

LOWELL NATIONAL HISTORICAL PARK
LOWELL, MASSACHUSETTS

FINDING AID FOR
PROPRIETORS OF THE LOCKS & CANALS ON MERRIMACK
RIVER RECORDS,
1747-2008 (BULK DATES 1844-1970):

VOLUME II

**GUIDES TO THE
PHOTOGRAPHS SERIES
AND
ARCHITECTURAL AND ENGINEERING DRAWINGS**

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PREFACE to GUIDE TO PHOTOGRAPHS

This document describes the extensive collection of documentary photographs produced by the Proprietors for their use in creating, maintaining, altering, and expanding their waterpower delivery system to the textile manufacturers of Lowell, Mass., and later to the New England electrical power grid. It includes only that portion of the photographs collection purchased by Lowell National Historical Park. Another portion of the collection was separately donated by the Proprietors to the University of Massachusetts Lowell Center for Lowell History.

The processing of this collection was completed in March 2007 by staff and volunteers at Lowell National Historical Park. These include Dan Walsh as project coordinator and LOWE volunteers Clee A. Ace and Steven Sussman.

Related materials include a large collection Proprietors of Locks and Canals management and operations records at Lowell National Historical Park (LOWE-5058) including an extensive series of Architectural and Engineering Drawings also at Lowell National Historical Park, and a large collection of business records, including the papers of such notable principals as James B. Francis, Uriah A. Boyden, Patrick T. Jackson, Kirk Boott, George W. Whistler, *et al.*, at the Baker Library, Harvard Business School.

The PL&C photograph collection may be accessed directly via the NPS Museum Management homepage at www.cr.nps.gov/museum. This guide will be of help in locating the PL&C photographs within the total Lowell National Historical Park cultural resources collection found at that web site.

Researchers may contact the Lowell National Historical Park by phone at 978- 970-5241 for further assistance in accessing and using this material.

INTRODUCTION

The Proprietors of the Locks and Canals on Merrimack River Photograph collection as received by Lowell National Historical Park is an organic collection of 6,770 original photographic prints and copies thereof, 79 film negatives, 9 glass-plate negatives, and 39 glass lantern-slides produced by PL&C between the years 1883 and 1956.

It documents the construction and ongoing maintenance of the first comprehensive industrial water-power delivery system in the United States but beyond that it provides unique insights into the fabric and quality of life of the city of Lowell, Massachusetts, at the height of its industrial development on into its decline. In this respect, it is remarkable in its historical depth and, since it is almost entirely field photography, it is remarkable in its breadth.

As with the other materials received by Lowell National Historical Park from the Proprietors, these photographs were well, if incompletely documented. For this collection, the Proprietors created several finding aids, the largest being the typed 172 page sequential numerical list which may be found herein at Appendix 1. While it stops at the end of the year 1941, it is largely complete. Other finding aids were simple hand-written lists such as that for the X prefix photographs, which may be found herein at Appendix 2. They also began a typed subject list for the sequentially numbered photographs, which runs from A through Me, but was not completed. In addition to being incomplete, it only indexed photographs made between January 1, 1928, and early 1941. It is Appendix 3. At the opposite extreme, groups such as T. D. H. prefix photoprints or the glass lantern-slides or had no indexing at all.

Like the Proprietors' Architectural and Engineering Drawings series, a portion of the photographs was also separately donated to the UMASS Lowell Center for Lowell History. It consists of the glass-plate negative collection, 5 bound volumes of numbered photoprints, a group of prefix-numbered, unbound photoprints, and a group of 709 unnumbered, unbound photoprints later numbered by the Center using their own M-prefix numbering system.

SCOPE AND CONTENT NOTE

- Accession number:* LOWE-132.
- Catalog numbers:* LOWE 5058 (entire PL&C collection); individual catalogue on page 5.
- Quantity/ Storage:* 3976 original photographic prints with over 1000 additional copies; 33 glass lantern slides; 19 film negatives; 9 glass plate negatives.
- Location:* Lowell National Historical Park, 67 Kirk Street, Lowell, Massachusetts 01852–1029. Phone 978-970-5000.
- Description:* This photograph series was produced in the commonly available photographic media and on the commonly available photographic supports of its time.

The vast majority of the positive imagery was rendered on paper. The majority of the prints are gelatin prints with a much smaller group of albumen prints and a handful of cyanotypes.

The majority of the negative imagery was on cellulose nitrate film and was transferred to safety film by Lowell National Historical Park. The cellulose nitrate originals, which were actively deteriorating, required disposal as hazardous material. However, the negative holdings of LOWE give an uncharacteristic impression of the overall PL&C negative collection.

The PL&C historic negative collection at UMASS Lowell Center for Lowell History is definitive on this subject. The negatives, from no.1 to no. 2230 (10/22/1926), are glass plates while those from no. 2231 to the end of the collection are film negatives.

