyanotypes of a scow boat for Wachusett Reservoir, 1909 (nos. 9066-9067 in database)

Two (2) keys to names of employees in Nos. 1098 and 1168 (nos. 9154-9155 in database)

Mounted photographic print of Spot Pond Pumping Station, photograph by Nathaniel L. Stebbins (NLS Negative No. 11798) (no. 9078 in database).

One (1) photographic print on mounting board from an unnumbered negative (no. 8145 in database) of Wachusett-Sudbury Power Transmission Line work. The dry plate glass negative to no. 8145 had been found at the MWRA Records Center.

Four (4) mounted photographic prints (2 of each) of MWW Truck No. 13, parked along Somerset Street, behind the Suffolk County Courthouse, 1916 (nos. 8122, 9057-9059 in database). The dry plate glass negative to no. 8122 had been found at the MWRA Records Center.

Six (6) 3.75" x 4.75" photographic prints supported on mounting board (6" x 7"), taken by Oliver D. Flood (1866-1940; active 1905-1912)[263], of Leominster, showing construction work of the Wachusett Dam is it was being completed, 1905 (2nd half) (nos. 9079-9084 in database).

One (1) rolled panoramic negative (nitrate negative), Wachusett Dam and Grounds, spring 1919, photograph by Charles L. O'Toole (1874-1959), O'Toole Studio, Clinton, MA, for the MDC Water Division (no. 9514 in the database). The 7 13/16" x 39.50" negative was found at the back of a supply closet at the Wachusett Dam Administration Office (Lower Gatehouse) in 2000.

Two (2) photographic prints supported on mounting board (ca. 1895): Venturi Meter (30"); and Recording Apparatus (Register), Venturi Meter. These prints were probably advertising photographs from the Builders Iron Foundry, Rhode Island, because they are published in the Foundry's reprint of an article by Clemens Herschel.[264] (nos. 9075-9076 in database).

There are two (2) slightly different loosely bound volumes entitled, "Photographs of Pumping Station Designs", with a total of 21 unique images; one at the MWRA Library (nos. 9300-9316 in the database), and one at the State Archives. The MWRA version includes 14 photographic prints, and 3 documents. The State Archives version includes 22 photographic prints (and no documents), with 7 photo prints unique to this volume (not yet scanned), and not in the MWRA version; and with 4 images in the MWRA version not in the State Archives version. The images represent the architectural design sketches for the Chestnut Hill Low Service and Spot Pond Pumping Stations as submitted by six (6) firms. The designs were judged without the submitter's attribution, using a key code, which is explained on the 3 associated documents in the MWRA version. The MWRA version was found in its Records Center in 2006, and transferred to its Library at that time.

The photographic prints of these ca. 1897 architectural designs were likely made in December 1902, according to

[263] According to Leominster City Directories, Oliver D. Flood's listed occupation between 1907 and 1912 is photographer. Flood is listed in the *Leominster City Directory* between 1913 and 1941, but never as a photographer. The 1942 City Directory lists Flood's death as November 15, 1940, at the age of 74. Flood's occupation in the 1903-1906 city directories is motorman for a street railway company. See also Obituary, *Leominster Daily Enterprise*, November 15, 1940, p. 2, c. 3.
[264] Clemens Herschel, "Measuring Water," *Polytechnic* [publication of the Rensselaer Polytechnic Institute] 11 (March 23, 1895): 135-144 (in State Library, Call No. 628.16/A1/vol.3/no.10).

a Weekly Report.[265]

Within the MWW Photograph Collection, there are scores of 6.5" x 8.5" dry plate glass negatives and photographic prints that were not originally assigned a 7600 Series number, but are very similar to 7600 Series numbered images. These unnumbered (and un-captioned) images were likely rejected images for the official set. Many, but not all, of these images have a slightly different angle or perspective than their numbered counterpart; while other images are very unique and not similarly duplicated elsewhere in the photograph collection. We will likely never know why such images were not assigned a number.

B. From MWRA Records Center

Three (3) reversible bound volumes were located, with soft covers titled:

- "Triplicates, 1214-1531, B.R. [Board Room]";
- "Triplicates, 1532-2990, B.R. [Board Room]";
- "Triplicates, 4586-5211".[266]

These volumes were unbound, and the individual loose photo prints were archivally rehoused and sequentially merged with the other 7600 Series loose prints from the MDC/DCR portion in the mid-2000s.

C. MWB's Exhibit at the Paris Exposition of 1900

The MWB created an exhibit for the Paris Exposition of 1900, a World's Fair. The "wall exhibit" consisted of a large map, and 18 "bromide enlargements" of MWB photographs. The exhibit was in the Department of Civil Engineering and Transportation (Group VI), and was awarded a Gold Medal (as was the exhibit by the Metropolitan Sewerage Board and the Metropolitan Park Commission). The Gold Medal was not received by the Board until February 1902.[267] Ironically, in December 1898, the Board had declined an offer from the Massachusetts Board of Paris Exposition Managers to participate in the World's Fair. The 18 enlargements (either 22" x 28" or 16" x 20") were made from the 7600 Series of numbered negatives: Nos. 650, 1181, 1214, 1253, 1281, 1283, 1412, 1541, 1662, 2063, 2552, 2557, 2822, 2848, 3013, 3053, 3075, and 3078.[268] The enlargements were made by Charles M. Litchfield (1850?-1914)[269], Boston, whom also retouched some of the enlargements by improving the perspective "by means of clouds in the sky, and by sharpening the outlines and making the shadows clearer in the foreground."[270] Half of these numbered enlargements were extant at the MWRA Records Center. In 2001, under my direction, these were discarded, many of them were very brittle with missing corners, and generally in very poor condition. Correspondence between the MWB and Litchfield indicates that the Board had additional enlargements made at the

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[265] MWW, Letterbooks of Weekly Reports from the Engineering Office Force to the Chief Engineer, Vol. 4, December 29, 1902. DCR Archives.

[266] The MDWSC (1926-1947) and later the MDC Construction Division (1947-1970s) also created triplicate bound volumes of their construction contract photographic prints; in addition to their "Secretary" and "Chief Engineer" sets. These triplicate sets are usually not complete volumes that mirror the 2 official sets.

[267] MWW, Letters from the Secretary, Letterpress Copybook, Vol. C, p. 94. MSA, EN4.05/2096X. The Gold Medal is not extant, but through the MWW Photographs Project, we found at the MWRA Records Center an engraved certificate of the MWB's Gold Medal Award (21.75" x 17.25") (no. 9513 in database; digitally scanned; and integrated into MWW Photograph Collection). The MPC's Gold Medal is extant in the DCR Archives. Ironically, the MWB had originally declined to offer an exhibit to the Paris Exposition; see MWW, Letters from the Secretary, Letterpress Copybook, Vol. H, p. 271. MSA, EN4.05/2096X.

[268] MWW, Letters from the Sudbury Department, Letterpress Copybook, Vol. 5, p. 877. MSA, EN4.07/2098X.

[269] Obituary, *Boston Transcript*, January 15, 1914, p. 7, c. 6. Polito, *Directory of Massachusetts Photographers*, 90, 152.

[270] Additional correspondence is in Records of the Massachusetts Board of Paris Exposition Managers, Manuscript Collection No. 21, State Library of Massachusetts, Special Collections Department, Boston, MA. For example, on January 13, 1900, MWB Secretary William N. Davenport writes to the Secretary of the Massachusetts Board indicating that the MWB is sending a set of the Board's annual reports to him for the MWB's exhibit (Box 2, Folder 19).

same time--for use of the Board, and not for the Paris Exposition. Thirty-six photographs were published in the MWB's 43-page pamphlet written for the Exposition.[271]

After the Paris Exposition (April 15 – November 12), the MWB's exhibit (and the exhibits by the other two metropolitan boards) was exhibited at the Pan-American Exhibition of 1901, in Buffalo, NY (May 1 - November 2). It was also exhibited at the Louisiana Purchase Exposition of 1904 in St. Louis, MO (April 30 - December 1), and at the Lewis and Clark Centennial Exposition of 1905, in Portland, OR (June 1 - October 15).[272] The MWB and the MWSB Annual Reports make no mention of the MWW's exhibits at these expositions.

While the 18 bromide enlargements from the 7600 Series printed in 1900 do not survive, there is a photograph of eight (8) of them in 1930, on exhibit in the MDC's agency exhibit for the statewide Tercentenary Exposition. Two photographs from this exhibit include MWW Nos. 1214, 1253, 1283, 1412, 1662, 2822, 2848 and 3075 in their frames.[273] In addition, these same 1930 photographs include oversize mounted B/MWW photographic prints that survive today in the MWW Photograph Collection (No. 5476, and nos. 9509, 9510, 9511, and 9901 in database).

D. MWW Photographic Prints interfiled in MWW Letterbooks

Occasionally, interfiled in MWW Letterbooks amongst the reports received by the Chief Engineer of the MWW from his assistants and by the Chairman of the MWB are photographic prints; only three of which are from the 7600 Series. These Letterbooks were transferred from the MDC Archives to the State Archives in 1997. The records series are as follows:

1. EN4.05/2103X: Metropolitan District Commission, Water Division, General Reports from the Chief Engineer to the Commissioner

   There are three photographic prints between pages 141-142 of Volume 21 (May 1911 - February 1912): Negative/Print Nos. 6589, 6617, and 6795 (see Sudbury Department, Volume 1).

2. EN4.05/2108X: Metropolitan District Commission, Water Division, General Reports from the Distribution Department Assistant Engineers and Division Engineers to the Distribution Department Engineer and Chief Engineer

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[271] *Water Supply and Work of the Metropolitan Water District (Boston and its Vicinity) in the Commonwealth of Massachusetts, U.S.A.* (Boston: Wright & Potter, 1900). The 36 photographic plates were Nos. 229, 650, 1181, 1214, 1253, 1281, 1283, 1352, 1354, 1407, 1412, 1477, 1541, 1548, 1552, 1662, 2063, 2133, 2153, 2521, 2552, 2557, 2605, 2705, 2774, 2822, 2848, 2883, 2888, 2897, 3013, 3053, 3075, 3169, plus Sudbury Aqueduct, Echo Bridge (plate 19) from FitzGerald's 1895 history (opp. p. 20), and the Chestnut Hill High Service Pumping Station, with addition (plate 21), an unnumbered negative from 1898 or 1899 which was published in the *Fourth Annual Report of the MWB, for 1898* (1899), opp. p. 66 (no. 8103 in the database).

[272] The MPC's exhibit won a Gold Medal in 1904 and 1905, and a Silver Medal at the Panama-Pacific International Exposition of 1915, San Francisco (Feb. 20 – Dec. 4). The DCR Archives holds each of these medals. The MSB's exhibit of 1900 (Paris) is described in its *12th Annual Report, for 1900* (1901), 35. For general information pertaining to each exposition, see John E. Findling, ed. *Historical Dictionary of World's Fairs and Expositions, 1851-1988* (Westport, Conn.: Greenwood Press, 1990).

[273] Tercentenary Exposition of Governmental Activities of the Commonwealth of Massachusetts, 1930, Photograph Album, (photographs by Paul E. Genereux [1892-1977]), Photograph 385, State Library of Massachusetts, Special Collections, Boston, MA. MDC Exhibit, Print Nos. 113, 151-155; see Print Nos. 154 and 155. DCR Archives has duplicate prints of these nos. Also Massachusetts Governmental Activities Exposition Photograph Album, 1930, PH043, Special Collections and Archives, W.E.B. Du Bois Library, University of Massachusetts, Amherst, MA, which holds 88 of the 175 photo prints. See also *Eleventh Annual Report of the Metropolitan District Commission, for 1930* (1931), 4-5.

In Volume 10, between pages 208-209, there is one photographic print (3.25" x 6.5") pasted onto paper and attached to a three-page typewritten report pertaining to the MWW inspection of a pipe-cleaning machine used in Hartford, CT, October 1912 (no. 9161 in database; not scanned).

3. EN4.07/2104X: Metropolitan Water and Sewerage Board, Water Works, General Reports to Chief Engineer from Consulting Engineers and other Consultants, and from Various Water Works Engineers

a. There is a report dated February 16, 1899 from the Olmsted Brothers pertaining to raising the water level of Spot Pond, and landscaping the shores and relocating the roads around the pond (1898-1899). One typewritten (carbon copy) report includes thirty 6.5" x 4.25" photographic prints pasted onto paper documenting the shoreline of the pond (Volume 3, pp. 108-146). There is a topographical map of Spot Pond which is marked as to where each photograph was taken, and the names of each section of the pond are also noted (20.25" x 15.5"; between pp. 146-147). In 1900, the *Journal of the New England Water Works Association* published an article regarding this work by the Olmsted Brothers at Spot Pond.[274]

A second original copy of the report (with original prints) was found in the MWRA Records Center. This copy is water damaged which had caused most of the photographs to become detached from the glued corners and the emulsion is flaking on some of the prints. On the reverse side of each print (except the last on p. 33) there is a lengthy hand-written (in pencil) caption, date and negative no. furnished by the Olmsted Brothers firm. Each caption starts with the following information: Spot Pond—July 1898—A.S. 'A.S.' refers to Arthur A. Shurcliff (1870-1957), who was employed by the Olmsted Brothers during the late 1890s. The 29 negative numbers range from 15138 to 15306.[275] In November 2002, these photographs were removed from this copy of the report, resleeved in Mylar, and assigned database numbers (nos. 9111-9140 in database). Both the typescript and the rehoused photographic prints are in the MWW Photograph Collection, and the prints were also digitally scanned as part of the 2012-2014 project.

A third original copy of the report (with original prints) is held by the Library of Congress, Manuscript Division, in The Records of the Olmsted Associates, Series B, Job No. 2073 [Metropolitan Water Board, Spot Pond], Container B108. The report is also available on microfilm (in The Records of the Olmsted Associates, Series B, Job No. 2073, Container B108, Microfilm Reel 79 [frames 135-154], Library of Congress, Manuscript Division).

The Olmsted Archives at the Frederick Law Olmsted National Historic Site (Brookline, MA) holds a related collection. Within the records of Job No. 2073 (Metropolitan Water Board, Spot Pond) there is a photograph album encompassing 79 prints dating from 1898-1902. A four-page typescript within the album lists the descriptions for each photograph, and these descriptions match those that are on the verso side of the prints from the water-damaged typescript described above. Each print is numbered in the lower right corner with the Job No. as the prefix (2073), followed by a print number. The prints are numbered from 2073-1 to 2073-78 (the 79th being a postcard). In this album, nos. 1-29 are the same images found in the 1899 Report. The typescript notes that these 29 images were taken by Arthur A. Shurcliff in July 1898. The 30th (and last) print in the 1899 Report is not in the album. Nos. 30-78 include construction and post-construction (i.e. landscaping) images from 1899-1902. The 35mm microfilm format of the negatives to these images do not include any images not found in the album. In 2014-2015, the Olmsted Archives posted these images online, through flickr, as part of a project to place the entire photograph album collection at the Olmsted Archives online.[276]

[274] See Frederick Law Olmsted, Jr., "Landscape Problems in the Improvement of Spot Pond Reservoir, Metropolitan Water Works," *Journal of the New England Water Works Association* 15 (March 1901): 272-87.
[275] 15138, 15139, 15140, 15141, 15142, 15143, 15145, 15284, 15285, 15286, 15287, 15288, 15289, 15290, 15291, 15292, 15293, 15294, 15295, 15296, 15297, 15298, 15299, 15300, 15301, 15304, 15305, 15306, and 15385.
[276] See https://www.flickr.com/photos/olmsted_archives/sets/72157647210689966/

At the Visual Resources Collection, Loeb Library, Graduate School of Design, Harvard University, there are approximately 15 lantern slides (and matching 35mm slides) and approximately 8 mounted photographic prints from the 30 photographs in the 1899 Report.[277] Additionally, the mounted photographs include another approximately 30 taken by the Olmsted Brothers firm from the work at Spot Pond.

Additionally, in the MWW Photograph Collection from the DCR Archives (and found bound between soft cardboard), there are twenty-three (23) 4.25" x 6.5" photographic prints mounted on cloth of Spot Pond before improvements. All are numbered 1 through 29 (missing are nos. 7, 14, 19, 20, 23, 24) at the top right corner. These numbers/images match those numbers/images in the Olmsted Brothers report described above. At the bottom right corner is an additional set of numbers. At least 17 of them have the Olmsted Brothers Job No. of 2073 followed by a print number. Six others begin with no. 28 followed by a print number. Only no. 10 is labeled on the back: "Spot Pond Reservoir, before improvements, 1899." Bound after the prints is a folded map of Spot Pond, dated December 1900.[278] The top right corner print numbers are written in red ink with an arrow drawn indicating the direction of the view. At the top right corner of the cover board is written: "S. E. Killam." This set of photographic prints, and the map were also scanned for the 2012-2014 project (nos. 9087-9109 in the database).

Eleven photographs from the 7600 Series dating from July 1900 reference ten of the thirty Shurcliff photographs of July 1898 as comparisons to before and after the construction work (Landscape Architects Nos. 1, 4, 6, 8, 15, 16, 17, 18, 21, 22; Nos. 3296, 3304, 3308, 3310, 3313, 3319, 3320, 3321, 3326, 3330, 3333).

Also in the MWW Photograph Collection from the DCR Archives are seven (7) photographic prints from the 7600 Series were found collected together and paper bound with two fasteners. The cover page is entitled "Views taken at Spot Pond Showing character of bottom of pond and method of improvement." The seven views are Nos. 2670, 2735, 2897, 3006, 3117, 3205, 3262.

b. Also in this Volume 3, between pp. 2-16, there are thirteen photographic prints (2" x 1.5") pasted onto paper and attached to a fourteen-page typewritten report. The prints, dated 1899, are very faded. The report includes two oversize pages that are folded: 10.5" x 14" and 10.75" x 17.5" (blueprint). These images have not been digitally scanned.

4. EN4.07/2105X: Metropolitan Water and Sewerage Board, Water Works, General Reports from the Principal Office Assistant of the Engineering Office Force to the Chief Engineer

There are six photographic prints (6.5" x 8.5") attached to a thirty-page report between pages 194-223 of Volume 1 (1895-1899) pertaining to the Wachusett Dam load test experiment of 1897. Within this report, there are nine typewritten pages and nineteen pages of linen sheets of tables. The six prints from the experiment's photographic series includes the plan, and nos. 25, 27, 30, and 35 (nos. 8866, 8878, 8880, 8883, 8888 in the database). The existence of these images pre-date the known existence of the larger collection of dry plate glass negatives from the Wachusett Dam load test experiment of 1897 (found in 2002 in a MWRA building; nos 8866-8970 in the database).

[277] The collection no. for the lantern slides is KX258.54, and for the mounted prints is NAB 6827 Bost-Met, Mid-Sp. The images from the prints are also available in 35mm slides; collection no. KX258.53. In regards to the lantern slides/35mm slides, the Accession Nos. for the 15 range from 117626-117660.

[278] Same plan as in *Sixth Annual Report of the Metropolitan Water Board, for 1900* (1901), opp. p. 134.

5. Volume 577 of the photographic field notebooks notes which photographic nos. were used for Professor W. O. Crosby's "North Dike Report." See pp. 11-12, 14 for nos. 2474-2483, 2492-2500, and 2507-2512 (Nashua Reservoir, General Views, November-December 1898).

E. MWW Photographs in MWW Letterboxes in DCR Archives

Between 2006-2008, the MWRA Records Center transferred to the DCR Archives a series of MWW letterbooks, letterboxes, and letterpress copybooks dating between 1895 and 1936. These had been found by the MWRA in the early 1990s at a former MDC Water Division records storage area in the 1865 Mystic Pumping Station (called Mystic Shops since the early 1920s, when it partially converted for records storage). My prior familiarity with similar MWW correspondence volumes in the mid-1990s (examples of which are described above), encouraged the MWRA to have these additional volumes transferred and archivally organized and described by DCR. All contents in letterboxes have been filed in archival file folders.

MWW, General Letters/Reports (not weekly reports) from Wachusett Department Superintendent E. R. B. Allardice to Chief Engineer, 1914-1916

- March 31, 1915 letter to Chief Engineer Foss regarding the purchase of the Thomas N. Coleman property, Jefferson, and includes four (4) photographic prints, 6.5" x 8.5", unmounted, which represent Nos. 7074-7077 in the 7600 Series (archivally rehoused)
- December 17, 1915 letter to Chief Engineer Foss regarding Gates Brook Settlement, West Boylston, and includes six (6) 3.25" x 5.5" photo prints; the photos are described in the letter/report; these are the same images that represent Nos. 7232-7236 (10 images) in the 7600 Series; the prints here are the original prints (archivally rehoused); see also January 17, 1914 letter, and attached report and blueprints
- February 17, 1916 letter to Chief Engineer Foss regarding reforestation of Big and Little Crane Swamps, Northborough/Westborough, and includes five (5) 3.25" x 5.5" photographic prints; the photos are described on p. 3 of the letter/report (archivally rehoused)

General Letters/Reports (not weekly reports) from Wachusett Department Superintendent E. R. B. Allardice to Chief Engineer, 1917-1919

- Plan of Property of Matteo Frantino, Gates Brook Settlement, West Boylston, June 1918 (blueprint), with six (6) photographic prints (3.5" x 5.75"), and blueprint is annotated with direction of views
- Photographic print (3.5" x 5.75"), March 26, 1918, Worcester Pumping Station, Wachusett Reservoir
- Three (3) photographic prints (3.5" x 5.5"; photo snapshot postcards), with attached letter, November 21, 1917, regarding accident of Cadillac Touring car, Wachusett Reservoir

F. Elsewhere other than State Archives, MWRA and DCR

There are 7600 Series photographic prints located at other archival repositories outside of the State Archives, MWRA, and DCR.

<u>Clinton Historical Society, Clinton, MA</u>

Metropolitan Water and Sewerage Board Chairman Henry H. Sprague maintained a written record of items that were discussed at the Board's meetings, many of which were not recorded in the Minutes of the Board.[279]

On December 20, 1904, Sprague writes the following:

> It was determined that the Clinton Historical Society should receive not exceeding one hundred copies of pictures relating to the dam and reservoir, for preservation, it being understood that they would properly mount and keep them for the inspection of the public.[280]

[279] MSA, EN4.07/2094X (Diary); EN4.07/2093X (MWSB Minutes).

As of the early 2000s, in the collections of the Clinton Historical Society, there are 134 MWW photographs from the 7600 Series. Approximately 14 of them came from a Harry J. McSherry (written on back of each).[281] Approximately 105 of the photographic prints are bound (without covers). The remaining 15 are loose.

About five (5) images are MWW-created images that are similar to other 7600 Series numbered images; 4 of which are mounted on board. These 5 images were not digitally scanned for the 2012-2014 digital imaging project. Four of these 5 images are similar to Nos. 4461, 5128, 5134, and 5090/5276 (nos. 9156-9160 in database).

Southborough Historical Society / Southborough Public Library, Southborough, MA (1970s-2015)

Four (4) photographic prints mounted on board from the MWW 7600 Series (Weston Aqueduct at Sudbury Dam):

- No. 4416 (June 24, 1902)
- No. 4483 (August 7, 1902)
- No. 4601 (September 12, 1902)
- No number / (November 3, 1902); similar to No. 4684 (no. 8109 in database)

Earl R. Smiddy (1902-1982), son of William Smiddy (b. 1871), MDC employee, 1896-1941, who served as Sudbury Section Foreman (1900-1941), MWW, donated to the Southborough Public Library in the 1970s these photographs and a collection of 86 BWB photographs (ca. 1893/94) documenting the real estate takings for the Sudbury Reservoir.

The 1 "similar" image was not digitally scanned for the 2012-2014 digital imaging project.

In December 2014, the DCR Archives learned from the Southborough Historical Society that all portions were transferred from the Public Library to the Historical Society sometime in the late 2000s. This collection was returned to the Commonwealth, through the DCR Archives, by the Southborough Historical Society on April 26, 2015, missing only 1 photo print from the 2001 inventory.

Library of Congress, Prints and Photographs Division, Washington, D.C.

The Library of Congress, Prints and Photographs Division, holds approximately 200 MWW 7600 Series photographic prints. The Call No. is Lot 3805. There is a set of loose prints (99, including 3 unnumbered) and a set of bound prints (104). In September 2002, the Head Reference Librarian forwarded a list of the negative/print numbers. These photographs were purchased by the Library of Congress in 1949 from Robert W. Lull, a dealer of old and rare books, Newburyport, MA. (Acc. No. 0629g1, April 1949). I reviewed these at the Library of Congress in August 2006, while attending the Society of American Archivists Annual Conference.

As of 2014, about six (6) of these images are available online through the Library of Congress, Prints and Photographs Division website, but only one larger than a thumbnail.[282]

MIT Institute Archives, Cambridge, MA

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[280] MWW, Chairman's Diary, Vol. 11, pp. 123-124. MSA, EN4.07/2094X.

[281] According to *Clinton City Directories* of the 1920s-1940s, Henry (Harry) J. McSherry was a teacher at the Clinton High School. According to the United States Social Security Death Index, a Henry McSherry of Clinton, MA was born in 1886 and died in June 1969.

[282] Nos. include 724, 5661 (larger than a thumbnail image). Searched "Wachusett" and also "Lot 3805" on August 18, 2014. http://www.loc.gov/pictures/

The Massachusetts Institute of Technology (MIT) Institute Archives and Special Collections of the MIT Libraries holds 10 MWW 7600 Series photographic prints within Manuscript Collection (MC) No. 68: William O. Crosby Papers. Crosby (1850-1925), was Consulting Geologist to the MWW. The loose prints are in Box 3, folder 13, and were examined in June 2003.[283]

Smithsonian Institution, National Museum of American History, Archives Center, Washington, D.C.

From the 1964/65 loan of the MWW dry plate glass negatives, the MDC had also loaned 877 cyanotypes to the Smithsonian Institution, though this is not documented anywhere in the MDC records. In winter/spring 2011, an intern working at the Archives Center inventoried these cyanotypes, and brought their existence to my attention. They also hold 128 modern contact prints made after the 1964/65 loan.[284] Originally held in the Division of Work and Industry (and in its two predecessor divisions), in 2007, the MWW cyanotypes and the ca. late 1960s contact prints were transferred to the NMAH Archives Center (est. early 1980s), with an accession number of 2007.3201, and collection number of 1117.

Metropolitan Waterworks Museum, Inc., Brighton, MA

Sometime in about 2011/12, the Metropolitan Waterworks Museum, located at the B/MWW Chestnut Hill High Service Pumping Station, received a donation of 5 original 1897 MWW photographic prints, all with the same original style of annotations on back, and each mounted on supporting board in the same manner. Representing Wachusett Aqueduct (1) and Sudbury Reservoir/Dam (4) construction, these photographs were likely taken by a MWB engineer or MWB contractor, and were likely personally retained by the engineer/contractor. This collection was donated to the Commonwealth, through the DCR Archives, by the Museum on April 27, 2015 (nos. 9459-9463 in the database).

DEP Archives, New York City

The Archives of the New York City Department of Environmental Protection (DEP), the agency that manages the NYC water supply system, holds a collection of B/MWW photographic prints, of unknown quantity.

Other Repositories, and in Private Possession

It is likely that MWW-created 7600 Series photographic prints are located at other archival and library repositories across the United States, and likely in small quantities.

The MWW made photographs for contracting companies and for companies who had other business relationships with the MWB/MWSB. For example, in September 1903, the MWW selected "photographs of the relocation of Central Massachusetts Division for Mr. Bissell, Chief Engineer of B. & M. R. R."[285] Such photographs could be found amongst the archival collections of such companies.

In addition, MWW engineers and MWW contractors and workers were permitted to purchase copy contact prints from the MWB/MWSB, for their professional portfolio.[286] This was also a common practice during the 1876-1878

[283] Negative Nos. 1738, 2501, 2502, 2506, 2615, 2647, 2648, 2842, 2843, and 2845. No. 1738 was highlighted in the July 2003 Online Object of the Month by the Institute Archives; see http://libraries.mit.edu/archives/exhibits/wachusett/index.html.
[284] E-mail, William J. Callahan to Sean M. Fisher, March 17, 2011. DCR Archives.
[285] MWW, Letterbooks of Weekly Reports from the Engineering Office Force to the Chief Engineer, Vol. 4, September 29, 1903.
[286] See, for example, MWW Letterpress copybook of Outgoing Correspondence from the Chief Engineer, Vol. 14, p. 292, April 13, 1903 letter regarding printing fees for private use prints. DCR Archives.

construction of the Sudbury River Conduit (Aqueduct) for the BWW, and during the 1926-1940 construction of Quabbin Reservoir by the Massachusetts Metropolitan District Water Supply Commission (MDWSC). It is these purchased sets that occasionally come up for auction through the online auctioneer eBay, and through other auction houses, as descendants of these engineers/contractors/workers find them.

For example, in 2013, a descendent of MWW engineer Charles C. Murphy (1868-1951), employed 1897-1902, showed me the family's collection of MWW photographs, and donated the majority of them to the DCR Archives.[287] The donation included 16 cloth-backed MWW photographic prints from the 7600 Series and 15 mounted on board from the 7600 Series. The donation also included six (6) photographic prints mounted on board of MWW construction (or likely of) that possibly may not have been taken by the MWW (nos. 9450-9455 in database).

The family retained additional MWW construction photographic prints in which engineer Murphy is pictured, including a rare image of a MWW survey crew labeled with the names of Bangs, Booth, Shaw, Cain, Murphy. Other photo prints retained by the family include two photographs possibly taken by Murphy: of MWW contractor Silvio A. Casparis (1849-1921)[288] on a horse, with other engineers/workers in photo; and a construction image, with MWW engineer C.E. Wells.

Three of the more fascinating privately-created images in the MWW Photograph Collection were donated to the MDC Water Division in 1975 by a descendent of MWW engineer Abraham Lincoln Shedd (1865-1921; MWW engineer, 1896-1904). These photographic prints (nos. 9456-9458 in database) show unique scenes not documented elsewhere in the official collection. They were found by the MWRA Library in 2013, in its original 1975 mailing envelope, along with descriptive information for each provided by the donor.

[287] Donated July 12, 2013; and part of transfer of DCR portion to the MA State Archives in 2014.
[288] Also spelled Sylvio. For an interesting biography of Sylvio A. Casparis, see "Sylvio Casparis," in Charles B. Galbreath, *History of Ohio*, Vol. 3 (Chicago and New York: American Historical Society, Inc., 1925), 233-234, with a portrait between pp. 232 and 233. See also, www.findagrave.com.

11. Artificial Numbering of the Unnumbered MWW Images in the Database

For purposes of assigning a unique number to unnumbered B/MWW images dating between 1876 and 1930 in the MWW Photograph Collection, an artificial number was assigned to each unique image. The 8000s are used for dry plate glass negatives and glass lantern slides, and the 9000s are used for photographic prints in which there is no corresponding negative. Because some unnumbered B/MWW images were discovered by MDC/DCR/MWRA over an extended period of time between the early 2000s and 2014, the artificial grouping and/or numbering of some images is not consistent. Also, the 2012-2014 digital scanning project required some additional numbering adjustment.

8000-8017 (18)

- 7600 Series negatives that were captioned and numbered but had duplicate numbers and different images with other numbers and not in bound volumes of prints (14)
  - 8014/2063A (8" x 10")[289]
  - 8015/2552A (8" x 10")
  - 8016/7666A (8" x 10")
  - 8017/7666B (8" x 10")

8050-8089 (40)

- Miscellaneous Views, 1897-1898, unnumbered, 6.5" x 8.5" dry plate negatives (40)

8100-8288, 8350-8373 (213)

- Miscellaneous Views (unnumbered)
  - Approximately 213 plates: 189 measure 6.5" x 8.5" (8100-8288); 24 measure 8" x 10" (8350-8373); and 4 measure 4" x 5"

8400-8483 (84)

- 4" x 5" dry plate negatives that match the unnumbered lantern slides (73), or that are 'similar' (4), or that are unique (7)

8500-8586 (87)

- Glass Lantern Slides (unnumbered)
  - There are 618 lantern slides (3.25" x 4"). Approximately 447 of these are a lantern slide format of negatives from the 7600 Series. Of the remaining 171, approximately 25 are a lantern slide format of photographs that appear to be unnumbered. There are 2 lantern slides of design drawings, and approximately 146 are lantern slides of plans, maps, diagrams, and tables. The 8500s represent only those images in a lantern slide format that are not extant in any other format (dry plate negative; photographic print).

8800-8850 (51)

- Engineering Plans (unnumbered):
  - unnumbered 5" x 7" dry plate negatives reproducing engineering plans, 1894-1899 (51)

8866-8970 (105)

- 1897 Wachusett Dam Load Testing Experiment
  - 8" x 10" dry plate negatives, 1897 (109)

9000-9168 (163)

[289] The use of "A" by the MWW for some images is referenced in MWW, Letters from Wachusett Dam and Aqueduct Department Engineer Thomas F. Richardson to Chief Engineer, 1896-1901, July 25, 1900 letter. DCR Archives.

- unnumbered loose and mounted photographic prints

Note: nos. 9156, 9157, 9158, 9159, 9160, 9161 are not in MWW Photograph Collection, as they are held by other repositories. These are official MWW images, but not held by DCR/MWRA/State Archives, but included in the original MWW Photograph Database from the early 2000s.

9300-9313 (14), and 9314-9316 (3 documents)

- Photographs of Pumping Station Designs (architectural sketches, accepted and rejected designs); MWRA Library set
  Note: entries from early 2000s, for negatives / lantern slides of same: Nos. 8350, 8501.

9317-9323 (7)

- Photographs of Pumping Station Designs (architectural sketches, accepted and rejected designs); those unique in the State Archives set (from MDC, 1980s), and not duplicated in the MWRA Library set
  Note: not scanned yet

9400-9411 (12)

- 1897 David W. Butterfield oversize photographic prints for MWW

9450-9463 (14)

- Unique photographic prints from donations to MWW photographic collections
  - Murphy donation to DCR Archives, 2013 (6: 9450-9455)
  - Herbert H. Jaynes donation to MDC Water Division, 1975 (3: 9456-9458)
  - Waterworks Museum donation to Commonwealth, through DCR Archives, 2015 (5: 9459-9463)

9500-9516 (17)

- unnumbered oversized photographic prints

9700-9801 (102)

- Boston Water Board, Reservoirs of the Sudbury System (construction progress photographic prints, Hopkinton Reservoir/Dam; Sudbury Reservoir/Dam, 1890-1896)

9810-9895 (85)

- Boston Water Board, Sudbury Reservoir/Dam, Real Estate Taking photographic prints, ca. 1893/94

9900-9919 (20)

- Boston Water Board, oversized photographic prints, 1875-1893

9950-9972 (23)

- Boston Water Board, Photographs of the Sudbury and Cochituate Systems, oversize, 1893
  Note: entries from early 2000s, for smaller loosely bound set of same (labeled as "Miscellaneous Photographs, Boston Water Works, 1893"), include, Nos. 9908, 9909, *9910*, 9911, 9912, *9913*, *9914*, 9915, 9916, *9917* (4 or 10?; need to verify).
  Note: the 2013 review of the 1893 volume at the MWRA Library prior to scanning revealed 6 additional/duplicate loose versions that likely came from the same loosely bound set, based on the mounting look/feel/format.

12. Description of Photographic Plates from the Annual Reports (MWB and MWSB)

The Metropolitan Water Board (1895-1901) and its successor the Metropolitan Water and Sewerage Board (1901-1919) published lengthy and technical annual reports describing the construction and operations of the MWW. These reports usually included photographs printed as halftone photomechanical prints. Between 1898 and 1918, the MWW photographic plates that were published in the annual reports were all, except 2[290], drawn from the 7600 Series of dry plate negatives (147 from 7600 Series). In addition to the 2 photographs not from the 7600 Series, the database includes 4 images that were also published in the annual reports, and 1 photograph that was published as the frontispiece for the 1924 (5th) MDC Annual Report.

Samuel E. Killam (1878-1942), Assistant Engineer who managed the photographic work between 1904-1908, used 2 methods to track the 7600 Series Negative No. associated with the images in the annual reports.

The first method was to take a complete set of the annual reports and write in pencil on each photograph plate the negative number the image was printed from. This set of annual reports is easily identified. The name and title of Samuel E. Killam is stamped on a blank page at the front of each volume.[291] In 2000, the MDC Archives held this set of annual reports. Only the 'Killam' annual reports for 1910, 1911, and 1912 are missing (or were never annotated). The 1916 and 1918 Killam-stamped volumes are not annotated.

The second method was to remove each photograph plate from another set of the annual reports and bind these plates together into one volume. Here, the negative is stamped in red, written are the annual report number and page number, and the pages are numbered from page 1 through page 187. In the front of the volume is a six-page index. The condition of this volume is very poor: most of the pages have separated from the binding, most of the binding no longer survives, and the pages are brittle. Remarkably, only three pages are missing from this volume. In 2000, this volume was held by the MDC Archives, and in spring 2000 these plates were resleeved into Mylar L-sealed envelopes.

There is an incomplete duplicate volume of bound photograph plates assembled from the annual reports. It is annotated in the exact manner as the one described above. In 2000, this volume was held by the MWRA Records Center. This volume has been disbound and the plates arranged by negative number.

It is important to differentiate between the photographic numbering of the MWW and the Metropolitan Sewerage Works (MSW) of the MWSB. The combined Board in 1901 created two divisions: Water Works and Sewerage Works. The MWW and the MSW did not change their photographic numbering systems to reflect the general merger. These two divisions maintained a completely separate numbering system of their respective photographs. The MWW 7600 Series does not incorporate any of the MSW photographs after the 1901 merger. As a result, while the MWW photographic numbers are in the 4000s in 1901, the MSW photographic numbers are only in the 1000s for the High Level Sewer construction.

The two bound volumes of annotated photographic plates from the annual reports includes both MWW and MSW photographs. There are 46 MSW photograph plates published in the MWSB annual reports (1902-1911), going no higher in number than the 2800s.

Today, the MWB and MWSB (and MDC) Annual Reports are available online through the Internet Archive; www.archive.org; and Google Books. However, in most cases (but not all), these digital versions exclude the photographic plates, maps, and folded plans printed inside them.

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[290] *Fourth Annual Report of the Metropolitan Water Board, for 1898* (1899), opp. p. 66 (Chestnut Hill High Service Pumping Station; nos. 8103/8505 in the database); and *Sixth Annual Report of the Metropolitan Water Board, for 1900* (1901), opp. p. 140 (Chestnut Hill High Service Pumping Station, Allis Engine for Addition; no. 9509 in the database). The original dry plate glass negative is extant for the former (no. 8103).

[291] For a discussion of Killam, see note no. 161 through 164.

13. Statistical Analysis of the MWW Photograph Collection

Throughout spring 2003, queries were designed for the database in order to gather statistical data about the collection.[292] These numbers have not been updated to reflect additional images since 2003.

1. **8,403**: The total number of unique images in the MWW photograph collection (1895-1926);
   An additional 208 images in the database represent the Boston Water Works (BWW) from 1875-1895 (8,611);

2. The **top 5 towns** which are represented in the MWW collection are as follows (representing 8,435 images):
   a. Clinton (1,755);
   b. West Boylston, including Oakdale (1,590);
   c. Boylston (794);
   d. Stoneham (613);
   e. Southborough (386);

   Only 207 images include multiple town names within the town field.

3. **4,712**: The total number of images representing the Wachusett Watershed, the Wachusett Aqueduct (excluding those in Southborough), and those west of Southborough but not in the Watershed;

4. **49**: The total number of cities, towns, and Boston neighborhood districts represented in the MWW collection;

5. **14**: The total number of numbers between 1 and 7672 (aka 7600 Series) that were not used (7,658 possible 7600 Series negatives);

6. **7,291**: The total number of 7600 Series dry plate glass negatives that were located at the MDC Archives, MWRA Records Center, West Boylston Historical Society, and Boylston Historical Society:
   a. MDC Archives (5,893; or 76.95% of 7,658);[293]
      of which 455 pertain to Wachusett Real Estate (8% of 5,893);
   b. MWRA Records Center (815; or 10.64% of 7,658);
      of which 564 pertain to Wachusett Real Estate (69% of 815);
   c. West Boylston Historical Society (489; or 6.38% of 7,658);
      of which 459 pertain to Wachusett Real Estate (94% of 489);
   d. Boylston Historical Society (94; or 1.22% of 7,658);
      of which 49 pertain to Wachusett Real Estate (52% of 94);

7. **7,816**: The total number of dry plate glass negatives (plus 2 film negatives) that were located at the MDC Archives, MWRA Records Center, West Boylston Historical Society, and Boylston Historical Society:
   a. MDC Archives (6,094; or 77.96%);
   b. MWRA Records Center (1,139; or 14.57%);
   c. West Boylston Historical Society (489; 6.25%);
   d. Boylston Historical Society (94; or 1.20%);

8. **367**: The total number of 7600 Series dry plate glass negatives that are not extant (4.8% of 7,658);

9. **7,651**: The total number of 7600 Series images printed in the bound volumes of prints;

[292] Excludes discoveries after 2003.
[293] Excludes the 13 MWW glass plate negatives from 7600 Series returned to the DCR Archives from a private citizen in 2014.

10. **21**: The total number of numbers between 1 and 7672 that were not printed in the bound volumes of prints:
    a. 5" x 8" images from 1895 (10);
    b. between 1896 and 1920 (5); of which 1 negative is extant but not it's print;
    c. 1921 (6); of which all 6 negatives are extant;

11. **36**: The total number of 7600 Series images that were printed in more than one bound volume, excluding the volume entitled "Structures of the Metropolitan Water Works," in which all 84 prints are bound elsewhere;

12. **13**: The total number of dry plate glass negatives that are duplicates from the 7600 Series;

13. **257**: The number of non-7600 Series MWW images that the dry plate glass negative is not extant;

14. **1,467**: The total number of dry plate glass negatives that exhibit at least one type of condition problem (18.7% of 7,816);

15. **1,358**: The total number of 7600 Series dry plate glass negatives that exhibit at least one type of condition problem (17.7% of 7,658);

16. **414**: The total number of 7600 Series dry plate glass negatives that exhibit at least one significant type of condition problem and cannot be used for reformatting (too much loss of significant image information) (30.9% of 1,339; or 5.4% of 7,658):
    a. MDC Archives (230; or 4% of its portion);
    b. MWRA Records Center (179; or 22% of its portion);
    c. West Boylston Historical Society (3; or 0.6% of its portion);
    d. Boylston Historical Society (2; or 2% of its portion);

17. **781**: The total number of 7600 Series prints that must be used for reformatting either because the negative is not extant and a print is extant (367), or because the negative exhibits at least one significant type of condition problem and a print is extant (414) (10.19% of 7,658);

18. **618**: The total number of glass lantern slides:
    a. MDC Archives (565; or 91.42%);
    b. MWRA Records Center (53; or 8.57%);
    c. Duplicate copies (37);
    d. Triplicate copies (5);
    e. Cracked (31);
    f. Broken (2);

19. **259**: The total number of 7600 Series images that are of portrait orientation (3.38% of 7,658); total in collection (305; or 3.53% of 8,641);

20. **155**: The total number of MWW images that were published in the MWB (1895-1901) and MWSB (1901-1919) Annual Reports (1.83% of 8,433);

21. **1,694**: The number of 7600 Series images in the 15 bound volumes of prints pertaining to the "Wachusett Reservoir Real Estate" and the 2 bound volumes of prints pertaining to the "Wachusett Reservoir General Views" (22.12% of 7,658);

22. **366**: The total number of 7600 Series images in the 4 bound volumes of prints entitled, "Views of West Boylston and Vicinity." In 1906, the Metropolitan Water and Sewerage Board bound these photographic prints into 4 volumes and donated them to the West Boylston Public Library, where they remain today.