The Photographs as Administered by the Proprietors of Locks and Canals:

The Proprietors of the Locks and Canals on Merrimack River (PL&C) photograph series at Lowell National Historical Park is an organic grouping of 6770 original photographic prints and copies thereof, along with 79 film negatives, 9 glass-plate negatives and 39 glass lantern- slides, produced by PL&C between the years 1883 and 1956.

Basically, it is documentary photography and illustrates both PL&C and textile manufacturing company project work such as new construction, reconstruction, or repair of buildings, dams and canals and their appurtenances, turbine installations and power generation equipment, and streets and bridges, as well as documentation of railroad related issues, and PL&C properties. But to characterize these photographs as simply project documentary photography is to vastly understate its value as a historical record of the urban fabric of Lowell, Massachusetts, during the apex of its development as an industrial city. That function was tangential to PL&C's purposes when they generated these photographs, if it occurred to them at all, but because location photography almost always includes context as well as subject, it almost always illustrates many things other than just its subject. It is that context, rather than simply their subjects, that gives these photographs their unique value as a historical record.

Judging from the various sizes of the photographic prints and negatives they produced, PL&C used more than one camera during the history of this collection. If the prints are, in fact, contact prints then PL&C had at least one 8x10 camera and one 5x7 camera since the vast majority of the prints were produced in these sizes. This is confirmed by the film negatives and glass-plate negatives which were also found in both these sizes. However, in addition to these sizes, there is a group of film negatives in a 2 ¼ x 3 ½ inch format. This implies the existence of another camera but they could also have been produced as half-size negatives on a 5x7 format camera. There are also a few low-resolution snapshot prints at 2 ¾ by 4 ¾ inches from the 1950s included with the larger format prints but they represent the end of the line for photography at PL&C It would seem that PL&C had a staff photographer who knew how to use large-format view cameras and do darkroom work for most of the history of this collection.

The collection was produced in the usual late-19th and 20th century media and supports. The glass-plate negatives are standard format Eastman dry plates. The original film negatives were produced on cellulose nitrate bases but were copied directly onto safety film by Lowell National Historical Park after which the cellulose nitrate originals were disposed of as hazardous material. The majority of the prints are gelatin prints but there are some albumen prints among the earlier photographs. There are also a few cyanotypes.

It should be noted here that the holdings of Lowell National Historical Park represent only one portion of the total PL&C photograph collection. Another portion was separately donated by PL&C to the University of Massachusetts, Lowell. Their holdings

include almost all of the glass plate negatives and some historic prints. The researcher should also note that PL&C staff members integrated photographs into the office files of various departments; their presence is noted in the collection listing for those files (see Vol. I of this finding aid).

P.L. & C. Photographs Numbering Schemes:

The Proprietors of the Locks and Canals on Merrimack River numbered many of its photographs, but not all of them, and among the numbered photographs it employed several different numbering schemes. This implies a subject-group function for each of the different numbering schemes but, except for the two sequential numbering schemes, the HJ prefix numbering scheme, and the X prefix numbering scheme it is not known what broader subject each group represents.

1. The largest numbered group was that represented by a sequential numbering scheme beginning with number 1 and ending with number 3276. It contained interpolated imagery bearing duplicate print numbers with an –A suffix (e.g. 1589 vs. 1589-A) which imagery was often not related to the print whose number was thus used in modified form. Without these interpolations, the original numbering scheme would have been basically chronological; however, the interpolations typically introduced later imagery back into a number sequence of earlier images, thereby interrupting the otherwise chronological character of the sequential numbering. Clearly, this numbering scheme represents the fundamental PL&C photo-documentation.

2. There were also several smaller numbered groups.

The first consisted of 88 images using Roman numerals beginning with I and ending with LXXXVIII.

The second consisted of 73 images employing a mixed alpha-alpha and alpha-numeric numbering scheme (e.g. A, A-1, BB, YY-1). While not identified as such, this group seems to consist of images of both banks of the Merrimack River.

The third consisted of 72 images using a B prefix (e.g. B-1 through B-72).

The fourth consisted of 23 images using a C prefix (e.g. C-2 through C-24).

The fifth consisted of 16 images using an HJ prefix (e.g. HJ-1 through HJ-16). This is the only small numbered grouping whose purpose or subject is identified. This prefix scheme applies to photo-documentation of a *Special Hamilton* [Mfg. Co.] *Job – December 1921*.

The sixth consisted of 80 images using a T.D.H. prefix (e.g. T.D.H. 1 through T.D.H. 78, plus T.D.H. 15A and 53A).

The seventh consisted of 26 images employing an X prefix (e.g. X-0 through X-25). This prefix scheme applies to *Miscellaneous Images* as noted on the PL&C handwritten X- prefix list of March 31, 1921.

The eighth consisted of at least 654 glass lantern-slides sequentially numbered without prefixes but with some suffixes (e.g. 638a and 638b).

3. There were also three unnumbered groups.

The first consisted of an unnamed album containing 88 unnumbered images from the years 1909 and following which illustrate such subjects as the construction of the new Massachusetts Mills power house and their new cotton storehouse.

The second consisted of an envelope entitled "Fire Protection" containing images primarily of fire hose and pressure tests conducted by PL&C at the various textile mill complexes where they provided water for indoor sprinkler systems and outdoor hydrants.

The third consisted of 708 truly miscellaneous original images in the collection of the UMASS Lowell Center for Lowell History which it, in turn, numbered with an M- prefix followed by a number, the range being M-1 through M-708. There were 31 copies of images that fell into the group which came to Lowell National Historical Park when it purchased the portion of the PL&C collections that it holds.

4. There was also a large group of unnumbered photographs found among the P.L. & C. General Files (LOWE-5058). These were used to illustrate the letters, reports, etc. found in those files. It was in this group that the photo-documentation for several PL&C upper Merrimack River functions was found. These functions include PL&C's reservoirs and pondings, such as Merrymeeting Lake, and their dams, along with PL&C operations at the Lake Company on Lake Winnepesaukee in New Hampshire.¹

P.L. & C. Photographs Indexes:

PL&C produced typed numerical indexes to its photograph collections through 1941 (see Appendix 1). It also produced a handwritten list of photographs created between 1942 and the end of December 1948 and another handwritten list of X- prefix photographs entitled *Miscellaneous Negatives* dated March 31, 1920 (Appendix 2). In addition, it produced a typed alphabetical subject index to those photographs (Appendix 3). These indexes were found in the PL&C General Files (LOWE-5058) under file number 1031.

The 172 page typed numerical index includes indexes to the B- prefix, C-prefix, and Roman numeral photographs at pages 91 through 93 (B- prefix), page 94 (C- prefix), and pages 95 through 98 (Roman numerals) (Appendix 1). The numerical sequence, which

¹ The Collection Listing for the General Files in Vol. I. notes the locations of photographs integrated into these files.

was interrupted by the insertion of these otherwise unrelated photographs, resumes at page 99 and continues uninterrupted to the end.

The typed alphabetical subject index is partial in that it only covers subject headings from A to Me. The typing stops at Me in mid-page, which suggests that its creation never got beyond that point (Appendix 3).

Ultimate Disposition of the P.L. & C. Photograph Collection:

In October 1996, Lowell National Historical Park purchased the PL&C photographs collection except for the portion that had been donated earlier by the PL&C to the University of Massachusetts, Lowell.

The Collection as Received by Lowell National Historical Park:

1. Seventeen bound volumes of original photographic prints. These comprise two copies of volume no.1; volume no.7; volume no.7-A; volume no.8; and volumes nos. 9 through 15. They contain prints bearing PL&C numbers:

1-213 (vol. 1)
1361-1589-A (vol. 7)
1623A-1695 (duplicate prints, vol. 7-A)
1590-1812 (vol. 8)
1813-2035 (vol. 9)
2036-2260 (vol. 10)
2261-2483 (vol. 11)
2484-2706 (vol. 12)
2707-2927 (vol. 13)
2928-3156 (vol. 14)
3157-3276 (vol. 15)

2. All of the original and copy photographic prints contained in the PL&C General Files (LOWE-5058). There were many duplicate prints from the sequentially numbered print group noted above found within the General Files. However, there were also quite a number of original prints that did not bear any PL&C numbering at all and were largely of subjects relating to PL&C's reservoirs and pondings, and their dams, in New Hampshire along with PL&C operations at the Lake Company on Lake Winnepesaukee.

3. Seven prints from the group of 88 using Roman numerals.

4. Six prints from the group of 73 using the mixed alpha-alpha and alpha-numeric numbering scheme.

5. Twenty three prints from the group of 72 using the B prefix.
6. Fourteen prints from the group of 23 images using the C prefix.
7. Twenty three prints from the group of 80 using the T.D.H. prefix.
8. Twenty six prints, which is a complete set, from the group using the X prefix.
9. Thirty three glass lantern slides from a sequentially numbered group whose highest number among those received was 653.
10. The unnamed album containing 88 unnumbered prints from the years 1909 and following which illustrate such subjects as the construction of the new Massachusetts Mills power house and their new cotton storehouse.
11. Nineteen unnumbered film negatives.
12. Nine unnumbered glass-plate negatives.

The Collection as Processed by Lowell National Historical Park:

Because of the image-bearing capabilities of artifact catalogue records created in the ANCS+ cataloguing system, which has been adopted by the National Park Service for service-wide use, LOWE chose to individually catalogue the PL&C photographs it owns.

Although item level processing is not generally done for archival collections, in the case strong user interest in PL&C images coincided with the capabilities of the cataloguing system to present a compelling argument for item level cataloguing.

Given that all the collections of Lowell National Historical Park can be accessed through the National Park Service web catalogue, item level cataloguing of this collection was the most expeditious way to make all these images available for perusal by researchers nationwide. It also parallels the cataloguing of other imagery in the LOWE collection.