14. Associated Archival Records

Wachusett Reservoir Real Estate Views Annotated on Set of Land Survey Plans

There are 71 sheets of blueprints entitled "Photographs of Real Estate, Wachusett Reservoir" (MWW Plan Accession No. A4072). The base plans are the sheets for the Wachusett Reservoir Land Surveys, totaling 104 sheets. Each plan is annotated with the Negative No. (showing the location the photograph was taken) and an arrow showing the direction the photographic view is looking towards. These photo annotated blueprints account for 1,432 real estate photographs in the MWW Photograph Collection. This annotated blueprint set is located at DCR's DWSP, Office of Watershed Management, Wachusett Reservoir Watershed Engineering Office, Plan Library, West Boylston. I decided to add this collection to the MWW Photos Digital Project for staff and historians to inter-connect the land surveys with the real estate photographs.[294]

[294] See MWW, Plan Accessions, Wachusett (A), Vol. 2, A4072; described as encompassing 41 sheets. DCR, Office of Watershed Management, Wachusett Engineering Office, West Boylston. Plan Acc. A4073, Wachusett Aqueduct, Index to Photographs, 1 sheet (blueprint) has yet to be located.

15. Uniqueness of the Non-Photographic Archival Records of the MWW

The design, construction, operations and management of the Boston / Metropolitan Water Works system between 1846 and 1946 produced an enormous collection of records. This period is considered the most historically significant as compared to the years since 1946.[295] Engineers of this period were precise men who kept voluminous and precise records. Examples of record types include minutes; correspondence; internal reports; engineering and architectural design and construction plans; contract specifications; photographs; calculation notebooks; field notebooks; maps; tables and charts; real estate files; legislation; injury reports; water consumption files; water quality analysis files; meteorological files; reservoir elevation files; reservoir yield files; diaries; consultant reports; newspaper scrapbooks; technical annual reports, and reference libraries. The thoroughness of engineers extended to creating various indexing systems to reference these record types in an efficient manner. And as was the practice in the 2nd half of the 19th century and early 20th century, many of these record types were bound into volumes rather than maintained as loose items.

Of all of the functions historically associated with the MDC, the surviving non-photographic archival records of the Metropolitan Water Works system are the most voluminous in quantity and quality, and complement the photographic records. As with the MWW photographic collection, this large collection is unique in subject matter, size, and scope. My preliminary findings regarding this uniqueness, as with the photographic collection, indicate that there are few similar collections east of St. Louis[296]. The only similar collection that I could locate using OCLC/NUCMC and through Internet searches are those of the Philadelphia Water Department held by the Philadelphia City Archives (Record Group 91).[297] A site visit made by the author in fall 2003 revealed that the Philadelphia Water Department Archives holds such non-photographic records as contract specifications; letterpress copybooks of correspondence; employee lists; pumping logbooks; laboratory notebooks; and newspaper scrapbooks.

The archival records of the New York City water supply system are scattered amongst a number of repositories including the Municipal Archives of the City of New York; Copper Union Library and Archives, NYC; New York Historical Society; and the City of New York, Department of Environmental Protection (DEP), the agency that operates the system. The NYC DEP Archives was officially established in summer 2001 (operated by the Cooper Union from 1995-2001) and little is known of the archival records within NYC DEP.[298] According to NUCMC, the Municipal Archives of the City of New York holds 245 volumes of records from the NYC Board of

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[295] On January 18, 1990, all extant facilities of the Boston / Metropolitan Water Works system from 1846 to 1926 were accepted into the National Register of Historic Places in the category of a Thematic Resource Area. The Quabbin facilities were not submitted for nomination because they did not meet the 50 year eligibility rule at the time of submission (but qualified by the time the nomination was officially approved). The nomination was based on Martha H. Bowers and Jane Carolan, prep., *The Water Supply System of Metropolitan Boston: 1845-1947* (Wellesley, MA: Cultural Resource Group, Louis Berger & Associates, for the MDC, 1985). However, the significance of the engineering improvements of the MWW system by the MWRA since 1985 cannot be overstated.

[296] I focused on 9 cities: St. Louis; Chicago; Cleveland; Cincinnati; Louisville, KY; Baltimore; Philadelphia; New York City; and Hackensack/Oradell, NJ.

[297] The Philadelphia Water Department maintains an Archives both at its HQ offices in downtown Philadelphia, and in (as of 2003) a storage area at a pumping station; see "Inventory of Archival Material stored at Delaware and Race with recommendations for transfer," by Adam Levine, PWD Historical Consultant, June 2000 (34 pages). See also note no. 27 and 28. In 1998, Adam Levine, PWD Historical Consultant, surveyed the Philadelphia City Archives pertaining to sewer records, and compiled his findings in a "Catalogue of Sewer Records." He made similar surveys for 12 other city departments; see www.sewerhistory.net/CityArchives/City_Archives%20_Inventory_1998.html.

[298] The Seattle Municipal Archives holds letterpress copybooks created by the City Water Department (Record Group 8200); see 8200-02 (54 volumes of outgoing correspondence from Superintendent, 1891-1958); see also 8200-04 (indexes). www.cityofseattle.net/CityArchives/Tools/Guide/8200.html; http://www.cityofseattle.net/cityarchives/Research/photocoll.htm. The Cincinnati Historical Society Library holds one letterpress copybook of correspondence from a consulting engineer to the Cincinnati Water Works (the engineer's collection totals 8 volumes), and approximately 20 photographs of the Water Works that date prior to 1920, 2 of which are dry plate glass negatives. Telephone conversation with Manuscript Department, June 25, 2003.

Water Supply dating from 1883-1945. The Cooper Union Library and Archives holds contract specifications and drawings.[299]

A. MWW Letterbooks and Letterpress Copybooks of Correspondence, and other Textual Records

At the Fall 1998 meeting of the New England Archivists, Regina Lee Blaszczyk, a professor of history at Boston University, vividly described the experience of entering a room at a corporation and seeing all 4 walls of the room lined with letterbooks and letterpress copybooks of correspondence. She further notes in her "Essay of Sources" section of her 2000 book entitled *Imagining Consumers: Design and Innovation from Wedgwood to Corning*: "The corporate archives of the Homer Laughlin China Company are a dream come true for the historian. The collection's centerpiece is a complete run of executive correspondence, consisting of millions of incoming and outgoing letters" from the 1880s through the 1950s. "Homer Laughlin's departmental records are another remarkable source. In the laboratory and engineering departments, a wide array of sources, including notebooks, blueprints, and interoffice reports, reveal how materials science and technology affected design practice."[300]

In November 1995, I had a similar experience. In the 3rd floor vault of the MDC's Quabbin Administration Building in Belchertown was a large collection of letterbooks and letterpress copybooks of correspondence from the 1895 to 1936 period and all not related to Quabbin but to Wachusett and associated facilities.

Working with the Quabbin Visitor Center manager, within a month we had an inventory list of these records, boxed and ready for transfer to the MDC Archives. In 1996, I archivally processed, arranged and described these records, along with additional MWW records that were in the MDC Archives prior to 1996. I transferred all of these records to the State Archives in 1997. The correspondence within letterbooks and letterpress copybooks are generally bound chronologically, regardless of subject matter. Thus, in a given volume, there is correspondence pertaining to construction, real estate, personnel, injury, supply, operations and maintenance. The letterbook and letterpress copybook system of correspondence management was terminated by the MDC Water Division in 1936.

These records included the following (Record Group EN4):

1. Metropolitan Water Board, Minutes, 1895-1901;
2. Metropolitan Water and Sewerage Board, Minutes, 1901-1919;
3. Metropolitan Water and Sewerage Board, Diary of the Chairman, 1896-1911;
4. Metropolitan Water and Sewerage Board, Letters from the Chairman, 1895-1914;
5. Metropolitan District Commission, Water and Sewerage Divisions, Letters from the Secretary, 1895-1926;
6. Metropolitan District Commission, Water Division, Letters from the Chief Engineer, 1915-1936;
7. Metropolitan Water and Sewerage Board, Water Works, Letters from the Chief Engineer to the Engineer of the Distribution Department, 1895-1906;
8. Metropolitan Water and Sewerage Board, Water Works, Letters from the Engineer of the Sudbury Department, 1896-1904;
9. Metropolitan Water and Sewerage Board, Water Works, Wachusett Department, Letters from the Assistant Engineer to the Sanitary Inspector, 1897-1917;

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[299] All New York City water supply publications and records are under the call no. of TD225 at the Cooper Union Library and Archives, and the New York Historical Society. See online catalog for both at www.bobcat.nyu.edu. See also (2012) http://www.nyc.gov/html/dep/html/news/dep_stories_p3-119.shtml

[300] Regina Lee Blaszczyk, *Imagining Consumers: Design and Innovation from Wedgwood to Corning* (Baltimore, MD: Johns Hopkins University Press, 2000), 347-348. For a history of letterbook and letterpress copybook correspondence management, see JoAnne Yates, *Control through Communication: The Rise of System in American Management* (Baltimore, MD: Johns Hopkins University Press, 1989), 25-46; and Barbara Rhodes and William Wells Streeter, *Before Photocopying: The Art and History of Mechanical Copying, 1780-1938* (New Castle, DE: Oak Knoll Press, 1999). See also James M. O'Toole, "On the Idea of Uniqueness," *American Archivist* 57 (Fall 1994): 643-646.

10. Metropolitan District Commission, Water Division, Wachusett Department, Office of the Superintendent, General Letters from the Superintendent, 1918-1927;
11. Metropolitan District Commission, Water Division, Wachusett Department, Office of the Superintendent, General Letters from the Superintendent to the Chief Engineer of the Water Division, 1917-1927;
12. Metropolitan District Commission, Water Division, General Reports from the Chief Engineer to the Commissioner, 1895-1936;
13. Metropolitan Water and Sewerage Board, Water Works, General Reports to Chief Engineer from Consulting Engineers and other Consultants, and from Various Water Works Engineers, 1895-1913;
14. Metropolitan Water and Sewerage Board, Water Works, General Reports from the Principal Office Assistant of the Engineering Office Force to the Chief Engineer, 1895-1905;
15. Metropolitan Water and Sewerage Board, Water Works, General Reports from the Distribution Department to the Chief Engineer, 1895-1905;
16. Metropolitan Water and Sewerage Board, Water Works, Reports from the Engineer of the Distribution Department to the Chief Engineer and to the Chairman, 1895-1907;
17. Metropolitan District Commission, Water Division, General Reports from the Distribution Department Assistant Engineers and Division Engineers to the Distribution Department Engineer and Chief Engineer, 1895-1921;
18. Metropolitan Water and Sewerage Board, Water Works, General Reports from the Sudbury Department to the Chief Engineer, 1896-1903;
19. Metropolitan Water and Sewerage Board, Water Works, General Reports from the Aqueduct Department and the Dam and Aqueduct Department to the Chief Engineer, 1895-1904;
20. Metropolitan Water and Sewerage Board, Water Works, General Reports from the Reservoir Department to the Chief Engineer, 1896-1905;
21. Metropolitan Water and Sewerage Board, Water Works, General Reports from the Weston Aqueduct Department to the Chief Engineer, 1901-1905;
22. Metropolitan Water Board, Weekly Reports to the Distribution Department Engineer, 1898-1901 (had been transferred in 1990);
23. Metropolitan District Commission, Water Division, Force Accounts, 1896-1919;
24. Metropolitan Water Board, Engineering Department, Dimensions and Weights of Cast-Iron Water Pipes, Special Castings, and Valves, 1897-1899;
25. Metropolitan Water Board, Engineering Department, Diagrams of Discharges and Mean Velocities for Brick Sewers and Smooth Pipes from the Formula of Ganguillet and Kutter, 1897;
26. Metropolitan Water Board, Engineering Department, Record of the Wachusett Aqueduct, 1898;
27. Metropolitan Water and Sewerage Board, Water Works, Permit Requests, Claims and Complaints, 1896-1903;
28. Metropolitan District Commission, Water Division, Water Consumption Records [Venturi Meter Records], 1904-1973;
29. Metropolitan District Commission, Water Division, Meteorological Records, 1896-1910, 1938-1984;
30. Metropolitan District Commission, Water Division, Yields of Watersheds, 1896-1985;
31. Metropolitan District Commission, Water Division, Distribution Section, Elevations of Water in Reservoirs, 1925-1987;
32. Metropolitan District Commission, Water Division, Reservoir Capacity Tables, 1890s-1960s;
33. Metropolitan Water and Sewerage Board, Water Works, Employee History Cards [also known as Personnel History Cards], 1895-1919, 1931;
34. Metropolitan District Commission, Water Division, Annual Reports from the Chief Engineer, 1964-1973;
35. Department of Public Health, Rules and Regulations for the Sanitary Protection of Waters of the Metropolitan Water Supply, 1918-1948;
36. Metropolitan District Commission, Water Division, Records Pertaining to Fishing, 1921-1939;
37. Boston Water Board, Eastern Division, Calculation Books, 1878-1895;
38. Boston Water Board, Records of the Biological Laboratory, 1890-1898;

39. Metropolitan District Commission, Water Division, Biological Laboratory, Microscopical Examination of Water, 1903-1904, 1922-1930;
40. Metropolitan Water and Sewerage Board, Water Works, Biological Laboratory, Tables, 1901-1912;
41. State Board of Health, Engineering Department, Records of the Chief Engineer X. H. Goodnough, Abstracts of Legislative Action on Matters Pertaining to Water Supply and Sewerage Disposal of Metropolitan Cities and Towns, 1880s-1913;
42. Metropolitan Water and Sewerage Board, Legislation, 1889-1914;
43. Metropolitan District Commission, Special Reports to the Legislature Pertaining to Water Supply, Sewerage, Sanitary Conditions, Drainage, and Public Health, 1880s-1990s;
44. Metropolitan Water Board, Engineering Department, Reference Library, 1884-1929 (transferred to the Massachusetts State Library for permanent retention).

In 2005/06, some additional MWW records sets were transferred from the DCR Archives to the State Archives.

1. MWB, Newspaper Scrapbooks, 1895-1900, 3 volumes (reformatted through preservation digital facsimile, 1999-2000);
2. Daily Hydraulic Records of Wachusett Section, 1898-1952;
3. Yields of Watersheds (additional editions between 1914-1985);
4. MWW, Incoming Correspondence to the Weston Aqueduct Department, 1900-1937 (from MWRA Records Center, 2001; see below).

B. Remaining at the DCR Archives (to be transferred to the State Archives)

1. Letters to MWB Pertaining to Naming the Nashua (Wachusett) Reservoir, 1897 (1 file folder);
2. MDC, Water Division, Executed copy of contracts, 1920s-1950s (1 box);
3. MWW, non-executed copy of contracts, 1895-1919 (2 boxes);
4. Real Estate and Rents files, 1895-1910s (2 boxes);
5. Diaries, 1890s-1930s; and Force Accounts, 1920s-1960s (2 boxes);
6. MWB/MWSB/MDC, Water, Wachusett Section, Calculation Books (thick), 1896-1987 (7 boxes);
7. Miscellaneous MWW files, 1890s-1910s, with unique documents/files (various boxes);
8. MWW, Record of Personal Injuries to Employees, 1911-1934; includes deaths (2 boxes).

C. MWRA Records Center

The collection of 1895-1936 MWW correspondence in letterpress copybooks, letterbooks, letterboxes and subject files that the MWRA located at the Mystic Shops in about 1993 remained uncataloged in their Records Center until 2006. In spring 2006, in planning for the Records Center's relocation, the MWRA Records Center granted the DCR Archives the opportunity to review many of these record boxes.

The result was the transfer of many of these records from the MWRA Records Center to the DCR Archives from April 2006 through August 2009, for the purpose of providing archival arrangement and description for these records. All the MWW records in the following records series list have been archivally arranged, as most were found to be scattered and inter-mixed. Letters found in letterboxes were rehoused in archival file folders. However, there are gaps (missing volumes/letterboxes) within records sets that likely remain in the MWRA Records Center.

<u>MWW Records Transferred to DCR Archives</u>

1. State Board of Health, Metropolitan Water Supply Study, Calculation Books, 1893-1895 (1 box);
2. MWB / MWSB, MWW, Annual Reports from Department Engineers, Original Typescripts submitted to Chief Engineer, 1895-1935 (3 boxes);
3. MWB, Real Estate Valuation Reports, Mills, Wachusett Reservoir and Sudbury Reservoir, 1895-1898 (1 box);
4. BWW/MWW, Agreements (1 box);
5. MWB / MWSB, MWW, Releases and Petitions (2 boxes);

6. MWB / MWSB, MWW, Newspaper Scrapbooks, 1895-1904 (1 box);
7. MWW, Biological Laboratory, Weekly Reports, 1901-1928 (1 box);
8. MWW, Wachusett Section, Sterling Filter Beds, Weekly Reports, 1909-1930 (1 box);
9. MWB/MWSB, Water, Distribution Department, Calculation Books (thick) (3 boxes);
10. MWB / MWSB, MWW, Auditing Department, Contracts, 1895-1920s (4 boxes);
11. MWW, Secretary William N. Davenport, Subject Files of Correspondence, Letters, Reports, etc., Received by Secretary, 1900s-1930s (1936) (2 boxes);
12. MWB, Chief Engineer's Study Photographs of Larger Masonry Dams of the World Built or Under Construction, ca. 1898 (1 box);
13. MWW, Outgoing Letters from the Chief Engineer, 1895-1908 (3 boxes); 1896, 1915-1936 at State Archives;
14. MWW, Outgoing Letters from Distribution Department Engineer, Dexter Brackett, 1895-1905 (1 box);
15. MWW, Outgoing Letters from Samuel E. Killam, Distribution Department, Superintendent, Pipe Lines and Reservoirs, and later, Superintendent, Distribution Section, 1908-1936 (1 box);
16. MWW, Outgoing Reports from Samuel E. Killam, Distribution Department, Superintendent, Pipe Lines and Reservoirs, and later, Superintendent, Distribution Section, 1908-1937 (2 boxes);
17. MWW, Letterbooks, Weekly Reports from the Chief Engineer to the Board, 1895-1927 (5 boxes);
18. MWW, Letterbooks, Weekly Reports from the Engineering Office Force to the Chief Engineer, 1895-1906 (1 box);
19. MWW, Letterbooks, Weekly Reports from the Aqueduct Department Engineer to the Chief Engineer, 1895-1906 (3 boxes);
20. MWW, Letterbooks, Weekly Reports from the Reservoir Department Engineer to the Chief Engineer, 1896-1904 (2 boxes);
21. MWW, Letterbooks, Weekly Reports from the Sudbury Department Engineer to the Chief Engineer, 1896-1904 (2 boxes);
22. MWW, Letterbooks, Weekly Reports from the Weston Aqueduct Department Engineer to the Chief Engineer, 1900-1904 (1 box);
23. MWW, Letterbooks, Weekly Reports from the Distribution Department Engineer to the Chief Engineer, 1895-1907 (2 boxes);
24. MWW, Letterbooks, Weekly Reports from the Distribution Department Division Engineers to the Distribution Department Engineer, 1895-1906 (6 boxes);
25. MWW, Letterbooks, Weekly Reports of the Pumping Engines & Stations, Superintendent of Pumping Stations, Distribution Department, 1898-1914 (2 boxes);
26. MWW, Weekly Reports from Wachusett Department Superintendent E. R. B. Allardice to Chief Engineer, 1907-1935 (3 boxes);
27. MWW, Weekly Reports from Sudbury Department/Section Superintendent to Chief Engineer, 1907-1935 (3 boxes); includes Letters and Reports from Sanitary Inspector William W. Locke to Chief Engineer, 1900-1913;
28. MWW, Weekly Reports from Superintendent of Pipe Lines & Reservoirs Samuel E. Killam / Distribution Section Superintendent Samuel E. Killam to Chief Engineer, 1908-1935 (3 boxes);
29. MWW, Weekly Reports from Distribution Department Engineers to Chief Engineer, 1907-1935 (4 boxes);
30. MWW, Letters from Wachusett Dam & Aqueduct Department Engineer Thomas F. Richardson to Chief Engineer, 1896-1901 (1 box);
31. MWW, Various Letters from Sudbury Department Engineers to Sudbury Department Engineer, 1896-1903 (1 box);
32. MWW, External Letters received by Distribution Department Engineer / Chief Engineer Dexter Brackett, 1899-1912 (1 box);
33. MWW, Distribution Department, Division Engineer, William E. Foss, Outgoing and Incoming Letters from Foss, 1895-1910s (1 box);
34. MWW, Various letter files from various departments, 1895-1936 (2 boxes);
35. MWW, Subject Index Volumes to Letters to the Chief Engineer, 1895-1935 (1 box);

36. MWW, Time Books, 1895-1896 (1 box);
37. MWW, Employment Records, 1912-1916 (1 box); includes 1902 employee list, and other employee lists;
38. MWW, Distribution Department, Letterbooks, sample volumes regarding pipes, 1896 (1 box);
39. MWW, Electrolysis of Water Pipes, General and Special Reports, 1890-1904 (1 box).

Remaining at the MWRA Records Center

The MWRA Records Center continues to hold an unknown quantity of 1840s-1920s B/MWW archival records that are waiting to be cataloged from an archivist's perspective. An example of such archival items and record sets include, but are not limited to, the following (as of 2006).

1. Mystic Water Board, Minutes, 1860-1876, with separate index volume;
2. Record of Mystic Water Works, by Roberdeau Buchanan, copied 1878;
3. BWW, Bound Volumes of Plans of Structures, 1840s-1860s: Cochituate system, 1848/49; and Chestnut Hill Reservoir system, 1860s;
4. BWB, Sudbury Reservoir contracts, 1890s;
5. State Board of Health, Water Supply, 1893-1894 investigative reports (3 volumes);
6. Metropolitan Water Board Investigation, Hearing Transcript of the Investigation by a Joint Special Committee, 1900 [MWRA Library].

D. Active Archival Records Sets of MWW Records at both DCR and MWRA

There are specific 1895-1920s MWW archival records sets that remain in DCR/MWRA offices for ongoing operations use. Generally, these records sets fall into two categories: real estate and engineering. The MWW real estate records are generally used by both the land records staff and engineers at both agencies, but have research value to other staff as well. Fortunately, there is considerable original duplication of the real estate records, making dual use by DCR/MWRA staff more possible.

Examples of Surviving MWW Real Estate Records at both DCR and MWRA (used by land records and engineering staff)

1. MWW, Evaluation and Settlements (Record of Land Assessment) (2 volumes);
2. MWW, Takings, 1896-1927 (4 volumes);
3. MWW, Record of Deeds to the Board, 1896-1912 (10 volumes);
4. MWW, Record of Deeds of Former Owners (6 volumes);
5. MWW, Copies of Instruments Relating to Real Estate Pertaining to the Spot Pond Water Supply in Malden, Medford, and Melrose (1 volume);
6. MWW, Copies of Instruments Relating to Real Estate in Middlesex County Pertaining to Water Supply of the City of Boston, Cochituate Water Board, Boston Water Board, and the Mystic Water Board, 1800-1897 (deeds and takings by City of Boston for CWB and BWB; deeds and takings for MysticWW) (3 volumes);
7. MWW, Watershed Real Estate, Table of Grantors (1 volume);
8. MWW, Index of Land Owners for Wachusett Reservoir (1 volume).

Examples of Surviving MWW, Engineering, Wachusett Records at DCR (used by Wachusett Watershed Engineering staff)

1. MWW, Main Triangulation Data, Wachusett Reservoir (1 volume);
2. MWW, Engineering, Wachusett, Field Notebooks (about 531 volumes), and Index to Field Notebooks (3 volumes; and Card Index);
3. MWW, Engineering, Wachusett, Calculation Books (thin style) (about 483 volumes), and Index to Calculation Books (2 volumes).

Examples of Surviving MWW, Engineering Records at MWRA

1. MWW, Contract Specifications, Chief Engineer's Set;

2. MWW, Engineering Field Notebooks, Distribution Department;
3. MWW, Engineering, Calculation Books.

E. Engineering Instruments

The DCR Archives also includes a collection of engineering instruments that have direct connections to the 1895-1900s construction of the MWW. All of the instruments were salvaged from the Wachusett Dam Lower Gatehouse in 2000 as the staff relocated the administrative and engineering offices from that building. Some of the instruments were found in the attic. These include a set of surveying links, measuring rods for surveying, and planimeters. The most interesting item (found in the attic) is the ca. 1896 recording apparatus (No. 732) used to measure the Nashua River. Sample chart readings from this gauge also were salvaged.

16. Related Archival Collections

Twenty years since the availability of the Internet and the associated World Wide Web to the general public (1994)[301], DCR/MWRA staff and consultants, and the research public have the opportunity to be informed of and utilize archival records, reports, photographs and plans pertaining to the MWW beyond what is available in the DCR Archives, MWRA Library and Records Center, and the MA State Archives.

Archivists representing all types and sizes of archival repositories, and librarians of local history collections are increasingly using the Internet to post information about their archival collections, ranging from a simple list of collection names to comprehensive archival finding aid guides that detail every folder in a collection. Some repositories are also posting searchable digital facsimiles of documents, volumes and reports to the Internet Archive (http://archive.org/about/about.php). This level of access is transforming the ways in which we identify potential archival and historical records for research and use in our work.

Other than those materials at the MA State Library, and on the microfilm edition of the Olmsted Archives, none of the other collections were examined in person.

Note: The DCR Archives is not responsible for dead or broken web links. Each entry includes enough detail information for users of this Guide to locate current links to the organization/collection.

A. Boston / Metropolitan Water Works

includes Cochituate and Mystic Systems

Boston Water Supply Papers, 1824-1892, Ms. No. S-656, Massachusetts Historical Society, Boston, MA
see also at MHS, printed volume entitled, "Boston Water Supply, 1834-1844"; Letters regarding Boston's water supply, 1824-1892. The MHS collections have extensive holdings of various reports and documents pertaining to the Boston water supply debate, 1830s-1840s.
http://www.masshist.org/library/

Boston Water Supply Papers and Pamphlets, Cabot Science Engineering Library, Harvard University, Cambridge, MA

- Boston Water Supply Papers, 1825-1838
- Papers Relating to the Introduction of Pure Water, 1838
- Boston Water Supply Pamphlets
- Broadside Collection (cataloged by title of broadside); some broadsides have been digitized by Harvard University, and are available through HU Hollis Catalog

A review of HU Library Hollis Catalog reveals many entries for 'Boston Water Supply'
http://lib.harvard.edu/catalogs/hollis.html
http://hcl.harvard.edu/libraries/cabot/

Print Department, Boston Athenaeum, Boston
In 1849, Samuel W. Rowse (1822-1901) made a tinted lithograph of Benjamin F. Smith, Jr.'s (1830-1927) drawing of the "View of the Water Celebration, on Boston Common, October 25, 1848." John Henry Bufford (1810-1870) of J. H. Bufford & Co. made a tinted lithograph for the cover of the "Cochituate Quick Step," a

[301] On April 30, 1993, CERN released for free the WWW protocol and code invented by Tim Berners-Lee; and in January 1994, the Internet and the WWW became available for home use; see Tim Berners-Lee, *Weaving the Web: The Original Design and Ultimate Destiny of the World Wide Web by Its Inventor* (HarperSanFrancisco, 1999), pp. 75, 80. April 30, 1993 is often referred to as the official date of the WWW release. TBL's first WWW webpage invented in 1990, and the WWW name. See also http://www.w3.org/History.html.

piece of music composed for the 1848 Celebration. Bufford also made a tinted lithograph of the Celebration procession
http://www.bostonathenaeum.org/print.html

Documents Concerning the Water Celebration, Boston, October 25, 1848, Ms. No. C 5143, Special Collections Department, New England Historic Genealogical Society, Boston, MA
http://www.newenglandancestors.org/manuscripts.asp

Digital Collections and Archives, Tufts University Archives, Medford, MA
Mystic Water Board Reservoir, on Tufts Campus, 1865-1944 (search for "Reservoir")
http://dca.tufts.edu/
http://dca.tufts.edu/?pid=98&c=114
http://dl.tufts.edu/view_text.jsp?urn=tufts:central:dca:UA069:UA069.005.DO.00001&chapter=R00003

Cochituate/Boston Water Works Deeds, 1846-1897, Records Series 5080.001, City of Boston Archives, West Roxbury, MA
There are 5 tin containers in 2 boxes holding deeds dating from 1846-1897, and 1 volume of grantors information associated with the deeds (with same date range); Boxes 3F127 and 3F128, and volume at 6J002. The deeds are trifolded.
http://www.cityofboston.gov/archivesandrecords/

Auditing Department, bills and payment receipts, ca. 1822-1882, Records Series 2200.002, City of Boston Archives, West Roxbury, MA
trifolds of financial documents from city departments, including Cochituate construction, and Water Works (59 boxes)
http://www.cityofboston.gov/archivesandrecords/

Natick Historical Society, Natick, MA
Holds 7 prisms, as in masonry/mortar prisms, used to test the compressive strength of brick masonry during the 1876-1878 construction of the Sudbury Aqueduct by the Boston Water Works. Some of the prisms are stamped 'BWW/1876' and 'Newark & Rosendale Cement Company.'
http://www.natickhistoricalsociety.org/

Joseph P. Davis (1837-1917) Papers, 1861-1903, MC No. 26, Institute Archives and Special Collections, Rensselaer Polytechnic Institute, Troy, NY
Davis was Boston City Engineer from 1872-1880 and was Chief Engineer of the Sudbury River Conduit project; this collection has minimal material regarding his BWW work
http://www.lib.rpi.edu/dept/library/html/Archives/access/inventories/manuscripts/MC26.html
http://www.lib.rpi.edu/dept/library/html/Archives/
http://www.lib.rpi.edu/dept/library/html/Archives/access/inventories/index.html

National Museum of American History, Division of Mechanical and Civil Engineering, Exhibition Records, ca. 1955-1985, SIA Acc. 95-116, Smithsonian Institution Archives, Washington, D.C.
Box 1 (includes), Pumping, Metropolitan District Commission (Chestnut Hill)
http://siarchives.si.edu/collections/siris_arc_238694
http://siarchives.si.edu/collections

Dexter Brackett Scrapbook, Dibner Library of the History of Science and Technology, Special Collections Department, Smithsonian Institution Libraries, Washington, D.C.
Brackett's (1851-1915) entire career was with the BWW/MWW, culminating in Chief Engineer. The Library of the NMAH, accessioned this item on September 9, 1977, but there is no record as to why it was acquired. It contains newspaper and magazine clippings, ca. 1882-1895, pertaining to the Boston Water Board; Dexter

Brackett; water meters; and water works issues. There are also items of correspondence to Dexter Bracket in his capacity as an engineer for the Boston Water Board and as a consulting engineer, and documents collected in these capacities.
http://www.sil.si.edu/libraries/Dibner/about.htm
http://library.si.edu/departments/special-collections
http://siris-libraries.si.edu/#focus

Desmond FitzGerald Papers, 1868-1930, Archives of American Art, Smithsonian Institution, Washington, D.C.
FitzGerald (1846-1926), was a civil engineer for the BWW/MWW from 1873-1902, managing the Western Division (BWW) and the Sudbury Department (MWW). The AAA collection pertains to his role as an art collector, though there are 28 volumes of his personal diary, of which the early volumes pertain to his professional work. This material is available on the AAA microfilm series, Reel Nos. D177, and 2774-2775. The MIT Institute Archives and Special Collections holds a collection of papers of Desmond FitzGerald (MC465) pertaining to his consulting work for the State of New Jersey, Passaic waters.
http://www.aaa.si.edu/collections/collections.cfm

Desmond Fitzgerald (1846-1926) Papers, 1857-1903, M 0105, BV 1255, Indiana Historical Society, Indianapolis, Indiana
includes correspondence and papers relating to various engineering projects; and papers relating to American Society of Civil Engineers and Boston Society of Civil Engineers
http://www.indianahistory.org/our-collections/manuscript-and-visual-collections#.VFY6OmeBH3h
http://www.indianahistory.org/

Erasmus D. Leavitt Papers, 1871-1917, Archives Center, Smithsonian Institution, National Museum of American History, Washington, D.C.
Leavitt (1836-1916), the nation's leading 19th-century mechanical engineer, designed 2 pumping engines for the BWW in the early-mid 1890s. Mystic No. 4 and Chestnut Hill No. 3. The latter was so significant, a working model was designed and constructed (unfinished) between 1964 and the early 1970s for the Smithsonian Institution. The NMAH also holds a set of 79 blueprints of the Chestnut Hill High Service Pumping Station Leavitt engine from the MDC Water Division. The BWW blueprints are dated between 1890 and 1896 (bulk 1890-1892) and have accession nos. ranging between 2119 and 3753. See Records Group No. EI80 (Leavitt Engine Collection). The Leavitt Engine (Chestnut Hill) model is under the curatorship of the Division of Work and Industry, and is located in NMAH off-site storage in Landover, Maryland.
http://americanhistory.si.edu/archives/b-1.htm
http://www.siris.si.edu/
http://americanhistory.si.edu/about/departments/work-and-industry
http://americanhistory.si.edu/about/departments/work-and-industry/collections

George C. Whipple Papers, Harvard University Archives, Cambridge; and Countway Library of Medicine, Rare Books Department, Harvard University, Boston
Whipple (1866-1924) managed the BWB Biological Laboratory from 1890-1897. There are 19 boxes at Harvard Archives, and the Countway Library of Medicine includes 'collected papers.'
http://lib.harvard.edu/
http://hul.harvard.edu/huarc/
https://www.countway.harvard.edu

George W. Rafter (1851-1907) Papers, 1872-1920, Coll. No. 4383, Division of Rare and Manuscript Collections, Cornel University Library, Ithaca, NY
includes correspondence
Rafter advised BWB and Desmond Fitzgerald in starting the BWB Biological Laboratory
http://rmc.library.cornell.edu/ead/htmldocs/RMM04383.html
http://rmc.library.cornell.edu/EAD/browselists/allRMC.html

http://rmc.library.cornell.edu/

Chestnut Hill Pumping Station, Architect's Rendering, Sheet 4, End Elevation, ca. 1887 (46" x 33.5"), Waterworks Museum, Chestnut Hill High Service Pumping Station, Brighton, MA
designed by Arthur H. Vinal (1854-1923), Boston City Architect (1884-1888)
http://www.waterworksmuseum.org/

George A. Clough Architectural Collection, AR005, Historic New England / Society for the Preservation of New England Antiquities Library & Archives, Boston, MA
George A. Clough (1843-1910), Boston City Architect (1873-1883), designed all of the superstructures for the BWW Sudbury Aqueduct project between 1875 and 1880. This collection holds a watercolor design drawing of the Terminal Chamber superstructure at the Chestnut Hill Reservoir.
http://www.historicnewengland.org/collections-archives-exhibitions

Engineering Drawings (5), Boston Water Works, Charles River Bridge [Echo Bridge], Sudbury River Conduit (Sudbury Aqueduct), December 1875, City of Boston Engineer's Office, BWW Plan Accession Nos. E464-E468 (Lh57-Lh61), E509 (Lh104), located in the Conference Room, New England Water Works Association, Holliston, MA
These oversize colorized drawings were inherited from the BWB by the MWB / MWSB, WW / MDC Water Division, but were likely given to the NEWWA by a MDC Water Division employee, possibly in the 1970s or early 1980s. Technically, public records, and property of the Commonwealth.
http://www.newwa.org/
Sheet 1, Lh57, Arch B and Cross Section (21"x28.5")
Sheet 2, Lh104, Longitudinal Section and Centre Line, Arch A (26"x37")
Sheet 3, Lh58, Longitudinal Section and Centre Line, Arches C, D, E (21"x28")
Sheet 4, Lh59, Longitudinal Section and Centre Line, Arches E, F (21"x22")
Sheet 6, Lh61, 4 Sections (21"x30")
all sheets colorized; Sheet 5 missing

Engineering Societies Library Collection, Special Collections Department of the History of Science Collection, Linda Hall Library, Kansas City, MO
holds a copy of 2 Boston Water Works, Additional Supply (Sudbury Aqueduct) contract specifications: Building Dam No. 1 on Sudbury River, 1877; and Building Dam No. 3 on Sudbury River, 1877.
http://www.lindahall.org/

Birkinbine Engineering Firm Papers, Special Collections, Linderman Library, Lehigh University, Bethlehem, PA
holds a copy of a Boston Water Works, Additional Supply (Sudbury Aqueduct) contract specification: Section A, Sudbury River Conduit, 1877.
http://www.lehigh.edu/library/

Kenneth Allen (1857-1930) Diary, 1874, MC44, Institute Archives and Special Collections, Rensselaer Libraries, Rensselaer Polytechnic Institute, Troy, NY
"While studying at Rensselaer, Kenneth also worked for the Boston Water Works, Sudbury River, Framingham, Mass., from July 1875 to August 1877." "The diary also contains a report entitled, "Dam No. I. Boston Water Works--Additional Supply" (51 p.)"
http://www.lib.rpi.edu/archives/access/inventories/manuscripts/MC44.html

Boston Water Works, Contracts and Specifications, 1885-1894, Herman T. Pott National Inland Waterways Library, Mercantile Library, University of Missouri, St. Louis, St. Louis, MO
2 volumes of contracts
http://www.umsl.edu/pott/index.html
http://www.umsl.edu/mercantile/

http://laurel.lso.missouri.edu/search~S6

John Bloomfield Jervis Papers, Jervis Public Library, Rome, NY

Jervis (1795-1885) served as Consulting Engineer for the Boston Water Works from 1846-1848, during the construction of the Cochituate Aqueduct system. The collection encompasses 79 boxes mostly pertaining to all aspects of Jervis' professional work. There are some materials pertaining to the BWW.
http://clrc.org/digital/jervis/jervisindex.htm

Baldwin Family Business Papers, Mss. 7, Baker Library, Manuscript Division, Harvard Business School, Harvard University, Brighton, MA

Loammi Baldwin, Jr. (1780-1838; Boston Water Works) and George R. Baldwin (1798-1888; Charlestown / Mystic Water Works)
http://oasis.lib.harvard.edu//oasis/deliver/deepLink?_collection=oasis&uniqueId=bak00153
http://lib.harvard.edu/
http://www.library.hbs.edu/hc/

Baldwin Family Papers, 1784-1904, Collection No. 204, Winterthur Library, Joseph Downs Collection of Manuscripts and Printed Ephemera, Winterthur, DE (Collection No. 204)

Loammi Baldwin, Jr. (1780-1838; Boston Water Works) and George R. Baldwin (1798-1888; Charlestown / Mystic Water Works)
http://findingaid.winterthur.org/html/HTML_Finding_Aids/COL0204.htm
http://www.winterthur.org/research/library_resources.asp

Baldwin Family Papers, MSS No. 62, Library, Peabody Essex Museum, Salem, MA

Loammi Baldwin, Jr. (1780-1838; Boston Water Works) and George R. Baldwin (1798-1888; Charlestown / Mystic Water Works)
http://pem.org/museum/library.php

Baldwin Family Papers, 1662-1838, Clements Library, Manuscripts Division, University of Michigan, Ann Arbor, MI

Loammi Baldwin, Jr. (1780-1838; Boston Water Works)
http://www.clements.umich.edu/Webguides/Arlenes/B/Baldwin.html
http://www.clements.umich.edu/Manuscripts.html
http://www.clements.umich.edu/index.html

Loammi Baldwin Papers, Institute Archives and Special Collections, Massachusetts Institute of Technology, Cambridge, MA

this collection of Loammi Baldwin, Jr. Papers (MC69) mainly pertain to naval dry docks
http://libraries.mit.edu/archives/research/collections/manuscripts-list.html#B
http://libraries.mit.edu/archives/index.html

Baldwin Family Rare Book Collection, 1694-1880, Institute Archives and Special Collections, Massachusetts Institute of Technology, Cambridge, MA

The Engineering Library of the Baldwin Family was acquired by the Institute Archives in 1914. This Library of 2,000 volumes and 60 chests of Baldwin Family Papers are referenced in John R. Freeman, *Report of the Committee on Charles River Dam* (Boston: Wright & Potter, 1903), pp. 545-548.
Middlesex Canal
Boston Water Works
http://libraries.mit.edu/archives/index.html
http://libraries.mit.edu/archives/research/rare-books.html

Loammi Baldwin Papers, 1821-1842, Crerar Ms No. 203, Special Collections Research Center, University of Chicago, Chicago, IL
http://ead.lib.uchicago.edu/view.xqy?id=ICU.SPCL.CRMS203&c=b
http://www.lib.uchicago.edu/e/spcl/

Jamaica Pond Aqueduct Corporation, Proceedings (Minutes), 1857-1893, Series 301.024, City of Boston Archives, Boston (West Roxbury), MA
1 volume
St 1892, c 371: City of Boston Park Commission is authorized to take the lands of the Jamaica Pond Aqueduct Corporation [1795-1893], and through an agreement between the Park Commission and the Boston Water Board, the Water Board takes the Corporation's pipe system
http://www.cityofboston.gov/archivesandrecords/

Jamaica Pond Aqueduct Corporation records in Francis Parkman (1823-1893) Papers III, 1761-1932, MS N-663, Massachusetts Historical Society, Boston, MA
http://www.masshist.org/findingaids/doc.cfm?fa=fa0210

Roberdeau Buchanan Papers, 1862-1865, Library of Congress, Manuscript Division, Washington, D.C.
Buchanan (1839-1916), an engineer for the Charlestown / Mystic Water Works between 1862 and 1872, donated in 1909 to the Library of Congress, Manuscript Division, a bound volume of construction progress drawings and notes of the 1862-1865 CWW work. As of 2006, the MWRA Records Center holds a related item pertaining to Roberdeau Buchanan's drawings for the Charlestown / Mystic Water Works.
http://lccn.loc.gov/mm82082073
http://www.loc.gov/rr/mss/
see also Handbook of Manuscripts in the Library of Congress, 1918, p. 253
http://www.archive.org/details/handbookofmanusc00unituoft

Mystic Water Board, Deeds, 1862-1871, City of Charlestown Records, 1725-1874, Coll. No. 1200.001, City of Boston Archives, Boston (West Roxbury), MA
Box 8 (4 folders)
1865 Charlestown Water Works Final Report
http://www.cityofboston.gov/archivesandrecords/
http://www.cityofboston.gov/Images_Documents/Guide%20to%20the%20City%20of%20Charlestown%20records_tcm3-30010.pdf

Artifacts from the October 25, 1848 Cochituate Water Celebration, Collections (Library and Archives?), Historic New England, Boston, MA
Ribbon/Badge
Pincushion
http://www.historicnewengland.org/collections-archives-exhibitions/collections-access
http://www.historicnewengland.org/collections-archives-exhibitions/library-archives

Spot Pond Aqueduct Company Pamphlets, 1845, proposing water from Spot Pond to Boston, Library, American Antiquarian Society, Worcester, MA
see Inventory for "Massachusetts Local Institutions", Boston, Spot Pond Aqueduct Company
http://www.americanantiquarian.org/Inventories/MassLocalInst.pdf
http://www.americanantiquarian.org/findingaids.htm
http://www.americanantiquarian.org/

Horsford Family Papers, 1681-1954, MC5, Institute Archives and Special Collections, Rensselaer Libraries, Rensselaer Polytechnic Institute, Troy, NY

see Series I, Eben Norton Horsford Correspondence, Box 2, folder 85; Box 4, folder 75; Box 5, folder 12; Series II, Eben Norton Horsford Professional Papers, 1817-1892, Box 32, folder 30; Box 35, folder 19; Box 37A, folders 2, 21, 23, 26, 30, 31
http://archives.rpi.edu/archon/index.php?p=collections/controlcard&id=57
http://www.lib.rpi.edu/Archives/
Horsford wrote the following Reports regarding the Boston/Mystic Water Works

- Report of the Water Commissioners on the Material Best Adapted for Distribution Water Pipes; and on the Most Economical Mode of Introducing Water into Private Houses (1848)
- Report on Mystic Pond Water to the Boston Harbor Commission (1861)
- Report on the Purity of the Mystic Water (1873), in City Document No. 134 (1873)
- Report on the Effect of Moseley's Tannery on the Salubrity of the Mystic Water (1873), in City Document No. 134 (1873)

Boston Water Board, World's Columbian Exposition Commemorative Presentation Medal, 1892/93, struck 1895–96, designed by Augustus Saint Gaudens (1848–1907) and Charles E. Barber (1840–1917), bronze, Museum of Fine Arts, Boston

Provenance, presented to the Boston Water Board in 1896, to Cornelius C. Vermeule, Sr. (1859-1950), a civil engineer and consultant to the Boston Water Board, by descent through the family to Cornelius C. Vermeule III, to the MFA, 2005 gift, Acc. No. 2005.1130, on view in the Jan and Warren Adelson Gallery (An American Renaissance, 221), Art of the Americas Wing
http://www.mfa.org/collections/object/world-s-columbian-exposition-commemorative-presentation-medal-462816
http://www.mfa.org/collections
http://www.mfa.org/americas-wing/descriptions_02.html

Photochrom photograph, "Echo Bridge, Newton, Massachusetts, 1901" by William Henry Jackson (1843-1942), published by Detroit Photographic Co., in William Henry Jackson Photochrom Collection, Digital Item WHJ-11149, C Photo Collection, 84, Western History/Genealogy Department, Denver Public Library, Denver, CO
http://digital.denverlibrary.org/
http://history.denverlibrary.org/index.html

"Statement of Agreed Facts," by MA Supreme Judicial Court, 1863-1886, Osborne Library, American Textile History Museum, Lowell, MA

Court document involving Wamesit Power Company vs. Wilder et al., Sterling Mills et al.; Lowell Bleachery vs. Wamesit Power Company; with the defendants suing the city of Boston to compensate them for damages done by withdrawing water from the Sudbury River for the city's water supply.
http://www.athm.org/collections/osborne-library/

Boston / Metropolitan Water Works at the Massachusetts State Library
http://www.mass.gov/anf/research-and-tech/oversight-agencies/lib/

Note: During the digital conversion of the MA State Library old paper-based card catalog and staff shelf-list to create a more complete online catalog of its holdings, these paper-based card catalogs were discarded (about 2012?). The following items were listed in the paper-based card catalog.

Legislative Hearings as to the Nashua River Water Supply, February 25 – April 29, 1895.
transcripts (7 volumes)

Joint Special Committee to Investigate Alleged Violations of the Labor Laws and Liquors Laws by the Metropolitan Water Board, Hearings, February 27 – May 4, 1900.
transcripts (2 volumes, totaling 1,888 pages)

Hearings to Consider the Claims of Clinton, Sterling and Holden, . . . Chapter 101, Resolves of 1901, 2 volumes: November 21 – December 24, 1901 (Boston: Wright & Potter, 1902).

John F. O'Brien vs. Commonwealth of Massachusetts, Trial ... to Determine the Value of Certain Real Estate Taken by the Commonwealth for the Wachusett Reservoir, May 1903; 373-page typescript of transcript; JFO'B purchased a farm in 1893; 32 witnesses called (p. 96 missing)

Special Collections, MA State Library

Rules and Regulations for the Sanitary Protection of Waters of the Metropolitan Water Supply

The State Library holds one copy of the 1899/1900, 1918, 1925, and 1948 editions.

Contract Specifications, Water Commissioners of the City of Charlestown (6), 1862-1863

MWW Contract Specifications (in old Card Catalog, but missing)

Boston Water Works at the Boston Public Library

Cochituate Water Board Contract Specifications (in Card Catalog, but missing)

Boston Water Department Lantern Slide Collection, Print Department

68 slides, from both Water Division and Sewer Division

includes 6 BWW images, likely ca. 1893:

- View of Basin No. 4 (waste weir)
- Basin No. 2, Sudbury River
- Sudbury River Conduit, Waban Bridge
- Basin No. 2, Dam and Gatehouse
- Farm Pond, Conduit and Gatehouse
- Dam on Basin No. 1

http://www.bpl.org/research/print/

B. Metropolitan Water Works, 1895-1926

Agency Reports, Online (Internet Archive)

House No. 500: Report of the Massachusetts State Board of Health upon a Metropolitan Water Supply, February 1895.

the engineering study/planning report that is the foundation for the MWW 1895-1905 construction

http://archive.org/details/reportmassachus01healgoog

http://archive.org/details/reportmassachus02healgoog

http://archive.org/details/cu31924012492116

John D. Rockefeller Library, Brown University, Providence, RI

Holds a collection of 6 or 7 MWB contract specifications dating between 1896 and 1899. Contracts include Nos. 37, 71, 108, 157, 166, and 168. Contract No. 162 may also be found within the collection.

http://dl.lib.brown.edu/libweb/about/rock/

John R. Freeman Papers, MC No. 51, Institute Archives and Special Collections, Massachusetts Institute of Technology, Cambridge, MA

Freeman (1855-1932) was a board member for one year (1895-1896) to the MWB. This collection of papers includes at least two boxes pertaining to the MWW (Boxes 93-94).

http://libraries.mit.edu/archives/research/collections/guides-online.html#mss

http://libraries.mit.edu/archives/research/collections/collections-mc/pdf/mc51.pdf
http://libraries.mit.edu/archives/index.html

William O. Crosby Papers, MC No. 68, Institute Archives and Special Collections, MIT Libraries, Massachusetts Institute of Technology, Cambridge, MA

Crosby (1850-1925), was Consulting Geologist to the MWW; and served as a Consulting Geologist to the 1919-1922 Joint Board between DPH/MDC to study the Swift/Ware River (Quabbin) expansion. This collection encompasses 5.7 cubic feet. Box 3, folder 13 holds 10 MWW 7600 Series loose photographic prints. See also:

Box 3, folder 26: Nashua Tunnel, 1896-1897
Box 4, folder 1: Reservoir and Aqueduct of the Metropolitan Water Works, Weston, Mass., 1900, 1903
Box 4, folder 10: Geology of the Tunnels of the New Aqueduct in Southboro, Framingham, and Weston, 1902
Box 4, folder 20: Water Resources of Boston Basin, 1904
Box 5, folder 11: Proposed Dam Sites on the Swift River Watershed of Central Massachusetts, 1921

http://libraries.mit.edu/archives/research/collections/collections-mc/pdf/mc68.pdf
http://libraries.mit.edu/archives/index.html

The Records of the Olmsted Associates, Series B [correspondence files], Job Nos. 2070, 2071, 2072, 2073, 2074, 2075 [Metropolitan Water Board, Boston, Mass.], Containers B108 and B109, Microfilm Reel 79 [frames 75-392], Library of Congress, Manuscript Division

The Olmsted Brothers (landscape architects, Frederick Law Olmsted, Jr. [1870-1957], and John Charles Olmsted [1852-1920]) were consultants to the MWW for the following projects: 2070 (MWB, general); 2071 (Chestnut Hill Reservoir Pumping Station); 2072 (Wachusett Reservoir); 2073 (Spot Pond and Fells Reservoir); 2074 (Weston Reservoir); and 2075 (Wachusett Dam and Grounds).
http://www.loc.gov/rr/mss/f-aids/mssfa.html

Olmsted Archives, Frederick Law Olmsted National Historic Site, Brookline, MA

As mentioned earlier in this report, within the records of Job No. 2073 (Metropolitan Water Board, Spot Pond) there is a photograph album encompassing 79 prints dating from 1898-1902. A four-page typescript within the album lists the descriptions for each photograph. Each print is numbered in the lower right corner with the Job No. as the prefix (2073), followed by a print number. The prints are numbered from 2073-1 to 2073-78 (the 79th being a postcard). In this album, nos. 1-29 are the same images found in the 1899 Report. The typescript notes that these 29 images were taken by Arthur A. Shurcliff in July 1898. The 30th (and last) print in the 1899 Report is not in the album. Nos. 30-78 include construction and post-construction (i.e. landscaping) images from 1899-1902. The Olmsted Archives also holds plans from each of the 5 Job Nos.
http://www.nps.gov/frla/olmsted-archives-collections.htm
http://www.nps.gov/frla

Olmsted Research Guide Online (ORGO)

use this online database to locate a list of plans, correspondence and photograph albums associated with each Olmsted Job No.
http://www.rediscov.com/olmsted/

Olmsted Online, Plans & Projects of the Olmsted Firm, National Association for Olmsted Parks

converts the items listed per Olmsted Job No. to a mapping tool, and future digital repository of digital images of a Job's plans, documents and images/photographs
http://www.olmstedonline.org/

George Augustus Gardner (1829-1916) Collection of Photographs of the New England Landscape, Special Collections, Cabot Science Library, Harvard University, Cambridge, MA

geological rock along shore of Spot Pond; Upper Mystic Lake/Pond; Pumping Station Dike, Brighton, ca. 1888 (regarding Chestnut Hill?); Wachusett Reservoir (Kettle Pond), MWW Print No. 2490 (1898)
Collection has been digitized
http://hcl.harvard.edu/collections/digital_collections/gardner.cfm
http://via.lib.harvard.edu/via/deliver/advancedsearch?_collection=via
http://hcl.harvard.edu/libraries/cabot/

Heather Ross Munro, *The History and Significance of the Gardner Collection of Photographs at the Kummel Library, Harvard University*, Thesis (A.L.M.), Harvard University, 1988

U.S. Geological Survey, Photographic Library, Central Regional Library, Denver, CO
search 'Massachusetts' (online)
Wachusett Aqueduct, 1906
Wachusett Reservoir, 1906
http://libraryphoto.cr.usgs.gov/about_library.htm
http://libraryphoto.cr.usgs.gov/index.html

for a comprehensive review of geology of the metropolitan Boston area, see, Patrick J. Barosh and David Woodhouse, *A City Upon a Hill: The Geology of the City of Boston and Surrounding Region*, Civil Engineering Practice [Journal of the Boston Society of Civil Engineers Section/ASCE], Vols. 26 & 27 (2011/2012), pp. 7-442 (see p. 263; and extensive bibliography, pp. 411-442)
see especially, "Boston Area Water Supply & Wastewater Tunnels," pp. 349-409; which includes many references to the metropolitan systems; however, there are some factual date errors in this chapter regarding the metropolitan systems

Henry P. Walcott Papers, Rare Books Department, Francis A. Countway Library of Medicine, Harvard Medical School, Boston
Walcott (1838-1932), was a board member of the MWB/MWSB from 1896-1919, and served as Chairman of the MWSB from 1914-1919. Walcott was also a member of the State Board of Health from 1886-1914. This collection encompasses 1 box.
http://lib.harvard.edu/
http://www.library.hbs.edu/hc/

Henry P. Walcott Papers, Clendening Medical Library, University of Kansas Medical Center, Kansas City, KS
http://clendening.kumc.edu/

Henry P. Walcott (1838-1932), MD, Oil painting, 63" x 58" with frame, 1919, by Charles Hopkinson (1869-1962), Massachusetts General Hospital, Boston, MA
http://www2.massgeneral.org/history/catalogueDetails.asp?catalogueNo=10
http://www2.massgeneral.org/history/

Allen Hazen Papers, 1883-1974, MC 430, Institute Archives and Special Collections, Massachusetts Institute of Technology, Cambridge, MA
Between 1888 and 1893, Hazen (1869-1930) was chief chemist at the Massachusetts State Board of Health's Lawrence Experiment Station. This collection of Hazen's papers (MC430) includes 1 letter (1898) to the MWB, and 1 letter (1895) to the BWW, Western Division. Between 1894 and 1896, Hazen was associated with Albert F. Noyes (Metropolitan Sewerage Commissioner; d. 1896) in private engineering practice. Between 1904 and 1930, Hazen was associated in private engineering practice with George C. Whipple (see Whipple below). Hazen also served as Consulting Engineer to the 1924 Metropolitan Water Supply Investigating Commission, a special Legislative Commission that challenged the 1922 DPH/MDC report regarding the Swift/Ware River (Quabbin) expansion.
http://libraries.mit.edu/archives/research/collections/manuscripts-list.html#H

http://libraries.mit.edu/archives/index.html

Papers of John George Jack (1861-1949) Papers, 1887-1990, Archives of the Arnold Arboretum, Harvard University, Jamaica Plain, MA

compiled by J. G. Jack, primarily during his tenure at the Arnold arboretum; includes biographical info
John G. Jack (dendrologist, 1861-1949), consultant to the MWB (1897-1898) regarding Wachusett Reservoir Watershed (forestry)
http://arboretum.harvard.edu/wp-content/uploads/II_A-3_JGJ_2012.pdf
http://oasis.lib.harvard.edu/oasis/deliver/~ajp00011
http://arboretum.harvard.edu/library/archive-collection/

Boston Water Supply: Clippings from Boston Newspapers, 1895-1904 (newspaper scrapbook), Rare Book Department, Boston Public Library

http://www.bpl.org/research/rb/index.htm

Melrose (MA) Public Library, Local History Collection

Transcript of Cities of Malden, Medford and Melrose, petitioners v. Commonwealth of Massachusetts, October 10, 1904 – January 27, 1905, 7 volumes (Boston: Wright & Potter, 1905)
Middlesex, ss Superior Court No. 614.1 regarding Spot Pond takings
http://www.melrosepubliclibrary.org/

Institute Archives and Special Collections, Massachusetts Institute of Technology, Cambridge, MA

Holds 3 theses pertaining to the Hydroelectric Power Station/Plant at the Wachusett Dam (1914, 1923, 1925); see Theses section at end of this Guide
http://libraries.mit.edu/

Metropolitan Water Works Photographs, 1897 (5), Waterworks Museum, Chestnut Hill High Service Pumping Station, Brighton, MA

Sudbury Reservoir, Section P & Q, Engineering Party & Office, 1897, with Bertram Davis, Frank D. Low, Herbert Fay, F. Bass; with surveying equipment (5”x7”)
Wachusett Aqueduct, Italian laborers village, 1897 (5”x7”; faded)
Sudbury Reservoir Dam, under construction (4.25”x5.25”)
Sudbury Reservoir Dam, above dam, under construction (4.25”x5.25”)
Sudbury Reservoir, site of old Mill Dam in foreground (4.25”x5.25”)
all with same style annotations on back; mounted on board
also holds MWW 7600 Series Nos. 5394, 5475, 5771, 5881, 5929, 6265 (ca. 1930s contact prints, from MDC Water Division)
http://www.waterworksmuseum.org/

Framingham Historical Society, Framingham, MA

Box “Reservoirs and Aqueducts”: MWSB, MWW Dinner Menu to celebrate the start of construction of the Weston Aqueduct, November 20, 1901, at Hotel Kendall, South Framingham [in the form of a MWW contact specification (miniature)]
http://www.framinghamhistory.org/

Records of the Proprietors of the Locks and Canals on Merrimack River, Files Collection, Lowell National Historical Park, National Park Service, Lowell, MA

In a ca. 1920s typed list of file folder titles, File No. 1012.19 entitled, “Nashua River. Diversion of Water from Merrimack River by the Metropolitan Water Board, 1894” was extant. The folder and its contents are not extant today.

Note: This collection may or may not be the same as the collection at the Center for Lowell History, Patrick J. Mogan Cultural Center, University of Massachusetts, Lowell

http://library.uml.edu/clh/Collect.Html

Records of the Proprietors of the Locks and Canals on Merrimack River, MSS 393, Baker Library, Manuscript Division, Harvard Business School, Harvard University, Brighton, MA

Hiram F. Mills (1836-1921), a consulting engineer to the MWW between 1898-1919, was Chief Engineer of the Proprietors from 1892-1917, and the Chief Engineer of the associated Essex Company (Lawrence) from 1869-1917. Mills was also a member of the Massachusetts State Board of Health from 1886 to 1914 (committee on water supply and sewerage), and the founder of its Lawrence Experiment Station in 1887. This collection of 13 linear feet encompasses the corporation records of the company including minutes and letterbooks, while the LNHP/NPS Collection encompasses the engineering records, including files, notebooks, photographs and plans.
http://lib.harvard.edu/

Records of the Essex Company of Lawrence, Massachusetts, 1845-1987, Lawrence History Center, Lawrence, MA

Engineer's Correspondence, Nashua River Diversion, Nashoba Co. vs. Comm. of Mass., 1897-1903 (27/B33)
Engineer's Correspondence, Nashua River Paper Co. vs. Comm. of Mass., 1900-1902 (27/B33)
Engineer's Correspondence, Mass. Dept. of Public Health / Mass. Metro District Commission, 1918-1954 (27/B30)
MWW, Yields of Watersheds, 1904-1927 (63/B35)
http://www.lawrencehistorycenter.org/files/library/essex-collection-2nd-fl-vault.pdf
http://www.lawrencehistory.org/node/4
http://www.lawrencehistory.org/

Lancaster Mills Records, 1844-1931, Baker Library, Manuscript Division, Harvard Business School, Harvard University, Brighton, MA

includes both Lancaster Mills, Clinton, and Sawyer's Mills, Boylston; both affected by the Wachusett Reservoir construction
http://lib.harvard.edu/

Massachusetts, Division of Water Supply, Consulting Engineers Reports, 1886-1931, Records Series No. EN3.12/1259X, Massachusetts State Archives, Boston, MA

108 volumes of typescripts of reports created by State Board/Dept. of Health / Dept. of Public Health Engineering Division on Water Supply and Sewerage issues; indexed by town/client; MWW example include:

- Box 12, Volume 61, 1919, Volume 2 (pp. 309-317), for MWSB regarding boating and fishing in Lake Cochituate, October 22, 1919

http://www.sec.state.ma.us/arc/arcidx.htm

Worcester Society of Antiquity Tour of the Wachusett Reservoir Construction, October 16, 1897, Library and Archives, Worcester Historical Museum, Worcester, MA

- Original photographic print of the same image in MWW Photograph Collection (see No. 8067), in the general Photograph Collection
- Diary entry of George Maynard, in George Maynard (1850-1917) Collection, 2007.FIA.03

http://www.worcesterhistory.org/library/

see also, George Maynard, "Excursion to Metropolitan Water Basin," *Proceedings of the Worcester Society of Antiquity*, Vol. 16 (1899), 124-132; see also p. 191

Haven & Hoyt Collection, Fine Arts Department, Boston Public Library

Edmund M. Wheelwright (1854-1912), a Consulting Architect for the MWW, was a partner with Parkman B. Haven (1858-1943), in Wheelwright & Haven, Architects (1888-1910); and in 1910, Edward A. Hoyt (1868-

1936) joined the partnership to form Wheelwright, Haven, and Hoyt (1910-1912). This collection includes some records of Wheelwright's work before and after 1888.
http://www.bpl.org/research/finearts.htm

Builders Iron Foundry Records, 1849-1905, MSS 7, Sub Group 1, Library, Rhode Island Historical Society, Providence, RI

Builders Iron Foundry (Providence, RI) manufactured Venturi Meters, used by the MWW, to measure the flow of water through distribution pipes. The Venturi Meter was invented by engineer Clemens Herschel (1842-1930); see, *The Venturi Meter, patented by Clemens Herschel, hydraulic engineer, and by Builders Iron Foundry, made by Builders Iron Foundry, Founders and Machinists* (Providence, RI, 1895)
http://www.rihs.org/library/collections/
http://www.rihs.org/

Ernest Wilson's New England Trees Photograph Collection (glass plate negatives), Arnold Arboretum Library and Archives, Harvard University, Jamaica Plain, Boston, MA; see also Ernest Henry Wilson (1876-1930) Papers, 1896-1952

during the mid-1920s, Wilson began to photograph what he considered to be noteworthy trees in the Boston area, central Massachusetts, the Mohawk Trail, southern New Hampshire, Maine, and Rhode Island
https://www.digitalcommonwealth.org/collections/commonwealth:1r66j310m
http://arboretum.harvard.edu/library/image-collection/ernest-wilsons-new-england-trees/
http://arboretum.harvard.edu/wp-content/uploads/III_EHW_2012.pdf
http://arboretum.harvard.edu/library/

1 image related to the MWW: Ulmus procera Massachusetts (Chestnut Hill), Tree habit, November 28, 1925, Image No. M-287; English Elms along the Chestnut Hill Reservoir
https://www.digitalcommonwealth.org/search/commonwealth:n296x369r
http://ark.digitalcommonwealth.org/ark:/50959/n296x369r

Historic American Buildings Survey (HABS), and Historic American Engineering Record (HAER) Collections, Prints and Photographs Division of the Library of Congress, Washington, D.C.

B/MWW Buildings (HAER)
Sudbury Aqueduct (aka Sudbury River Conduit; Echo Bridge), Needham/Newton (HAER)
http://memory.loc.gov/ammem/collections/habs_haer/
http://lcweb2.loc.gov/pp/hhhtml/hhabt.html
http://memory.loc.gov/pp/hhquery.html

Leavitt-Riedler Pumping Engine, Chestnut Hill High Service Pumping Station, American Society of Mechanical Engineers Landmark

MDC/ASME Dedication Program for Leavitt Pumping Engine, Chestnut Hill High Service Pumping Station
http://files.asme.org/ASMEORG/Communities/History/Landmarks/3129.pdf
http://www.asme.org/Communities/History/Landmarks/LeavittRiedler_Pumping_Engine.cfm
http://www.asme.org/Communities/History/Landmarks/

Photographs of the Chestnut Hill Reservoir Gateway Arch (1870-1895), Brookline Room, Brookline Public Library, Brookline, MA

Three (3) photographs: Monumental entrance gate to Chestnut Hill Reservoir, BrooklinePL_NS-53; Reservoir Arch near Cleveland Circle, April 1893, BrooklinePL_GPN-1; Arch Entrance to Chestnut Hill Reservoir, BrooklinePL_C6a
http://www.brooklinelibrary.org/what/local-history
https://www.digitalcommonwealth.org/
https://www.digitalcommonwealth.org/collections/commonwealth:5425kb612

Photographic print, Chestnut Hill High Service Pumping Station, by Soule Photographic Co. (John P. Soule, 1828-1904), ca. 1890, No. 167, Prints and Photographs Department, Boston Athenaeum, Boston, MA
http://catalog.bostonathenaeum.org/vwebv/holdingsInfo?bibId=433558
http://cdm.bostonathenaeum.org/cdm/ref/collection/p15482coll7/id/514
http://www.bostonathenaeum.org/collections/prints-photographs

Arlington Standpipe (1894), June 5, 1898, Arlington Historical Photograph Collection, Arlington Historical Society, Robbins Library, Arlington, MA
https://www.digitalcommonwealth.org/search/commonwealth:p5548587c
http://www.robbinslibrary.org/using_the_library/local_history_room
http://www.arlingtonhistorical.org/

Nathaniel L. Stebbins, Negative Day Books Collection, PC047, Library and Archives, Historic New England, Boston, MA
Boston photographer Nathaniel L. Stebbins (1847-1922) recorded each photograph in his Negative Day Books. Stebbins took at least two (2) photographs for the MWW, through the architectural firm of Shepley Rutan & Coolidge, who designed the Spot Pond Pumping Station. See NLS Negative Nos. 11798 and 11799, November 5, 1900. A photographic print from NLS No. 11798 is in the MWW Photograph Collection; No. 11799 is not extant.
http://www.historicnewengland.org/collections-archives-exhibitions/library-archives

The Report of the Board of Consulting Engineers and of the Isthmian Canal Commission on the Panama Canal, 1906, Senate Document No. 231, 59th Congress 1st Session, Documents of the Panama Canal Commission and Its Predecessor Agencies, University of Florida Digital Collections, University of Florida George A. Smathers Libraries and the Panama Canal Museum
p. 10: September 27, 1905, Board visited the Wachusett Dam and other works constructed by MWSB (see MWW No. 5929)
http://ufdc.ufl.edu/ufpancan
http://ufdc.ufl.edu/pcm

Robert Farrington Elwell (1874-1962) Collection, 1890-1962, MS 221, Harold McCracken Research Library, Buffalo Bill Center of the West, Cody, Wyoming
Elwell was employed as a MWW office assistant working as an engineering draftsman (1897-1901), and made a "Perspective Drawing" of the Wachusett Dam in 1900 (see MWW image, no. 8418 in database). Elwell became a well-known illustrator/artist of the American West, and had a life-long friendship with William F. "Buffalo Bill" Cody (1846-1917), dating to the 1890s. While this collection likely does not include anything regarding his MWW work, he is one of the many fascinating persons who were employed by the MWW during the 1895-1905 construction era. See also Elwell/Cody correspondence in the William F. Cody Collection, MS6.
http://centerofthewest.org/research/mccracken-research-library/manuscripts-and-archives/
http://centerofthewest.org/research/mccracken-research-library/

Boston Police Strike of 1919, and Placement of MA National Guard at MWW Facilities (Chestnut Hill Reservoir)
Samuel Dunn Parker's Police Strike Papers, 1919-1920, MS Am 1723, Houghton Library, Harvard University, Cambridge, MA
contains ca. 244 letters, general orders, and printed ephemera pertaining to the strike; includes responses, both positive and negative, to the behavior of the guardsmen on police duty; Parker was Brigadier General of the Massachusetts State Guard when Governor Calvin Coolidge called out the militia during the Boston police strike, September-December 1919
http://hcl.harvard.edu/libraries/houghton/

Calvin Coolidge (1872-1933) Papers, Calvin Coolidge Presidential Library and Museum, Forbes Library, Northampton, MA
includes material on the 1919 Boston Police Strike
http://www.forbeslibrary.org/coolidge/coolidge.shtml
http://www.forbeslibrary.org/index.shtml

Communications to Edwin U. Curtis regarding the Boston police strike from individuals, Microtext Department (microfilm, 2 reels), Boston Public Library

Communications to Edwin U. Curtis regarding the Boston police strike from organizations, Microtext Department (microfilm, 2 reels), Boston Public Library
http://www.bpl.org/research/microtext/

Records of Police Commissioner, 1919 (1 volume ledger; 1,757 pages), City of Boston Police Department, Archives
http://www.bpl.org/govinfo/online-collections/regional-boston-and-massachusetts/boston-police-strike-1919/

Massachusetts State Guard, Regimental Infantry, 11th A Company, *Dates, Data and Ditties: Tour of Duty, A Company, 11th Regiment Infantry, Massachusetts State Guard, during the Strike of the Boston Police, Nineteen Hundred and Nineteen* (Massachusetts: The Company, 1920); 38 pages; at the MA State Library, Boston
http://www.mass.gov/anf/research-and-tech/oversight-agencies/lib/

Report of Committee appointed by Mayor Peters to Consider the Police Situation, Document 108-1919 (October 3, 1919); 43 pages; at the MA State Library, Boston
http://www.mass.gov/anf/research-and-tech/oversight-agencies/lib/

C. Theses and Dissertations

While B.A., B.S., M.A., and M.S. theses, and Ph.D. dissertations are considered secondary sources, they are generally only available in the College/University Archives from where the degree was earned. This Guide includes only a sampling of related theses and dissertations for the B/MWW system.

George S. Rice, *Description of a Gatehouse at the Chestnut Hill Reservoir*, Thesis (A.B. Honors), Harvard University, 1870.

Antonio M. Iznaga, *Thesis on the Sudbury River Conduit as an Additional Supply of Water to the City of Boston*, Thesis (A.B. Honors), Harvard University, 1875.

George W. Hamilton, *The Mystic Water Works*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Civil Engineering, 1880.

Charles H. Brown, "*Sudbury River Water Works or the Additional Supply Boston Water Works*," Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Civil Engineering, 1880.

Hiram A. Hitchcock, "*A Graphical Determination of the Equilibrium Curves of the Large Sequential Arch of the Sudbury River Conduit Bridge over the Charles River at Needham*," Thesis (C.E.), Thayer School of Engineering, 1881; Rauner Special Collections Library, Dartmouth College, Hanover, NH

George A. Merrill, *An Investigation of the Mystic Water Supply*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Civil and Sanitary Engineering, 1892.

Elizabeth F. Fisher, *The Geological History of Lake Cochituate*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Geology, 1896.

Edwin A. Brainerd, *A Study of the Ware River Basin as a Source of Water Supply for the Boston Metropolitan District*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Civil Engineering, 1897.

James Madison Love, *The Boston Water Works Before the Organization of the Metropolitan System*, Thesis for Government 10, May 1901 (Love earned his Harvard AB in 1901), Harvard University Archives.

Gilbert Holland Montague, *Metropolitan Water Board*, Thesis for Government 10, April 1, 1901 (Montague earned his Harvard AB in 1901), Harvard University Archives.

A. H. Savva, *An Investigation of the Water Supply System of Cochituate, Mass., with reference to fire protection*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Civil Engineering, 1910.

Fred L. Franks, *Study of Provisions for Flood Discharge at Wachusett Reservoir*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Civil Engineering, 1912.

Jas. T. Holmes, *Test of the Hydro-Electric Power Station at the Wachusett Dam, Clinton, Mass*., Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Electrical Engineering, 1914.

Erving G. Betts, *The Hydro-Electric Power Station at Sudbury Dam, Southboro, Mass*., Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Electrical Engineering, 1921.

John L. Vaupel, *The Design of a Dam at the Junction of the Upper and Lower Mystic Lakes, Winchester, Mass.*, Thesis, Massachusetts Institute of Technology, 1922.

Hugh D. Haley, *Study of Hydro-Electric Plant at Wachusett Dam*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Electrical Engineering, 1923.

Theodore M. Kuss, *An Experimental Study of the Efficiency of the Wachusett Power Plant*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Civil Engineering, 1925.

Dominic A. Perry, *A Study of Water Power as a by-product of Water Supply to the Metropolitan District*, Thesis (B.S.), Massachusetts Institute of Technology, Dept. of Civil Engineering, 1932.

Lori Ferriss, *Preservation of Early Wrought Iron Trusses: The 1848 Roof of the Cochituate Gatehouse*, Thesis (S.B. in Art and Design), Massachusetts Institute of Technology, Department of Architecture, 2009.

17. Previous Archival Preservation and Access Actions Regarding the 7600 MWW Series of Dry Plate Glass Negatives and Bound Volumes of Prints

A. Division of Mechanical and Civil Engineering (now Division of the History of Technology), National Museum of American History, Smithsonian Institution

During the late 1960s, the staff of the Division of Mechanical and Civil Engineering at the Smithsonian Institution National Museum of American History removed each original kraft paper envelope from the dry plate negative and replaced it with a glassine envelope. The negative number was written on the upper left corner (portrait orientation) and the original kraft paper envelope discarded. The staff also made new wooden rectangular crates each holding no more than 200 plates along their short edge. A total of 43 crates were made. Thirty-three crates contained plates in sequential order, and another five crates were plates not in any particular order. Four crates were made for the West Boylston Historical Society request and another one for the Boylston Historical Society request.[302]

The storage area in which the plates were kept had a history of water leakage problems. During the cleaning and rehousing work of 2000, the plates in two crates at the MDC Archives showed extensive flaking emulsion and glassine adhering to the emulsion as a result of water damage. Mr. William Worthington, a museum specialist at the Division, confirmed that it is likely that part of the collection received water damage while under their care. It was also evident that a second generation of glassine envelopes replaced those that were wet. This glassine was not as brittle and discolored as those used from the late 1960s.

I have characterized 183 plates as exhibiting water damage from their tenure at the Smithsonian Institution, most often showing flaking emulsion and glassine paper adhesion to the emulsion. Many additional plates do not show flaking emulsion or glassine paper adhesion when viewed on a light table. However, when the plates are turned over, there are ripples in the emulsion. The plates that meet this condition problem are not recorded in the database. Only those plates in which this condition problem is visible when viewed on a light table are recorded in the database as "water damage."

The cleaning and rehousing work of 2000-2001 also revealed that those plates held by the Boylston and West Boylston Historical Societies were not as dirty as those returned to the MDC in 1990. It is likely that the plates loaned to the two societies in the mid-1970s were cleaned by the Smithsonian Institution staff prior to their release.

B. West Boylston Historical Society

The West Boylston Historical Society contact printed all 489 dry plate negatives in their possession around 1976. The plates remained in the wooden crates built by the Smithsonian Institution until fall 2000. In fall 2000, these plates were archivally cleaned, rehoused, and sequentially merged with the plates from the MDC Archives collection.

C. Boylston Historical Society

The Boylston Historical Society enclosed each dry plate negative (94) and its Smithsonian Institution glassine with a four-flap enclosure by Light Impressions in the late 1990s. The negative number was written with ballpoint ink on the four-flap. The plates remained in the wooden crate built by the Smithsonian Institution until spring 2001. In spring 2001, these plates were archivally cleaned and rehoused, and sequentially merged with the plates from the MDC Archives/WBHS collection.

[302] These wooden crates were discarded by the MDC Archives in 2003.

D. West Boylston Public Library

Through a 1998-1999 grant from the Massachusetts Board of Library Commissioners, the Library digitized their entire photographic collection, including those prints from the 13 bound volumes of photographs from the MWW in their possession (4 from 1906 donation; 9 from 1976 loan). The scanned images were printed from a laser printer and bound in three-ring binders. There are two sets of these. In the early 2000s, there were 6 volumes of these three-ring binder sets, 5½ of which are from the 13 MWW bound volumes. The Library entitled this project, "Picturing Our Past." Each MWW image from the digital scan in these three-ring binders measure 5.5" x 7" (original print size is 6.5" x 8.5"). The Library did not digitally scan the 489 MWW contact prints from the West Boylston Historical Society.

Through a 2000-2001 grant from the Massachusetts Board of Library Commissioners, the Library undertook preservation and conservation measures for its photographic collections. For the 9 bound volumes of MWW photographs loaned by the MDC Water Division in 1976, each were individually enclosed in a CONSERpHASE™ box by Bridgeport National Bindery, Inc. (Agawam, MA). The Library consulted with Boston photograph conservator Paul Messier regarding the volumes.

E. Clinton Historical Society

The Clinton Historical Society holds a miscellaneous collection of loose prints from the MWW 7600 Series that it likely received from the MWSB, MWW in 1904-1905. As of 2003, all of these items are housed loosely, without individual enclosures, in archival boxes.

F. MWRA Library

No preservation action taken pertaining to the bound volumes of photographic prints in their possession. It was common to find post-it notes and post-it flags adhered to the prints (on either side) to bookmark specific prints. It is also common for the front and back boards of the volumes to be attached to the spine with non-archival clear sealing tape.

G. MWRA Records Center

During the course of the late 1980s and early 1990s, the MWRA staff and the staff of its Records Center located MWW and MSW dry plate glass negatives at various facilities including Chestnut Hill Pumping Stations, Mystic Pumping Station (Mystic Shops), Glenwood Pipe Yard, and the Deer Island and Nut Island Sewerage Treatment Plants. From accounts by the Records Center staff, many of these plates were found with such condition problems as extreme dust, grime, mold and a non-water soluble black residue covering the non-emulsion side.

In 1992-1993, the Records Center staff sought professional advice from archival supply vendor Gaylord Brothers. A representative from Gaylord recommended the use of the product PEC-12 to clean the plates, applied onto lint-free photowipes. The Records Center purchased from Gaylord these two products along with 8" x 10" four-flaps, 5" x 7" thumb cut envelopes, blotting paper, dry cleaning sponges (to clean photographic prints), and received a sample of Filmoplast tape. Funding the purchase of archival supplies was only made available by applying for grant monies. Over the course of a number of years, several small grants were received. For example, in 1995, the Records Center received a joint grant from the New England Archivists and the Boston Branch of the Association of Records Managers and Administrators (Haas Award) to partially fund the cleaning and rehousing of the MWW dry plate negatives in their possession.[303] Due to funding limitations, a minimal quantity of four-flaps were purchased while an extensive quantity of 5" x 7" envelopes were purchased.

[303] *NEA Newsletter* [New England Archivists] 22 (July 1995): 10.

In about 1994, the Records Center staff partnered with the Boy Scouts of America, Eagle Scout Troop No. 242 (Newton, MA) to undertake some of the cleaning work. Approximately 12 boys ages 11 to 16 were divided into two groups. One group cleaned approximately a few hundred plates and another group contact printed the negatives and digitally scanned them onto a CD-ROM. Afterwards, the Scouts exhibited their work at the MWRA Offices, at Newton City Hall, and elsewhere.[304] As one scout noted, "we restored old glass plate negatives on the brink of destruction and made contact prints of them. These plates were of important water-works projects and can still be used for reference on some sections of pipe by the Mass. Water Resources Authority."[305]

Some 6.5" x 8.5" plates were rehoused in 8" x 10" four-flap enclosures. However, mostly the plates were rehoused without enclosures and the 5" x 7" envelopes and the blotting paper were used to separate each plate. Plates were also rehoused in letter-size manila envelopes. The plates were then stored in either 8" x 10" short lid boxes, vertically along their long side (approximately 100 per box); 8" x 10" clamshell boxes with plates flat; or in 1 cu. ft. record storage boxes (vertical and flat). Trash bags and shredded paper enclosed in trash bags were used to cushion the dry plate glass negatives.

The cleaning agent used during the project with the Eagle Scouts was PEC-12. In summer 2000, the Records Center staff demonstrated to me their methodology for cleaning dry plate glass negatives. This methodology was recommended to them by Gaylord Brothers ca. 1992-1993.

> Wearing latex gloves, spray PEC-12 onto a lint-free photowipe and apply the moistened area to the glass side. Then take a dry section of the same photowipe and pass this over the emulsion side once.

According to the manufacturer, Photographic Solutions, Inc. (Buzzards Bay, MA), PEC-12 is not to be used on glass plate emulsions.[306]

In summer 2000, I made three attempts to clean the black residue off the non-emulsion side of a sample plate. The distilled water and cotton ball method made no impact (the water beaded on top of the residue). The use of 2 parts distilled water and 1 part ethyl alcohol also made no impact. By comparison, the PEC-12 loosened the residue from the glass immediately. A follow-up application of distilled water then picked the residue off the plate, leaving the cotton ball pitch black.

While the non-chemical archival cleaning methodology of dry plate glass negatives that I created at the MDC Archives does not include the use of PEC-12, and I would not recommend its use for such purpose, I had to come to terms with the fact that PEC-12 easily removed the black residue. In all, 19 MWW negatives and many more MSW negatives were saved by the MDC Archives by removing this black residue using PEC-12.

Of the approximately 80 broken dry plate glass negatives, approximately 45 were mended by the Records Center with Filmoplast P90 pressure-sensitive tape. The tape was applied to both the emulsion and non-emulsion side. This type of mending on the emulsion side is not professionally recommended, and its application on the non-emulsion side is not fully endorsed by the profession. During the cleaning and rehousing work of fall 2000, the

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[304] Telephone conversation with Troop Leader Paul Roberts, September 23, 2002. Mr. Roberts owned Newtonville Camera Inc., Newton, and the negatives were contact printed at his company. Additional information communicated by Daisy Monsalve, the MWRA Records Manager at the time of the project, and project manager. It is believed that a combination of MWW and MSW plates were cleaned and contact printed. Troop 242 is part of the Knox Trail Council of the Boy Scouts of America.

[305] Internet, October 30, 2002, site www.troop160.org/eagleprojects.htm. The website for BSA Troop 160, Burholme, PA, included a webpage entitled "Eagle Scout Project Ideas." The MWRA/Eagle Scout project was listed under "Restoration and display of historic photos."

[306] "PEC-12 Photographic Emulsion Cleaner Technical Specifications." (Buzzards Bay, MA: Photographic Solutions, Inc., 1996).

MDC Archives removed this tape from both sides of each plate by peeling the tape off. Minimal emulsion adhered to the tape as it was being removed.

The archival cleaning and rehousing work of fall 2000-winter 2001 revealed that the majority of the 7600 Series MWW plates at the MWRA Records Center were significantly dirty, even following the work of the Scouts.

The archival cleaning and rehousing work of fall 2000-winter 2001 also revealed that the majority of the 7600 Series MWW plates had remnants of their original kraft paper envelope adhering to the emulsion. In most cases, loose paper did not remain, only the adhered paper, especially along the edges and corners, remained. Using a small spatula (an archival tool), I removed all loose portions of the remaining paper. The Records Center staff claim to have found these negatives in this condition. Since these are the 7600 Series MWW plates that were left behind from the Smithsonian Institution loan of the mid-1960s, their exclusion by the MDC Water Division did more harm to these plates. But at some time between the mid-1960s and the early 1990s, the original kraft paper was carefully removed from each plate, but not before the damage was done.