At the item level, each individual image has its own unique ANCS+ catalogue number. These ANCS+ catalogue numbers are separate from and bear no organizational relationship to any numbering schemes employed by PL&C or others. They were applied to each individual image as it was processed, basically, in the order received. However, the PL&C numbers are recorded in the ANCS+ catalogue records in a data field called "other numbers" and are not lost to an image simply because it was given an ANCS+ number upon cataloguing.

In order to facilitate searching the Lowell National Historical Park website by ANCS+ catalogue number, the following list of ANCS+ catalogue number as applied to PL&C imagery is provided:

PL&C photographic prints:

LOWE-7001 through LOWE-9955
LOWE-10026 through LOWE-10099
LOWE-11001 through LOWE-11905
LOWE-11969 through LOWE-11999
LOWE-15544 through LOWE-15547

PL&C glass plate negatives:

LOWE-14529 through LOWE-14537

PL&C film negatives (replicated as inter-positives and film negatives on safety film):

LOWE-10003 through LOWE-10025
LOWE-12565 through LOWE-12575

PL&C glass lantern slides:

LOWE-14515 through LOWE-14528
LOWE-15557 through LOWE-15575

The Collection as Received by UMASS Lowell Center for Lowell History:

The University of Massachusetts Lowell Center for Lowell History received the bulk of the PL&C photographic negatives.

It also received those bound volumes of original photographic prints donated to it before the purchase of the remainder by Lowell National Historical Park. They contain prints originally generated from the negatives noted above.

In addition, it received all 16 images using the HJ prefix (e.g. HJ-1 through HJ-16) representing photo-documentation of a *Special Hamilton [Mfg. Co.] Job – December 1921*.

It also received the bulk of the imagery from the other numbered groups of images employing prefixes.

Lastly, it received 708 miscellaneous original images which it then numbered with an M-prefix followed by a number, the range being M-1 through M-708, in order to gain basic intellectual control of these images.

The holdings of the UMASS Lowell Center for Lowell History are not detailed in this finding aid. To access their collection and survey its contents, researchers may contact the Center at 978-934-4000.

Searching the NPS web catalogue for PL&C Photographs:

All of the PL&C imagery at Lowell National Historical Park covered by this finding aid is accessible for perusal through the NPS web catalogue. It can be found via the NPS Museum Management web page at www.cr.nps.gov/museum/. Once there, select Web Catalog from the bar menu. Then select Lowell NHP from the list. The catalogue allows you to Browse or Search. Use the Search function in conjunction with this finding aid.

To search by PL&C numbers as found in Appendix 2, simply type a number into the block provided and strike the search button below. Your selection will appear on the screen. You may also find a second selection. This is because some PL&C photograph numbers have the same number component as some LOWE catalogue numbers. When they do, both selections will appear even though the LOWE catalogue number will have no relationship to the PL&C photograph number.

For example, a search on number 1761 will bring up two records. One is LOWE catalogue number 1761, which is a pharmacist's chemical bottle (catalogued in 1989), the other is LOWE catalogue number 8135, which is PL&C photoprint number 1761 (catalogued in 2000). The two artifacts have nothing to do with each other except that they happen to have one number in common in their respective catalogue records. Both appeared in this sample search but the user of this finding aid would only be seeking the photoprint.

Other PL&C numbers will yield only the PL&C photoprint. A search on number 1672A, for example yields only the PL&C photoprint with that number. That print happens to carry the LOWE catalogue number 7996 but LOWE catalogue numbers do not have alphabetic suffixes so no other item was found in a search for number 1672A.

Searches can also be conducted in the search mode using words rather than numbers. The PL&C titles or captions that appear on the photographs themselves were transcribed literally into the Web Catalogue records, thus, the titles that appear in Appendix 2 should be searchable in the Web Catalogue. However, a word of caution regarding text searches is necessary and it is that the more words used in any given search entry, the longer the search will take. Therefore, it is better to use the fewest number of words possible and to rely on key terms. For example, PL&C photoprint number 363 bears the title "Left shore Merrimack River from north pier of Aiken St. bridge, looking upstream. Shows head of Long Island." If one attempted a search on the entire title, the search would take quite a

long time. If, however, one searched just on the words “Long Island”, the search would be much faster and this photograph would appear in the results along with any others of the same subject.

The database is larger than the body of photographs that appears in the PL&C Index of Photograph Plates, however. Therefore, when doing a broad-based, general search use any term or terms that might lead to the subject being pursued, especially if that subject has a name or its location is known. For example, a search for photographs of Merrymeeting Lake (using the single search term “merrymeeting”) would yield a large number of images outside the numbered series of photographs covered by the PL&C Index of Photograph Plates. In this case the PL&C Index would provide a useful search term but is hardly definitive in and of itself and only a database search would yield the full scope of Merrymeeting Lake imagery in the collection.