The Records Center had no light table which to view photographic negatives until summer 2002 when I secured one for them from another MWRA office.

Between 1996 and 2006, when the MWRA opened its new Records Center at the Quincy Fore River Shipyard (Building 4), Quincy, this repository had standard archival environmental controls and compact shelving.[307] The MWRA Records Center is no longer at this location.

H. MDC Archives

In 1990, the MDC Archives, after the Smithsonian Institution returned the dry plate negatives, hand wrote a title list of each negative for each of the 38 wooden crates that totaled 664 pages. After which, in cooperation with the MDC Reservations and Historic Sites Division, designed and began inputting this data into a Reflex 2.0 database. The data entry was complete for 25 of the 38 crates when the state fiscal crisis temporarily closed the MDC Archives in fall 1990.

In regard to the unnumbered MWW dry plate glass negative collections also at the MDC Archives and described above, in 1990, the plates were placed in archival four-flap enclosures. The information from each original envelope was apparently transcribed onto the new enclosure and the original envelope discarded. Some of the plates with their new enclosure were archivally boxed and some were not. However, those that were boxed were interfiled with MDC Parks dry plate glass negatives. Finally, all 6.5” x 8.5” negatives were enclosed in 8” x 10” four-flaps. In 1995 and in 2000-2001, the MDC Archives cleaned and rehoused these unnumbered dry plate glass negatives.

I. Massachusetts State Archives

Except for providing the standard archival environmental controls, the State Archives had not undertaken any other preservation actions for the bound volumes of photographs in their possession. It is common for the front and back boards of the volumes to be attached to the spine with non-archival black tape. For only 8 of the 14 Wachusett (Nashua) Reservoir Real Estate volumes not in their possession, the State Archives copy printed these prints by making 2” x 2” internegatives and developing 5” x 7” copy prints from these (Records Series EN4.06/1335X).

For loose prints from the MWW Series, it placed these into archival enclosures and boxes. The MWW photographs were divided between three records series: EN4.06/1335X (real estate, but filed with Quabbin

[307] Prior to the renovation of Building 4, the MWRA Records Center occupied space in Building 10.

Reservoir real estate); EN4.07/887X (general); and EN4.12/889X (construction).

The archival enclosures used at the State Archives for the MWW loose prints included a combination of top-loading paper envelopes (with flap and middle seam), polyethylene page sheets, and, for photographic prints supported on mounting board, file folders with multiple prints per folder (without any interleaving). The loose prints were in no particular order in five boxes (EN4.07/887X; and EN4.12/889X, Boxes 1, 2, 8, 99). That the photographs of the Metropolitan Sewerage Works were interfiled with those of the MWW in these boxes was confusing to the user.

In 2000-2001, the MDC Archives re-arranged the MWW and MSW loose photographic prints to properly reflect their provenance and original order. All loose prints were sleeved in Mylar, except cyanotypes, which were sleeved in unbuffered envelopes. For oversized photographic prints supported on mounting board, each one was enclosed using Conservation Resources' MicroChamber .020" folder paper stock, with unbuffered tissue paper placed over the print. These rehousing units were placed in drop-front boxes. Many MWW loose prints were also unidentified; identification was made for nearly all of them.

The forthcoming (late fall 2014) physical integration of the complete MWW Photograph Collection will unite the collection under a new Records Series Number: No. EN4.05/2630X.

18. MWW Dry Plate Glass Negatives: The Archival Cleaning and Rehousing Work of 2000-2001, the Databasing of the MWW Photographs, 2001-2003, and the Digital Imaging, 2012-2015

A. Significant Dates Pertaining to Identification, Cleaning and Rehousing, Integrating, Databasing, and Digital Imaging

July 18, 1994
Joint MDC Archives / MWRA Records Center general tour of each other's collections, where we learned, generally, of the MWW glass plate negative portions we each held. We also reviewed the MWW photograph collection at the MA State Archives.

December 12, 1997
Edgar Whitcomb, West Boylston Historical Society, and I jointly visit the MWRA Library (at that time located at the Charlestown Navy Yard), and review their set of the MWW bound volumes of photographs. I am provided with an inventory of the volumes. I compare this list with the MWW bound volumes of photographs at the MA State Archives.

Winter 1998
Obtained price quotes from archival supply vendor University Products (Holyoke, MA) for large quantities of four-flap enclosures and custom Coroplast storage boxes (archival grade) for glass negatives.

February 11, 1998
MDC Archivist visits West Boylston Historical Society to identity any MWW photographs at WBHS.

MDC Archivist visits Beaman Memorial Public Library, West Boylston, to identity any MWW photographs at WBPL.

April 16, 1998
MDC Archivist visits Boylston Historical Society to identity any MWW photographs at BHS.

May 16, 1998
MDC Archivist visits Clinton Historical Society to identify any MWW photographs at CHS.
Subsequent visits to all four of these Wachusett Watershed repositories were made in 2000.

Fall 1999
MDC DWM Wachusett Section employee discovers a 40" rolled panoramic photograph of the Wachusett Dam and Grounds in a storage closet at the Administration Office; NEDCC (Andover, MA) is contracted to make contact prints of it (winter 2000).

December 26, 1999
MDC Archivist begins drafting MWW Photo Project Proposal.

January 2000
Broken MWW dry plate glass negatives from the Smithsonian Institution are returned to the MDC Archives.

Obtained new price quotes from University Products for large quantities of four-flap enclosures and custom Coroplast storage boxes for glass negatives.

Winter 2000
Designed a relational database in MS Access to track the whereabouts of each MWW bound volume of prints.

February 2000
1st draft of MWW photo project proposal to MDC DWM Wachusett Superintendent and to State Archives Curator.

March – April 2000
Wachusett Superintendent supports project.

State Archives Curator supports project.

MDC Deputy Commissioner for Policy (supervisor to MDC Archivist) and MDC DWM Director supports project.

Northeast Document Conservation Center (NEDCC, Andover, MA) provides a cost estimate for the archival rehousing of broken glass plate negatives, using a sample MWW plate broken into three (3) pieces. While the unit cost for stabilizing one plate was reasonable, when multiplied by scores, the cost was prohibitive.

April 13, 2000
MDC Commission approves project, and authorizes DWM and MDC Archives to begin formal communications with the MWRA and the State Archives and to seek approval from the Board of Trustees of the 4 Wachusett Watershed repositories: Boylston, Clinton, and West Boylston Historical Societies, and the Beaman Memorial Public Library, West Boylston.

April – May 2000
MDC Archivist discusses proposed project with a representative from each of the 4 Wachusett Watershed repositories, and with the MWRA Librarian/Records Manager.

May 18, 2000
Letters to the 4 Wachusett Watershed repositories requesting that the MDC DWM be placed on the agenda for their June board meeting regarding the project.

June 1, 2000
BHS Board Meeting attended by Wachusett Superintendent and MDC Archivist.
11 board members attended meeting; project partially endorsed, and subsequently fully endorsed.

June 6, 2000
WBPL Board Meeting attended by Wachusett Superintendent and MDC Archivist.
9 board members attended; project approval withheld.

June 10, 2000
CHS Board Meeting attended by Wachusett Superintendent and MDC Archivist.
11 board members attended meeting; project fully endorsed.

June 15, 2000
WBHS Board Meeting attended by Wachusett Chief Ranger and MDC Archivist.
12 board members attended meeting; project fully endorsed.

Letter of Support from CHS

Late June 2000 (after June 22)
Letter of Support from BHS.

June – July 2000
For five weeks in late June and July 2000, three interns from the Simmons College Graduate School for Library and Information Science, "Preservation Management in Libraries & Archives" course assisted with the start of the archival cleaning and rehousing work of the MWW dry plate glass negatives.

June 27, 2000
Meeting with MDC Archives; MDC DWM; MWRA; State Archives; and Beaman Memorial Public Library regarding project (representatives from the 3 historical societies were unable to attend).
MWRA agrees to participate.

July 2000
Archival supply orders for project are submitted.

July 7, 11, 2000
Initial identification survey for MWW dry plate glass negatives at MWRA Records Center as authorized during June 27, 2000 meeting.

July 11, 2000
Letter of Support from WBPL.

Summer 2000
9 volumes of Field Notebooks created by the MWW photographers to record images taken are discovered at the Wachusett Dam Administration Office.

Summer 2000 & Winter 2001
MDC Archivist re-arranges MWW and MSW loose photographic prints at the State Archives to properly reflect their provenance and original order, and each individual print is archivally rehoused and identified.

Late August 2000
Archival cleaning and rehousing work of the MWW dry plate glass negatives at the MWRA Records Center begins.

October 11, 2000
MDC Archivist interviewed by the *Worcester Telegram & Gazette* regarding the project and need for volunteers.

October 20, 2000
Worcester Telegram & Gazette article regarding the project is published.

October 28 and November 11, 2000
Volunteer Days for archival cleaning and rehousing work of the MWW dry plate glass negatives.
The MWW dry plate glass negatives at the WBHS merged into those at the MDC Archives for this work.

December 2000
Some volunteers from the Volunteer Saturdays continued the archival cleaning and rehousing work.

January 2001
All cleaned and rehoused negatives from the June 2000 – January 2001 work sequentially merged and transferred to the State Archives.

March 2001
BHS Volunteers archivally cleaned and rehoused their portion of the MWW dry plate glass negative collection, and were merged with the collection at the State Archives.

Archival cleaning and rehousing work of the MWW dry plate glass negatives at the MWRA Records Center completed.

May 2001
Designed on paper a relational database for the MWW photographs, and MDC MIS Office began working with my design and creating a relational database structure on the computer.

July 23, 2001
WBPL returns the 9 MWW bound volumes of prints, and a few days later, they are deposited at the State Archives.

Spring – Fall 2001
Rehousing methodology for broken dry plate glass negatives revised, and new archival supplies purchased, and work began to rehouse these negatives at the MDC Archives and at the MWRA Records Center, along with rehousing oversized photographic prints.

MWRA Southborough Office transfers additional BWW/MWW oversized prints and lantern slides to MWRA Records Center, and MDC Archives rehouses these items for the project.

MDC Archives divides some specific archival supplies from the cleaning and rehousing work, and donates them to the 4 Wachusett Watershed repositories, and to the MWRA Records Center and the State Archives.

MDC Archivist identifies and rehouses BWW photographs at the Southborough Public Library.

Fall 2001
MDC MIS Office and MDC Archivist fine tune the relational database.

December 2001 – April 2002
Data entry into the database of the 7600 Series of images.
Data entry continues throughout 2002 for the remainder of the MWW photo collection.

Winter 2002
MWRA discovers additional MWW/MSW dry plate glass negatives and textual archival records in the attic of the Mystic Shops (aka Mystic Pumping Station).

April 17, 2002
MDC Archivist visits Mystic Shops to confirm and make recommendations for items found.

August 2002
MWW/MSW dry plate glass negatives located at Mystic Shops are transferred to MWRA Records Center.

September 2002
MDC Archivist identifies, and archivally cleans and rehouses MWW/MSW dry plate glass negatives located at Mystic Shops.

Library of Congress, Prints and Photographs Division, forwards list of their holdings of 200 MWW photographic prints.

Fall 2002
BWW images at the State Archives, MWRA Records Center, and Southborough Public Library added to the MWW photo database.

Winter 2003
Each MWW image at the State Archives and MWRA Records Center is viewed by MDC Archivist and cross-checked against entry in the MWW photo database.

MWRA receives final list of BWW/MWW images at the MWRA Records Center.

Spring 2003
Database queries and query reports are designed, and design of a search form interface is begun.
MWW photo collection statistically analyzed through the queries.

Olmsted Brothers photographs for MWW (Spot Pond) at Olmsted Archives examined, and helped to identify original duplicates at the State Archives and at the MWRA Records Center.

July – September 2003
While attending the Annual Meeting of the National Association of Government Archivists and Records Administrators (NAGARA) in Providence, RI, in July, I had a lengthy discussion with the Program Officer for the National Endowment for the Humanities Preservation & Access Division. We reviewed the work of the MWW Photo Project to date, what the goal is, and how to achieve that goal.

The NEH Program Officer requested that a professional photograph conservator verify that the archival cleaning and rehousing methodology I used met preservation and conservation standards. Even though my methodology was based on extensive research in the professional literature, NEH wanted a letter from a conservator. In September 2003, Boston-based photograph conservator Paul Messier visited the DCR Archives to view a demonstration of the cleaning, and visited the State Archives to view the rehoused collection. In his November 4th letter, Mr. Messier described the methodology as "sound, effective and posed minimal risk to the glass plates." He could offer "no major suggestions for improvement" and was "impressed with the scale and execution of the project."

June 2003
MWW photographic prints at MIT Institute Archives are identified.

August 20, 2003
On behalf of the DCR/MDC Archives, Policy Director Samantha Overton Bussell, and Joseph McGinn, Acting Director of the Division of Water Supply Protection, Department of Conservation & Recreation, send letter to MWRA Executive Director Frederick A. Laskey officially requesting the physical merger of the MWRA's portions of the MWW dry plate negatives, loose prints, and lantern slides into the whole collection at the State Archives.

October 6, 2003
In a letter dated September 23, 2003, MWRA Executive Director Frederick A. Laskey approved the August 20th request to merge the MWRA portion of the MWW Photograph Collection with that of the whole collection at the State Archives.

December 4, 2003
The MWRA Records Center physically transferred the non-broken MWW 7600 Series dry plate negatives in their possession to the State Archives. This was a partial transfer of all of the pre-1927 MWW photographic materials agreed upon in September 23, 2003 letter from the MWRA.

January 13, 2004
Physically merged the 700-plus dry plate negatives that the MWRA physically transferred into the whole collection at the State Archives.

January – April 2004
Closure of the MDC Boston Office HQ, 20 Somerset Street, Boston. Work on MWW photo project temporarily suspended.

December 4, 2004
The MWRA Records Center physically transferred to the State Archives slightly more than 50% of their portion. I physically merged them with the whole collection on January 13, 2004 (the delay of 5 weeks was the result of my emergency appendectomy on December 5).

December 2005 – January 2006
On December 20, 2005, the MWRA transferred their full remaining portion to the State Archives. and I spent many days in January 2006 integrating this remaining portion into the whole collection (except loose prints), and updating the database. Except for the loose prints, a complete box list was completed as a result of the integration, and this data was entered into the database.

August 2006
While attending the SAA Annual Conference in Washington, D.C., I visit the Library of Congress, Prints and Photographs Division, and review their holdings of 200 MWW photographic prints, to verify image numbers.

November 2008
Found one (1) unnumbered MWW dry plate glass negative amongst a mix of agency and personal photographs within an abandoned collection from a former (and deceased) employee. This negative was archivally cleaned and rehoused, and integrated into the whole MWW negative collection at the State Archives. This employee likely removed the negative from the MDC Archives in about the early 1990s, and had been missing from the MDC Archives since that time.

November 2011
MWRA Library solicits a bid from the Northeast Document Conservation Center (NEDCC, Andover, MA) for the digital imaging of the MWW dry plate glass negatives and the MWW photographic prints in the bound volumes within their Library's possession.

Winter / Spring 2012
MWRA makes some internal progress in obtaining support for the digital imaging of the MWW photographs. DCR Archivist is contacted by MWRA Librarian in January 2012, and communicates willingness to attend meetings regarding the same.

July 2012
MWRA Librarian contacts DCR Archivist, asking for assistance in the digital imaging phase.

July / August 2012
After extensive communications between MWRA Librarian and DCR Archivist (and with others at each of our own agencies), the two agencies decided to join "Digital Commonwealth", a web portal organization, and apply for a Digital Commonwealth / Boston Public Library Digital Services Grant, through a joint/separate grant. We submitted joint/separate grant applications online simultaneously on August 21.

August 31, 2012
Joint BPL Digital Services, DCR Archives, MWRA Records Center and Library, and MA State Archives meeting at the State Archives to review the MWW Photograph Collection.

September 2012
First batch of MWW dry plate glass negatives transported to BPL to start the digital imaging.

November 7, 2012
Letter from BPL Digital Services officially accepting MWW Photograph Collection as a Digital Commonwealth / BPL Digital Services Project.

November 30, 2012
The bulk of the MWW dry plate glass negatives (except broken plates) are transported by William B. Meyer library relocation services from MA State Archives to the BPL Storage Facility, at the City of Boston Archives Center, West Roxbury, in order for BPL Digital Services to draw batches at their own pace. I oversee this process.

Fall 2012
Through DCR Watershed Management funds, the EOEEA Information Technology (IT) Office purchases a 2 terabyte external hard drive for the DCR Archives to use for this project to load all project digital files coming in batches from BPL Digital Services.

July 2013
Archives Center of the National Museum of American History, Smithsonian Institution, Washington, D.C., returns MWW glass plate negative No. 728, a broken plate (in 2 pieces), that remained from the 1964/65 loan, and which was rediscovered in 2011.

September 11, 2013
At the MWRA Library, and using their set of the MWW bound volumes of photographs, MWRA Librarian and I review all MWW digital images that are based on damaged negatives, against the photographic prints of the same in the MWW photograph volumes in order to compile a master scanning list of these photographic print images and those from missing glass plate negatives for BPL Digital Services to scan.

November 14, 2013
The entire MWW dry plate glass negative collection is transported back to the MA State Archives from BPL Storage, by William B. Meyer library relocation services. I oversee this process.

2013 – winter 2014
All other portions of the MWW Photograph Collection are digitally scanned by BPL Digital Services, in batches from the MA States Archives and MWRA Library.

January 17, 2014
Initial metadata meeting with BPL Digital Services, DCR Archivist, and MWRA Library.

Winter / Spring 2014
DCR Archivist and MWRA Librarian divide metadata responsibility, and then, in March/April, jointly work on the metadata together, at the MWRA Library. Initial draft sent to BPL Digital Services on April 18.

Spring / Summer 2014
Various drafts of metadata circulated for review by BPL Digital Services.

March / April 2014
The 71 sheets of 1896-1898 MWW Wachusett Reservoir Land Survey blueprints annotated with negative numbers for the real estate images, and direction of image, is picked-up from the DCR Wachusett Watershed Office. Each sheet is manually reviewed in detail, and each negative number is recorded in an Excel worksheet.

May 2014
The 71 sheets of 1896-1898 MWW Wachusett Reservoir Land Survey blueprints annotated with negative numbers for the real estate images digitally scanned by BPL Digital Services.

July/August 2014
A private citizen donates/returns thirteen (13) MWW glass plate negatives from the 7600 Series to DCR Archives.

July/August 2014
MWRA Executive Office approves legal transfer of their portion of the MWW Photograph Collection to MA State Archives, through the MA Records Conservation Board process.

September 3, 2014
MA Records Conservation Board approves the legal transfer of the DCR/MWRA portions of the MWW Photograph Collection to the MA State Archives. MWRA Records Manager and I represented our agencies.

September 2014
Digital version of the MWW Photograph Collection goes live on Digital Commonwealth, through BPL Digital Services.[308]
https://www.digitalcommonwealth.org/collections/commonwealth:g732dh56k

October 2014
Metadata errors that were revealed through the September launch are corrected, as are updates to some specific metadata.

November 2014
Physical integration of all DCR, MWRA, MA State Archives portions of MWW photographs into a single collection was completed, under a new Records Series number, No. EN4.05/2630X. Box list finding aid completed. In 2015, State Archives staff created a label for each box in the collection.

December 2014
Digital scanning by BPL Digital Services of the 13 glass plate negatives donated/returned to DCR Archives in summer 2014, and 7 photographic prints inadvertently omitted from the original scanning batches. The collection's MARC record for OCLC drafted by State Archives.

January 2015
The MARC record for the MWW Photograph collection is available through OCLC/WorldCat, with OCLC No. 898344983; and through NUCMUC/OCLC.
https://www.worldcat.org/advancedsearch
http://www.loc.gov/coll/nucmc/oclcsearch.html

January 2015
A related MWW photograph, not part of the 2012-2014 digital project, was transferred to the State Archives: "Metropolitan Water Board, Chief Engineer's Study Photographs of Larger Masonry Dams of the World Built or Under Construction, 1897-1899," encompassing 26 photographic prints, 1 halftone, and 2 blueprint page compilations. MWB Chief Engineer Frederic P. Stearns (1851-1919) undertook a study of all masonry dams constructed and under construction throughout the world in preparation for the design of the Wachusett Dam, and collected photographic prints of many of these dams. This collection was archivally organized and rehoused in 2006, and as part of the 2015 transfer, was assigned Records Series No. EN4.08/2639X (OCLC No. 900612790).

March 2015
The additional 20 digital scans made in December 2014 are uploaded by BPL Digital Services into the MWW

[308] In 2013, the Digital Public Library of America (DPLA) was launched, with Digital Commonwealth as a service hub member. All digital resources on the Digital Commonwealth web portal are harvested by DPLA, and also accessible through the DPLA web portal; http://dp.la/. The MWW Photograph Collection was harvested in about April 2015.

Photograph Collection in Digital Commonwealth.

April 2015
Five (5) original 1897 MWW photographic prints, all with the same original style of annotations on back, and each mounted on supporting board in the same manner, and representing Wachusett Aqueduct (1) and Sudbury Reservoir/Dam (4) construction, were donated to the Commonwealth, through the DCR Archives, by the Metropolitan Waterworks Museum, for the Digital Project.

Provided the DCR DWSP Office of Watershed Management, Wachusett Watershed Office with a 2TB external hard drive holding 100% of the MWW Photos digital files created by BPL Digital Services for their use. Purchase of drive funded by the Watershed Trust. In spring, DCR DWSP OWM Wachusett Watershed Rangers purchased an additional 2TB external hard drive, and copied all files to this drive, for their more regular use for interpretive programs.

July-August 2015
BPL Digital Services digitally scanned the 85 BWW Sudbury Reservoir ca. 1893 real estate (79) and ca. 1894 construction (6) photographic prints returned to the Commonwealth in April by the Southborough Historical Society. An additional ca. 1915 MWW photo print was also scanned.

BPL Digital Services digitally scanned the 5 MWW 1897 photographic prints returned to the Commonwealth in April by the Waterworks Museum.

One MWW glass plate negative was also scanned, a negative which inadvertently was not scanned during the main phase.

September 15, 2015
Updated the external hard drive assigned to OWM Wachusett Watershed Office, of the addendum images scanned this summer.

In fulfillment of the general intentions committed in 2000, and through the request of the Beaman Public Library, West Boylston, provided the Library with 100% of the MWW Photos digital files on a 2TB external hard drive purchased by the Library. The Library will function as a local public repository of the MWW Photos digital images, in collaboration with the West Boylston Historical Society.

Fall 2015
The Massachusetts Records Conservation Board (RCB), at its October meeting, approved the transfer from DCR to the State Archives of the 95 total B/MWW photographic prints that were donated/returned to the Commonwealth (through DCR Archives) in April 2015, following the digital scanning of them by BPL Digital Services for Digital Commonwealth in summer 2015 . In November, these photo prints were physically added to the overall MWW Photograph Collection at the State Archives.

November 2015
MWW Photograph Collection Preservation and Access Project is concluded.

Printed/Online Announcements of MWW Photograph Collection Digital Project (after September 2014)

- *Views, Newsletter of the Visual Materials Section* [Society of American Archivists], Vol. 29, No. 1 (March 2015), p. 21.
  http://www.archivesinaction.com/Views_March_2015.pdf
- *NEA Newsletter* [New England Archivists], Vol. 42, No. 2 (April 2015), pp. 10-11.
  http://www.newenglandarchivists.org/page-1772951
- *Downstream* [DCR Division of Water Supply Protection, Office of Watershed Management], No. 33 (Spring

2015); a special issue.
http://www.mass.gov/eea/docs/dcr/watersupply/watershed/downstream33.pdf
- *Downstream* [DCR Division of Water Supply Protection, Office of Watershed Management], No. 32 (Fall 2014), p. 8.
http://www.mass.gov/eea/docs/dcr/watersupply/watershed/downstream32.pdf
- Blog, Photographic Historical Society of New England (March 2015)
https://phsneblog.wordpress.com/2015/03/
- Web page, From the Archives / From the Field, DCR Office of Cultural Resources (June 2015)

B. Explanation, 1990s-2004

For seven years, I had 6,000 MWW dry plate glass negatives in the MDC Archives, and I was waiting for an opportunity to archivally rehouse them. From 1995-1999 I had designed and implemented a methodology to archivally clean and rehouse dry plate negatives, and wanted to apply it to this collection. The opportunity came in fall 1999. The Massachusetts State Archives, through its Massachusetts Historical Records Advisory Board (MHRAB), was in the middle of its Documentary Heritage Grants Program, a program funded by the National Historical Publications and Records Commission and the Commonwealth of Massachusetts. I had developed a good working relationship with the Superintendent of the MDC Division of Watershed Management (DWM) Wachusett Section and with the Section's staff, archiving the Section's permanent records and reformatting three volumes of MWW newspaper scrapbooks that were in Section's office.

On December 26, 1999, I began writing a grant funding proposal within the parameters of the MHRAB's 1999 Strategic Plan. A few months later, I had drafted a project proposal, summarized as follows:

> With cooperation from and collaboration of the MDC Office of Policy, MDC Division of Watershed Management, MWRA Library & Records Center, Mass. State Archives, Boylston Historical Society, Clinton Historical Society, West Boylston Historical Society, and the Beaman Memorial Public Library, West Boylston, archivally clean and rehouse all 8,000+ MWW dry plate negatives and sequentially merge them together. Reformat this whole collection using 35mm continuous tone microfilm and digital imaging, and provide each collaborating repository with a complete set of the reformatted images, and archive the whole original collection at the State Archives. Create a relational database of the whole collection.

In early April 2000, the MDC DWM and the Office of Policy, followed by a vote of the MDC Commission on April 13, authorized me and the Superintendent of the DWM Wachusett Section to proceed with obtaining collaboration approval from the Board of Trustees of the four local repositories. In June 2000, 3 of the 4 boards approved the project proposal. Also in June, the MWRA approved its cooperation and collaboration. I was also authorized to proceed with ordering archival supplies through MDC DWM / MWRA funds.

The remainder of this section is drawn from the seven project progress reports I filed to the collaborators.[309]

For five weeks in late June and July 2000, three interns from the Simmons College Graduate School for Library & Information Science, "Preservation Management in Libraries & Archives" course assisted with the start of the archival cleaning and rehousing work (Mary Hammer, Nighat Saleemi and Jerusha White). With the four of us

[309] Progress Report No. 1, summer 2000, (August 25, 2000); Progress Report No. 2, fall 2000 (December 14, 2000); Progress Report No. 3, mid-winter 2001 (February 14, 2001); Progress Report No. 4, early summer 2001 (July 3, 2001): Progress Report No. 5, winter 2002 (January 14, 2002); Progress Report No. 6, spring 2002 (June 12, 2002); Progress Report No. 7, fall 2002 (January 9, 2003); and Progress Report No. 8, spring 2003 (May 8, 2003). See also Progress Report No. 9, winter 2004 (January 26, 2004), and a drafted (but not sent) Progress Report No. 10 (October 5, 2005).

working together, 836 plates were cleaned and rehoused[310] and another 170 lantern slides were also cleaned and rehoused. Following the departure of the interns, I cleaned and rehoused the remaining lantern slides (378). I also resleeved in Mylar and boxed 164 loose prints from the negatives that were in the MDC Archives, and 53 loose prints that were in the MDC Wachusett Dam Administration Office. These two groups of prints were merged. I also resleeved in Mylar 255 loose prints at the State Archives.

In July, I also surveyed the dry plate negative collection at the MWRA Records Center, identifying more than 1,000 with MWW provenance. By September, Daisy Monsalve, MWRA Assistant Records Manager, and I had begun to clean and rehouse them, a process that would take six months to complete.

Fall 2000 was dedicated to planning and managing two Volunteer Cleaning and Rehousing Days for the residents of the Wachusett Watershed area.

3,950 dry plate negatives were archivally cleaned and rehoused by 120 volunteers on Saturdays, October 28 and November 11, 2000, at the John Augustus Hall Gymnasium in West Boylston, the field headquarters of the MDC DWM.[311]

All 50 seats were taken during the November 11th am session and only 5 or less seats were available during the October 28th am and pm sessions and the November 11th pm session.

The volunteers included 12 middle and high school students, 5 college students, 2 middle school teachers, many members of historical societies, a church historian, a photographer, a farmer, a lawyer, 2 professional archivists, one volunteer who had just moved to West Boylston, one father/son team, 3 father/daughter teams, 10 husband/wife teams, 1 brother/brother team, and 3 family teams.

The volunteers came from 31 MA cities and towns; these included Arlington, Auburn, Barre, Belmont, Boston, Boylston, Clinton, Fitchburg, Holden, Jefferson, Leicester, Leominster, Marlboro, Maynard, Newton, Northboro, North Brookfield, North Grafton, Princeton, Rutland, Seekonk, Shrewsbury, Southborough, Spencer, Sterling, Sturbridge, Uxbridge, Webster, West Boylston, Westminster, and Worcester.

There were 4 volunteers from the MDC DWM (including Acting Superintendent John Scannell and former Superintendent Mike Misslin, with his son), and another 6 were relatives of MDC DWM personnel. There was 1 volunteer from the MDC Reservations & Historic Sites Division. There were at least 12 volunteers who registered through the West Boylston Historical Society (with another 6 who did not show), and at least 7 volunteers registered through the Clinton Historical Society (with another 7 who did not show). Neither the Boylston Historical Society nor the Beaman Memorial Public Library volunteered any of their members.

In addition to the 120 people who volunteered, another 33 were on a waiting list, and there were an additional 19 no shows. Off-setting the no shows were 10 walk-ins who had not pre-registered.

In addition to those volunteers who registered with the West Boylston and Clinton Historical Societies, at least 11 volunteers were recruited as a result of the 223-piece mailing we did to the Friends of the Wachusett Watershed and related mailing lists.

It was a result of this mailing that Nancy Sheehan, a staff writer for the *Worcester Telegram & Gazette*, received a flyer advertising the need for volunteers. Immediately, Ms. Sheehan contacted me requesting permission to write a feature article about the project to be published prior to October 28th in order to help recruit volunteers. I

[310] The lint-free photowipes are not 100% lint-free and often left lint on the plates which was then removed by the natural hair brush. The photowipes also disintegrated rapidly. The archival 4-flap enclosures left some paper dust and splinters of paper on the plates.

[311] The work was also summarized in Sean Fisher and Jeanne Zilligen, "Preservation of Historic Photos," *Commissioner's Update* [MDC] February 2001, p. 6.

received permission from DWM Division Director Joe McGinn, my supervisor Deputy Commissioner for Policy Samantha Overton Bussell, and from the MDC's Public Information Officer. Ms. Sheehan interviewed me at John Augustus Hall on October 11th and the article was published on Friday, October 20th in all editions on the front-top page of Section C ("Glass from the Past").[312]

The majority of the 182 people who were interested in volunteering responded as a result of this article. I started to receive telephone calls and e-mails as early as 8:30am on October 20th and they continued all weekend and throughout the next 2 weeks.

I should note that there were a few factual errors in the article, the corrections to which I communicated to the appropriate MDC/MWRA/State Archives personnel.

During the 2 Volunteer Days, I was assisted by 7 people to help me oversee the volunteers. On October 28th, Vivien Goldman (Archivist for the Boston Psychoanalytic Society & Institute), Karen Lempert (Librarian for Facing History & Ourselves National Foundation, Brookline), Steve Kenney (grants writer/exhibit developer for the State Archives), and my wife, Anne Macdonald, assisted me. I trained all 4 of them in October. I recruited Vivien and Karen at the New England Archivists Fall Meeting that was held in Worcester on October 21st. On November 11th, Nighat Saleemi and Jerusha White, 2 of the 3 summer interns from the Simmons College GSLIS that volunteered during the summer to begin the dry plate cleaning/rehousing process, and my wife assisted me (the third intern, Mary Hammer, was a volunteer in the afternoon).

Nancy Gerlach, MDC DWM Office Manager at the Field Headquarters was of invaluable assistance in planning for this event. Nancy also oversaw the food planning and the catering during the 2 days. I am also indebted to Roger Clifford and Dan O'Leary, facilities managers at John Augustus Hall. Roger oversaw the coordination of all the needed tables (approx. 50) and chairs and ensured the restrooms were properly supplied (especially since this event required each person to wash their hands prior to beginning their work). In moving the tables and chairs, Roger was assisted by the Wachusett Section Labor Crew headed by Mike Tomaiolo. Dan ensured that the lighting in the gym was repaired and that we had heat on the 2 Saturdays. Tables and easels were also supplied by Clif Read of the Quabbin Section. Frank Battista of the DWM Wachusett Laboratory supplied the needed distilled water.

DWM Chief Ranger John Kovich posted flyers advertising the need for volunteers at the main gates to the Wachusett Reservoir. I posted flyers at each Town Hall, Library, and Post Office in Boylston, Clinton, and West Boylston, in addition to the following locations: The Paper Source, Clinton; DEM District Office; Fisheries & Wildlife District Office, West Boylston; and at the Tower Hill Botanic Garden, Boylston.

Jim French, DWM Land Acquisition Coordinator, supplied the mailing list for the Friends of the Wachusett Watershed and related lists, and helped stuff envelopes with the flyer.

As a thank you, each volunteer received a "Certificate of Appreciation" that included a 1919 panoramic image of the Wachusett Dam and Grounds. The design concept for this certificate was made by Allan Mueller and Mary Bonin, both of the Wachusett Section. Jim Taylor, graphic designer for the DWM, designed the certificate around the text I wrote. Bill Brutsch and Mary Lydon of the MWRA refined the certificate by including the names of the 7 participating institutions around the Seal of the Commonwealth. Jeanne Zilligen, a DWM planner, hand-wrote each person's name on the manila envelope enclosing the certificate. The certificates were very well received by the volunteers.

As I prepared each encumbrance for the purchase of the needed archival and office supplies, Bob Lenox of the DWM managed the submission of these to the MDC Finance Office and managed the payment of all the invoices.

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[312] Nancy Sheehan, "Glass from the Past," *Worcester Telegram & Gazette*, October 20, 2000, Section C, pp. C1, C8.

After I spent 3 days at John Augustus Hall merging these 3,950 dry plate negatives into sequential order, they were moved to the State Archives. Here, I was physically assisted by Joe Petitpas and Anthony Massei of the State Archives, who also supplied the transportation. We made a second trip the next day to my office in Brighton where we moved the lantern slides also to the State Archives.

With approximately 1,700 dry plate negatives remaining in my office, a number of the volunteers offered to continue with the cleaning and rehousing work at John Augustus Hall during the weekdays. Six volunteers worked on Wednesday, November 29th cleaning and rehousing approximately 389 plates; 3 volunteers worked on Wednesday, December 6th cleaning and rehousing approximately 240 plates; and 7 volunteers worked on Wednesday, December 13th cleaning and rehousing approximately 379 plates. A total of 9 different people volunteered during these 3 days, and of these volunteers, 4 were from the West Boylston Historical Society, 1 was from the Clinton Historical Society, 2 were from the Sterling Historical Society, and 1 was from the Friends of the Wachusett Watershed (2 were parents of DWM staff).

A total of 1,008 plates were cleaned and rehoused during these 3 days. Combined with those 3,950 completed during the 2 Saturdays, 4,958 plates were cleaned and rehoused by the volunteers, with less than 650 remaining.

The approximately 490 MWW plates from the West Boylston Historical Society were cleaned and rehoused by their members and other volunteers during the two Saturdays. These were merged with the others that were cleaned and rehoused during those two days.

The archival cleaning and rehousing work of the 7600 Series plates at the MWRA Records Center was completed in January 2001. Through this process, a master list of MWW plate numbers held by the MWRA was created for the first time.

During the last week in January 2001, I sequentially merged 3 groups of plates (I had previously sequentially ordered each group): those plates cleaned and rehoused by the 3 interns in July 2000; those plates cleaned and rehoused by the volunteers during the 2 Saturdays in October-November; and those plates cleaned and rehoused by the volunteers in December and by me in January. During the merging process, I left a space in the archival box for each plate number at the Boylston Historical Society and the MWRA Records Center. This sequential merging work was done at the Massachusetts State Archives where the plates are stored.

In addition, 83 MWW unnumbered/uncaptioned plates in the MDC Archives were fully described. Another 78 of these at the MWRA Records Center were cleaned, rehoused and fully described in January and February.

In March 2001, 6 members of the Boylston Historical Society spent a morning cleaning and rehousing their 90 plates. Following their work, I merged the plates into the whole MWW dry plate collection at the State Archives.

At the MWRA Records Center, 109 MWW dry plate negatives (not from the 7600 Series), that depict the 1897 load experiment for the proposed Wachusett Dam, were archivally cleaned and rehoused.

In the spring, nearly all of the ‘unnumbered/uncaptioned’ MWW dry plate negatives and prints at the MDC Archives, MWRA Records and at the State Archives were identified as to their subject matter.

The Master List of all MWW dry plate negatives and prints located at the MWRA Records Center was completed in March.

In consultation with Maxine Trost, State Archives Curator, the method for rehousing the dry plate negatives broken into multiple pieces was revised and new archival supplies purchased to carry out this change. Once the supplies were received, I measured and cut supply pieces to make rehousing units for approximately 150 broken plates at the MDC Archives and the MWRA Records Center. Now a broken plate can be viewed on a light table without removing it from its enclosure.

At the MWRA Records Center, thirty oversized and mounted on board items that encompass twice as many MWW prints were rehoused from archival supplies also purchased in the spring.

In May, I designed on paper a relational database consisting of 15 tables of information to be linked together. Mike Ciulla of the MDC MIS Office, whose specialty is designing MS Access databases, began working with my design (with his recommended modifications) and creating a relational database structure on the computer.

Earlier in 2000, I had designed a relational database in MS Access to track the whereabouts of each MWW bound volume of prints. Throughout 2001 and 2002, this database was updated as new information came to light. Each bound volume title was assigned a Volume ID No. The database includes such fields as volume title, volume number, range of negative numbers, number of table of contents pages, number of prints, and repository per volume.

In the summer and fall of 2001, some additional MWW oversized prints and lantern slides were transferred from the MWRA's Southborough offices (Sudbury Dam) to the MWRA Records Center (through MWRA Photographer Terry Bickford). I archivally cleaned and rehoused the lantern slides, and rehoused the oversized prints (September 11th was one of the days I was working at the MWRA Records Center).

With additional archival supplies that were received in the summer, all the broken glass plate negatives were properly rehoused.

Also in the summer and fall of 2001, I equally divided the remaining archival supplies from the dry plate negative cleaning work, and donated them to the Boylston Historical Society, Clinton Historical Society, West Boylston Historical Society, and the Beaman Memorial Public Library, West Boylston. Each repository also received an updated cleaning methodology. Some supplies were also donated to the State Archives.

The MWRA Records Center received cleaning supplies as well as archival rehousing supplies for the purpose of doing the same to the Metropolitan Sewerage Works dry plate negatives from the 1890s-1920s (less than 200 were extant at that time). This work was done in spring 2002, and through it, another 12 MWW dry plate negatives were identified.

Throughout the summer and fall of 2001, Mike Ciulla of the MDC's MIS Office, technically designed a relational database in MS Access 2000. Mike and I communicated regularly about the progress, and there were many drafts to work through both design and technical issues. Late drafts were reviewed by Mary Lydon of the MWRA Library and Records Center, Maxine Trost of the State Archives, and by MDC cultural resource manager Bill Stokinger. The technical design was completed in November. I began data entry in early December.

From early December 2001 through early April 2002, the primary project work was the data entry for the MWW photograph database, with additional work completed in April and May.

The caption information from each numbered (7600 Series) and most of the unnumbered MWW dry plate negatives and photographic prints were entered into the database.

The subject information for each of the 7600 Series photographs was entered in 3 steps. First (December-February), using photocopies of the Table of Contents from each of the MWW bound volumes of photographs, I entered all information for each image along with a cross-reference to which volume the image appears in. Second (February-March), borrowing batches of the bound volumes from the State Archives (including those volumes from the Boylston Historical Society and Beaman Memorial Public Library) one week at a time, I visually examined each printed image. This enabled me to edit my work from the Table of Contents entries and to add any additional information I thought necessary. Third, where the town was not identified for a particular image, I researched the image to include the town location.

A cross-reference was added to identify which organization held the dry plate negative for each image: MDC Archives; MWRA Records Center; West Boylston Historical Society; or the Boylston Historical Society.

A cross-reference was also added to identify which images were published in the Annual Reports, with year of Report and page number.

In 1906, the MWW presented to the West Boylston Public Library 4 bound volumes of photographs (366 prints) culled from the 7600 Series representing mostly real estate from "West Boylston and Vicinity." Using the Table of Contents from these volumes, a cross-reference was added to them for each of the 366 images.

The subject information for most of the MWW unnumbered dry plate negatives (and for prints in which the negative is not extant) was entered along with the cross-reference to location (MDC Archives or MWRA Records Center). These images were artificially assigned numbers between 8000 and 9999.

Loose original duplicate prints from the 7600 Series and which organization holds them were cross-referenced to the main body of information. There are loose original duplicates at the State Archives, MDC Archives, MWRA Records Center, Clinton Historical Society, and Southborough Public Library. The number of duplicates was also supplied.

I also inserted additional subject headings for images which I deemed appropriate. For example, 'Old Stone Church' is an additional subject heading for each image the First Baptist Church, West Boylston. Other examples include: Italian camps; camps; police; dismantling mill; and African-Americans. For the real estate photographs, I also noted wherever there was a family, child/children or people in general pictured with the property.

For Water Works structures, where the image is of completed construction, the phase 'construction completed' was used to distinguish the image from a construction-in-progress image.

However, I stopped short of using Library of Congress Subject Headings or other library/archival cataloging thesauri to describe each individual image.

The spelling of certain words was also standardized. For example, today we use upstream / downstream (according to Merriam-Webster). The captions spelled it a variety of ways: up stream; up-stream; and upstream. The captions used both Quinepoxet (old) and Quinapoxet (modern); the latter spelling was chosen.

In September 2002, the Library of Congress, Prints and Photographs Division, forwarded the negative numbers of the 200 MWW 7600 Series prints they hold, and I entered this cross-reference into the database in October.