A final note on two popular search subjects:

The first is “Little Canada”, the old Franco-American neighborhood that was lost to an urban renewal project. A search of the database under the term Little Canada will yield only a few images but there are actually over thirty images in the collection. The explanation for this is that the term Little Canada was not usually used by the Proprietors to identify the subjects of photographs taken there. This is because they were not photographing a neighborhood but, rather, some much more specific subject, such as a piece of property they might own, which happened to be in that neighborhood. As a result, they typically identified the photograph by the name of the street on which the subject was located and not by the neighborhood in which it was found. Therefore, the best way to locate Little Canada photographs is by searching street names in that neighborhood. The following streets in Little Canada were photographed by the Proprietors of the Locks & Canals: Aiken Street, Cabot Street, Cheever Street, Coolidge Street, Ford Street, Hall Street, James Street, Moody Street, and Perkins Street.

The second is the “Francis Gate” dam and lock complex. This is current rather than historic nomenclature and, thus, was not used by the Proprietors of the Locks & Canals for that location. They routinely referred to it as the “Old Guard Locks” and that is the search terminology that will yield the desired results.

Proprietors of the Locks and Canals
on Merrimack River Photographs

Appendix 1

PL&C Index of Photograph Plates. This is the sequential numerical list of the main body of glass-plate negatives and their prints created by the Proprietors between 1883 and 1941. It contains the B-prefix sequence (pages 91-93), the C-prefix sequence (page 94), and the Roman numeral sequence (pages 95-98) and is 172 typewritten pages in its entirety. The original is located in the General Files #1031, Box 40, Folders 3-6.

Proprietors of the Locks and Canals
on Merrimack River Photographs

Appendix 2

PL&C Miscellaneous Negatives. This is the sequential numerical list of X-prefix negatives and their prints created by the Proprietors between October 18, 1896, and Nov. 28, 1899. The list contains 26 entries and all have dates but only X-1 through X-16 are identified by subject.

Proprietors of the Locks and Canals
on Merrimack River Photographs

Appendix 3

PL&C Alphabetical Index to Photograph Plates, A-M. This is a partial index complementing the sequential numerical list in Appendix 1.

***PREFACE to GUIDE TO ARCHITECTURAL AND
ENGINEERING DRAWINGS***

This document describes the extensive collection of drawings produced or acquired by the Proprietors for their use in creating, maintaining, altering, and expanding their waterpower delivery system to the textile manufacturers of Lowell, Mass., and later to the New England electrical power grid.

The processing of this collection was completed in February 2007 after several years of inventorying and data entry by staff and volunteers at Lowell National Historical Park. These include Dan Walsh as project coordinator, Rebecca Hartwell and Michelle Verfaillie from LOWE park staff, along with LONG volunteers Clee A. Ace, Kathy Dery, and Steven Sussman.

Related materials include a large collection Proprietors of Locks and Canals management and operations records at Lowell National Historical Park (LOWE-5058), a large collection of individually catalogued historic PL&C photographic prints also at Lowell National Historical Park, a small collection of PL&C architectural and engineering drawings as well as historic glass plate negatives and some historic photographic prints at the University of Massachusetts/Lowell Center for Lowell History, and a large collection of business records including the papers of such notable principals as James B. Francis, Uriah A. Boyden, Patrick T. Jackson, Kirk Boott, George W. Whistler, *et al.*

Researchers may contact the Lowell National Historical Park by phone at 978-970-5241 for assistance in accessing and using this material.

INTRODUCTION

The Proprietors of the Locks and Canals on Merrimack River Architectural and Engineering Drawings series holds over 11,000 plans, elevations, renderings, charts, graphs, templates and copies thereof produced by PL&C and its partners and suppliers between the years 1801 and 1987.

It covers all aspects of the design, construction, and ongoing maintenance of the first comprehensive industrial water-power delivery system in the United States and, as such, provides a unique record for what would become the prototypical industrial power delivery system before and into the age of steam and electrical power. It also provides key information for this power delivery system today since the entire system is extant and functioning as a hydropower component of the New England regional electrical power grid.

The collection consists of six separate sub-series of drawings. They are as follows:

1. Assets Division of Boott Mills series: 1295 original drawings and copies covering the period 1828-1987.
2. Lowell Industrial Development Company boiler series: 49 copies covering the period 1948-1950.
3. Maps series: 101 maps, generally published, covering the period 1818-1939.
4. Massachusetts Mills series: 327 original drawings and copies covering the period 1856-1943.
5. Merrimack Valley sewers project of 1948 series: 161 original drawings and copies covering the period 1876-1948.
6. Numbered series: 9218 original drawings and plans covering the period 1801-1980 for original drawings with a group of nine copies of earlier plans covering the period 1729-1794.

Page 9 describes briefly the business relationships of the Assets Division of Boott Mills, the Lowell Industrial Development Company, Massachusetts Mills, and the Proprietors of the Locks and Canals. That description will illustrate why and how these seemingly unrelated drawings series were incorporated into the Proprietors of the Locks and Canals drawings collection.

SCOPE AND CONTENT NOTE

Accession number: LOWE-132

Catalog number: LOWE 5058 (PL&C collection); LOWE-6391

Quantity/ Storage: 11151 drawings in:
82 standard map case drawers (flat storage)
14 smaller plans case drawers
147 six foot capped tubes (rolled storage)
2 open shelves (oversize foldered, flat storage)

Location: Lowell National Historical Park, 67 Kirk Street, Lowell,
Massachusetts 01852–1029. Phone 978-970-5000.

Description This collection was produced in all of the various rendering and copying media and on all of the various drawing supports typically employed throughout the nineteenth and most of the twentieth centuries. Its drawing quality ranges from the near-artistic to the casual and perfunctory. Its supports range from fine all-cotton rag paper and drafting cloth to low quality brittle wood-fiber paper as well as some mylar and acetate film. Several of the early drawings bear the names of such noteworthy figures as James B. Francis, Uriah A. Boyden and George R. Baldwin.

The Collection as Administered by the Proprietors of the Locks and Canals:

The Proprietors of the Locks and Canals on Merrimack River (PL&C) Architectural and Engineering Drawings is an organic series of over 11,000 plans, elevations, renderings, charts, graphs, templates and copies thereof produced by PL&C and its partners and suppliers between the years 1801 and 1987.

It covers all aspects of the design, construction, and ongoing maintenance of the first comprehensive industrial water-power delivery system in the United States and, as such, provides a unique record for what would become the prototypical industrial power delivery system before and into the age of steam and electrical power. It also provides key information for this power delivery system today since the entire system is extant and functioning as a hydropower component of the New England regional electrical power grid.

This collection was produced in all of the various rendering and copying media and on all of the various drawing supports typically employed throughout the nineteenth and most of the twentieth centuries. Its drawing quality ranges from the near-artistic to the casual and perfunctory. Its supports range from fine all-cotton rag paper and drafting cloth to low quality brittle wood-fiber paper as well as some mylar and acetate film. Several of the early drawings bear the names of such noteworthy figures as James B. Francis, Uriah Boyden and George R. Baldwin.

The Drawings Series:

The collection consists of six separate sub-series series of drawings. They are as follows:

1. Assets Division of Boott Mills sub-series: 1295 original drawings and copies covering the period 1828-1987.
2. Lowell Industrial Development Company boiler sub-series: 49 copies covering the period 1948-1950.
3. Maps sub-series: 101 maps, generally published, covering the period 1818-1939.
4. Massachusetts Mills sub-series: 327 original drawings and copies covering the period 1856-1943.
5. Merrimack Valley sewers project of 1948 sub-series: 161 original drawings and copies covering the period 1876-1948.
6. Numbered sub-series: 9218 original drawings and plans covering the period 1801-1980 for original drawings with a group of nine copies of earlier plans covering the period 1729-1794.

There are two broad groups within which these six groups are contained. The first broad group is plans created by and for the PL&C in its functions and includes the Maps sub-series, the Merrimack Valley sewers project of 1948 sub-series, and the Numbered plans sub-series. The

second broad group is plans created by subsidiaries or partners or those created for a purpose outside the functions of the PL&C *per se* and includes the Assets Division of Boott Mills sub-series, the Lowell Industrial Development Company (L.I.D.C.) boiler sub-series, and the Massachusetts Mills sub-series.

Origins, Growth, and Development of the Collection:

First broad group:

The first broad group of drawings is understandable without having to go into a discussion of other or parallel business relationships. It sprang from the needs of the P.L. & C. itself and was created by them for their fundamental business objectives, the provision of water for power production or other industrial processes not related to power production.

The Numbered sub-series is the first and most fundamental of the PL&C drawings collections. It is also the oldest and the largest collection. It contains original drawings dating from 1801 and copies of drawings dating from 1729 and covers every aspect of the creation and maintenance of the water power delivery system, which is the canals, dams, gates, locks, wasteways, and their appurtenant structures, as well as the penstocks, raceways, turbine pits, and turbines themselves, and the equipment necessary to operate them. The last dated drawing is from 1980.

The Maps sub-series is primarily devoted to published maps of the Merrimack River and its watershed, along with published maps of the city of Lowell. There are also a small number of maps dealing with other areas of the country or areas of Massachusetts outside of the Merrimack River watershed. Originally the maps collection was larger and contained maps of other parts of the country or the hemisphere but these were no longer part of the collection when it was received by Lowell National Historical Park. The majority of this collection is from the nineteenth and early twentieth centuries.

The 1948 Merrimack Valley sewers project is unusual in that it is a discrete collection intended to meet a specific short-term objective to document the historic and, what was then, the current water quality of the Merrimack River. That need arose out of an initiative to address, on a regional scale, the problems of sewage and other water-borne waste in the Merrimack River Valley in Massachusetts. It involved federal, state, and local government as well as business and industry and ultimately led to a resolution of what were long standing problems.