In September 2002, I archivally cleaned and rehoused, and identified, additional dry plate negatives that were found by the MWRA earlier in the year at the Mystic Shops, Somerville. Of the more than 200 that were located, those that were salvageable and pertaining to the MWW were 27 in number. Throughout September and the fall 2002, the data for these plates and other MWW dry plate negatives located this year, additional MWW loose prints, and MWW oversized prints and MWW lantern slides was entered into the database.

Since Boston Water Board photographic prints between 1890-1896 account for less than 250, and that the MWW lantern slide collection includes some BWB photographic images, and that the Sudbury Reservoir/Dam construction transcends both the BWB and the MWB, I decided to add the BWB 1890-1896 photographs to the database, which I did in November 2002.

During January and February 2003, I conducted a verification process whereby I examined each 7600 Series dry plate negative at the MWRA Records Center and State Archives verifying negative no., thoroughness of the cleaning, noting plate condition, and cross-checking plate condition with the condition remarks made by the

volunteers on the glassine envelopes.

The volunteers did excellent work. I only had to reclean 51 plates, though this number could have been approximately 5 times higher had I recleaned plates that remained dirty only along the edges. For example, I recleaned some but not all between Nos. 3109-3170s in which the volunteers did not clean as close to the edge as I would have preferred. Only occasionally did I find plates with the emulsion side facing up. Only occasionally were the 4-flap enclosures folded improperly, and only for 4 plates did I find two 4-flaps enclosures around a plate. Some volunteers allowed their photowipes to get too dirty before using a fresh one. Of plate condition, I did not officially record many of the chipped plates even though the volunteers were very diligent in this area. This work at the MWRA and at MSA enabled me to compile a final box list of negative nos. for each repository.

Throughout March and April 2003, I worked with the MDC MIS Office to design queries for the database, and to gather statistical data about the collection. Mike Ciulla of MIS and I designed report queries in May. In June, he and I began designing a search form interface. The 10 original MWW loose prints at the MIT Institute Archives were identified in June.

In August 2003, retired Smithsonian Institution museum specialist William E. Worthington, Jr., of the National Museum of American History visited the State Archives to review the MWW project work. Worthington was responsible for returning 6,000 MWW dry plate negatives to the MDC Archives from the Smithsonian in 1990.

In January 2004, after 39 years of being separated, more than 700 of the 7600 Series of MWW dry plate glass negatives were physically merged with the whole collection. It was these 700-plus negatives that the MDC Water Division randomly chose not to loan to the Smithsonian Institution in fall 1964. They remained stored at the Chestnut Hill Pumping Stations until the MWRA located them ca. 1993.

This merger was the result of an agreement made in a September 23, 2003 letter by MWRA Executive Director Frederick A. Laskey who approved the August 20, 2003 written request made by DCR's Samantha Overton Bussell and Joe McGinn (through my urging) to merge the MWRA portion (1,200-plus images) of the MWW Photograph Collection with that of the whole collection at the State Archives. The MWRA portion includes 1,139 dry plate glass negatives (14.57% of the negative portion); approximately 100 loose/mounted/oversize photographic prints not from the 7600 Series; and 53 lantern slides (8.57% of the lantern slide portion).

On December 4, 2004, the MWRA Records Center physically transferred to the State Archives slightly more than 50% of their portion. I physically merged them with the whole collection on January 13, 2004 (the delay of 5 weeks was the result of my emergency appendectomy on December 5).

All work for the MWW photo project was temporarily suspended beginning in mid-January 2004, when the DCR Commissioner announced that the 150 staff persons working at the MDC Boston Office HQ at 20 Somerset Street would be moving to join our DEM colleagues at 251 Causeway Street, Boston, during a 14-week relocation process. I was assigned the archival records and general records management responsibilities of this move process.

C. From 35mm Continuous Tone Microfilm to Digital Imaging: Reformatting Research and Tests, 1998-2003

Simultaneous to locating all the portions of the original MWW Photograph Collection, and undertaking the archival cleaning and rehousing of the MWW glass plate negatives, I also undertook to learn the archival preservation reformatting options available for this collection, in order to accommodate the multiple legal owners of the collection (MDC, MWRA, State Archives), and the three main local history repositories in which the MDC had lent portions of the collection.

While I was aware that some archival repositories in the New England region were digitizing historical

photographs as early as the mid-1990s, MA state government was in no position to be on the leading edge of the digital imaging transition, using the MWW Photograph Collection as a test project.

During the 1990s, 35mm continuous tone microfilm was considered a best practice option for reformatting printed and photographic materials, and was available through a few nationally respected document preservation and conservation companies in the New England and upper Mid-Atlantic regions. Beginning in 1998, my reformatting research for the MWW Photograph Collection centered on the use of 35mm continuous tone microfilm.

During the late 1990s, the leading organizations and professionals who researched and reported on digital imaging for archival materials also were advancing a hybrid approach to reformatting, advocating for the continued use of 35mm continuous tone microfilm as the preservation standard, and, by the late 1990s, digital imaging for access use. My original project proposal in 2000 recommended the hybrid approach.[313]

Imaging professionals who specialize in historic photographs emphasize that if the archival photograph collection provides the option of reformatting/scanning from the original negative or from the original photographic print (with the same vintage as the negative), the image that holds the highest image quality is the negative. Negatives are a first generation image, and the photo print is a second generation image.

In 2000, we needed to know a cost estimate for the 35mm continuous tone microfilm reformatting of the MWW Photograph Collection. Through my research, I identified three (3) companies: Northeast Document Conservation Center, Andover, MA (NEDCC); Preservation Resources, a division of OCLC, Bethlehem, PA (PR); and Hudson Microimaging, Port Ewen, NY (HMI). However, all three companies were only willing to conduct a test sample (using a modest sample size) at a cost ($500 was agreed). Looking back at this from a distance of 14 years (2014), I am surprised that the MDC Division of Watershed Management (OWM) approved funding for these test samples; $500 for each company.

In 2000, these 3 companies each tested more than 50 MWW images (the same images for each), drawn from the various formats and conditions. To say the least, I was very disappointed in the image quality of these tests, compared to the original image, especially at the access generation level.[314] When I shared the results with the other organizations, they too were just as disappointed.

Discouraged, the MDC approved to fund my attendance at the annual "Preserving Photographs in a Digital World: Balancing Traditional Preservation with Digital Access," a week-long workshop sponsored by the Image Permanence Institute (IPI) of the Rochester Institute of Technology, and the International Museum of Photography and Film at the George Eastman House, Rochester, NY. I attended the August 2001 edition.[315]

One of the main components of this workshop was how to evaluate digital image quality and choose a vendor. At the workshop, the now late Steven Puglia, of the National Archives, and one of the leaders in preservation reformatting of photographic materials[316], suggested I contact Chicago Albumen Works, Housatonic, MA (CAW). I contacted CAW only days before September 11th.

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[313] During the mid/late 1990s and early 2000s, some of the leading organizations investigating and publishing technical papers on preservation reformatting and digital imaging included the Commission on Preservation and Access (est. 1986, and merged with the Council on Library Resources to form the Council on Library and Information Resources in 1997); the Research Libraries Group (RLG est. 1974/75, and merged into OCLC in 2006); and the Image Permanence Institute (IPI), Rochester Institute of Technology (est. 1985). There were others, but these were the organizations whose technical papers I tried to become familiar with during this time period.

[314] The access (service) copy is the 3rd generation of microfilm; the 1st generation is the archival master, and the 2nd generation is the print master.

[315] IPI/GEH held this week-long workshop annually from about 1993 to 2009; in 1993/94 it was simply called "Preservation of Photographs"; "in a Digital World" was added in 1995.

[316] See Steven Puglia, "Technical Requirements for the Duplication of B&W Negatives: Shadow Normalization Tone Reproduction," May 2001 (National Archives and Records Administration).

While the workshop assured me of the faithfulness of tonal range for 35mm continuous tone microfilm (at least at the Master level; not at the access level), CAW encouraged me to evaluate 70mm film preservation reformatting using inter-positives and duplicate negatives, used by the Library of Congress and the National Archives, CAW clients. That fall, for $500, CAW conducted a reformatting test (smaller sample set than the other 3 companies), using 70mm film and digital imaging, and the cost estimate was received in the spring of 2002.

Also in 2002 (spring), based on my disappointment of the image quality at the access level, OCLC's Preservation Resources suggested the use of 105mm full frame fiche film preservation reformatting, rather than 35mm continuous tone microfilm; and they conducted a small sample test, at no additional cost.

The databasing work of 2001/02 and the identification of more B/MWW photographic images enabled me by spring 2003 to compile a more realistic quantitative analysis of the MWW Photograph Collection.

In May 2003, I requested that the 3 prospective vendors provide final preliminary cost estimates for the reformatting work based on the final statistical numbers of the collection which had been determined in spring 2003. The vendors provided an opportunity to evaluate 3 different reformatting methodologies: Chicago Albumen Works (70mm film for preservation, and direct digital imaging of originals); Preservation Resources (digital capture first, for access, followed by its transfer to 105mm full frame fiche film, for preservation); and Hudson Microimaging (35mm continuous tone microfilm, and digital capture from that microfilm). At the time, NEDCC had no in-house digital imaging services. The three cost estimates were received between June and August 2003. While the cost estimates ranged widely, it was clear that a significant financial investment would be needed to undertake the reformatting phase.

The legislative abolishment of the MDC at the end of June 2003, and the creation of a new (and singular) statewide state parks agency (DCR), with Watershed Management restructured from a Division to an Office within the organizational structure (and a new funding structure for Watershed Management through the MWRA in 2004), basically ended any continuing momentum of the reformatting phase of the MWW Photograph Collection Preservation and Access Project. My responsibilities shifted as a result.

Given the huge long-term investment needed for the reformatting phase, for both equipment, hardware and software, including software licensing fees, and the politics of managing this investment through 3 different state agencies, I did not encourage the leadership of the agencies to pursue the reformatting phase after 2003. The course of action taken was to let a digital imaging opportunity come to the MWW Photograph Collection.

A crack in such an opening occurred in 2007 when the statewide "Digital Commonwealth" web portal was launched.[317] However, it was not until Digital Commonwealth and the growing Boston Public Library Digital Services began a formal partnership (2011), and through IMLS/LSTA federal funding to the Massachusetts Board of Library Commissioners (MBLC), offered free digital imaging services for Digital Commonwealth members, beginning in 2011 (for federal FY12), that a potential realistic opportunity arose.[318]

In 2012, MWRA asked DCR to renew the joint MWW Photograph Collection Project relationship, for Year 2 of the IMLS-funded free digital imaging services (2012-2013). The spark that was needed arrived. At the conclusion of the 2-year IMLS-funding to BPL for Digital Commonwealth, the FY2014 Commonwealth of Massachusetts

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[317] DCR (through the DCR Archives) joined as a paid member of Digital Commonwealth in FY2008 and FY2009, but membership lapsed until DCR rejoined in FY13.

[318] Announced by Digital Commonwealth on September 27, 2011. BPL Digital Services federal grant from IMLS/LSTA (Institute of Museum and Library Services / Library Services and Technology Act), through MBLC, was for "Statewide Digitization Services: A Feasibility Study." All imaging at BPL Digital Services is done in accordance with the Federal Agencies Digitization Guidelines Initiative's "Technical Guidelines for Digitizing Cultural Heritage Materials"; http://www.digitizationguidelines.gov/guidelines/digitize-technical.html. TIFF master files are produced, with JPEG derivatives.

state budget formally provided funding to BPL as the digital "library of the Commonwealth".[319]

It should be noted that while film-based preservation reformatting remains a viable preservation tool and offered by two of the original prospective vendors[320], it was not selected for the MWW Photograph Collection Project. The Commonwealth of Massachusetts is not in a financial position to undertake such a project.

[319] See MA General Court Acts of 2013, chapter 38, line item 7000-9401, for the MBLC.

[320] Preservation Resources, OCLC Preservation Service Center (est. 1994), and formerly founded as the Mid-Atlantic Preservation Service (MAPS) in 1985/86, was sold to Backstage Library Works (BLW) in 2009. BLW continues to offer "continuous tone film in 35mm or 105mm (fiche) sizes." http://www.bslw.com/microfilm/; http://www.bslw.com/resources/Backstage_Preservation_Microfilm.pdf. As of 2014, 35mm continuous tone microfilm remains a current preservation microfilming service at Hudson Microimaging. http://hudsonmicroimaging.com/preservationmicrofilm.htm. NEDCC is no longer offering 35mm continuous tone microfilm, and instead, since 2005, provides digital imaging services. http://www.nedcc.org/imaging-services/overview. Ironically, in 2011, Chicago Albumen Works (CAW) was selected as the vendor by the New York City Municipal Archives to digitize its vast collection of glass plate negatives, and other photographic collections, including 331 images from the NYC Board of Water Supply, dating from the 1890s-1920s. CAW posted a blog post about the project in April 2014. All of these images are now online through the NYC Municipal Archives website; see sub-heading under "DEP Board of Water Supply". http://albumenworks.wordpress.com/2014/04/; http://www.nyc.gov/html/records/html/gallery/home.shtml

19. Photographs Created by the Boston Water Board, as well as by the Cochituate Water Board and the Mystic Water Board

The Boston Water Board (1876-1895) is the government body that immediately precedes the Metropolitan Water Board. It was the Western Division and the Mystic Division of the Boston Water Board (BWB) that were removed from it in 1895 to form the MWB. The BWB continued with some construction of the MWW system during 1895-1897, after which all construction and operations were transferred to the MWB, effective January 1, 1898.[321]

Along with the real estate property that was transferred from the BWB to the MWB on January 1, 1898, many, but not all, records (including photographs) created by the BWB, Mystic Water Board, and Cochituate Water Board were transferred as well (see subsection at end of this section). In fact, a June 1896 *New England Magazine* article entitled "How Boston Gets Its Water" is illustrated with many pre-1895 photographs along with some MWW photographs.[322] An author's note from the article's first page notes that the "illustrations from photographs kindly furnished by the Metropolitan Water Board."

For archivists, researchers and staff alike not to confuse BWB created photographs with those created by the MWW, I have compiled the first multiple repository finding guide to BWB created photographs, and to other 1846-1895 BWW created images that are extant in a variety of visual formats.

A. The known photographic collections of the BWB

The known photographic collections of the BWB are divided as follows.

1. Sudbury River Conduit (SRC; aka Sudbury Aqueduct), 1875-1880. Principal structures include the Sudbury Conduit and its superstructures (2 bridges, Waban and Echo; 2 siphons, Rosemary East and West; 4 waste weirs; and a terminal gatehouse); Framingham Reservoirs/Dams/Gatehouses Nos. 1, 2, 3; and Farm Pond and its gatehouse.

   Amongst 11 repositories, there are approximately 455 stereographs, representing more than 160 original images. The photographs were taken by three official photographers hired by the Board for this project: William H. Barritt (1848-1920), Hyde Park; James W. Black (1825-1896)[323] of Black & Co., Boston; and Edwin N. Peabody (1846-1920), Salem, MA.

   In 2002-2003, I gathered photocopies of the stereographs, and entered their subject information into a MS Access relational database. In addition, there are fields for photographer and for repository.

   According to City Directories, Barritt is listed as a photographer practicing in Hyde Park from 1876-1920, and Peabody is listed as a photographer practicing in Salem from 1878-1893/4. Both Barritt and Peabody

[321] See extensive note at end of this section.

[322] Fletcher Osgood, "How Boston Gets Its Water," *New England Magazine* 14, NS (June 1896): 388-409.

[323] Obituaries: *Boston Transcript*, January 6, 1896, p. 7, c. 5. *Boston Herald*, January 6, 1896, p. 4, c. 8; *Boston Globe*, January 6, 1896, evening ed., p. 9, c. 7. See also obituary and portrait in *Wilson's Photographic Magazine* 33 (March 1896): 120-121; and obituary in *Annals of the Massachusetts Charitable Mechanic Association, 1892-1900 Appendix* (Boston: Lincoln & Perry, 1903), 820. See also description of 'J. W. Black & Co.' in *Leading Manufacturers and Merchants of the City of Boston, and a Review of the Prominent Exchanges* (Boston: International Publishing Co., 1885), 309; Sally Pierce, *Whipple and Black: Commercial Photographers in Boston* (Boston: Boston Athenaeum, 1987), 42-45; and Polito, *Directory of Massachusetts Photographers*, 31-32. For many years, Black had an assistant by the name of John L. Dunmore (1833?-1897); see all references to Black, and also Dunmore's obituary, *Somerville Journal*, June 4, 1897, p. 8, c. 1; and Polito, *Directory of Massachusetts Photographers*, 32, 53. Black is buried in Mount Auburn Cemetery, Cambridge (Middlesex County), MA.

died in 1920 according to the City Directories (Boston and Salem respectively): Barritt on August 20[324] and Peabody on March 18[325].

a. The New York Public Library, Art, Prints and Photographs Division, holds 141 stereographs of the 1875-1880 construction of the Sudbury River Conduit. An international stereoscopic collector named Robert N. Dennis (1900-1983) collected these views. He donated his entire collection to the New York Public Library in 1941 and in 1983. Each stereograph is enclosed in a Mylar envelope. Peabody made 4 of the stereographs; Barrett 41; and Black 90 (no photographer can be ascertained for 6 of the stereographs). On the back of a May 13, 1876 stereograph stamped by "Black & Co.", reads: "Mr. Jos. P. Davis / 40 views / @ 19¢ each $7.60." Joseph P. Davis (1837-1917) was Boston City Engineer from 1872-1880 and was Chief Engineer of the Sudbury River Conduit project.

   In the mid-2000s, the New York Public Library posted a digital scan of each of the BWW SRC stereoviews in its collection on their Digital Gallery website.[326]

b. The Historic New England (formerly the Society for the Preservation of New England Antiquities; SPNEA) Library and Archives (Boston) holds 115 stereographs of the 1875-1880 construction of the Sudbury River Conduit. Of these, approximately 78 were taken by Black (35 are stamped "Black & Co."), 25 are identified as being taken by W. H. Barritt, and 8 are identified as being taken by Edwin N. Peabody, Salem, MA. A photographer cannot be ascertained for 4 of the stereographs. Of the 115, 9 were a gift from SPNEA founder William S. Appleton (1929 and 1933), and 3 were a gift from Charles F. Batchelder (1971).

c. In 1994, the Massachusetts State Archives received a gift from a descendant of one of the engineers (Frank H. Barrett, 1851-1879) of the 1875-1880 Sudbury River Conduit construction.[327] This gift consisted of 74 stereographs, by both Barritt (16) and Black (55). While a photographer cannot be ascertained for 3 of the stereographs, they were likely taken by Black. The collection is in Records Series EN4.12/889X, Boxes 96 and 97. The State Archives has photocopies of those stereographs held by the New York Public Library (Box 98).

d. The Boston Athenaeum, Print Department, holds 45 stereographs of the 1875-1880 construction of the Sudbury River Conduit, and one additional oversized print. No accession information is available for the stereographs, but the oversized print, by Black & Co., was purchased in 1985 from a dealer who collected Whipple and Black photographs. The stereographs are by both Barritt (13) and Black (31). Each stereograph is enclosed in Mylar. Twelve (12) of the stereographs were from BWW/SRC Engineer Osgood Hodges, as his name/initials are on the verso side.[328]

e. The Boston Public Library, Print Department holds 26 stereographs of the 1875-1880 Sudbury River

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[324] Obituary, "William H. Barritt," *Hyde Park Gazette-Times*, August 25, 1920, p. 1, c. 3. See also Polito, *Directory of Massachusetts Photographers*, 28.

[325] Obituary, "Edwin N. Peabody," *Salem Evening News*, March 19, 1920, p. 2, c. 6. See also Polito, *Directory of Massachusetts Photographers*, 428. Peabody is buried in Harmony Grove Cemetery, Salem (Essex County), MA. See www.findagrave.com.

[326] http://digitalgallery.nypl.org/nypldigital/index.cfm

[327] The descendant, Frank J. Barrett, Jr., Fairlee, VT, holds Frank H. Barrett's set of drafting instruments, and an oversized, mounted and framed photograph print of Echo Bridge following its construction.

[328] Four stereographs from the collection at the Boston Athenaeum were exhibited in 1981; see the exhibition catalog *The Boston Ambience: An Exhibition of Nineteenth-Century Photographs, February 9 through March 5, 1981*, prepared by Pamela Hoyle (Boston: Boston Athenaeum, 1981), pp. 20, 23, 38-39. In addition, much of what we know of James W. Black comes from the research Boston Athenaeum Prints and Photographs Curator Sally Pierce; see Sally Pierce, *Whipple and Black: Commercial Photographers in Boston* (Boston: Boston Athenaeum, 1987); pp. 42-45 pertain to Black's work for the Sudbury River Conduit; the oversized print is published on p. 44 (incorrectly dated as 1876; should be ca. 1878).

Conduit construction. The collection was transferred from the BPL, Rare Book Department in May 1970. There are approximately 23 stereographs made by Black (6 are stamped "Black & Co."), and none in the collection have any original information on the verso side. A photographer cannot be ascertained for 3 of the stereographs. The collection is filed under "Black & Co." in the Department's catalog.

f. The Hargrett Rare Book and Manuscript Library of the University of Georgia, Athens, GA, holds 17 BWB stereographs by Barritt (14) and Black & Co. (3) of the 1875-1880 construction. This collection was acquired as part of the William C. Darrah Collection (MS 2630) the University purchased in 1978. Darrah was an historian and collector of stereographs. These stereographs are incorrectly identified on back as "Clinton—Wachusett Aqueduct."

g. There is a private collection in which there are 19 BWB Sudbury River Conduit stereographs. All 19 were made by Black (10 are stamped "Black & Co.").

h. Through 2006, there was a private collection in which there were about 14 BWB Sudbury River Conduit stereographs. An unknown number were made by Black (and stamped "Black & Co."). This private collection was held by a descendant of civil engineer John Allen Gould (1852-1919), who worked for the Boston Water Board for twenty years beginning September 1873.[329] According to the descendant, John Allen Gould passed the stereographs on to his son Gardner S. Gould (1886-1973), who passed them on to his son Gardner S. Gould, Jr. After the latter died in 1998 (the descendant's father), the descendant found these stereographs stored in the attic of the father's house. The collections of the Newton (MA) Historical Society, Jackson Homestead, holds 9 copy prints of SRC stereographs which are identified as having been made in 1959 by Gardner S. Gould (the elder). According to the information accompanying the copy prints, they may have been made in 1959 in some association with Harvard University. Throughout the early and mid-2000s, this author tried unsuccessfully to have the Gould family donate this collection to the MA State Archives. However, in December 2006, the Gould family chose to sell them to a collector/dealer, who immediately sold them on eBay, breaking up the set.

i. The Natick Historical Society, Natick, MA, holds a collection of 5 stereographs of the 1875-1880 Sudbury River Conduit construction. This collection was part of a larger gift in 1984 of stereographs of Natick from a former resident of the town. All 5 of the stereographs were made by Barritt. None of the other historical societies along the aqueduct line hold SRC stereographs (Framingham; Sherborn; Needham; Wellesley; and Newton).

j. The International Museum of Photography and Film at the George Eastman House, Rochester, NY, holds a collection of 3 stereographs of the 1875-1880 Sudbury River Conduit construction. This collection was accessioned in 1984 (No. 84:1971:1-3). All 3 of the stereographs were made by Black, though none of them are stamped "Black & Co."

k. In fall 2003, the Newton City Archives of the Newton Historical Society (Newton, MA) located within its collections 3 stereographs of the 1875-1880 Sudbury River Conduit construction.[330] What makes these three stereographs different from all the others is the four-line wet stamp on the verso side of each of them; it reads:

Metropolitan District Commission

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[329] For a memoir of John Allen Gould, see *Journal of the Boston Society of Civil Engineers* 6 (October 1919): 311-312. See also *Proceedings of the New England Association of Gas Engineers 50th Annual Meeting* (February 1920): 56-57; Obituary, *Boston Transcript*, May 19, 1919, p. 15, c. 2; and *Newton Graphic*, May 25, 1919, p. 3, c. 5-6. These note that Gould's specialty at the BWB was the distribution system; no other details about his work for the BWB are given. Gardner Sabin Gould, a civil engineer, died on May (or June) 29, 1973, in Brunswick, Maine, where he briefly resided at the time. His son, Gardner S. Gould, Jr., (1918-1998), a plant engineer, died on January 2, 1998 in Brunswick; see *Brown University Alumni Magazine* (May/June 1998), Class of 1939; and *Bath-Brunswick Times Record*, January 5, 1998.

[330] Susan Abele, Curator of Photographs and Manuscripts at the Newton Historical Society, located these stereographs.

Water Division – Sudbury Section
133 Hollis St. P.O. Box 132
Framingham, Mass. 01701

This is the first indication that the MWW had in its possession SRC stereographs. The Hollis Street Office in South Framingham (located over the Sudbury Aqueduct, at the intersection of Claflin Street) functioned as the Sudbury System's HQ Office ca. 1876 through 1981. The Office included a records/library vault. The building was razed by the MDC Water Division in 1981 or 1982. The Newton City Archives has no record of how it acquired these stereographs. Multiple MDC employees have communicated to me since 1992 that the records from the Hollis Street Office were scattered and mostly destroyed to prepare for its demolition (see note no. 386). In November 2003, these 3 stereographs were returned to the DCR Archives from the Newton City Archives; and were transferred to MA State Archives in January 2015, and added to Records Series No. EN4.05/2630X.

l. Prior to 2006, the Massachusetts Water Resources Authority (MWRA) Records Center, Quincy, held 20 photographic prints created by the BWB during the 1875-1880 Sudbury River Conduit construction. In 2001, the MDC Archives identified at the MWRA Records Center 3 oversized mounted photographs of Echo Bridge and 1 of Waban Bridge (nos. 9900-9903). All but one is stamped Black & Co. Mounted on another piece of board there are 16 photographs (generally 4.25" x 3.75", but varies) of Sudbury River Conduit construction from 1876 and 1877 (Echo Bridge, 10; Waban Bridge, 1; 48-inch pipe connection, 4; fountain at Boston Common, 1). Two of the 16 images are unique and are not found among the original images described above. Fifteen were made by Black & Co. This board of 16 photographs (no. 9904) was likely exhibited by the Boston Water Board at the 1893 World's Columbian Exposition, Chicago (see below). In 2001, each mounted print was enclosed in MicroChamber folder paper, with unbuffered interleaving tissue placed over the print area, and placed in a drop-front box. Now part of the MWW Photograph Collection at MA State Archives.

m. In June 2013, the MWRA Communications Office asked staff to inform them of any B/MWW photos in their offices, per the MWW Photo Digital Project. MWRA Chief Engineer transferred to the MWRA Library a set of 26 BWW SRC stereographs that had come from the MWRA Southborough Office. Many of these copies are annotated on front/back as belonging to Oliver Wallace and W. H. Wallace. Both of these men were engineers on the BWW SRC project, as one of these from the MWRA set includes the stereograph of a group of 17 engineers, and notes where the Wallace's are pictured. The same stereograph image from the MA State Archives set is annotated with the identity of all 17 engineers, and both Wallace's are noted. None of the stereographs from this MWRA set were taken by Barritt or Peabody; and many are stamped Black & Co.

The 10 collections at the New York Public Library, Historic New England Library and Archives, Massachusetts State Archives, Boston Athenaeum, Boston Public Library Print Department, University of Georgia, Natick Historical Society, George Eastman House, DCR Archives (from Newton Historical Society), MWRA; and at various private collections form one single photograph collection created by the BWB, with some duplication.

Occasionally, "Sudbury River Conduit" stereographs can be found for sale. For example, in fall 2001, a photograph dealer in Gardiner, Maine was selling a Barritt stereograph of Dam No. 3 construction (August 1876), Framingham, for $85.00.[331]

One of the most important sets of Sudbury River Conduit stereographs came up for auction on November 3, 2005, at Skinner Auction (SciTech Sale 2314, Lot 705). A box of approximately 56 BWW Sudbury River Conduit stereoviews was auctioned, and purchased by Jeffrey Kraus of Antique Photographics,

[331] A November 27, 2001 conversation with the dealer revealed that he had recently sold it at a photograph show. I became aware of the sale of this stereograph by conducting an Internet search on November 27th for "Sudbury River Conduit."

New Paltz, NY. Mr. Kraus created a webpage just of these images. In the early months, he sold a numerous quantity. The Boston Athenaeum Print Department (2) and the Boston Public Library Print Department (4) acquired (at my urging in 2005/06) a total of 6 to add to their BWW SRC stereograph collections, but in 2014, there still remain 42 for sale. According to Mr. Knaus, this collection was auctioned with an original box.[332]

2. Until April 2015, the Southborough (MA) Historical Society held from the Southborough Public Library a collection of 86 photographs created by the Boston Water Board ca. 1893/94 to document the real estate takings for the Sudbury Reservoir (the takings were made in April 1894). Each 4.5" x 7.75" print is supported on a 5.25" x 8.5" board. Each print is identified with a number at the bottom left corner of the board, and with subject identification at the bottom right corner. None of the photographs are dated nor is the photographer identified. The print nos. range from 1 to 93, with seven nos. not extant (10, 17, 31, 36, 53, 65, and 79). Thirty-four of these photographs include real estate transaction information on the verso side. This collection was donated to the Library in the 1970s by Earl R. Smiddy (1902-1982), son of William Smiddy (b. 1871), a MDC employee, 1896-1941, who served as MWW Sudbury Section Foreman (1900-1941). This photograph collection is state property, improperly removed from a state office. On behalf of the Commonwealth, in fall 2001, the MDC Archives enclosed each print in a Mylar sleeve, and entered the subject information for each image into a MS Excel worksheet, and then subsequently added to the MWW Photograph Database (nos. 9810-9895 in database). However, this collection was not part of the initial MWW Photograph Collection digital project of 2012-2014.[333] This collection was returned to the Commonwealth, through the DCR Archives, by the Southborough Historical Society on April 26, 2015, missing only 1 photo print from the 2001 inventory.

3. Within the collections of MWW bound volumes of prints at both the State Archives[334] and at the MWRA Library there is one volume entitled "Reservoirs of the Sudbury System." There are 102 4.5" x 7.5" prints bound in the same manner as the MWW prints. Like the MWW volumes, there is a typed table of contents, numbered from 1 to 102. These prints document the construction of the Hopkinton Dam (1890-1892), Hopkinton Reservoir (1892-1893), Sudbury Reservoir (1894, 1896), and Sudbury Dam (1894-1896) during 1890-1896. This volume is not counted as part of the MWW 7600 Series, though each print has been entered into the MWW Photograph Database (nos. 9700-9801 in database).

   In 2001, the MDC Archives identified at the MWRA Records Center an oversized item with 6 (six) 4.5" x 7.5" prints mounted on one board of the Hopkinton Reservoir and Dam construction (no. 9906 in database). Four of the six match those from the above bound volume (print nos. 5, 6, 8, and 34), and one print is similar to print No. 17. All 6 prints thus date from 1890-1892. This board of 6 photographs was likely exhibited by the Boston Water Board at the 1893 World's Columbian Exposition, Chicago (see below). Also formerly located at the MWRA Records Center, there was an additional construction

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[332] http://antiquephotographics.com/stereoviews/boston-water-works-stereos/; http://www.maineantiquedigest.com/articles/feb06/skscitech0206.htm [*Maine Antique Digest*, February 2006]: "An immaculate boxed set of 19th-century stereoviews, showing construction projects of the Boston Water Works." I encourage someone to purchase the remaining lot as a whole, and donate them to the DCR Archives, for transfer to the MA State Archives. The seller remains unwilling to donate them directly to the DCR Archives or MA State Archives. In this lot, there are some that are more rare than the others, and should be donated/returned to the Commonwealth. These include the image of the Cement & Brick Test"; "Dam Division Office and Engineer Party"; "Dam 1, Top of Course L, Gate House"; "Winter Street Bridge"; and "Dennett's Orchard Section 3" by Peabody. In about 2006, the Historic New England Library and Archives may also have acquired at least one from this lot, but this has not been verified.

[333] Strangely, a partial(?) second set of BWW 1894 real estate taking photos for Sudbury Reservoir in Southborough came up for auction on eBay in November/December 2014, from a person in Roslindale, MA. The seller declined to donate them back to the Commonwealth, and would not reveal the quantity in their possession. One construction photographic print includes Desmond FitGerald's name on front. The numbers on the front of the real estate images match those same held by Southborough Historical Society (formerly Southborough Public Library).

[334] MSA, EN4.05/2630X.

photograph of Hopkinton Dam mounted on board (no. 9905 in database). In typescript at the lower left corner of the print, text reads "D. W. Butterfield, Photographer and Publisher, Cambridge, Mass.". This image is similar to print No. 14 in the volume described above (Hopkinton Dam, southerly end looking north, 1890). All transferred to State Archives.

The 1890 oversized mounted print of Hopkinton Dam construction provides evidence that possibly noted Boston/Cambridge photographer David W. Butterfield (1844-1933)[335] took all of these photographs. On June 16, 1896, Desmond FitzGerald, Sudbury Department Engineer, MWB, writes the following to William C. Hall, the Principal Assistant Engineer for "Reservoir No. 5" (Sudbury): "Whenever any more photographs are wanted at Basin 5, please communicate with me, and I will tell you about Mr. Hildreth who is with Mr. Richardson, and who can be spared any time to come down to Basin 5 for a day or two and take our views. . . and it will save hiring Mr. Butterfield."[336]

4. Photographs from the Biological Laboratory of the Boston Water Board.

As part of its function, the Boston Water Board, beginning in 1889, operated a Biological Laboratory at the Chestnut Hill Reservoir.[337] Desmond FitzGerald (1846-1926), Resident Engineer and Superintendent of the Western Division, created the Laboratory in 1889 at the recommendation of George W. Rafter (1851-1907) of the Rochester, N.Y. Water Works, acting as a consulting sanitary engineer to the Boston Water Board during 1889-1890.[338] George C. Whipple (1866-1924) managed the Laboratory from 1890-1897. Beginning in January 1898, the Laboratory (including all of its equipment, photograph outfit and photograph negatives and prints[339]) along with the metropolitan water works system westward from Chestnut Hill Reservoir of the Boston Water Board was transferred to the Metropolitan Water Board. The laboratory itself was moved to the Boston Office on July 25, 1898. Whipple did not stay on. He departed in 1897, and would become a leading sanitary engineer and author. Whipple's 1899 book *The Microscopy of Drinking-Water* was written from his experiences and experiments at the Boston Water Board.[340] The Laboratory is said to be the first municipal laboratory for biological water analysis in the United States.[341] Whipple wrote a good

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[335] Obituary, "David W. Butterfield," *Cambridge Chronicle*, November 17, 1933, section B, p. 2, c. 7; Obituary, "David W. Butterfield Was Prominent as a Photographer," *Boston Transcript*, November 11, 1933, p. 8, c. 5-6; evening ed., p. 4, c. 5. According to both obituaries, Butterfield photographed President Abraham Lincoln in the East Room of the White House in 1864, and photographed many prominent people of the late 19th century and early 20th century. See also Thomas Weston Fels, *O Say Can You See: American Photographs, 1839-1939—One Hundred Years of American Photographs from the George R. Rinhart Collection* (Cambridge, Mass.: MIT Press, for The Berkshire Museum, 1989), 60-61, 128. See also Polito, *Directory of Massachusetts Photographers*, 37-38, 194. See also Note no. 132-140 above.

[336] MWW, Letters from the Sudbury Department, Letterpress Copybook, Vol. 1, p. 204. MSA, EN4.07/2098X.

[337] The one-story frame structure was built in 1889 from designs by the Boston City Architect Office. The building was built "with the necessary rooms for photographic work and office." See Boston City Document No. 29 (1890): *Annual Report of the City Architect, for 1889*, p. 2.

[338] *Fourteenth Annual Report of the Boston Water Board, for 1889* (1890), 33. See also George W. Rafter, "Biological Examination of Potable Water," *Proceedings of the Rochester Academy of Science* 1 (March 10, 1890): 34-44; here Rafter references the work of the BWB and Whipple. For Rafter's discussions pertaining to photomicrography, see George W. Rafter, "On the Best Technique for High-Power Photo-Micrography," *Proceedings of the American Society of Microscopists* 11 (1889): 112-114. Here, Rafter notes that he designated a place at the BWB Biological Laboratory for photographic work; p. 114; which is confirmed by a statement in a BWB Annual Report noting that the laboratory was "built especially for microscopical and photographic studies of the Boston water"; see *Fourteenth Annual Report of the Boston Water Board, for 1889* (1890): 4. For biographical sketches pertaining to Rafter, see J. Y. McClintock, "Memoir of George W. Rafter," *Transactions of the American Society of Civil Engineers* 62 (1909): 554-559; "Rafter, George W.," *Dictionary of American Biography*, Vol. 15 (New York: Charles Scribner's Sons, 1935), 324-325; and "Rafter, George W.," *The National Cyclopaedia of American Biography*, Vol. 12 (New York: James T. White & Co., 1904), 234.

[339] See Note no. 386 and 387 for a description of the Biological Laboratory's inventory of property (including photographic equipment, negatives and prints) that was transferred to the MWB in January 1898.

[340] George C. Whipple, *The Microscopy of Drinking-Water* (New York: John Wiley & Sons, 1899).

[341] See George F. Swain, "George Chandler Whipple," *Harvard Engineering Journal* 10 (June 1911): 75. For other obituaries of Whipple, see *New York Times*, November 29, 1924, p. 13, c. 4; *Boston Transcript*, November 28, 1924, p. 4, c. 5; memoir prepared by Desmond FitzGerald in *Transactions of the American Society of Civil Engineers* 88 (1925): 1453-1454; *Journal of*

summary of the work at the laboratory, including the photomicrographical, in *The American Naturalist* and in *Popular Science Monthly*.[342] The latter article notes that a set of the laboratory's photographs "was on exhibition at the World's Fair in Chicago" in 1893.

While the limited extant textual records of the BWB Biological Laboratory are held by the Massachusetts State Archives[343], the photographic records are currently held by the DCR Archives (will be transferred to the Massachusetts State Archives sometime in the forthcoming years).[344] There are 73 dry plate negatives, 123 cabinet cards, 138 photograph prints mounted in a photograph album, and 43 photographic prints supported on mounting board of microscopical organisms by the photomicrograph process.[345] The negatives, the cabinet cards, and the prints in the album all date between 1891 and 1892, and are presumed to have been taken by Whipple. However, Whipple's assistants also made photographs for the Laboratory (including an assistant by the last name of Curtis).[346] Most of the prints that are mounted on board larger than cabinet card size are presumed to have been taken by George W. Rafter; half of these carry a Rafter label on back.[347] There are also 2 delineations of unknown origin. In 1997, the MDC Archives cleaned and rehoused these photographs. In the three Boston Water Board Annual Reports between 1891-1892 and 1893-1894 (16^{th}-18^{th}), 12 photographs from the Biological Laboratory were published. These images are not part of the integrated MWW Photograph Collection, and were not included in the 2012-2014 digital project.

In 2001, the MDC Archives located at the MWRA Records Center an additional 22 photographic prints from the BWB Biological Laboratory. Supported on mounting board are sixteen 4" x 4.5" prints of organisms; Desinidieau and Diatomaceae (no. 9919 in database). Supported on another mounting board are six prints of the laboratory equipment and of the laboratory building at the Chestnut Hill Reservoir (no. 9918 in database). Horatio N. Parker (1871-1946)[348], Assistant Biologist at the BWB Biological Laboratory from 1896-1899,

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the Boston Society of Civil Engineers 13 (March 1926): 131-32; *Journal of the American Water Works Associatio*n 13 (January 1925): 93; A. E. Kennelly, "George Chandler Whipple," *Proceedings of the American Academy of Arts and Sciences* 60 (1925): 654-657; and *The National Cyclopaedia of American Biography* 24 (New York: James T. White & Co., 1935), 104-105. Whipple's Papers are held by the Harvard University Archives, Cambridge, and the Countway Library of Medicine, Rare Books Department, Harvard University, Boston.

[342] George C. Whipple, "Biological Studies in Massachusetts, No. 1," *The American Naturalist* 31 (June 1897): 503-508; and George C. Whipple, "Municipal Water-Works Laboratories," *Popular Science Monthly* 58 (December 1900): 172-182; see especially pp. 173-174. See also George C. Whipple, "Some Observations on the Temperature of Surface Waters, and the Effect of Temperature on the Growth of Micro-organisms," *Journal of the New England Water Works Association* 9 (June 1895): 202-216, see especially pp. 202, 208. In May 1897, Whipple was appointed Biologist for the Brooklyn Water Works, Mt. Prospect Laboratory, and he included a dark room for photographic work in the laboratory's building; see George C. Whipple, "The Work of Mt. Prospect Laboratory of the Brooklyn Water Works," *Transactions of the American Microscopical Society* 22 (1901): 25-40.

[343] MSA, Records Series EN4.08/2134X.

[344] William H. Green, Jr., a bacteriologist for the MDC Water Division Biological Laboratory from 1949 through 1978, pulled this collection from the trash at the MDC HQ around 1970. Upon his retirement in 1978, he took the collection home with him. In 1988, he offered it to the Mass. State Archives, but they declined. In 1996, I located a MSA internal memo, dated August 31, 1988, pertaining to this offer, and contacted Mr. Green. Green was willing to donate the collection to the MDC Archives, which he did in 1996.

[345] For a discussion of photomicrography, see Andrew Pringle, *Practical Photo-Micrography: By the Latest Methods* (New York: Scovill & Adams, 1890); and "The Latest Improvements in Photo-Micrography," *Engineering News* 27 (January 2, 1892): 6-7.

[346] BWB, Biological Laboratory Records, George C. Whipple Diary, 1891. MSA, EN4.08/2134X.

[347] The Rochester (NY) Public Library, Local History Division, holds a collection of 88 printed plates of photographs showing the work of George W. Rafter in photomicrography. The plates were published in 1888. Rafter's photographs at the MDC Archives need to be compared to those in this publication to determine any matches. Photomicrographs by Rafter are also published in George W. Rafter, "On the Fresh Water Algae and Their Relation to the Purity of Public Water Supplies," *Transactions of the American Society of Civil Engineers* 21 (1889): 483-505.

[348] "Horatio Newton Parker—An Appreciation," *Journal of Milk Technology* 9 (September-October 1946): 302-304; and *Who Was Who in America*, Vol. 2, p. 413. Whipple had at one time 3 assistants: Frederick S. Hollis (1867-1950?), Parker, and Charles E. Livermore (1876 – d. after 1946) was appointed in 1893. Hollis was Chief Biologist from 1898-1900; Parker

may have contributed to taking the photographs of the laboratory. Two of the photographs are published in M. N. Baker's *The Quest for Pure Water: The History of Water Purification from the Earliest Records to the Twentieth Century*. Both photographs are dated 1892: "from photograph supplied by Horatio N. Parker; made at the time that he was assistant to George C. Whipple."[349] Both of these boards were likely exhibited by the Boston Water Board at the 1893 World's Columbian Exposition, Chicago (see below). In 2001, each mounted print was enclosed in MicroChamber folder paper, with unbuffered interleaving tissue placed over the print area, and placed in a drop-front box. An additional original photographic print, ca. 1892, of the Biological Building is framed and was found hanging in the MWRA Water Quality Testing Laboratory, Somerville (behind the Mystic Pumping Station/Mystic Shops), before its relocation (it is unknown if this original print continues to survive today).

5. In 2001, the MDC Archives identified 10 oversized photographic prints (12.75" x 16", varies), cloth-backed, with a cover board with a label that read: "Miscellaneous Photographs, Boston Water Works, 1893." The images are of BWW facilities (nos. 9908-9917 in database): Lake Cochituate, upper portion looking south; Lake Cochituate, east shore above gate house; Lake Cochituate, Outlet Dam; Dam 1 [Framingham]; Basin 2 [Framingham]; Basin 3, upper part [Framingham]; Dam 3, Gate House; Farm Pond, Gate House and Aqueduct; Dam 4, Gate House and Outlet Channel [Ashland]; Dam 4, Overfall and Waste Way. The subject of each print is at the bottom right corner in red ink, and each print is dated 1893 also in red ink. I am attributing these photographs to the work of David W. Butterfield. Six of these prints were also found mounted on board at the MWRA Records Center: Lake Cochituate, Dam at Outlet; Dam No. 1 Overflow; Basin 2; Dam No. 3; Farm Pond; and Dam No. 4. Most of these photographs (8) were published in Fletcher Osgood's 1896 article in *New England Magazine*, entitled "How Boston Gets Its Water."[350] These 10 photographs were likely exhibited by the Boston Water Board at the 1893 World's Columbian Exposition, Chicago (see below). In 2001, both the cloth-backed prints and the mounted prints were archivally rehoused. For the cloth-backed, each print was enclosed in a Mylar L-sleeve and placed in a drop-front box (at the time they were located, these prints were curling at both ends). For the mounted, each print was enclosed in MicroChamber folder paper, with unbuffered interleaving tissue placed over the print area, and placed in a drop-front box.

   Ironically, sometime between 2006 and 2012, the MWRA located a BWW oversize bound volume of the full set of these 1893 photographic prints by Butterfield.[351] Here, there are twenty-three (23) 13" x 16" photo prints in a volume entitled, "Photographs, Metropolitan Water Works, Sudbury and Cochituate Systems" (nos. 9950-9972 in database). Like the ones described above, the subject of each print is at the bottom right corner in red ink, and each print is dated 1893. Inside the volume, loose, were six (6) duplicate prints that likely had come from the loosely bound volume of 10 described above (making a total of 16). In 2013, these 6 were removed from the volume and archivally rehoused in polyester L-sleeve enclosures, and are expected to be merged with the other 10 in fall 2014.

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as Chief Biologist from 1900-1901; and Livermore as Chief Biologist from 1902-1946. Whipple, Hollis and Parker were all graduates of MIT (1889; 1890; 1895 respectively). Livermore had no college degree; see MWW, Employee History Cards. MSA, Records Series EN4.05/2123X. Whipple's predecessor was James I. Peck (1863-1898), who was appointed Biologist in 1889 but his failing health forced him to resign by the end of that year; see Peck's obituary in *Biological Lectures from the Marine Biological Laboratory, Wood's Hole, Mass., 1898* (Boston: Ginn & Co.; Athenaeum Press, 1899), 339-341.

[349] M. N. Baker, *The Quest for Pure Water: The History of Water Purification from the Earliest Records to the Twentieth Century* (New York: American Water Works Association, 1948), 399-400.

[350] Fletcher Osgood, "How Boston Gets Its Water," *New England Magazine*, 14, NS (June 1896): 388-409; see especially pp. 388, 393, 395-399.

[351] I was shown this volume in August 2012, at the MWRA Library, as part of the initial planning for the digital project. All the images in this volume were scanned by the BPL for the MWW Photo Digital Project in 2013.

> Since these 23 images by Butterfield of BWW facilities date from 1893, it is likely these were made for the BWB's exhibit at the World's Columbian Exposition in Chicago of that same year.[352]

As with the MWW Series of photographs between 1895-1926, the Boston Water Board created additional photographic evidence of their real estate takings and construction, especially since the BWB undertook other construction than just those between 1875-1880 and 1890-1896. This is evident when examining the BWB Annual Reports. For the annual reports between 1876-1877 (1st) and 1894-1895 (19th), there are 12 photographs published as photogravures (excluding those from the Biological Laboratory). None of these photographs were published prior to the 1886 Annual Report (11th).[353] An examination of the annual reports does not reveal in the text any reference to photographs or who took them. The Annual Reports of Boston's City Engineer also include BWB photographs, some of which were also published in the BWB's Annual Reports.[354]

Furthermore, BWB Western Division Superintendent Desmond FitzGerald wrote two articles for the American Society of Civil Engineers that publish photographs taken by the Board. In 1886, in an article pertaining to evaporation experiments at Chestnut Hill Reservoir, two photographs are published; the Effluent Gatehouse can be seen in the background of one these.[355] In an 1896 article, FitzGerald notes that the BWB took a few photographs "by flash light" in 1894 and 1895 of inside the 48-inch pipes of the Rosemary Siphon, Sudbury Aqueduct, Wellesley. The article publishes three of the photographs.[356] Also in 1886, Engineering News published an article and a wood engraving regarding the Boston Water Works entitled "Lifting a 40-inch Water-Main" whereby the taking of photographs is noted: "The sketch below, reproduced from a photograph, shows the general method adopted for lifting a 40-inch water-main on Brookline avenue, in Boston, Mass."[357]

In a rare 1891 publication entitled *Maps of the Sanitary Districts of the Sudbury and Cochituate Watersheds of the Boston Water Works*, there are 8 photographs published as photogravures (there are also many maps, but no text).[358]

However, there are no known construction progress photographs created by the BWB extant anywhere, except for the periods between 1875-1880 (though there is minimal that is extant from the 1878-1880 construction period of the Sudbury River Conduit superstructures) and 1890-1896 (Hopkinton Reservoir/Dam, Ashland/Hopkinton [1890-1894]), and the beginning of Sudbury Reservoir, Marlborough/Southborough, in 1894-1896). The extant photographic record of the Sudbury River Conduit construction project is not complete; for example, of the

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[352] "This model, together with a number of large photographs, was exhibited at the World's Columbian Exposition in Chicago", in Boston City Document No. 39, *18th Annual Report of the Water-Supply Department, For the Year 1893-94* (1894), 12.

[353] 11th, for 1886 (1887), opp. p. 44: 48-inch main, Beacon Street; 12th, for 1887 (1888), opp. p. 32: Fisher Hill Reservoir and Gatehouse; 13th, for 1888 (1889), opp. p. 11: Chestnut Hill High Service Pumping Station; opp. p. 30: Bellevue Hill Standpipe/Water Tower; opp. p. 35: Mystic Valley Sewerage Works; 14th, for 1889 (1890), opp. p. 6: Orient Heights, Breed's Island Standpipe/Water Tower; opp. p. 30: 30-inch siphon at Warren Bridge (dated Nov. 13, 1889); 15th, for 1890 (1891), opp. p. 28: Hopkinton Dam (2 plates); 18th, for 1893 (1894), frontispiece: Hopkinton Dam; opp. p. 6: Hopkinton Dam; and 19th, for 1894 (1895), opp. p. 166: boiler for Leavitt Engine on train car (no caption).

[354] 20th, for 1886 (1887), opp. p. 22: 48-inch water pipe at Beacon Street Bridge [not in BWB Annual Reports]; 24th, for 1890 (1891), opp. p. 38: Hopkinton Dam (2 plates) [15th BWB Annual Report]; 27th, for 1893 (1894), opp. p. 114: Hopkinton Dam (2 plates) [in 18th BWB Annual Report]; and 28th, for 1894 (1895), opp. p. 54: boiler for Leavitt Engine on train car (no caption) [in 19th BWB Annual Report].

[355] Desmond FitzGerald, "Evaporation," *Transactions of the American Society of Civil Engineers* 15 (1886): 581-646; see photograph plates opp. p. 586 (Plate LXXI) and opp. p. 596 (Plate LXXV).

[356] Desmond FitzGerald, "Flow of Water in 48-in. Pipes," *Transactions of the American Society of Civil Engineers* 35 (July 1896): 241-275, see especially pp. 241-244, 263. FitzGerald thanks William E. Foss, Frank S. Hart, and F. F. Moore, the "principal assistants in these experiments" (p. 263).

[357] "Lifting a 40-inch Water-Main," *Engineering News* 15 (January 23, 1886): 55.

[358] *Maps of the Sanitary Districts of the Sudbury and Cochituate Watersheds of the Boston Water Works* (1891): plate 11: Pegan Brook, Natick; pl. 18: Basin 4; pl. 25: Whitehall Pond; pl. 26: Whitehall Pond; pl. 27: mill pond below Whitehall Pond; pl. 29: Cedar Swamp, Westborough; pl. 35: Hardiman's Brook, Marlborough; and pl. 36: Angle Brook, Marlborough.

Terminal Chamber Gatehouse (1878-1879) at the Chestnut Hill Reservoir. Other principal structures from the late 1870s but not associated with the SRC include the Brighton Temporary Reservoir/Pumping Station (1876-1877); and the Chestnut Hill Reservoir, Stone Stable (1878-1879). The lack of extant photographs for the 1880s is significant because this period of construction includes the infamous Chestnut Hill High Service Pumping Station, Brighton (1887-1888), as well as the Ashland Reservoir/Dam/Gatehouse, Ashland (1881-1886); Farm Pond Conduit, Framingham (1883-1886); Fisher Hill Reservoir/Gatehouse, Brookline (1885-1888); Bellevue Standpipe/Water Tower, West Roxbury (1886-1888) and its associated West Roxbury Pumping Station (1886); and Breed's Hill/Orient Heights Standpipe/Water Tower, East Boston (1888-1899) and its associated Pumping Station (1888-1889). There are also no extant photographs of BWB's construction work at Whitehall Reservoir/Gatehouse, Hopkinton (1890s); Pegan Brook Filter Beds, Natick (1893); nor of the installation of the two Leavitt Engines: Chestnut Hill High Service Pumping Station (1894) and Mystic Pumping Station (1895).

But the MWW lantern slide collection reveals that construction progress photographs were taken for the Chestnut Hill High Service Pumping Station and Fisher Hill Reservoir. This collection includes 1 lantern slide of Chestnut Hill and 3 of Fisher Hill (nos. 8516, 8518-8520 in database). The Chestnut Hill image is of constructing the foundation and the beginning of the exterior wall. Scaffolding surrounds the chimney, and the Stone Stable is visible in the background. There are a number of men also in the image. The Fisher Hill images mostly pertain to the construction of the lining of the reservoir. All of these lantern slides were assigned MWW lantern slides numbers (Distribution Department [DD] 125, 127, 128, 129). According to an undated two-page typed list of lantern slides, these slides belonged to BWW/MWW engineer Dexter Brackett.[359]

The BWB's own published descriptive histories include photographs not published in the annual reports. In Desmond FitzGerald's *History of the Boston Water Works from 1868 to 1876* (1876 by the BWB), there are 5 photographs published as photogravures.[360] In Alphonse Fteley's *Boston Water Works: Additional Supply from Sudbury River: Description of the Work* (1882 by the BWB), there are 3 photographs published as heliotypes.[361] In Desmond FitzGerald's *A Short Description of the Boston Water-Works* (1895 by the BWB), there are 8 photographs published as halftone photomechanical prints.[362] None of these descriptive histories, though very detailed, include any reference to photographs being taken or by whom. Surprisingly, the names of Peabody, Barritt and Black are not referenced in Fteley's 1882 project history, a sizeable volume in of itself.

It would be useful, first, to survey all town historical societies and public libraries within the BWB construction area to locate additional official photographs (those created by/for the BWB), if any. The standard archival repositories within the cities of Boston and Cambridge would also need to be surveyed.

While no photographic collections of the BWB's predecessors (Boston Water Commissioners, 1846-1850; and Cochituate Water Board, 1851-1876) are extant, daguerreotypes were taken on at least one occasion. Publisher George R. Holbrook, in his 1848 publication *A Description of the Boston Water Works, Embracing all the Reservoirs, Bridges, Gates, Pipe Chambers, and other Objects of Interest, from Lake Cochituate to the City of Boston*, describes that "The Corner Stone of the [Beacon Hill] Reservoir was laid on Saturday, November 19th, 1847, by the mayor, in presence of the City Council, and of a vast body of citizens and strangers. Daguerreotype

[359] Nos. 11, 13-15 on this list. MA State Archives, Records Series No. EN4.05/2630X.

[360] Frontispiece: Chestnut Hill Reservoir, Lawrence Basin; opp. p. 24: Lake Cochituate; opp. p. 159: Roxbury Standpipe; opp. p. 161: Parker Hill Reservoir and Gatehouse; opp. p. 175: Chestnut Hill Reservoir, Entrance Arch; and the lithographs of the Chestnut Hill Reservoir Influent and Intermediate Gatehouses from Bradlee's 1868 history are reprinted here (between pp. 174-175).

[361] Opp. page 42: Dam No. 2 and Gatehouse; opp. p. 58: Waban Bridge; and opp. p. 62: Charles River Bridge. All three photographs were likely made by Black & Co.

[362] Frontispiece: Dam No. 4 (Ashland) and Gatehouse [likely made by David W. Butterfield in 1893 for World's Columbian Exposition]; opp. p. 12: Dam No. 3 and Gatehouse [likely made by David W. Butterfield in 1893 for World's Columbian Exposition]; opp. p. 13: Dam No. 6 (Hopkinton) [in 18th BWB Annual Report]; opp. p. 16: Farm Pond and Gatehouse; opp. p. 20 (Echo Bridge), made by Black & Co.; opp. p. 24: Chestnut Hill Reservoir, Lawrence Basin; opp. p. 26: Chestnut Hill High Service Pumping Station; and opp. p. 28: Fisher Hill Reservoir and Gatehouse [in 12th BWB Annual Report].

views of the scene were taken for the benefit of coming generations."[363] In this corner stone at Derne and Temple Streets, "a copper box 12 inches square and 6 inches deep was deposited in the stone; it contained some of the publications of the day, the various Reports on Water, and two silver plates . . . ."[364]

There are 11 wood engravings of the Cochituate facilities in Holbrook's guide.[365]

However, in the First Report of the [Second] Cochituate Water Board (Boston City Document No. 6 [1852]), there is no reference to these daguerreotypes or to any other photographs. This is unusual considering that this specific report is the first to describe in detail the 1846-1848 construction. Even the infamous report "Celebration of the Introduction of Water of Cochituate Lake into the City of Boston, October 25, 1848" (Boston City Document No. 50 [1848]) does not reference any photographs.[366]

Principal structures of the 1846-1851 period include Cochituate Aqueduct (1846-1848) and its superstructures (4 waste weirs, 1 ventilator, and 2 bridges); Lake Cochituate/Gatehouse (1846-1848); Brookline Reservoir/Upper and Lower Gatehouses (1846-1848); Beacon Hill Reservoir (1847-1849); South Boston Reservoir (1848-1849); and East Boston Reservoir (1849-1851).

Unfortunately, there are no references to photographs in any other Boston City Document pertaining to water supply between 1846 and 1851; see, for example, Boston City Document Nos. 20 (1846); 44 (1847); 4 (1849); 38 (1849); 68 (1849); 3 (1850); and 45 (1850), amongst others.

Though not made for the Cochituate Water Board, 8 wood engravings of the water works facilities were made by A. Waud for *Ballou's Pictorial* in 1859.[367] While likely not photographed for the Cochituate Water Board, the renowned photographer Josiah J. Hawes (1808-1901), of Southworth & Hawes, did photograph the Beacon Hill Reservoir ca. 1860.[368] According to a biographer of Southworth & Hawes, the firm did not take many outdoor views. They did make a daguerreotype of the famous lithograph of the 1848 Celebration.[369]

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[363] *A Description of the Boston Water Works, Embracing all the Reservoirs, Bridges, Gates, Pipe Chambers, and other Objects of Interest, from Lake Cochituate to the City of Boston* (Boston: George R. Holbrook, 1848), 12.

[364] Nathaniel J. Bradlee, *History of the Introduction of Pure Water into the City of Boston, with a Description of its Cochituate Water Works* (Boston: Alfred Mudge & Son, 1868), 108. Bradlee's *History* denotes November 20th as the day the corner stone was laid, not the 19th.

[365] Frontispiece: Frog Pond Fountain, Boston Common; p. 11: Beacon Hill Reservoir; p. 20: Brookline Reservoir, Lower Gatehouse; p. 24: Brookline Reservoir, with both Gatehouses; p. 29: Charles River Bridge; p. 31: Charles River Bridge, East Pipe Chamber; p. 33: Charles River Bridge, aqueduct view; p. 35: Cedar Street Bridge; p. 36: Waste Weir at Worcester Turnpike crossing; p. 37: Cochituate Aqueduct, section view; and p. 39: Lake Cochituate, Gatehouse.

[366] In 1849, Samuel W. Rowse (1822-1901) made a tinted lithograph of Benjamin F. Smith, Jr.'s (1830-1927) drawing of the "View of the Water Celebration, on Boston Common, October 25, 1848." See Pierce, *Boston Lithography*, 12, 70-71, 155, 180; I. N. Phelps Stokes and Daniel C. Haskell, *American Historical Prints: Early Views of American Cities, Etc. from the Phelps Stokes and Other Collections* (New York: New York Public Library, 1933; Detroit: Gale Research Co., 1974 Reprint), 100; and Bettina A. Norton, "Tappan and Bradford: Boston Lithographers with Essex County Associations," *Essex Institute Historical Collections* 114 (July 1978): 149-160; see p. 153. For biographical information pertaining to Smith, see John W. Reps, *Views and Viewmakers of Urban America: Lithographs of Towns and Cities in the United States and Canada, Notes on the Artists and Publishers, and A Union Catalog of Their Work, 1825-1925* (Columbia: University of Missouri Press, 1984), 206-208; the Water Celebration drawing is not referenced in this book. John Henry Bufford (1810-1870) of J. H. Bufford & Co. made a tinted lithograph for the cover of the "Cochituate Quick Step," a piece of music composed for the 1848 Celebration. Bufford also made a tinted lithograph of the Celebration procession ; see Pierce, *Boston Lithography*, 70, 130-132; and David Tatham, "John Henry Bufford: American Lithographer," *Proceedings of the American Antiquarian Society* 86, Pt. 1 (April 1976): 47-73, especially p. 72.

[367] "The Cochituate Water-Works," *Ballou's Pictorial Drawing-Room Companion* 16 (May 14, 1859): 312-313. The 8 wood engravings are of the: Waste Weir at "West Needham"; Cochituate Dam, Framingham; Lake Cochituate Gatehouse; Cedar Street Bridge; Brookline Reservoir; Brookline Reservoir, Lower Gatehouse; Charles River Bridge; and Beacon Hill Reservoir.

[368] The photograph is in the collections of the Boston Public Library, Print Department. See Rachel Johnston Homer, ed. *The Legacy of Josiah Johnson Hawes: 19th Century Photographs of Boston* (Barre, MA: Barre Publishers, 1972); the photograph

While photographs are not referenced in Nathaniel J. Bradlee's *History of the Introduction of Pure Water into the City of Boston, with a Description of its Cochituate Water Works* (1868 by the CWB), there are 4 lithographs of structures (excluding maps and plans).[370] No reference is made to photographs or to daguerreotypes. Principal structures constructed by the CWB between 1851 and 1875 include the Chestnut Hill Reservoir (1865-1870), and its associated Influent, Intermediate, and Effluent Gatehouses, and Entrance Arch (1868-1870); Roxbury Standpipe/Water Tower (1869-1870), and its associated Pumping Station (1870); and the Parker Hill Reservoir/Gatehouse, Roxbury (1873-1875).

Surprisingly, there are two lithographs in the 1868-1869 Cochituate Water Board Annual Report; one of the Chestnut Hill Reservoir Entrance Arch to the Driveway, and the other of the Roxbury Standpipe.[371] At no other time did the Cochituate Water Board and the Boston Water Board print lithographs of its structures.

No lithographs of facilities were published in the Mystic Water Board's *Report of the Commissioners and Chief Engineer of the Charlestown Water Works*, February 1865 (1865), nor in the Mystic Water Board's (MyWB) Annual Reports (eleven reports between 1865-1876).). No reference is made to photographs. Principal structures of the MyWB constructed between 1862 and 1864 include the Mystic Conduit and its superstructures, Medford (1 waste weir and 1 ventilator); Upper Mystic Lakes Gatehouse, Medford; Mystic Pumping Station, Somerville; Mystic Reservoir/Gatehouse (also known as Walnut Hill Reservoir), Medford; and the Winthrop Square Fountain, Charlestown.

As with the corner stone ceremony for the Beacon Hill Reservoir on November 19, 1847, a copper box was placed under the Mystic Pumping Station. According to a memoir for George R. Baldwin (1798-1888), Consulting Engineer of the Mystic Water Works, a photograph of Baldwin "as such an official was deposited in the copper box under the engine-house in 1860."[372] As an aside, it is remarkable that this 1860s time capsule survives today (in the DCR Archives). Written on brown wrapping paper are the following: "The contents of old

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is published as the frontispiece. Two additional views of the Beacon Hill Reservoir are held at the Library of The Bostonian Society, one of which was published in Fletcher Osgood, "How Boston Gets Its Water," *New England Magazine* N.S. 14 (June 1896): 390. For additional information pertaining to Southworth & Hawes, see Robert A. Sobieszek and Odette M. Appel, *The Spirit of Fact: The Daquerreotypes of Southworth & Hawes, 1843-1862* (Rochester, NY: International Museum of Photography at the George Eastman House, 1976). There is an interesting wood engraving of the Beacon Hill Reservoir in Walter H. Kilham, *Boston After Bulfinch: An Account of its Architecture, 1800-1900* (Cambridge, MA: Harvard University Press, 1946), plate xvi, bottom.

[369] Charles LeRoy Moore, "Two Partners in Boston: The Careers and Daguerreian Artistry of Albert Southworth and Josiah Hawes," Ph. D. dissertation, University of Michigan, 1975; see especially pp. 359-360, 377. Courtesy Boston Public Library, Microtext Department.

[370] Opp. p. 1: Lake Cochituate, Gatehouse (lithograph by Augustus Meisel [1824-1885]); opp. p. 256: Chestnut Hill Reservoir, Effluent (Lower) Gatehouse; Influent Gatehouse; and Intermediate Gatehouse. For Meisel, see Pierce, *Boston Lithography*, 143. A. Meisel also made two lithographs for the Newton Water Works in 1877; see *Report of the Board of Water Commissioners of Newton, Mass., to the City Counsel, November 1, 1877* (Boston: Rockwell & Churchill, 1877), frontispiece (Pumping Station), and opp. p. 44 (Waban Hill Reservoir, Gatehouse); in *Newton City Documents, 1877-1878*, Courtesy Newton Historical Society, The Jackson Homestead, Newton, MA.

[371] *Annual Report of the Cochituate Water Board, for 1868-1869* (1869), opp. p. 5 and opp. p. 8. No credit is given on the lithographs to who made them. These lithographs were never reprinted in any other Boston Water Works publication.

[372] "Memoir of George Rumford Baldwin," *Proceedings of the American Academy of Arts and Sciences* 24 (1888-1889): 434 [429-434]. According to the *Report of the Commissioners and Chief Engineer of the Charlestown Water Works* (February 1865), Baldwin was appointed Consulting Engineer on April 5, 1862, and construction commenced on September 27, 1862, "with appropriate ceremonies, on Walnut Hill Reservoir" (p. 10), and the "construction of the engine-house was commenced early in 1863" (p. 13). The reference in the memoir to the date of 1860 is likely incorrect. In 1859, Baldwin and Charles L. Stevenson wrote the *Report on Supplying the City of Charlestown with Pure Water* (published in 1860) which recommended the Mystic Pond as the water supply source for Charlestown.

copper box found by workmen Sept. 22, 1920 while removing chimney at Old Mystic Pumping Station.[373] Wrapped by W.F.S. Jan. 24, 1944. Found during paper drive."

The date of 1944 and the reference to the paper drive is significant because it is evidence that the MDC was participating in the World War II paper drive per the orders of the state's Office of Administration and Finance.

In about 1993, the MWRA discovered the early 1920s era Metropolitan Water Works records storage area in the former Mystic Pumping Station, renamed the Mystic Shops during the 1920s. The contents of the MWW records storage area were deposited in the MWRA Records Center.

During a 2006 review of many of these records boxes that came from "Mystic Shops" with the MWRA Records Manager, we came across this ca. 1863 time capsule, mixed in with MWW letterbooks of Monthly Estimates, and with engineering field notebooks. The contents of the time capsule was transferred from the MWRA Records Center to the DCR Archives, and archivally rehoused in 2006.

Finally, the Annual Reports of the Boston Water Commissioners that reported on the MWW construction and operation (the first three reports between 1896-1898), do not include any photographs nor include any reference to photographs. However, in May 1939, approximately 250 dry plate negatives created by the Boston Water Department between 1896-1912 were extant, along with an index volume to them. Their existence is recorded in the Survey Forms in the Records of the Historical Records Survey of Massachusetts, Works Progress Administration.[374] It is unknown if these negatives or the prints from these negatives are extant today.

B. Boston Water Board's Exhibit at the 1893 World's Columbian Exposition, Chicago

In the above section, there are numerous references to the BWB's exhibit at the 1893 World's Columbian Exposition in Chicago, May 1 to October 30. According to the BWB's 18th Annual Report for the year 1893, "a number of large photographs" were exhibited at the Exposition.[375] According to the 1894 *Report of the Massachusetts Board of World's Fair Managers*, the BWB won an award for its exhibit of a "relief map and photographs" in the category of Department of Liberal Arts, Group 147.[376] This 1894 Report includes photographs of other Massachusetts exhibits which depict items enclosed in double-glazed frames hinged on a four-legged pole.[377] In her 1994 book, *Contesting Images: Photography and the World's Columbian Exposition*, Julie K. Brown describes the frames:

> "The exhibits employed various ingenious methods to display photographs. The free-winged frame, for example stood six or seven feet high, provided a compact and flexible format here as elsewhere in the Exposition. This efficiently designed stand could hold fifty doubled-glazed, swinging hinged frames, accommodating 100 22" X 28" mounts for a total capacity of 600

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[373] For MWW photographs of the chimney removal, see Nos. 7664-7665. These images are dated September 2, 1920; not the 22nd.

[374] MSA, SC1/167X, Box 57, City of Boston, Public Works Department, Water Division, Nos. 75-76.

[375] *Eighteenth Annual Report of the Boston Water Board, for 1893* (1894), 12.

[376] *Report of the Massachusetts Board of World's Fair Managers* (Boston: Wright & Potter, 1894), 212. That medal survives today, in the collections of the Museum of Fine Arts (Boston), and on exhibit in the Art in the Americas Wing, Gallery 221; see http://www.mfa.org/collections/object/worlds-columbian-exposition-commemorative-presentation-medal-462816. The "relief map", designed by engineer John N. McClintock (1846-1914), showed the Sudbury and Cochituate Watersheds of the BWW. The MWRA discovered the relief map in one of their buildings in the mid/late 2000s, had it professionally restored (ca. 2010/11), and installed in the lobby of their Water Treatment Plant, Marlborough. See, Boston City Document No. 39, *18th Annual Report of the Water-Supply Department, For the Year 1893-94* (1894), 12.

[377] *Report of the Massachusetts Board of World's Fair Managers*, pp. opposite 80, 86, 88, 90, and 108. The three double-glazed hinged frames were discarded (after removing the mounted photographs) under my direction in 2001 because of broken glass and prior to discovering their possible connection to the 1893 exhibit in winter 2002. Had I known, I would have retained the frames (minus the glass) as artifacts (I apologize). One frame contained both mounted sets of prints from the Biological Laboratory; and the other two frames contained four of the oversized facility prints photographed in 1893.

individual photographs."[378]

In 2001, six of the ten mounted on board items described above were found in the MWRA Records Center still within three similar double-glazed hinged frames. Since none of these items in the frames date after 1893, I believe they may have formed part of the BWB exhibit.

The mounted sets of photographs I believe were part of the BWB's exhibit are the following:

1. 16 one-half stereographs of the Sudbury River Conduit construction, 1876-1878 (mounted on one board);
2. 6 prints of Hopkinton Reservoir/Dam construction, 1890-1892 (mounted on one board);
3. 6 prints of the Biological Laboratory's building and equipment, ca. 1892 (mounted on one board);
4. 16 photomicrograph prints of biological organisms, ca. 1892 (mounted on one board);
5. 6 oversized prints of BWW facilities, 1893 (each separately mounted on board).

Some of these items within the double-glazed frames were reused in the MDC's exhibit at the Commonwealth's Tercentenary Exposition held in September and October 1930. The DCR Archives, the State Library, Special Collections Department, and the University of Massachusetts Amherst, Special Collections Department holds photographs of the MDC's exhibit.[379]

A related exhibit in the same Department and Group, but different class (Class 833) was made by the Mass. State Board of Health (SBH). This exhibit was compiled by Professor William T. Sedgwick (1855-1921) of the Massachusetts Institute of Technology, under whom George C. Whipple (MIT Class of 1889) of the BWB's Biological Laboratory studied.[380] The State Board's exhibit was located in the Anthropological Building, Bureau of Hygiene and Sanitation. In describing the State Board's "sanitary" exhibit, the *Journal of the American Medical Association* notes that "near by the exhibit of the State Board of Health, is a model and map of the water supply system of the city of Boston, showing the different water sheds included. A set of photographs of the different reservoirs is also shown."[381]

It is not likely that the BWB's exhibit was considered part of the State Board of Health's exhibit, even though the latter also included items pertaining to the Metropolitan Sewerage Commission. In its 1894 Annual Report for the previous year, there are six pages devoted to the SBH's exhibit, including a list of the items exhibited; there is no reference to the BWB.[382] In addition, the SBH published a 7-page pamphlet describing its exhibits; the BWB exhibit is not listed as one of them.[383]

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[378] Julie K. Brown, *Contesting Images: Photography and the World's Columbian Exposition* (Tucson: University of Arizona Press, 1994), 36 (see also photograph of a display on this page).

[379] Tercentenary Exposition of Governmental Activities of the Commonwealth of Massachusetts, 1930, Photograph Album, (photographs by Paul E. Genereux [1892-1977]), Photograph 385, State Library of Massachusetts, Special Collections, Boston, MA. MDC Exhibit, Print Nos. 113, 151-155; see Print No. 154 for a view of the hinged frames (see under 'Water Division' sign); DCR Archives has duplicate prints of these nos. Also Massachusetts Governmental Activities Exposition Photograph Album, 1930, PH043, Special Collections and Archives, W.E.B. Du Bois Library, University of Massachusetts, Amherst, MA, which holds 88 of the 175 photo prints. See also *Eleventh Annual Report of the Metropolitan District Commission, for 1930* (1931), 4-5.

[380] *Report of the Massachusetts Board of World's Fair Managers*, 129-135, 213.

[381] "Massachusetts Sanitary Exhibit," *Journal of the American Medical Association* 21 (August 5, 1893): 209. The State Board's exhibit is also alluded to in E. C. Hovey, "Massachusetts at the World's Fair," *New England Magazine* N.S. 9 (February 1894): 742-743 [735-750]; and in "World's Columbian Exposition: Hygiene and Sanitation Exhibit," *National Popular Review* 3 (August 1893): 73 [69-76].

[382] *Twenty-fifth Annual Report of the State Board of Health of Massachusetts, for the year 1893* (1894), xviii-xxiii.

[383] *State Board of Health: A Guide to its Exhibit at the World's Columbian Exposition, Department of Hygiene and Sanitation, Anthropological Building, 1893*. Courtesy Wisconsin Historical Society, Madison, WI. Two publications were invaluable in locating this item and referencing other items that I have cited. See David J. Bertuca, comp., *The World's Columbian Exposition: A Centennial Bibliographic Guide* (Westport, Conn.: Greenwood Press, 1996), especially pp. 108-109; and G. L. Dybwad and Joy V. Bliss, *Annotated Bibliography: World's Columbian Exposition, Chicago 1893* (Albuquerque, New Mexico: The Book Stops Here, 1992), 321 (entry no. 1929).

C. Some thoughts regarding the records (photographs, plans, library, etc.) of the Boston Water Board

Following the construction of the Cochituate System in 1846-1850, the City of Boston established an office known as the City Engineer and an Engineering Department under the City Engineer. Between 1850 and 1911, when the Office of the City Engineer was abolished, all construction activity by any city government agency was completed by the City Engineer and its Engineering Department. At the completion of construction, the City Engineer would transfer the operations of the facility to the appropriate agency. This was a typical procedure, but by no means was the city agency locked out from participating with the City Engineer in constructing its facilities.

Complicating matters was the role of the City Architect. Though the Office of City Architect was not established until 1873, the City Engineering Department employed at least one architect during the 1860s (Edward R. Brown, draftsman, then, architect in City Engineer's Office; 1855-1873). But not all City buildings constructed between 1873 and 1895 were designed by the City Architect.

The Sudbury Aqueduct construction between 1875 and 1880 was an amalgamation of the City Engineering Department and the engineering staff of the Boston Water Board. The City Engineer between 1872 and 1880 was Joseph P. Davis, the architect of the 1871-1872 Sudbury Aqueduct plan and a civil engineer who specialized in water works systems. For the first time in the BWW construction history, two practices were established: civil engineers with prior experience in water works engineering were employed, and junior engineers were employed with no prior working experience but who would remain designing, constructing and operating water works systems throughout their careers.

The BWB Annual Reports and the Resident Engineer's extensive 1882 history of the Sudbury Aqueduct project make it clear that on specific dates, various parts of the project were transferred from the Engineering Department to the BWB at the completion of construction.

It can be assumed that the engineering plans and any other records in possession of the BWW Western and Mystic Divisions as of January 1, 1898 were transferred along with the real estate property taken in January 1898 since the personnel of these two divisions were also transferred to the MWW. However, it would be another 7 years (1905) for the 1,300 engineering plans of these facilities to be transferred from the City of Boston Engineering Department to the MWW.[384] According to the "Classification of Expenses" in the Annual Reports of the Boston City Engineer of the 1880s, "photographs" is listed occasionally as an expense. Beginning with the 1890 Annual Report of the City Engineer, "Photographs of Engineering Works" is annually listed in its property schedule for the Main Office.[385]

Volume 2 of the Metropolitan Water Board Takings (Boston and Spot Pond Water Works) includes listings of property (i.e. goods) that were transferred from the BWB to the MWB.[386] The lists are divided by the building in which the goods resided. These lists confirm that the property in each building from the Western Division and Mystic Division were transferred. The only photographic camera listed is the one used by the Biological Laboratory at Chestnut Hill Reservoir to make photomicrographs.[387] The property listing for the Laboratory also

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[384] *Fifth Annual Report of the Metropolitan Water and Sewerage Board, for 1905* (1906), 107.
[385] *Twenty-fourth Annual Report of the City Engineer, for the year 1890* (1891), 75.
[386] Metropolitan Water Board Takings, Volume 2: Boston and Spot Pond Water Works, pp. 6-34, 235-280, 321-323 (see especially pp. 16, 18, 23). DCR, General Counsel's Office, Boston. It is also interesting what items were excluded from the inventory of property transferred to the MWB, for example, the stereographs of Sudbury River Conduit construction, and the ca. 1894 real estate taking photographs for the Sudbury Reservoir and Dam.
[387] The records of the BWB Biological Laboratory that were transferred to MSA in 1997 include a diary kept by Whipple throughout 1891. There are references to photographic work throughout the year (January-October), and the purchase of a "new Leitz camera" (see June 29, 1891 entry) that was received on May 19th (see May 19, 1891 entry). The Laboratory's property inventory includes an item identified as "photo micrograph apparatus" (p. 23).

includes "146 negatives of micro-organizms" and "2 albums of photomicrographs." The Chestnut Hill Pumping Station Office also included another "photo. album full of micro-organs" and a "misc. lot [of] negatives of various parts of work (probably 200)." The property listing for the Laboratory also includes "76 vols. B. W. W. record books, 50 books of reference." Various locations also had framed photographs listed. The South Framingham Office, Hollis Street, had a Library and a Blueprinting Room.[388]

The question remains to what extent were records (including photographs) of the BWB office at City Hall, the Eastern Division (Albany Street Yard), and of the City Engineering Department transferred to the MWW.[389] We will never know because of the following two events. Prior to 1962, a warehouse fire may have destroyed a collection of City of Boston records.[390] During the process of moving from old City Hall, School Street, to new City Hall, Government Center, in the mid-late 1960s, the majority of the City's records which had been stored in the basement of old City Hall and City Hall Annex (Court Street) were destroyed from the mid-1960s to mid-1970s. The sad story of the City of Boston's archival records is recounted in Mark J. Duffy's 1987 *State of the City's Records*.[391] Duffy accurately lays the blame on the City of Boston, the Commonwealth's Supervisor of Public Records and the Massachusetts State Archives. Similarly, it was the latter two offices which approved records destruction schedules, enabling the MDC during the 1960s-1980s to legally destroy records which today professional archivists would deem of permanent archival and historical value. A comprehensive update to the 1983 *Architectural Records in Boston* would be useful to answer some questions.[392]

The 1939 Survey Forms in the Records of the Historical Records Survey of Massachusetts, Works Progress Administration[393], provide additional evidence of archival records from the City's Engineering Office that were likely discarded by the City of Boston in the late 1960s and early 1970s.

1. Within the Library of the Water Division, Public Works Department, 710 Albany Street
   a. Minutes, Committee on New Supply, Cochituate Water Board, 1871-1875 (1 volume);
   b. Newspaper Scrapbook, 1883-1888 (2 volumes);
   c. Pumping Station Record, 1869-1871 (1 volume);
   d. Water Consumption, 1883-1906 (2 volumes): "of no value today";
   e. Records, Mystic Lake and Reservoir, 1878-1898 (3 volumes);
   f. Record of Observations at Mystic Lake and Reservoir, Assistant Superintendents Reports, 1872-1878 (1 volume);
   g. Observations, Brookline Reservoir, 1866-1878 (1 volume);
   h. Observations, Parker Hill Reservoir and 710 Albany Street, 1885-1899 (2 volumes): "of no value today."

2. Water Division, Public Works Department, City Hall Annex
   a. Votes of Water Board and Corporation Council Opinions, 1857-1890 (1 volume);

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[388] Metropolitan Water Board Takings, Volume 2: Boston and Spot Pond Water Works, pp. 14, 16-18, 22-23, 256, 260-261.
[389] BWW Engineer Dexter Brackett, in an 1894 article, describes the types of water records in the City Engineer's Office, Boston. See Dexter Brackett, "Water Works—Office Records," *Journal of the Association of Engineering Societies* 13 (October 1894): 596-600.
[390] MDC Water Division Engineer Allan Grieve, Jr. remarks so to Robert M. Vogel, Smithsonian Institution, in July 1962; see MDC Water Division (Boston Office) Records, Microfilm, Roll 101, Smi-Smz 1965. In this letter, Grieve also notes that the City of Boston had never transferred to the MWW the original drawings, contracts or specifications of the Leavitt Engine for the Chestnut Hill High Service Pumping Station.
[391] Mark J. Duffy, *State of the City's Records: A Report on the Status and Condition of the Public Archives and Records of the City of Boston* (Boston: Public Facilities Department, Municipal Archives and Records Project, 1987), see, for example, pp. 26-30.
[392] Nancy Carlson Schrock, ed., *Architectural Records in Boston: A Guide to Architectural Research in Boston, Cambridge and Vicinity* (New York: Garland Publishing, Inc., for the Massachusetts Committee for the Preservation of Architectural Records, Inc., 1983).
[393] MSA, SC1/167X, Boxes 57-58, City of Boston, Public Works Department, Water Division.

b. Committee on Construction, 1865-1868 [Chestnut Hill Reservoir] (1 volume);
c. Records of Employees, 1848-1939 (8 volumes in Library; 3 file boxes in City Hall Annex Office);
d. Calculation Books, 1848-1926 (5 volumes);
e. Field Books, 1888-1919 (39 volumes);
f. Letters, 1887-1936 (15 volumes; some in Library);
g. Record of Jamaica Pond, 1862-1892 (1 volume): "of no value today";
h. Card Index to Plans, 1869-1938;
i. Photograph of Chestnut Hill Pumping Station, by D.W. Butterfield.

Considering that some of the records noted above pertained to facilities that the MWB took over on January 1, 1898, it is strange that these items were not transferred to the MWB.

In 1867, the Cochituate Water Board (CWB) established a Library of items related to water works.[394] Following the 1888 death of former CWB president Nathaniel J. Bradlee (CWB president, 1868-1871), Mrs. Bradlee, in 1889, donated from her husband's personal library to the Engineering Department's Reference Library "109 reports and papers relating to the Boston Water-Supply, which are of special value, and have been bound for their better preservation."[395] By 1894, the City of Boston Engineering Department's "large" library "may be considered a model of what such a library should be."[396] From its inception in 1895, the MWB maintained a Reference Library. Though it is unknown if any of the BWB/City Engineering Department Library was transferred to the MWB (likely not all as the above list of records in the Library indicates), the library of the BWB Western Division (under Desmond FitzGerald at South Framingham, Hollis Street) was transferred when the construction of the Sudbury Reservoir and Dam under FitzGerald was transferred to the MWW in January 1896.[397] When the MDC Water Division moved into the MDC's new headquarters at 20 Somerset Street in 1930, a vault was created for the Water Division Library. This library remained until 1985-1986, at which time it became the foundation for the MWRA Library (currently located to the MWRA Chelsea Office). Some books (16 volumes) of the MWW Reference Library remained with the MDC, and the MDC Archives transferred these to the Massachusetts State Library, Special Collections Department, in 1997 (Collection No. 110). The MWW pasted a bookplate on the inside front cover of each book within its Reference Library.