Second broad group:

The second broad group requires some further description in order to understand how these sub-series found their way into the P.L. & C. drawings collection.

The Assets Division of Boott Mills represents a partnership involving the Boott Mills and the PL&C that dealt with the real estate assets of former Lowell textile manufacturing companies and in hydropower generation and mill sprinkler-system water delivery. Its real estate interests were in properties at 200 Market Street, at the Foot of John Street (Boott Mills complex), and at 95 Bridge Street (Massachusetts Mills). The majority of this drawings sub-series dates from the period 1950 to 1987, which makes it the most recent of the collections.

The Lowell Industrial Development Company represents another partnership, originally between Boott Mills and the Merrimack Mfg. Co. As described by Laurence Gross in his work *The Course of Industrial Decline* (p. 232), Boott Mills "...united with the Merrimack [Mfg. Co.] (controlled by the same investors) in the LIDC to buy up the real estate of the Massachusetts Mills, along with its waterpower rights plus those of the Lowell [Mfg. Co.] and Middlesex Mills and the 622 shares of Locks and Canals associated with them." The 49 plans of this sub-series cover the period 1948 to 1950 and relate to the design and installation of a steam turbine boiler by a single contractor. It is the smallest of the drawings collections. There is also a much larger group of L.I.D.C. plans in the Numbered sub-series at shelf/folio number prefix 156- , which nicely illustrates the interrelatedness of the L.I.D.C. and the PL&C but which had no provisions in its structure for this group of boiler plans.

Massachusetts Mills was one of the original 11 textile manufacturing companies and, like Boott Mills, was one of the last to remain in textile production in Lowell. As a partner in its successor, P.L. & C. seems to have inherited the extant Massachusetts Mills drawings collection, probably because it was the most logical partner to hold these drawings in view of the fact that it already maintained a large collection of its own drawings. In any case, this is the only collection of actual mill building plans held by PL&C This is not really surprising since P.L. & C. was less concerned with the actual structures raised by the textile manufacturers for their production purposes than they were with the structures of their own water power delivery system. This sub-series is also unique in that the existence or whereabouts of any other Lowell cotton mill plans are not known and, thus, it represents the only such documentation available.

These business relationships are complex because they are intertwined and involve the same individuals and the same properties. To illustrate the point even further, there was another entity known as the Assets Realization Company (1920-1946. See PL&C General Files), and another known as the Assets Division of L.I.D.C. (1943-1956. See PL&C General Files), and yet another local partnership known as Boott Hydropower, which became a wholly owned subsidiary of Consolidated Hydropower which is, itself, now a subsidiary of Enel, a major Italian-owned electric power company.

PL&C Drawing Sub-series Numbering Schemes:

1. Assets Division of Boott Mills sub-series. This sub-series was not numbered as such by PL&C but was simply held in a map case the contents of whose drawers were identified by drawer labels. Each drawer contained a typed list of abbreviated drawings titles for what was intended to have been its contents but these lists did not use plan numbers. Thus the numbering scheme employed for this sub-series of plans by Lowell National Historical Park (LOWE) staff in creating the database for this drawings sub-series uses a PL&C model, namely, a compound number consisting of an applied drawer number and an applied plan number, e.g. 01-01. In point of fact, many of the plans in this sub-series are copies of plans from other sub-series, such as the PL&C numbered sub-series, copies which bear the plan number of their sub-series of origin but which were not used in the sub-series in which they were found. Those other sub-series numbers are recorded in the database for this sub-series in a field named "Other Numbers".
2. Lowell Industrial Development Company boiler sub-series. This sub-series was not numbered by PL&C but did carry a plan numbering scheme of its creator, the Wickes Boiler Co. of Saginaw, Michigan, e.g. 51838. . This is the numbering scheme that was employed by LOWE staff in creating its database for this sub-series, with the addition of the prefix LIDC, resulting in the plan number LIDC 51838.

3. The Maps sub-series had a numbered list for its contents that was generated by PL&C The list actually consists of seven categories (i.e. Lowell Maps, New Hampshire State Maps, New Hampshire county and city maps, United States Maps, Massachusetts State Maps, Boston Maps, and Other maps) but is numbered continuously from 1 through 54 irrespective of the categorized organizational scheme. This PL&C numbering scheme is the numbering employed by LOWE staff in creating its database for this sub-series, along with the prefix Maps, e.g. Maps 001.

4. The Massachusetts Mills sub-series carries a numbering scheme that was evidently developed by Massachusetts Mills itself and simply left unaltered by PL&C This numbering scheme consists of compound alpha-numeric numbers for each of the plans, e.g. A-43, and seemingly reflects an intended categorized organizational scheme although what its categories may have been is not clear in the absence of any documentation other than the plans themselves. It is also discontinuous in its alphabetic prefixes lacking, as it does, any D-, H-, I-, J-, O-, P-, Q-, or T- through Z- prefix plans. In addition, it is discontinuous in its numbering within any given prefix group. As a typical example, the collection begins with drawing A-43 and goes next to A-47. The whereabouts of drawings A-1 through A-42 or A-44 through A-46 are unknown, as are the whereabouts of any of the other missing numbers within the other existing prefix groups, except for eight drawings still bearing their Massachusetts Mills sub-series numbers, which were renumbered by PL&C and added to their own Numbered sub-series of drawings. This may have been the fate of other missing Massachusetts Mills sub-series plans but without direct evidence there is no point in attempting to deduce what they may have been.