[394] Bradlee, *History*, 1867, p. 227.
[395] *Twenty-third Annual Report of the City Engineer, for the year 1889* [1890], 67.
[396] Discussion by George A. Kimball, in Albert F. Noyes, "Organization and Management of a City Engineer's Office," *Journal of the Association of Engineering Societies* 13 (October 1894): 557 [541-606].
[397] However, the personal papers of Desmond FitzGerald were returned to him. On September 22, 1904, Division Engineer Charles W. Sherman wrote to a shipping company requesting that they pickup from the MWW Boston Office 24 boxes of books and 5 bundles belonging to FitzGerald and transport them to Brookline Storage Warehouse for him; see MWW, Letters from the Sudbury Department, Letterpress Copybook, Vol. 8, p. 902. MSA, EN4.07/2098X. Nine months earlier though, Sherman wrote to Sudbury Department Superintendent Charles E. Haberstroh explaining that he had forwarded to Haberstroh a package of "Papers relating to Jackson's survey of Cochituate Aqueduct" that was found among FitzGerald's papers. Sherman was unsure of their value but noted that they should be placed in the Sudbury Office; see MWW, Letters from the Sudbury Department, Letterpress Copybook, Vol. 8, p. 696. MSA, EN4.07/2098X. Sherman was responsible for packing FitzGerald's office upon his resignation from the MWW due to his health.

20. Reasons for Why Photographs of the MWW Construction, but not created by or for the MWB/MWSB (WW), are not included in this Preservation and Access Project

The Boylston Historical Society, the West Boylston Historical Society, the West Boylston Beaman Memorial Public Library and the Clinton Historical Society each hold photographs of significant collection size not created by the MWB and the MWSB (WW) pertaining to the construction of the MWW and to the built environment just prior to the construction. These photographic collections were taken by local photographers. While many show similar views as are in the MWW 7600 Series, most depict images not represented in the 7600 Series. These photographic collections significantly add to our interpretive understanding of this construction project and its impact on the local communities.

However, these local photographic collections were not part of the MWW Photographic Preservation and Access Project from the 2000-2003 period, nor were they included in the 2012-2014 Digital Access Project.

The MWW 1895-1926 Photographic Collection encompasses 8,000-plus images all of the same provenance. It is beyond the financial, human and technical resources of the MDC/DCR/MWRA/State Archives to add multiple non-governmental collections with many provenances to the project.

The 8,000-plus photographs created by the MWB and the MWSB (WW) are the official state government public records of this construction. Approximately 95% of their photographic work is extant.

Most importantly, it would be most equitable if all extant non-public record MWW related photographs (between 1895-1926) were reformatted regardless of repository location. In other words, the MWW district as it existed ca. 1921 included 18 cities and towns, and the facilities in which the MWW system were located in and crossed by means of aqueducts included many more cities and towns. To be equitable, each library and historical society for each of these towns would need to be surveyed for MWW related photographs within their holdings. In addition, any other archival/library repositories within each town would also need to be surveyed.

For example, in the 2002-2003 period, I visited the Natick Historical Society, Framingham Historical Society, and the Southborough Historical Society. While the Natick Historical Society holds 5 BWW construction images, all three historical societies hold numerous photographs of BWW/MWW construction and of BWW/MWW facilities following construction taken by local photographers and town residents. All of these images provide additional photographic perspectives and are useful for interpretive purposes.

Therefore, any cataloging and digital imaging of MWW related photographs not created by the MWB and the MWSB (WW) is beyond the current financial and managerial capabilities of DCR, MWRA, and the State Archives.

I encourage the local historical societies and public libraries, especially Boylston, Clinton, and West Boylston, to identify images within their collections pertaining to the Boston/Metropolitan Water Works System, and to join Digital Commonwealth, and to apply for digital imaging services from the Boston Public Library to digitize these images. The Digital Commonwealth web portal is a great way to inter-connect the government-created images with those created by local photographers and citizens.

21. 7600 Series MWW Photographs Published in Engineering Journals and Elsewhere

What follows below is a partial list of engineering journal articles and other articles that included MWW photographs published as halftone photomechanical prints, most of which are from the 7600 Series. The inaugural volume of two journals from engineering schools included an article regarding the MWW construction, including the lead article from the first issue of the *Journal of the Worcester Polytechnic Institute*. Many of these articles were written by the MWW engineers.

A. Journal of the New England Water Works Association

Vol. 11 (Sept. 1896):	Jesse Garrett, "Making Cast Iron Pipe," pp. 27-62; opp. p. 35 (1 photograph: Jamaica Pond Aqueduct wooden pipe).
Vol. 15 (Sept. 1900):	John L. Howard, "The Construction of the Fells Reservoir for the Metropolitan Water Works," pp. 20-33 (6 photographs).
Vol. 15 (March 1901):	A. A. Knudson, "Cause and Effect of Electrolytic Action Upon Underground Piping Systems," pp. 244-271; discussion by Dexter Bracket, opp. p. 256 (2 photographs).
Vol. 15 (March 1901):	Frederick Law Olmsted, Jr., "Landscape Problems in the Improvement of Spot Pond Reservoir, Metropolitan Water Works," pp. 272-287 (12 photographs).
Vol. 15 (June 1901):	Will J. Sando, "Metropolitan Water Works Pumping Machinery," pp. 299-304 (1 photograph).
Vol. 16 (March 1902):	Edward S. Larned, "The Drainage of Swamps for Watershed Improvement," pp. 36-50 (6 photographs).
Vol. 16 (June 1902):	Caleb Mills Saville, "The Construction of a Reservoir and Standpipe on Forbes Hill, Quincy, Mass.," pp. 177-222 (12 photographs).
Vol. 17 (June 1903):	Caleb Mills Saville, "Pipes and Pipe Laying for the Metropolitan Water Works," pp. 203-230 (8 photographs).
Vol. 19 (March 1905):	Caleb Mills Saville, "Repairs to the Lining of a Small Reservoir on Powder Horn Hill, Chelsea, Mass.," pp. 66-75 (6 photographs).
Vol. 20 (March 1906):	A. O. Doane, "Water Pressure Regulators," pp. 1-16; opp. p. 8 (1 photograph).
Vol. 20 (March 1906):	"Electrolysis," pp. 34-50; opp. p. 36 (1 photograph).
Vol. 30 (March 1916):	T.C. Culyer, "Costs and Results Obtained in Reforestation of the Croton Watershed," pp. 69-85; discussion by E.R.B. Allardice, pp. 80-85; opp. p. 84 (2 photographs).
Vol. 31 (June 1917):	Samuel E. Killam, "Breaks in Water Mains," pp. 268-279 (4 photographs).
Vol. 33 (June 1919):	William E. Foss, "Break in No. 2 Hydraulic Turbine at Wachusett Power Station, Clinton, Mass.," pp. 143-152 (4 photographs).
Vol. 96 (September 1982):	p. 189 (2 photographs).

B. Journal of the Association of Engineering Societies

Vol. 26 (March 1901):	Caleb Mills Saville, "Submerged Pipe Crossings of the Metropolitan Water Board," pp. 193-222 (4 photographs).
Vol. 44 (January 1910):	E.R.B. Allardice, "Reforestation of the Marginal Lands of the Wachusett Reservoir of the Metropolitan Water Works, Boston, Mass.", pp. 71-93 (3 photographs).

C. Transactions of the American Society of Civil Engineers

Vol. 48 (August 1902):	Frederic P. Stearns, "The North Dike of the Wachusett Reservoir," (pp. 259-277) the discussion in "The Bohio Dam," by George S. Morison (pp. 235-313) (6 photographs)

D. Journal of the Boston Society of Civil Engineers

Vol. 1 (December 1914): B.C. Thayer and E.R.B. Allardice, "The Hydro-Electric Power Plant at the Wachusett Dam, Clinton, Mass.," pp. 523-548 (3 photographs).

E. Technology Quarterly (MIT)

Vol. 12 (June 1899): W. O. Crosby, "Geology of the Wachusett Dam and Wachusett Aqueduct Tunnel of the Metropolitan Water Works in the Vicinity of Clinton, Mass.," pp. 68-96 (3 photographs).

Vol. 12 (Dec. 1899): W. O. Crosby, "Geological History of the Nashua Valley During the Tertiary and Quaternary Periods," pp. 288-324 (2 photographs).

Vol. 16 (Sept. 1903): W. O. Crosby, "Structure and Composition of the Delta Plains Formed During the Clinton Stage in the Glacial Lake of the Nashua Valley," pp. 240-254 (9 photographs).

Vol. 17 (March 1904): W. O. Crosby, "Structure and Composition of the Delta Plains Formed During the Clinton Stage in the Glacial Lake of the Nashua Valley," pp. 37-75 (6 photographs).

F. Journal of the Worcester Polytechnic Institute

Vol. 1 (November 1897): Alfred D. Flinn, "Greater Boston's Water-Works," pp. 1-14 (4 photographs).

G. Harvard Engineering Journal

Vol. 1 (January 1903): Chester Wason Smith, "The Wachusett Dam," pp. 201-222 (1 photograph).

H. Municipal Engineering

Vol. 32 (June 1907): Caleb Mills Saville, "The Metropolitan Water Works System of Massachusetts," pp. 363-368 (no photographs).

Vol. 33 (July 1907): Caleb Mills Saville, "The Metropolitan Water Works System of Massachusetts: The Wachusett Dam," pp. 1-5 (2 photographs).

Vol. 33 (August 1907): Caleb Mills Saville, "The Metropolitan Water Supply System: Reservoirs, Aqueducts and Pumping Stations," pp. 73-77 (3 photographs).

Vol. 33 (September 1907): Caleb Mills Saville, "The Metropolitan Water Works of Boston, Mass.: Distributing Reservoirs and Pipe Lines, and Sanitary Protection," pp. 147-151 (1 photograph).

I. Proceedings of the American Water Works Association

1906: Dexter Brackett, "Metropolitan Water Works," pp. 488-547 (29 photographs). (between 1906 and the 1920s, this article was widely distributed by the MDC Water Division, until it was updated by Water Division Chief Engineer William E. Foss and by MDWSC Chief Engineer Frank E. Winsor through a pamphlet entitled *Description of the Metropolitan Water Works, 1846-1932*, published as a separate title by the MDC's monthly employee magazine, *The Office Window*)

J. Engineering News and American Railway Journal

Vol. 44 (September 13, 1900): Alfred D. Flinn, "The Wachusett Dam for the Metropolitan Water Supply, Boston, Mass.", pp. 174-179 (3 photographs, plans, and the "perspective" sketch based on Elwell's sketch of the same year, for the MWW).

Vol. 49 (March 5, 1904): "Progress on the Wachusett Dam of the Metropolitan Water Works, Massachusetts," pp. 268-269 (2 photographs).

K. New England Magazine

Vol. 14, NS (June 1896): Fletcher Osgood, "How Boston Gets Its Water," pp.388-409 (6 MWB photographs; 14 BWB photographs; p. 389: "Illustrations from photographs kindly furnished by the Metropolitan Water Board."). The photograph of Beacon Hill (Derne Street) Reservoir on page 390 is held by The Bostonian Society Library (Acc. No. 83.7) as is a similar view of another corner (Acc. No. 90.19).

L. Harper's Weekly

Vol. 41 (January 16, 1897): Charles H. Bemis, "Greater Boston's New Reservoir," pp. 56, 67, 69 (5 photographs).

M. Scientific American

Vol. 81 (November 4, 1899): J. A. Stewart, "Waterworks Expansion in Boston," pp. 292-294 (5 photographs).
Vol. 93 (July 1, 1905): "The Wachusett Reservoir for Boston Water Supply," pp. 11-12 (7 photographs including 2 on front cover).

N. Fire and Water Engineering

July 7, 1906: "The Water Supply of Boston," pp. 344-346 (8 photographs).

O. Municipal Journal

Vol. 31 (September 27, 1911): "Commercial Power from Water Works," pp. 393-395 (5 photographs).

P. Miscellaneous Publications, and Recent Books and Reports

John R. Freeman, *Report Upon New York's Water Supply* (New York: Martin B. Brown Co., 1900), Appendix 5, pp. 304-308 (4 photographs).

Report of the Committee on Charles River Dam [aka John R. Freeman Report] (Boston: Wright & Potter, 1903), opp. p. 517 (1 photograph).

Cast Iron Pipe (United States Cast Iron Pipe and Foundry Company, 1905), pp. 13-14, 32-33 (numerous photographs).

George Chandler Whipple, *State Sanitation: A Review of the Work of the Massachusetts State Board of Health*, Vol. 1 (Cambridge, Mass.: Harvard University Press, 1917), opp. p. 84 (2 photographs).

The Central Mass. (Boston & Maine Railroad Historical Society, 1975) (20 photographs).[398]

Dedication Booklet, *Leavitt Pumping Engine at Chestnut Hill Station, Metropolitan District Commission, as a National Historic Mechanical Engineering Landmark, American Society of Mechanical Engineers, December 14, 1973* (ASME/MDC booklet, prepared by MDC and Boston Section, American Society of Mechanical Engineers; 8-plus pages) (1 photograph, opp. p. 4, No. 2571).

Fern L. Nesson, *Great Waters: A History of Boston's Water Supply* (Hanover, NH: University Press of New England, 1983) (16 photographs).[399]

Sarah S. Elkind, *Bay Cities and Water Politics: The Battle for Resources in Boston and Oakland* (Lawrence: University of Press of Kansas, 1998) (4 photographs).[400]

Robert F. Murphy and Diana Laskin Siegal, *Public Health Trails in Massachusetts: A History and Guide*, 2nd ed. (Boston: Massachusetts Public Health Association, 2000) (1 photograph).[401]

Pamela W. Fox, *Farm Town to Suburb: The History and Architecture of Weston, Massachusetts, 1830-1980* (Portsmouth, NH: Peter E. Randall, 2002) (6 photographs).[402]

[398] Nos. 287, 341, 431, 3562, 3563, 3865, 4380, 4431, 4530, 4973, 5001, 5092, 5121, 5123, 5134, 5250, 5272, 5463, 5503, and 5580.
[399] Nos. 749, 1281, 1664, 1997, 3159, 3176, 3215, 4204, 5500, 5526, 5530, 5544, 5549, 5550, 5572, and 5729.
[400] Nos. 1168, 3637, 4360, 4721, and No. 8068 (database no.).
[401] No. 6227.
[402] Nos. 4151, 4467, 4905, 5002, 5391, and 5646.

22. A Chronology of Government Bodies Which Constructed and Operated Boston's Metropolitan Water Supply System

1836: St 1836, c 272: **Boston Hydraulic Company [1836-18??]** incorporated

1843: St 1843, c 76: **Spot Pond Aqueduct Company [1843-18??]** incorporated (see also St 1845, c 219)

1846: St 1846, c 167: "An Act for Supplying the City of Boston with Pure Water"; Long Pond (renamed Lake Cochituate) selected as the water supply source

1846-1850: **Boston Water Commissioners [1846-1850]** established and authorized to construct, maintain and operate Cochituate Water Works

1846-1848: Lake Cochituate constructed

1848: Boston City Document No. 50 (1848): Celebration of the Introduction of the Water of Cochituate Lake into the City of Boston, October 25, 1848

1850: 1st **Cochituate Water Board [1850]** established for one year to maintain and operate Cochituate Water Works

1851-1876: 2nd **Cochituate Water Board [1851-1876]** established to maintain and operate Cochituate Water Works

1860: George R. Baldwin and Charles L. Stevenson publish *Report on Supplying the City of Charlestown with Pure Water* (written in 1859). This report recommends the Mystic Pond as the water supply source

1861: St 1861, c 105: "An Act for Supplying the City of Charlestown with Pure Water"

1862-1865: **Water Commissioners of the City of Charlestown Water Works [1862-1865]** is a government body of the City of Charlestown established to construct the Charlestown Water Works (also known as the Mystic Water Works) as recommended by the 1860 report

1862-1864: Charlestown Water Works constructed

1865-1876: **Mystic Water Board [1865-1876]** is a government body of the City of Charlestown established to maintain and operate the Charlestown Water Works

1865: *Report of the Commissioners and Chief Engineer of the Charlestown Water Works*, February 1865, is published and provides a history of its construction

1867-1871: Mystic Water Board supplies water, in addition to Charlestown, to Chelsea, Somerville, East Boston, and Everett

1867: St 1867, c 208: **Spot Pond Water Company [1867-1870]** incorporated

1868: Cochituate Water Board publishes *A History of the Introduction of Pure Water into the City of Boston, with a Description of its Cochituate Water Works, etc.*, 1868 (written by Nathaniel J. Bradlee)

1870: St 1870, c 160: Towns of Melrose, Malden and Medford purchase the Spot Pond Water Company, and the Water Commissioners of these three towns are authorized to construct, manage and operate Spot Pond Water Works (see also St 1887, c 388)

1872: St 1872, c 177: Sudbury River Act authorizes the Cochituate Water Board to provide for an additional water supply

1873: Boston City Document No. 29 (1873): Report of the Cochituate Water Board on an Additional Supply of Water for the City of Boston recommends a plan to implement the Sudbury River Act of 1872

1874: City of Boston annexes the City of Charlestown

1875-1878: Sudbury River Conduit constructed by Cochituate, then Boston, Water Board as recommended by Boston City Document No. 29 (1873)

1875: St 1875, c 80: Cochituate Water Board and Mystic Water Board merge together to form the **Boston Water Board [1876-1895]**

1876: Boston Water Board publishes *History of the Boston Water Works from 1868 to 1876* (written by Desmond FitzGerald)

1882: Boston Water Board publishes *Boston Water Works: Additional Supply from Sudbury River: Description of the Work* (written by Alphonse Fteley)

1888: *Cochituate and Sudbury Water Supply: Its Present and Future Development* (March 1888), published by the Boston Water Board, recommends the construction of the Hopkinton (Indian Brook Basin), Whitehall, and Sudbury Reservoirs (Stony Brook Basin)

1892: St 1892, c 371: City of Boston Park Commission is authorized to take the lands of the **Jamaica Pond Aqueduct Corporation [1795-1893]**, and through an agreement between the Park Commission and the Boston Water Board, the Water Board takes the Corporation's pipe system

1893: St 1893, c 459: "An Act Relative to Procuring a Water Supply for the City of Boston and its Suburbs" authorizes the State Board of Health to investigate a metropolitan water supply

1895: House No. 500: Report of the Massachusetts State Board of Health upon a Metropolitan Water Supply, February 1895, recommends the establishment of the Metropolitan Water Board

1895: St 1895, c 488: Establishment of the **Metropolitan Water Board [1895-1901]** and authorizes the taking by this Board of the Metropolitan Water Works of the Boston Water Board, and the Spot Pond Water Works of the Towns of Melrose, Malden and Medford

1895: St 1895, c 449: Boston Water Board is abolished, and the Boston Water Department is established

1895: Boston Water Board publishes *A Short Description of the Boston Water-Works 1876* (written by Desmond FitzGerald)

1896: Construction of Boston Water Board's (now Water Department) Basin/Dam No. 5 (Sudbury) is taken over by the Metropolitan Water Board as authorized by St 1895, c 488

1898: Maintenance and operations of Boston Water Board's (now Water Department) Metropolitan Water Works is taken over by the Metropolitan Water Board as authorized by St 1895, c 488

1900: *Water Supply and Work of the Metropolitan Water District (Boston and Its Vicinity) in the Commonwealth of Massachusetts* is published by the Metropolitan Water Board for the Board of Paris Exposition Managers for Massachusetts

1901: St 1901, c 168: Metropolitan Water Board merges with the Board of Metropolitan Sewerage Commissioners [1889-1901] to form the **Metropolitan Water and Sewerage Board [1901-1919]**, within which there is the Water Works. The two boards as separate government bodies are abolished

1906: As a result of the Annual Convention of the American Water Works Association being held in Boston, Water Works Distribution Department Engineer Dexter Brackett writes a history of the "Metropolitan Water Works" project for the Proceedings

1919: St 1919, c 350, s 123: Metropolitan Water and Sewerage Board merges with the **Metropolitan Park Commission [1893-1919]** to form the **Metropolitan District Commission [1919-2003]**, within which there is the Water Division [1919-1985]. The two boards as separate government bodies are abolished

1919: Resolve 1919, c 49: A joint board consisting of the Department of Public Health and the Metropolitan District Commission authorized to investigate additional water supply sources

1922: House No. 1550: Report of the Joint Board consisting of the State Department of Public Health and the Metropolitan District Commission relative to Water Supply Needs and Resources of the Commonwealth, January 1922 (March 1922). This report forms the basis for the functions of the Metropolitan District Water Supply Commission [1926-1947]

1924: St 1924, c 491: A special commission known as the Metropolitan Water Supply Investigating Commission authorized to investigate additional water supply sources

1925: House No. 900: Report of the Metropolitan Water Supply Investigating Commission Constituted to study further the Water Supply Needs of the Metropolitan District, the City of Worcester and Such Other Cities and Towns as may require Water from the Metropolitan Water System, December 1925 (January 1926). This report was rejected by the Legislature in favor of House No. 1550 (1922), except that the Legislature adopted the recommendation of House No. 900 (1925) of establishing a new agency--the Metropolitan District Water Supply Commission--to construct the system

1926: St 1926, c 375: The **Metropolitan District Water Supply Commission [1926-1947]** is established to construct Quabbin Reservoir; the Commissioner of the Metropolitan District Commission concurrently serves as Chairman of this special commission. The MDC Water and Sewerage Divisions remain within the MDC and retain construction, maintenance and operation functions of the existing works

1932: Dexter Bracket's 1906 history is updated by Water Division Chief Engineer William E. Foss and by MDWSC Chief Engineer Frank E. Winsor through a pamphlet entitled *Description of the Metropolitan Water Works, 1846-1932*, published as a separate title by the MDC's monthly employee magazine (*The Office Window*)

1940: October 23: *A General Description of the Water Supply of the Boston Metropolitan District and the Work of the Massachusetts Metropolitan District Water Supply Commission in Extending the Sources of Supply and Improving the Methods of Distribution* (published on the occasion of the opening of the Commission's New Pressure Aqueduct into Norumbega Reservoir, Weston)

1945: Mystic Reservoir transferred to Tufts College

1947: St 1947, c 583: The Metropolitan District Water Supply Commission merges into the Metropolitan District Commission, abolishing the special construction commission, and the MDC assumes the maintenance and operations of the Quabbin Reservoir system in its Water Division (as recommended by House No. 1713 [1938]). The remaining and future construction of water and sewerage works is conducted by the newly established **Construction Division [1947-1972]** (s 2) of the MDC. The MDC Water and Sewerage Divisions retain their maintenance and operation functions

1947: St 1947, c 557: As recommended by a Special Commission in its Report to the Legislature (House No. 115 [1947]), the Metropolitan District Commission transfer care and control of Lake Cochituate, Ashland Reservoir, Hopkinton Reservoir, and Whitehall Reservoir to the Department of Conservation (later Department of Environmental Management; now DCR) for state park purposes. These reservoirs were no longer required for water supply purposes.

1948-1949: Lawrence Basin of the Chestnut Hill Reservoir transferred to Boston College for construction of athletic stadium

1956: Forbes Hill Reservoir and Standpipe transferred to the City of Quincy for park purposes

1972: MDC Construction Division is renamed the Engineering Division (also known as the Construction Engineering Division)

1974-1975: MDC Parks Engineering Division merges into the Engineering Division and retains the name Engineering Division

1982: *City of Quincy v. Metropolitan District Commission, et al.* is filed on December 17th in Norfolk County Superior Court, Civil Action (Docket No. 138477). The City of Quincy brings civil action against the MDC and the Boston Water and Sewer Commission and seeks injunctive, remedial and declaratory relief from the pollution of Boston Harbor, Quincy Bay and adjacent waters. In June 1983, three additional parties are joined in the complaint as defendants

1983: July 8: Judge Paul G. Garrity appoints a Special Master, Harvard Law School Professor Charles M. Haar, to investigate the case

1983: August 9: Special Master Charles M. Haar issues his findings, entitled *Report of the Special Master Regarding Findings of Fact and Proposed Remedies* (also known as the Haar Report). One of the recommendations is for the preparation of a financial plan by an independent expert financial consultant "setting forth mechanisms for obtaining the funds necessary to carry out the construction, rehabilitation and maintenance programs recommended in this report" (p.163). The Special Master further recommends that the financial report evaluate whether the sewerage division of the MDC should be "spun off and responsibility placed in an independent, autonomous, self-sustaining financial authority, with the advantages and flexibility of a public authority" (p.165)

1983: September 9: Judge Garrity issues a Procedural Order suspending proceedings so long as all the defendants "make a voluntary moral commitment to accept and to comply with" all of the Special Master's recommendations. August/September: plaintiff and defendants ratify an agreement to comply with the Special Master's recommendations

1983: November 21: the Executive Office of Environmental Affairs contracts with Bank of Boston's Public Finance Group in compliance with the financial plan recommendation

1984: February 8: the Public Finance Group of the Bank of Boston, contracted as the financial consultant, issues its report, entitled *Protecting Water Resources: A Financial Analysis, A Report Analyzing the Funding Requirements of Water and Sewerage Services in the Boston Metropolitan Area*. Here, for the first time since the action was brought before the court in December 1982, the scope was expanded to encompass the metropolitan water system:

> Perhaps more frightening, however, was the realization that the financial and organizational structure which had permitted this deterioration to develop and persist was the same structure which today governs the provision and delivery of the region's most basic of needs: clean water. In contrast to its failings regarding sewerage, this structure has to date performed a laudatory job of satisfying the Greater Boston area's needs for water resources. Nevertheless, in the very early stages of its research the Bank became increasingly concerned that the same structural flaws which had resulted in Boston Harbor's current plight could, in five to ten years, jeopardize the efficient delivery of water to the region's inhabitants. (pp.i-ii)

Recommendation:

> The maintenance and improvement of both the metropolitan water and sewerage systems could be more effectively funded and implemented through a combined authority. (p.iv)

1984: April 19: Governor Michael Dukakis sends to the Legislature legislation (House No. 5915) for the establishment of a Metropolitan Water Resources Authority that "will transfer to a new, independent authority the operations and capital improvement responsibilities for the metropolitan sewer system and the metropolitan water system now in the charge of the Metropolitan District Commission"; see also H6319, H6363, S2272, and S2363

Note: For a detailed account of the Boston Harbor case, see Charles M. Haar, *Mastering Boston Harbor: Courts, Dolphins, and Imperiled Waters* (Harvard University Press, 2005), and Eric Jay Dolin, *Political Waters: The Long, Dirty, Contentious, Incredibly Expensive but Eventually Triumphant History of Boston Harbor* (University of Massachusetts Press, 2004)

1984: December 19: St 1984, c 372: The Water Division, along with the Sewerage Division, of the Metropolitan District Commission, are removed from the Metropolitan District Commission to establish the **Massachusetts Water Resources Authority [1985-present]**. The Metropolitan District Commission retains maintenance and operation functions of the water supply reservoirs/dams and their watersheds through the establishment of the **Division of Watershed Management [1985-2003]** (s 42)

1991: July 1991: *City of Quincy v. Metropolitan District Commission, et al.*, dismissed

1999: Spot Pond transferred from MWRA to MDC for park purposes

2002: Chestnut Hill Reservoir transferred from MWRA to MDC for park purposes

2003: St 2003, c 41: Merges the **Metropolitan District Commission [1919-2003]** and the **Department of Environmental Management [1975-2003]** into a new agency called the **Department of Conservation and Recreation [2003-present]**. DCR shall have three divisions: **Division of Urban Parks and Recreation [2003-present]** representing the MDC Metropolitan Park System [dating from 1893]; the **Division of State Parks and Recreation [2003-present]** representing the DEM Division of Forests and Parks [dating from 1898]; and the **Division of Water Supply Protection [2003-present]** within which there are two bureaus: Bureau of Watershed Management representing the **MDC Division of Watershed Management [1985-2003]** and the Bureau of Water Resources representing the **DEM Office of Water Resources [1956-2003]** (see also St 2003, c 26, s 698, and many other sections)

2004: April 27, 2004: Memorandum of Understanding between the Department of Conservation and Recreation and the Massachusetts Water Resources Authority, among other things, transfers the operations of the Wachusett Dam and Winsor Dam (Quabbin Reservoir) from DCR's Division of Water Supply Protection, Office of Watershed Management to the MWRA, amending St 1984, c 372, and its subsequent July 1, 1992 Memorandum of Understanding

January 1, 1898 Name Changes of Reservoirs, Dams, and Aqueducts

On January 1, 1898, when the MWB took the facilities of the BWW Western and Mystic Divisions, the names of most facilities were changed.[403]

Nashua Aqueduct:	became Wachusett Aqueduct
Nashua Dam:	became Wachusett Dam
Nashua Reservoir:	became Wachusett Reservoir
Basin No. 5:	became Sudbury Reservoir
Dam No. 5:	became Sudbury Dam
Basin No. 1:	became Framingham Reservoir No. 1
Dam No. 1:	became Framingham Dam No. 1
Basin No. 2:	became Framingham Reservoir No. 2
Dam No. 2:	became Framingham Dam No. 2
Basin No. 3:	became Framingham Reservoir No. 3
Dam No. 3:	became Framingham Dam No. 3
Basin No. 4:	became Ashland Reservoir
Dam No. 4:	became Ashland Dam
Basin No. 6:	became Hopkinton Reservoir (originally named Basin No. 5, but BWB changed it to Basin No. 6 in 1891)
Dam No. 6:	became Hopkinton Dam
Whitehall Pond:	became Whitehall Reservoir

Memorial Renamings

December 18, 1974[404]

- Framingham Reservoir/Dam No. 1 (known as Basin No. 1, 1875-1897), Framingham (middle reservoir), renamed [Frederic P.] Stearns Reservoir
- Framingham Reservoir/Dam No. 2 (known as Basin No. 2, 1875-1897), Ashland/Framingham (lower reservoir), renamed [Dexter] Brackett Reservoir
- Framingham Reservoir/Dam No. 3 (known as Basin No. 3, 1875-1897), Framingham (upper reservoir), renamed [William E.]Foss Reservoir

[403] *Third Annual Report of the Metropolitan Water Board, for 1897* (1898), 10-11.
[404] Metropolitan District Commission, Minutes, Volume 40, p. 171, item 7 (December 18, 1974). DCR Archives.

23. Bibliography: Histories of Boston's Metropolitan Water Supply System

The New York City water supply system dates a few years earlier than Boston's. The history of the two systems are intertwined from the 1840s to 1940. Whenever one city was not building a new major component, the other city was, with construction at times overlapping each other. The engineers who designed these systems and managed their construction worked for both Boston/MA and New York City during the course of their careers. Unfortunately, this aspect of history has never been written. While academic and amateur historians have published many books between the early 1970s to 2014 on the New York City water supply history, only two academic books during the same time period have been published for the Boston/Metropolitan system. Both of these books relied heavily on published primary sources rather than on non-published primary sources.[405]

A. Scholarly Books Devoted to 50% or more to the Subject

1983: Fern L. Nesson, *Great Waters: A History of Boston's Water Supply* (Hanover, NH: University Press of New England).

1985: Martha H. Bowers and Jane Carolan, prep., *The Water Supply System of Metropolitan Boston, 1845-1947* (Wellesley, MA: Cultural Resource Group, Louis Berger & Associates, Inc., for the Metropolitan District Commission). A previous edition was published in June 1984 covering the period 1845-1926. These two documents were prepared for the purpose of nominating the water supply system of metropolitan Boston to the National Register of Historic Places as a Thematic Resource Area and a Linear District. The system dating between 1845 and 1926 was designated as such on January 18, 1990. Technically, this is not a book, but a report by a consultant.

1998: Sarah S. Elkind, *Bay Cities and Water Politics: The Battle for Resources in Boston and Oakland* (Lawrence: University of Press of Kansas). This book is an expanded version of Elkind's 1994 Ph.D. dissertation entitled *Regionalism, Politics and the Environment: Metropolitan Public Works in Boston, Massachusetts and Oakland, California, 1840 to 1940 and Beyond* (University of Michigan). Elkind was an interpretive ranger for the MDC Reservations & Historic Sites Division from 1986-1988.

B. Scholarly Books Devoted Partially to the Subject

1948: M. N. Baker, *The Quest for Pure Water: The History of Water Purification from the Earliest Records to the Twentieth Century* (New York: American Water Works Association).

1956: Nelson M. Blake, *Water for the Cities: A History of the Urban Water Supply Problem in the United States* (New York: Syracuse University Press).

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[405] Charles H. Weidner, *Water for a City: A History of New York City's Problem from the Beginning to the Delaware River System* (New Brunswick, N.J.: Rutgers University Press, 1974); Mary Josephine D'Alvia, *The History of the New Croton Dam* (1976); Stanley Greenberg, *Invisible New York: The Hidden Infrastructure of the City* (Baltimore: Johns Hopkins University Press, 1998); Diane Galusha, *Liquid Assets: A History of New York City's Water System* (Fleischmanns, N.Y: Purple Mountain Press, 1999); Christopher R. Tompkins, *The Croton Dams and Aqueduct* [Images of America: New York] (Arcadia Publishing, 2000); Gerald T. Koeppel, *Water for Gotham: A History* (Princeton, N.J.: Princeton University Press, 2000); Stanley Greenberg, *Waterworks: A Photographic Journey through New York's Hidden Water System* (Princeton, N.J.: Princeton Architectural Press, 2003); Alexander R. Thomas, *Gilboa: New York's Quest for Water and the Destruction of a Small Town* (Lanham, Md.: University Press of America, 2005); Kevin Bone, ed., *Water-Works: The Architecture and Engineering of the New York City Water Supply* (New York: Monacelli Press, 2006); *Water: An Underground History of New York* (New York, N.Y.: City University of New York: La Guardia and Wagner Archives, 2008); LaGuardia Community College; David Soll, *Empire of Water: An Environmental and Political History of the New York City Water Supply* (Ithaca: Cornell University Press, 2013)

1972: Barbara Gutmann Rosenkrantz, *Public Health and the State: Changing Views in Massachusetts, 1842-1936* (Cambridge, Mass.: Harvard University Press). Gutmann interweaves the history of water supply, sewerage disposal, sanitation, and public health.

2010: Michael Rawson, *Eden on the Charles: The Making of Boston* (Cambridge, MA: Harvard University Press). Rawson devotes a chapter to the 1820s-1840s politics that lead to the first phase development of the Boston Water Works system (Cochituate system).

2013: Carl Smith, *City Water, City Life: Water and the Infrastructure of Ideas in Urbanizing Philadelphia, Boston, and Chicago* (Chicago: University of Chicago Press). Smith is a Professor of English and American Studies, and professor of history at Northwestern University, Evanston, Illinois. Smith is an historian of Chicago history. Smith devotes a portion of the book to the 1820s-1840s politics that lead to the first phase development of the Boston Water Works system (Cochituate system).

C. Histories Published by the Government

1868: Nathaniel J. Bradlee, *A History of the Introduction of Pure Water into the City of Boston, with a Description of its Cochituate Water Works, etc.*, (published by the City of Boston through the Cochituate Water Board). Bradlee was a member of the Cochituate Water Board in 1868.

1876: Desmond FitzGerald, *History of the Boston Water Works from 1868 to 1876* (published by the City of Boston through the Boston Water Board). FitzGerald was the Superintendent of the Boston Water Board, Western Division in 1876.

1895: Desmond FitzGerald, *A Short Description of the Boston Water-Works 1876* (published by the City of Boston through the Boston Water Board). FitzGerald was the Superintendent of the Boston Water Board, Western Division in 1895.

1900: *Water Supply and Work of the Metropolitan Water District (Boston and Its Vicinity) in the Commonwealth of Massachusetts*. This pamphlet was published by the Metropolitan Water Board for the Board of Paris Exposition Managers for Massachusetts.

D. Descriptive Histories Published by the Government following Major Construction

1848: Boston City Document No. 50 (1848): Celebration of the Introduction of the Water of Cochituate Lake into the City of Boston, October 25, 1848.

1848: *A Description of the Boston Water Works, Embracing all the Reservoirs, Bridges, Gates, Pipe Chambers, and other Objects of Interest, from Lake Cochituate to the City of Boston* (Boston: George R. Holbrook & Co.). Not a government publication.

1865: *Report of the Commissioners and Chief Engineer of the Charlestown Water Works*, February 1865. Mostly written by Chief Engineer Charles L. Stevenson and provides a history of the 1862-1864 construction of the works, also known as the Mystic Works.

1882: Alphonse Fteley, *Boston Water Works: Additional Supply from Sudbury River: Description of the Work* (published by the City of Boston through the Boston Water Board). Fteley was the Resident Engineer of the project.

1940: October 23: *A General Description of the Water Supply of the Boston Metropolitan District and the Work of the Massachusetts Metropolitan District Water Supply Commission in Extending the Sources of Supply and Improving the Methods of Distribution* (published on the occasion of the opening of the Commission's New Pressure Aqueduct into Norumbega Reservoir, Weston).

E. Chronological Tables Published by the Government

1901: *Sixth Annual Report of the Metropolitan Water Board*, Appendix 1 ("Statement of Important Events in the Construction and Operation of the Metropolitan Water Works to January 1, 1901") (Boston: Wright & Potter, 1901): 194-195.

1909: *Ninth Annual Report of the Metropolitan Water and Sewerage Board*, Appendix 1 ("Statement of Important Events in the Construction and Operation of the Metropolitan Water Works to January 1, 1910") (Boston: Wright & Potter, 1910): 182-185.

1956: Frederic I. Winslow, comp., *Chronological Table of Boston Water Works* (Boston: City of Boston, Administrative Services Department). This pamphlet describes the history from 1652-1912. Likely this pamphlet was published posthumously since Winslow died in 1924. From 1883-1916, Winslow worked for the City of Boston, Engineer's Office in the Water Department, and from 1919-1924 worked for the MDC, Water Division.

F. Histories Devoted Partially to the Subject

1912: *State Board of Health of Massachusetts: A Brief History of its Organization and its Work, 1869-1912* (Boston: Wright & Potter).

1917: George Chandler Whipple, *State Sanitation: A Review of the Work of the Massachusetts State Board of Health*, Vol. 1 (Cambridge, Mass.: Harvard University Press). Whipple was Professor of Sanitary Engineering jointly at Harvard University and MIT in 1917. Between 1890 and 1898, Whipple directed the Biological Laboratory of the Boston Water Board. The history of the water works is interweaved with the history of sewerage disposal, sanitation, and public health.

G. Dissertations, Theses, and other Research Papers (list not complete)

1989: Jill Lepore, "Resistance, Reform, and Repression: Italian Immigrant Laborers in Clinton, Massachusetts, 1896-1906" (Wellesley College). Available at the Worcester Public Library. The Clinton Historical Society holds a copy of a research paper by Lepore of the same title. The paper was submitted to her Harvard University history course on May 17, 1989; it is 69 pages. Published under same title, in *Labor in Massachusetts: Selected Essays*, edited by Kenneth Fones-Wolf and Martin Kaufman (Westfield, MA: Institute for Massachusetts Studies, Westfield State College, 1990), pp. 138-167.

H. Articles

Note: Dozens of articles pertaining to specific engineering design, construction and operations of the metropolitan Boston water supply system throughout the 19th and 20th century are located in the *Transactions of the American Society of Civil Engineers* (est. 1872), *Proceedings of the American Society of Civil Engineers*, *Journal of the Association of Engineering Societies* (1881-1915), *Journal of the Boston Society of Civil Engineers* (est. 1914), *Proceedings of the American Water Works Association*, *Journal of the American Water Works Association* (est. 1914), *Journal of the*

New England Water Works Association (est. 1886), *Technology Quarterly* (1887-1908), and many other periodicals. Complementing the articles are the obituary memoirs published in the above journals of engineers who designed, constructed and operated the works. The following list of articles are those that provide a description of the entire works.

1859: "The Cochituate Water-Works," *Ballou's Pictorial Drawing-Room Companion* 16 (May 14, 1859): 312-313.

1878: Jno. W. Weston, *Description of the Boston Water Works* (Chicago: Engineering News). Few printings of this 62-page pamphlet likely are extant today. I located one at the Boston Public Library, Research Library; it is in a very brittle condition. It was published as a separate title by *Engineering News*, and was published serially in 16 parts in *Engineering News*, Vol. 5 (1878): "Water Supply of American Cities: Boston," January 3, pp. 4-5; Jan. 10, 12-13; Jan. 17, 21-22; Jan. 24, 28-29; Jan. 31, 37-38; February 14, 52; Feb. 21, 61-62; March 7, 78; Mar. 21, 95-96; Mar. 28, 102-103; April 4, 111-112; Apr. 11, 117-120; Apr. 18, 125-128; Apr. 25, 134-136; May 16, 160; and May 23, 167. Weston, a civil engineer, was a Special Correspondent for *Engineering News*.

1881: J. James R. Croes, "The History and Statistics of American Water-Works, Part 5: Boston," *Engineering News* 8 (April 2; April 9, 1881): 131-133; 141-142.

1882: Henry J. Barnes, "The Water Supply of Boston," *Boston Medical and Surgical Journal*, Vol. 106 (January 26, 1882): pp. 78-81.

1886: "Municipal Engineering, Paper No. 1: Boston, Massachusetts," *Engineering News* 15 (January 16 - April 3, 1886): 38-39, 41, 51-52, 67-69, 83-85, 102-103, 114-116, 131-134, 146-148, 162-164, 177-179, 193-194, 209-210. Serialized in 12 weekly parts, this article describes the public works functions of the City of Boston, including the Water Works (pp. 67-69, 83-85, 102-103, 114-116). There is a valuable description of the office of City Architect and the Supervisor of Public Buildings, the latter which issued the building contracts (pp. 209-210).

1889: John A. Gould, Jr., "High-Service System of the Boston Water-Works," *Journal of the Association of Engineering Societies* 8 (September 1889): 451-466.

1896: Fletcher Osgood, "How Boston Gets Its Water," *New England Magazine*, New Series, 14 (June 1896): 388-409.

1906: Dexter Brackett, "Metropolitan Water Works" *Proceedings of the American Water Works Association* (1906): 488-547. Bracket was the MWW Distribution Department Engineer in 1906.

1917: Moses W. Mann, "Medford's Disused Subway," *Medford Historical Register* 20 (January 1917): 1-5; and Moses W. Mann, "The Mystic Water-Works," *Medford Historical Register* 20 (April-July 1917): 21-30.

1924: "Massachusetts Acts and Resolves Relating to Water Supply," *Journal of the New England Water Works Association* 38 (December 1924): 364-439.

1927: John L. Howard, "How Boston and Suburbs Get Their Water," *Water Works Engineering* [formerly *Fire and Water Engineering*] 80 (September 14, 1927): 1327-28, 1362. In 1927, Howard was Deputy Chief Engineer of the MDC Water Division.

1932: Frank A. McInnes, "The Boston Water Supply," *Journal of the New England Water Works Association* 46 (March 1932): 8-23. Written for the 50th Anniversary of the NEWWA. McInnes was a consulting engineer in Boston in 1932.

1934: Karl R. Kennison, "Boston Metropolitan Water Supply Extension," *Journal of the New England Water Works Association* 48 (June 1934): 147-250. Pages 239-250 includes technical history of the Cochituate, Sudbury, Wachusett, and Distribution systems. Kennsion was Designing Engineer and Principal Assistant to the MDWSC Chief Engineer in 1934.

1946: Karl R. Kennison, "Water Supply Developments in Boston, Massachusetts and Recent Additions to the Works," *Journal of the New England Water Works Association* 60 (September 1946): 294-325. Reprinted from the *Transactions of the Institution of Water Engineers* [London] 50 (1945). Kennison was Chief Engineer of the Metropolitan District Water Supply Commission in 1945.

1948: Eugene C. Hultman, "History of Boston's Water Supply, 1652-1940," *Proceedings of The Bostonian Society* (1948): 41-51. Hultman was MDC Commissioner from 1934-1945.

1949: James J. Matera, "One Hundred Years of Public Water Supply for Boston," *Journal of the New England Water Works Association* 63 (June 1949): 150-164. Written for the 100th Anniversary of the Boston/Metropolitan Water Supply System. Matera was Superintendent of the MDC, Water Division, Wachusett Section in 1949.

1950: George W. Coffin, "Boston Metropolitan District," *Journal of the American Water Works Association*, 42, No. 9 (September 1950): 818-823. Engineer George W. Coffin (1897-1967), was associated with the Boston firm Coffin & Richardson.

1962: "Seventy-Five Years of Environmental Sanitation: A Brief History of the Division of Sanitary Engineering. 1886 to 1961," *Sanitalk* [Division of Sanitary Engineering, Massachusetts Department of Public Health], Vol. 10, No. 2 (1962); 16 pages. This article acknowledges the roll the engineering force of the public health government function played in planning the MWW System, and Quabbin System. Their role is less well-known, with only the 1895 (1893-1895) and 1922 (1919-1922) study reports that survive; their planning documents do not survive.

1964: "The Rise of Water Works in New England: Joint Discussion," *Journal of the New England Water Works Association* 78 (September 1964): 183-219. Discusses the engineers who designed and built water works systems.

1977: James J. Matera, "Two Centuries of Water Supply Planning and Development for Metropolitan Boston," *Journal of the New England Water Works Association* 91 (September 1977): 218-236. Matera was MDC, Water Division Chief Engineer in 1977, and Vice President of the NEWWA (1976-1977).

1982: *Journal of the New England Water Works Association* 96 (September 1982). Published for the 100th Anniversary of the NEWWA.

1983: James J. Matera, "Our Past—Metropolitan Boston: An Inspiration for the Future," *Journal of the New England Water Works Association* 97 (December 1983): 344-368. Written for the 100th Anniversary of the NEWWA. Matera was retired from the MDC in 1983, and an Editor for the Journal of the NEWWA.

1984: Mark L. Primack, "Technological Conception of Boston's First Water Supply, 1835-1848," *Journal of the New England Water Works Association* 98 (June 1984): 148-173. Primack was

employed by the MDC Reservations and Historic Sites Division from 1984-1986. Primack also researched and wrote three unpublished papers entitled, "The Architecture and Development of the Boston and Metropolitan Water Works, 1825-1900: A Bibliographic Essay"; "Engineering Structures and Engineers of the Boston and Metropolitan Water Works: A Bibliographic Essay"; and "Conflict on the Concord and Sudbury: Meadow-owners vs. Millers vs. Water Works vs. Canal Proprietors" (all ca. 1984). Primack also authored a photographic essay from his own photographs, entitled "Water Works: The Architecture and Development of the Boston and Metropolitan Water Works, 1846-1900" (University of Massachusetts, Boston, Healey Library, January-March 1984).

1986: William A. Brutsch, "The Historical Development of Boston's Water Supply System," in *Boston's Water Resource Development: Past, Present, and Future* (Proceedings of a session by the Boston Society of Civil Engineers Section in conjunction with the American Society of Civil Engineers National Convention, October 29, 1986), edited by Jonathan A. French (New York: American Society of Civil Engineers, 1986), 1-9. Brutsch was the Chief Engineer of the WaterWorks Division of the Massachusetts Water Resources Authority in 1986.

1996: John F. Shawcross, "Metropolitan Boston Water System Technical History," *Journal of the New England Water Works Association* 110 (June 1996): 106-122. Written for the 100th Anniversary of the Metropolitan Water Works. Shawcross was Director of Capital Engineering and Construction for the MWRA Waterworks Division in 1996.

2004: Michael Rawson, "The Nature of Water Reform and the Antebellum Crusade for Municipal Water in Boston," *Environmental History* 9 (July 2004): 411-435.At the time, Michael Rawson was a doctoral candidate in American history at the University of Wisconsin-Madison. This article pertains to the water debate of the 1830s and 1840s.

I. Miscellaneous

1881: Justin Winsor, ed., *The Memorial History of Boston*, Vol. 3 (4 Vols.) (Boston: Ticknor & Co.), pp. 238-256.

1888: M. N. Baker, ed., *The Manual of American Water-Works* (New York: Engineering News). Additional editions were published in 1890, 1891 and 1897.

1923: John Koren, *Boston, 1822-1922: The Story of Its Government and Principal Activities During One Hundred Years* (Boston: City of Boston, Printing Department), pp. 94-101.

1932: *Description of the Metropolitan Water Works, 1846-1932* (Boston: MDC, The Office Window, 1932). This pamphlet includes an article by William E. Foss, MDC, Water Division Chief Engineer, and one by Frank E. Winsor, Metropolitan District Water Supply Commission Chief Engineer. *The Office Window* was a monthly employee magazine and this pamphlet was published as a separate title by them.
http://archive.org/details/descriptionofmet00mass
http://archive.org/stream/descriptionofmet00mass#page/n1/mode/2up

1932: Charles M. Spofford, "Engineers and Engineering in Boston," In *Fifty Years of Boston: A Memorial Volume Issued in Commemoration of the Tercentenary of 1930*, edited by Elisabeth M. Herlihy (Boston, 1932), pp. 435-448.

1946: Katherine McNamara, comp., *The Boston Metropolitan District: Its Physical Growth and Governmental Developments: A Bibliography* (Cambridge, Mass.: Harvard Graduate School of Design, June 1946).

1949: Harold J. Toole, *The Water Supply System of the Metropolitan District Commission* (May 19, 1949). This 4-page circular providing a general description was prepared for the general public. It was revised in February 1964 (7 pages) and September 1976 (6 pages). Both the 1949 and 1964 editions were written by Toole, MDC, Water Division Chief Engineer. The 1976 edition was prepared by Chief Engineer James J. Matera and Assistant Director Francis D. Faucher.

1972: *Final Report: Analysis of the Regulation, Organization and Operations of a Regional Water Management Institution Founded in 1846* (prepared by Harbridge House, Inc., Boston, November 1972). In September 1972, the Harbridge House, Inc. published the *Management Handbook for the Water Division, Metropolitan District Commission*.

1974: *Metropolitan District Commission: Metropolitan Water System.* The MDC published 3 editions of a metropolitan water supply system map which also provided a brief history: March 1974; June 1976; and one dated in the early 1980s. In 198?, the MWRA published a new edition of this system map under a similar title (*Water System*).

1975: *Metropolitan District Commission: Report on Metropolitan Water Transmission and Distribution System*, December 1975 (Boston: Camp, Dresser & McKee, Inc.). While not descriptive of the entire water supply system, this report prepared for the MDC provides an excellent explanation of the Distribution System.

1980: *Abandoned or Reserve Water Supplies: Metropolitan District Commission Service Area* (Coffin & Richardson, Inc. for Department of the Army, New England Division, Corps of Engineers, February 1980).

1981: Neil J. Savage, *The Water and Sewer Works of the City of Boston, 1630-1978* (Boston: prepared for the Boston Water and Sewer Commission, July 1981). Typescript of 207 pages available from the Boston Water and Sewer Commission, Community Affairs Office.

1984: *Metropolitan District Commission, Water Supply Study and Environmental Impact Report—2020, Task 18.20: A History of the Development of the Metropolitan District Commission Water Supply System* (Wallace, Floyd, Associates, Inc., for the Metropolitan District Commission, September 1984).

1989: Report, *Chestnut Hill Reservoir and Pump Stations* (Boston Landmarks Commission, September 26, 1989).

1999: *Pocket Pal: A Compendium of Facts, Figures, Facilities, Science, Statistics, Schedules, Targets, Timelines and Terminology of MWRA*, 2nd ed. (Boston: Massachusetts Water Resources Authority, 1999). First edition was published in June 1996.

J. Quabbin Reservoir

1929: Roland D. Sawyer, *Two Decades in Ware* (Ware, MA). Includes a chapter on the "water fight."

1940: Evelina Gustafson, *Ghost Towns 'Neath Quabbin Reservoir* (Boston: Amity Press).

1946: Walter E. Clark, *Quabbin Reservoir: Memories of Conditions that Existed in the Swift and Ware River Valley while Quabbin Reservoir was being Developed* (New York, N.Y.: Hobson Press). A 50th Anniversary Edition was published in 1994, with a new introduction by J. R. Greene (Athol, MA: Athol Press).

1951: Donald W. Howe, comp., and Roger Nye Lincoln, ed., *Quabbin: The Lost Valley* (Ware, MA: Quabbin Book House). Reprinted in 1992.

1961: John H. Conkey and Dorothy D. Conkey, "History of Ware, MA, 1911-1960.

1967: "Quabbin Facts" (Greenfield, MA: Connecticut River Watershed Council).

1968: Leslie Haskins, *Abundant Action* (Framingham, MA). Includes "water fight."

1975: J. R. Greene, *An Atlas of the Quabbin Valley, Past and Present* (Athol, MA: Transcript Press). A Revised Edition was published in 1983. Adapted into *An Atlas of the Quabbin Valley and Ware River Diversion* (see 1989).

1981: Thomas Conuel, *Quabbin: The Accidental Wilderness* (Lincoln, MA: Massachusetts Audubon Society). A Revised Edition was published in 1990 (Amherst: University of Massachusetts Press).

1981: J. R. Greene, *The Creation of Quabbin Reservoir: The Death of the Swift River Valley* (Athol, MA: Transcript Press). A 2nd Edition was published in 1987.

1981: *The Old Quabbin Valley* (Northampton, MA: Florentine Films). Film documentarian Lawrence R. Hott produced, directed and wrote this one hour film that chronicles both the Quabbin Reservoir history and the public policy issues pertaining to the Northfield Mountain plan.

1983: J. R. Greene, *An Atlas of the Ware River Diversion* (Athol, MA: Transcript Press). Adapted into *An Atlas of the Quabbin Valley and Ware River Diversion* (see 1989).

1985: J. R. Greene, *The Day Four Quabbin Towns Died* (Athol, MA: Transcript Press).

1986: Joseph William Russell, *Vestiges of the Lost Valley: Buildings and Bells from the Quabbin: A Pictorial Record* (Monson, MA: Blatchley's Printers). Russell is an employee of the MDC, Division of Watershed Management, Quabbin Section.

1987: Joseph William Russell, *A Place Called Quabbin* (Monson, MA: Blatchley's Printers).

1988: Joseph William Russell, *A Quabbin Chronicle: 1900-1988* (Monson, MA: Blatchley's Printers).

1989: J. R. Greene, *An Atlas of the Quabbin Valley and Ware River Diversion* (Athol, Mass.: Transcript Press).

1989: *Quabbin Park and Reservation: Many Waters . . . Many Uses* (Friends of Quabbin, Inc.).

1991: *Quabbin Facts and Figures* (Friends of Quabbin and MDC Quabbin Section).

1991: *Letters From Quabbin: The Springfield Union, April 14, 1938-July 19, 1938* (Belchertown, MA: Friends of Quabbin, Inc.).

1991: J. R. Greene, *The Other Lost Valley: An Album of the Villages Lost to the Ware River Diversion* (Athol, MA: Transcript Press).

1992: Jane Yolen, *Letting Swift River Go* (Boston: Little, Brown). A children's book.

1992: J. R. Greene, *A Bibliography of Quabbin Valley history* (Athol, MA: J. R. Greene). Very comprehensive.

1994: J. R. Greene, *Historic Quabbin Hikes* (Athol, MA: Highland Press).

1996: J. R. Greene, *An Atlas of the Quabbin Valley and Ware River Diversion*, 20th Anniv. Ed. (Athol, Mass.: J & P Printing Co.).

1996: *Quabbin Park Trail Guide* (MDC, Division of Watershed Management, Quabbin Section).

2000/01: Gail Thomas, *No Simple Wilderness: An Elegy for Swift River Valley* (Athol, MA: Haley's)

2001: Terry Tyler, ed. *Quabbin to Dorset* (Dorset, Vt.: Dorset Historical Society). The story of a contractor who moved some of the homes from the Quabbin Valley to Dorset, Vermont.

2001: Ed Klekowski, *Under Quabbin*. Professor Ed Klekowski, Department of Biology, University of Massachusetts Amherst, explores the underwater history of the Quabbin Reservoir.

2001: Ed Klekowski, *Under Quabbin*. Professor Ed Klekowski, Department of Biology, University of Massachusetts Amherst, explores the underwater history of the Quabbin Reservoir.

2001: Stephen King, *Dreamcatcher: a novel* (New York: Scribner).

2002: Michael Tougias, *Quabbin: A History and Explorers Guide* (Yarmouth Port, MA: On Cape Publications).

2002: Jackie French Koller, *Someday: a novel* (New York: Orchard Books). A children's book.

2002: William F. Weld, *Stillwater: a novel* (New York: Simon & Schuster).

2003: Elizabeth Peirce, *The Lost Towns of the Quabbin Valley* (Arcadia Publishing)

2005: Sean Cole, *Haunting the Quabbin: Inside Out* (WBUR Radio Documentary)

2005/2006: David J. McLaughlin and Laren Bright, *Pathways to the Past: Around the Quabbin: Where Nature Flourishes and History Comes to Life* (Scottsdale, AZ: Pentacle Press)

2006: Elizabeth Peirce, *Quabbin Valley: People and Places* (Arcadia Publishing)

2010: J. R. Greene, *From Valley to Quabbin: 1938-1946* (Athol, MA: Athol Press).

2011: Dorothy Johnson, *A Swift River Anthology* (Athol, MA: Haley's); fiction

2012: Maryanne O'Hara, *Cascade: A Novel* (Viking/Penguin); a novel based on Enfield/Quabbin, 1930s

2014: Dianne Benson Davis, *Eagle One: Raising Bald Eagles, A Wildlife Memoir* (Worcester, MA: Chandler House Press); In 1982, the Massachusetts Bald Eagle Restoration Project was begun using the technique of taking eaglets from wild nests and transferring them to nesting platforms where they were raised by human caretakers in an effort to re-establish breeding pairs in areas that had seen the eagle population decimated. Davis spent the summer of 1985 alone in the wilderness area of the Quabbin Reservoir raising eight baby eagles.

2014: J.R. Greene, *B.V. Brooks' Pre - Quabbin Art, Photos & Postcards* (Highland Press)

2014: Helen R. Haddad, *The Taking: Before They Flooded the Quabbin; A Novel* (Levellers Press)

2014: Elizabeth Peirce, *Quabbin Valley: Life As It Was* (Arcadia Publishing)

24. Method of In-House, Non-Chemical Cleaning of Dry Plate Glass Photonegatives: For Plates Without Condition Problems

A Word of Caution

This cleaning methodology is for dry plate glass negatives only. It is not to be used for wet collodion plate glass negatives. Consult the bibliography below and other books pertaining to identifying 19th century photographic processes to determine the difference between wet and dry plates (there are many excellent books, some of which are available at your public library and at the local college/university library). It is also good archival management policy to consult with professional photographic conservators with your questions. This methodology limits its coverage to the non-emulsion side. For conservation of the emulsion side, consult a photographic conservator.

Methodology

After consulting the professional archival literature (see bibliography below), during the 1990s, the MDC Archives designed a non-chemical method to clean the glass-side (non-emulsion side) of dry plate negatives.

Archival Supplies:	**Non-Archival Supplies:**
blotting paper	rotary cutter
No. 1 extra soft pencil	cutting mat
gummed linen tape	straight edge (long)
natural hair brush	distilled water
dusting brush	100% pure cotton balls
lint-free photowipes	small plastic cup for distilled water
cotton gloves	mid-size Pyrex dish to hold small cup of water
4-flap enclosures	plastic container for new cotton balls
clamshell box (aka hinged-lid)	plastic plate for used cotton balls
archival corrugated board (lining for box)	X-Acto knife
Coroplast sheets or archival corrugated board (1/8“) (spacers between every 10 plates)	
Velcro (with ph neutral adhesive)	
bone folder	
small spatula	
Mars Plastic eraser	

Preparation

For each size glass plate, cut a window mat. Cut a section out from the middle of a sheet of blotting paper to the dimensions of the plate, plus an additional 1/16th inch per side. This is done by laying a sheet of blotting paper on a cutting mat. Place a dry plate negative in the middle of the sheet of blotting paper and, using a No. 1 extra soft pencil, trace the outline of the plate on the blotting paper. Remove the glass plate. Using a rotary cutter and a straight edge, cut only along the pencil lines at 1/16” from the outside of the line.

Using gummed linen tape (to prevent the edges from getting water-logged and shredding), cut 4 pieces to line the inner 4 sides of the window mat. Moisten the tape using a moistened sponge and wrap around all 4 inner sides. Place this blotting paper window mat on top of 2-3 sheets of blotting paper.[406]

Wash hands to remove glue (from above step) and oils.

Cleaning

Put on white cotton gloves.

[406] If there are dozens of people undertaking this cleaning method during a ‘Cleaning and Rehousing Day’, then the construction of the blotting paper window mats could be created prior to the designated day. In this way, more time is available for glass plate cleaning.

Place the glass plate, with the emulsion side down, inside the cutout. In this way, the plate will not slide from the blotting paper.

Inspect plate for any ink on non-emulsion side of the plate. The ink or markings on the non-emulsion side could be in the form of a negative number or a written description. The ink or marking may be water soluble. If so, this area should not be cleaned.

Inspect plate for any hairline cracks or major cracks. The area around any cracks should not be cleaned either because moisture from the moistened cotton ball could seep through the crack and come in contact with the emulsion.

Remove cotton glove from one hand, and with the gloved hand place the forefinger and thumb along the edge of the plate to hold it in position.

With a cotton ball in the gloveless hand, take the cotton ball and dip it into the cup of distilled water. While over the water but no longer in it, squeeze the cotton ball; this will remove any excess water and will also moisten the entire ball.

Staying ¼" from the edges of the plate, apply with some pressure the moistened cotton ball to the plate in a circular motion. This step may have to be repeated with a new cotton ball depending on the amount of dirt on the surface of the plate. Then proceed to very carefully apply moistened cotton ball along the closer edge areas along all four sides, staying 1/8" from the edges. Place all used cotton balls onto the plastic plate. With gloveless hand, immediately dry surface of the plate with the photowipe.

Using the natural hair brush, brush any lint off the just cleaned and dried plate surface.

Remove the window mat.

Put 2nd cotton glove back on hand.

Regularly use dusting brush to brush blotting paper work surfaces.

Rehousing

Resleeve in a 4-flap enclosure. Here, place the 4-flap enclosure in a landscape orientation. With the emulsion-side facing down, place the plate on the enclosure. Fold bottom flap first, and then left followed by right, with top flap folded last.

With top flap facing you and down, place plate in a lined (using archival corrugated board) clamshell box or a Coroplast box using only the translucent archival type.

Cleaning and Rehousing Day using Volunteers

This methodology can be utilized by professional archivists, non-professional archivists and volunteers. The most important thing to remember is that if you are supervising a group of people using this methodology, you should first experience the work yourself. Other recommendations include the following.

Whether you are supervising a few people or if there are dozens of people undertaking this cleaning method during a 'Cleaning and Rehousing Day', then the construction of the blotting paper window mats should be created prior to the designated day. In this way, more time is available for glass plate cleaning.

Gathering around a table, slowly demonstrate the cleaning and rehousing steps. Back at their own tables, walk the volunteers slowly through the steps, carefully watching them. Repeat the walk-through a second or third time if necessary.

Place a simplified version of the directions on table stands in front of the volunteers.[407]

Can work in pairs with one person cleaning and rehousing, and the other person folding 4-flap enclosures. Then encourage the pair to switch roles.

As supervisor, you control the archival supply inventory, making it necessary for the volunteers to ask you to replenish their supplies.

All broken plates should be forwarded to the supervisor without being worked on by the volunteers. The supervisor should clean and rehouse broken plates.

If the group of volunteers is larger than a dozen, train additional people to supervise.

Insure the work is being performed correctly and uniformly. Make the volunteers correct their own mistakes.

Do not permit the volunteers to carry the plates beyond their workspace. The supervisor should come to the volunteer, not vice versa.

Do not permit the photowipes to get too dirty; use fresh photowipes.

Take photographs of the work.

Do not permit food, drink or smoking in the work area. Insist on hand washing before beginning the work and after food breaks.

Be organized; be organized; be organized.

Additional Recommendations

Folding the doubled scored 4-flap enclosures is made easier by inserting an appropriately sized archival corrugated board (1/16" or 1/8" thickness) onto which the flaps can be folded over and the scores creased by hand or by using a bone folder.

Design your own box size to ensure plates are standing on their long side. Also, box base should be wide enough to ensure it does not tip over.

A less expensive, but more labor intensive, option lines negative/print storage boxes (clamshell/hinged lid type) on all five sides with either Coroplast sheets or archival corrugated board (1/8" thickness). Velcro (with ph neutral adhesive) should be used to attach the sheets/board to the inside walls of the box. Coroplast sheets or corrugated board would then be used as the dividers after every 10 plates.

For Coroplast sheets, use the translucent archival type. Never use the white version because the white is an additive dye.

[407] Self-Stick Easel backs are manufactured by Lineco, Inc. (a division of University Products); www.lineco.com.

Transcribe all information from original enclosures to the new 4-flap and enclose this information between quotes to distinguish it from information that you will likely add to the original information. Only use a No. 1 extra soft pencil.

Use a Mars Plastic Eraser (Staedtler) to erase pencil errors. These are available from some archival supply companies and from art supply and stationary stores. Remove the eraser head from the No. 1 extra soft pencil to prevent its use.

Prior to the decline of traditional film developing photography, the most common lint-free (dry) photowipe on the market was entitled Premier Professional Photowipes made by TIDI, Uni/Disco, Inc. (Troy, Michigan). This product was available from archival supply companies and photography stores. Never use photowipes sold under the name PEC-12, made by Photographic Solutions Inc. Never use any PEC-12 product or other chemical solutions on glass plate negatives.

Use only white 100% cotton gloves. Do not use any other material and do not use ‘sure-grip’ gloves; the latter leaves marks on dry plate negatives. Gloves can be washed in warm/cold water, gentle cycle, using mild detergent. Never use bleach or color-safe bleach. Not all of the dirty stains will be removed; this is okay.

Wrap Polyester UV Filter sleeves around fluorescent tubes in light tables. These are available from archival supply companies.

Avoid holding dry plate negatives in mid-air or over your head. Keep the negatives no more than a few inches above the work surface, and use a light table to view them. Dry plate negatives should be kept in their 4-flap enclosures when viewed on a light table. Any plain white piece of paper can also be used to view dry plate negatives in the absence of a light table.

When removing dry plate negatives from their non-archival enclosures, it is good practice to place the enclosed negative flat on the work surface and slit the sides of the enclosure using a small spatula (a tool available from archival supply companies). This way, if the negative is broken, the pieces will not fall and break further.

25. Method of In-House, Non-Chemical Cleaning of Dry Plate Glass Photonegatives: What to do with Plates with Condition Problems

As a result of its format, dry plate negatives can exhibit many different types of conditions. A plate may be cracked, broken into multiple pieces (with all or some pieces extant), broken but with missing pieces (i.e. significant, insignificant, chipped), have flaking emulsion, have paper adhered to the emulsion, have a masking of paper or paint on either side of the plate, have two or more plates adhered to each other, or have any combination of these conditions. It is wise to create a condition survey form to track these conditions.

Flaking Emulsion

If the emulsion is flaking, there are two storage options, depending on the quantity of plates exhibiting this condition, funds for archival supplies and storage space concerns: vertical in a box (Coroplast or clamshell), or flat in a drop-front box. The vertical option may cause an increase in flaking over time due to the nature of gravity. On the other hand, large quantities stored flat in a drop-front box presents labor and storage space issues (see below).

Multiple Plates Adhered Together

If two or more plates are adhered together, consult a professional photographic conservator. Do not attempt to pry them apart yourself.

Masking

It is common to find plates that have a part of the image masked with paper and/or paint on either the emulsion side and/or on the non-emulsion side. It is imperative that you do not attempt to remove the masking on the emulsion side. It is common for the paper masking on the non-emulsion side to be adhered to the glass by glue. Do not attempt to remove the paper masking. If the masking on the non-emulsion side is paint, consult a photographic archivist or conservator to determine if it is wise to remove the paint (if water soluble). It may be necessary to maintain the masking in order to preserve the photographer's intent of the photographic print from the masked negative. Each situation warrants careful decision making prior to any action.

Processing Residues

It is common that on the non-emulsion side, there are residues (i.e. silver) remaining from the original processing. Whatever cannot be removed with the distilled water/cotton ball cleaning methodology is not for you to remove. Any further cleaning should be conducted by a professional photographic conservator.

Paper Adhesion to Emulsion

If the plate has any of its original paper envelope (or subsequent enclosure) adhering to the emulsion, do not attempt to remove the paper. Only paper that is not adhered to the emulsion should be removed. Only a professional photographic conservator should remove any material that is adhered to the emulsion.

What to do with the Original Paper Enclosure

If the original paper enclosure contains extensive information, one may want to photocopy on archival paper this enclosure. For specific collections that exhibit a consistent pattern of how the original envelope was identified, it is wise to photocopy on archival paper samples of these envelopes as evidence on how the collection was originally identified. It is good practice to photocopy onto archival paper and discard the original envelope rather than keep the original envelope. Each situation is unique though and careful judgment should be used. Never immediately discard the original envelope following the archival cleaning and rehousing of dry plate negatives without first analyzing the future uses of the information contained on it. When transcribing information to the 4-flap enclosure, you will need to distinguish between the original information and any new identifying information that is added to the original identification. This could be accomplished by simply noting what information is 'original' or by bracketing the original information with quotation marks.

Cracked

If the plate is cracked, there are two storage options depending on the quantity of plates exhibiting this condition, the severity of the crack, funds for archival supplies and storage space concerns: vertical in a box (Coroplast or clamshell), or flat in a drop-front box. However, if the plate is severely cracked (i.e. nearly broken into multiple pieces), flat storage is a preferred option. A crack on a severely cracked plate is usually broken and seen on both sides of the glass. A non-severe crack is when the glass is broken and can be seen and felt only on one side. Large quantities stored flat in a drop-front box presents labor and storage space issues (see below).

Broken but with Missing Pieces (insignificant)
Insignificant missing pieces from broken plates are either in the form of chips or missing corners without the loss of significant image information. No action is needed except to make note of this condition.

Broken but with Missing Pieces (significant)
Significant missing pieces from broken plates include situations in which there is a significant loss of image information. The pieces from plates meeting this condition are no longer extant. Since plates should be housed along their long side, any significant loss of glass along the bottom and the two sides should be plugged with archival corrugated board of equal thickness of the plate (1/16" or 1/8"). A plug is made by taking a piece of corrugated board representing the same size as the original plate (without broken missing pieces). Place the plate with the significant broken missing piece over the board, lining up the intact corners together. With a No. 1 soft pencil, trace along the broken edge. Remove the plate from the board. Place the board on top of a cutting mat. With a combination of a rotary cutter and an X-Acto knife, cut the board along the pencil line. You should have 2 pieces of board: one that represents the exact dimensions of the existing plate and one that represents the broken missing piece. Together, the 2 pieces should represent the same size as an intact plate. Place the plate with the plug in a 4-flap enclosure of the same size of the plate.

If the significant broken missing piece is along the top and/or top two corners, adhere the plug to the 4-flap enclosure with archival double-coated film tape (3M #415). This will prevent the plug from falling down between the plate and the inside of the 4-flap enclosure.

The MDC Archives had experimented with using a red pigma brush pen (archival supply vendors) to write on the 4-flap enclosure (top most flap) at the location of the plug that there is a "broken piece plug here." If no plug was made for the missing piece, then it is written that there is a "broken missing piece here."

Broken with Multiple Pieces Extant
Dry plate negatives with broken multiple pieces extant must be housed flat. There are three rehousing methods for broken dry plate negatives that each represent a different level of time and money.

For two methods, the first few steps are the same. Determine the original size of the plate (4"x5"; 5"x7"; 6.5"x8.5"), then use a 4-flap enclosure of the next size up. Cut an archival corrugated board of same thickness as plate (1/16" or 1/8") to the increased dimension. For example, for 6.5"x8.5" size broken plates, use a 8"x10" 4-flap and a 8"x10" corrugated board. Say for example you have a 6.5"x8.5" plate in 4 pieces and each of these pieces includes a corner. Line each corner piece on top of the corrugated board at the board's 4 corners. The uncovered board should be in the form of a "+" sign. This uncovered area represents the plug (aka a spacer) to prevent the pieces of glass from rubbing against each other (if they rub together, it will produce shards of glass and flaking emulsion).

Using a No. 1 soft pencil, trace the outline of the 4 pieces of glass on the board. Remove the glass pieces from the board. Place the board on a cutting mat. Using a rotary cutter and an X-Acto knife, cut along the pencil line only, ensuring that the plug is a single piece of board. The combined plug and the 4 pieces of glass should be of equal size to the new dimension (8"x10" in this example). Place items in the 4-flap enclosure.

Here is where the two methods are different.

The least expensive and least time consuming method adds Coroplast sheets (or 1/8“ or ¼“ archival corrugated board) and drop-front boxes. In this method, it is important that the 2 pieces sandwiching the 4-flap enclosure be of the same size as the inside dimension of the box. If, for example, you have 4”x5” broken plates in 5”x7” enclosures in 8”x10” boxes, then the 2 boards should be 8”x10”. In this case, center the 4-flap enclosure on the bottom sheet. Along the two long sides, cut pieces of sheet/board to fill the gap between the edge of the 4-flap and the edge of the bottom sheet (leaving about 1/16” or 1/8” between the 4-flap enclosure and each piece). This step is recommended because the broken plate in its 4-flap enclosure can be slid out onto a flat surface rather than lifted out. Attach the pieces to the bottom board using double-coated (3M #415) tape. Only tape the pieces to the bottom board. Place the second sheet, cut to the same size as the base, on top to sandwich the plate and its 4-flap enclosure. Place the rehousing unit in a drop-front box. In a 3” deep box, place no more than 6 sandwiched plates. In this method, the broken glass plate negative can be viewed on a light table without removing it from its stabilizing unit.

The more elaborate second method is a sink mat housing unit. Here, 4 ply 100% Rag buffered board is used to create a sink mat. A single sheet is used as a base. Multiple layers of strips of board are placed around the dry plate negative (enclosed in a 4-flap enclosure) using the alternating layering method until it is raised slightly above the 4-flap enclosed plate (see NEDCC Technical Leaflets 4-10 and 6-6, 1999 ed.). These strips are glued together with ph neutral adhesive (PVA). A single sheet (of plate size) is glued onto the center of the underside of the cover (same size as base) and the cover placed on top. Sandwich the unit with either Coroplast sheets or archival corrugated board (1/8“ or ¼“ thickness) cut to same size as base/cover. The sink mat housing unit is placed in a drop-front box, with no more than 5 units per 3” deep box.

The third method is best described by the Conservation Center for Art and Historic Artifacts (Philadelphia, PA) recommending an elaborate sink mat housing that is described in *Storage of Natural History Collections: Ideas and Practical Solutions*, ed. by Carolyn L. Rose and Amparo R. de Torres (Pittsburgh, Pa.: Society for the Preservation of Natural History Collections, 1992, pp. 155-156). In practice, the small loose spacers as detailed by the CCAHA do not stay in position. In addition, the use of Plexiglas adds significant weight to the rehousing unit.

An advantage of the first method compared to the other two is the ability to view the broken glass plate negative on a light table without removing it from its rehousing unit, while at the same time stabilizing the broken glass plate negative without excessive weight and excessive cost.

Do not use short lid boxes for any of the three methods.

26. Method of In-House, Non-Chemical Cleaning of Dry Plate Glass Photonegatives: Bibliography

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Note: Bibliographic sources were consulted before such material was available through the Internet / World Wide Web. Minimal effort has been made by the author to review new professional sources available through the Internet since the early 2000s.

Trusted Online Resources
"Conservation Tip No. 4: A Method of Rehousing Glass Plate Negatives," online resource through Archives Outside, State Records, New South Wales, Australia
http://archivesoutside.records.nsw.gov.au/conservation-tip-no-4-a-method-of-rehousing-glass-plate-negatives/

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I would to thank former NEDCC Field Service Director Karen Motylewski for creating the NEDCC Managing Preservation Workshop Program that ran during the 1990s-2000s, to teach archivists from small and mid-sized repositories to establish preservation programs within their organization. Specifically, the program taught me how to balance in-house preservation by staff with conservation work by a conservator, and how to critically review the products sold by the archival supply vendors, which has proven useful throughout my work. I would like to thank former Curator of the Massachusetts State Archives Maxine Trost for demonstrating how to fully line a clam-shell box to rehouse dry plate glass negatives, and for providing comments to the other rehousing units I used in the Metropolitan Water Works Photographic Preservation & Access Project. I would like to thank photo conservator Paul Messier for graciously taking time to watch a demonstration of the methodology, to examine the rehousing units, and for providing comments on the methodology. I also thank NEDCC Photograph Conservator Monique Fischer and to former NEDCC Field Service Director Steve Dalton for reviewing the methodology. I would like to thank former Professor Josephine Fang for encouraging Simmons College GSLIS students from her summer preservation course to intern at the MDC Archives during 1995-1997, and 2000, and to the nine graduate students who accepted the challenge and cleaned and rehoused dry plate glass negatives throughout four summers. I would like to thank archivist Megan Sniffin-Marinoff and preservationist Jane Hedberg for their encouragement.

27. Project Acknowledgements

While I conceived this project, and led its management (2000-2003/06) and later co-led it (2012-2014), the implementation of the project was a team effort, spanning numerous government agencies and organizations, and could not have been successful without their support.

I am grateful for the trust that the Massachusetts Water Resources Authority (MWRA) has shown throughout this project, especially from its Executive Director Frederick A. Laskey, former MWRA records managers Mary Lydon and Daisy Monsalve, current records manager Elizabeth Steele, and current librarian Rebecca Kenney. Rebecca and I have made a good team since joining in July 2012 to co-manage the digital phase. It is Rebecca who encouraged me to find the time amongst my already planned archival projects for FY2013, to help coordinate the digital imaging phase. During the digital imaging phase, Barbara Allen, from the MWRA Communications Office, and I swapped external hard drives of digital files batches from BPL Digital Services.

It should be clearly acknowledged that the MWRA, through its funding of MDC/DCR Watershed Management, took on the majority of the financial costs of the archival supplies, for which this project could not have gone very far without them. Archival enclosures provided by the archival supply companies are expensive, but are critical in the preservation management continuum.

A special thank you goes to the late William A. Brutsch, who had the distinction of serving as Chief Engineer for the water system at both the MDC and MWRA. Bill was very much responsible for creating the MWRA Library from the more internal engineering libraries of the MDC Water and Sewerage Divisions, and for salvaging the second official set of the MWW photographic volumes in the mid-1980s. Bill supported this project in its development phase, before his 2002 retirement, and I wish he were alive to see its results. I did not have the opportunity to discuss the MWW organizational history with him, which I would have enjoyed.

On December 19, 1984, the Massachusetts Legislature, in response to the Boston Harbor sewerage pollution lawsuit against the MDC, created the MWRA (effective July 1, 1985) from the MDC Water and Sewerage Divisions, and in so doing, divided, at that time, the 90-year-old Metropolitan Water Works System in such manner that the engineers of 1895 could not have imagined.[408] The new MDC Division of Watershed Management and the MWRA each inherited MWW archival records based on which buildings each agency took control of in 1985, which did not reflect the new operationally divided water supply and water distribution system. Unbeknownst to those who drafted the 1984 legislation, both agencies also needed access to many of the same archival records, as various records sets could never really be divided in such a way as to reflect the new separation of responsibilities. Thirty years later, with our shared heritage, DCR and the MWRA continue to manage through the archival records management issues and operational needs of our agencies, while simultaneously, trying to apply professional archival management principles of provenance, original order, and physical and intellectual control to this still generally divided archival collection. At the foundation of the MWW Photograph Collection Preservation and Access Project was about strengthening an inter-agency professional relationship between our two agencies in the context of archival management preservation and access.

I would like to thank my previous and current immediate supervisors for supporting the project, and my ideals for it: Samantha Overton, during her tenure as MDC Director of Policy; and since 2004, Patrice Kish, DCR Director of Cultural Resources. Since 2004, I have had to balance being the archivist/historian/records manager for 4 major historical systems that form today's DCR, and Patrice has been patient with my approach to the significant increase in my work-load, and to giving proper attention to each system when it is required.

[408] One can argue that the January 1898 breakup of the Boston Water Works, with all facilities from Chestnut Hill Reservoir and west, and all northern facilities, taken over by the Commonwealth, was similar to the 1985 breakup. Ironically, in the case of 1898, the City of Boston and the Commonwealth had two and half years to plan for it since the split was legislated in 1895, within the MWB legislation. Even with that, there were complications, with the Commonwealth not inheriting in 1898 all the necessary operational records; and likely, there were records sets that both agencies needed access.

Former MDC Director of the Watershed Management Division, Joseph McGinn, was a key supporter during both the project development phase, and implementing the work in 2000-2001, as was former Wachusett Watershed Superintendent Mike Misslin, and current Wachusett Watershed Regional Director John Scannell, both of whom also helped clean the MWW glass plate negatives in 2000. In 2000, many staff of the Wachusett Watershed logistically assisted and supported this project. Current DCR Division of Water Supply Protection Director Jonathan Yeo has supported my archival management efforts for the MWW records since coming to DCR (from the MWRA) in 2005. Watershed Management planner Joel Zimmerman has been a collegial friend throughout the project. Joel also read through a late draft of this document, providing excellent editing comments, and implemented some formatting changes that enhanced the reading of it.

It was my predecessor, MDC Archivist Albert A. Swanson, who accepted the return of the MWW glass plate negatives from the Smithsonian Institution National Museum of American History in 1990. MDC Commissioner John W. Sears (1970-1975) created the MDC Archives in 1971, which was led my Mr. Swanson for nearly 20 years.

The third major partner in this project has been the Massachusetts State Archives. Former curator Maxine Trost supported the project, and provided constructive feedback on various options to archivally rehouse broken glass plate negatives. Executive Director Michael Comeau and current curator Martha Clark have significantly supported this project (and have generally supported my archival projects for MDC archival records transferred to them between 1980 and 1990), especially at the critical time in 2012, when the MWRA renewed the project for the digital imaging phase. A special thank you is for Wallace Dailey, bibliographer and quality control archivist. Wallace always made sure to document in detail the comings and goings of the MWW Photograph Collection, including for the portions on loan from MDC/DCR and the MWRA since the early and mid-2000s, that was needed for the project. Though I am not an employee of the Massachusetts State Archives, all staff have treated me and trusted me as if I was one. I am eternally grateful for this professional relationship.

The leadership of the Boylston Historical Society, West Boylston Historical Society, and West Boylston Beaman Memorial Public Library deserve special recognition for the care they took in managing each of their loaned portions of the MWW Photograph Collection between the 1970s and 2001. Their communities were significantly impacted by the MWW Wachusett construction project, and they greatly valued these photographs. It was not easy for these organizations to return the state-created photographs back to the Commonwealth. It also took much longer than expected for these organizations to have digital access to the complete MWW Photograph Collection, including of images that they did not know existed. I want to thank them for their patience.

Many citizens from the Wachusett Watershed communities volunteered to help archivally clean glass plate negatives in 2000. It truly was a unique experience for all who participated.

In summer 2000, Mary Hammer, Nighat Saleemi and Jerusha White, all graduate students at that time at the Simmons College Graduate School for Library & Information Science, Boston, interned in the MDC Archives and we launched the work of archivally cleaning and rehousing the MWW glass plate negatives. All three returned in the fall to help oversee the volunteers.

Former MDC database IT specialist Mike Ciulla designed the Microsoft Access relational database that enabled me to document and track each MWW image. Working with Mike helped me through a technology fear of creating a relational database. I should mention here that in 2012/14, MWRA Librarian Rebecca Kenney helped me translate that Access database into a more user friendly Excel worksheet format for the metadata project phase.

Starting in 2012, BPL Digital Projects Manager Tom Blake has been very enthusiastic about helping to bring to the public the digital access of the MWW Photograph Collection, as has been Danielle E. Pucci, Lead Digital Projects Librarian. BPL Digital Imaging Production Coordinator Bahadir Kavlakli and his staff have been

wonderful to work with, along with metadata specialist Nichole Shea, who assisted Rebecca Kenney and I in that process. The work of Boston Public Library Web Services Developer Eben English, and Digital Repository Developer Steven Anderson is gratefully acknowledged. It is the federal and state grant funding for free digital imaging services statewide through the Digital Commonwealth / BPL Digital Services partnership that enabled the MWW Photograph Collection Preservation and Access Project to reach its goal. We are indebted to the creators of Digital Commonwealth, and to Tom Blake's leadership and the team he has assembled at BPL Digital Services.

Special recognition is given to Robert M. Vogel, Curator of Mechanical and Civil Engineering at the Smithsonian Institution National Museum of American History (1957-1988); and to William E. Worthington, Jr., museum specialist at the Division of the History of Technology, Smithsonian Institution National Museum of American History (ca. 1983-2003). Mr. Vogel recognized the historical value of the MWW Photograph Collection, and without question, helped save the collection for future generations. Mr. Worthington, a colleague of Mr. Vogel, managed the process of returning the collection back to the MDC in 1990, a process that started in 1988. Mr. Worthington also oversaw the return to the MDC of broken MWW glass plate negatives in 2000 that had been omitted in the 1990 shipment. The role the Smithsonian Institution National Museum of American History has played in the history of the MWW Photograph Collection cannot be overstated.