5. The Merrimack Valley sewers project of 1948 sub-series is like the Assets Division of Boott Mills sub-series in that it was not numbered but had typed lists of abbreviated drawings titles which, in this case, were pasted to the exterior of the large envelopes which contained the drawings. Based on the model of the Maps sub-series, the numbering scheme employed for this sub-series of plans by Lowell National Historical Park (LOWE) staff in creating the database for this drawings sub-series uses a simple continuous numbering scheme beginning with 001.

6. The Numbered sub-series is by far and away the largest of the drawings sub-series in this collection and currently bears a numbering scheme that seems to have been developed by PL&C in stages over the course of the 19th century. In its most basic form, it is a compound numero-numeric scheme the first element of which is a “shelf” or folio number separated by a hyphen from a drawing number, e.g. 131-001.

However, as the collection grew, so did the elaboration of the its numbering scheme. Since not all drawings were small enough to be stored flat by PL&C, large drawings had to be stored rolled but weren’t given “shelf” or folio numbers. Instead, they were typically stored in paste-board tubes housed in sheet-metal cases, which PL&C termed “pigeon holes”, and were given compound numbers consisting of “P.H.” prefixes followed by drawing numbers, e.g. P.H. 6-E. As the collection continued to grow, additional storage had to be found and this resulted in a yet another refinement of the numbering scheme.

In the 20th century, at least, PL&C housed its drawings in a plans vault. Evidently, at some point, that vault was expanded since the latest PL&C numbering scheme uses a locator pre-prefix to distinguish between the Upper Vault and the Lower Vault, both of which contained flat and rolled drawings. The upper vault drawings were given a “C-“ pre-prefix, e.g. C-114-1 or C-P.H. 8, while the lower vault drawings were not given any pre-prefix and continued to be numbered as shown above. The necessity of PL&C having to employ the C- locator pre-prefix stems from the

fact that it reused its shelf and pigeon hole numbers and, thus, without a location indicator, one would not know whether any given plan was in an upper or lower vault folio or pigeon hole. Since the same upper and lower vault folio and pigeon hole numbers were used for different drawing topic groups, the possibility for confusion in actual location and the annoying consequences of misfiling would indeed have been a constant problem without a location designator.

That vault expansion point seems to have been reached about the year 1900. The evidence for this is found both in the drawing dates and in the new plan number labels that begin to appear. PL&C procured a type of preprinted paper label which could be affixed to a drawing and had blank spaces following the terms "No." and "Shelf" which were to be filled in with a drawing number and a shelf number. The printer included the year in which the labels were made, along with other proprietary information, on the margins of the label. There are three distinct groups of labels in terms of printing date: 1900, 1909, and 1913. Clearly, a compound-numbering system was in use by 1900 since it is reflected in the preprinted label form itself. In addition, the first appearance of the distinction between the "C-" plans and the non-"C-" plans found in the PL&C typed "Consecutive Index of Drawings" coincides with drawings dated at the turn of the 20th century. What PL&C appears to have done in making the distinction between upper and lower vault drawings was to have consolidated the older drawings in the upper vault and, folio by folio, given the C- designator to them. At the same time, PL&C seems to have instituted a uniform compound plan numbering scheme for new drawings, within which each numbered "shelf"/folio began its own internal sequence of drawing numbers starting with the number 1., e.g. 136-1>, 140-1>, etc., and which superseded an older compound numbering scheme.

It is not clear exactly why PL&C recycled shelf and pigeon hole numbers rather than simply creating a distinct sub-series of numbers for each level of its vault, especially in view of the fact that the shelf and pigeon hole numbers represent subject classifications, e.g. the subject of shelf 132 drawings is Water Wheels while the subject of shelf C-132 drawings is Hydrant Tests. Had PL&C simply given a shelf or folio sequence of 100-199 to the upper vault and 200-299 to the lower vault, with a similar distinction within the P.H. sequences, there would have been no need of yet another prefix in the form of "C-". The existence of this pre-prefix caused no end of difficulty in processing this drawings sub-series since LOWE was not in possession of the documentation explaining it until it received the PL&C Files collection in 1997 and, within the drawings themselves, PL&C had not been consistent in correctly labeling all the "C-" drawings as such while, in its later years, it often mixed "C-" and non-"C-" drawings together rather than storing them separately as was originally intended.

As noted above, the current classified numbering scheme for this drawings sub-series was developed by PL&C but it was not the original numbering scheme, which was characterized by unnecessary complexity. Beginning with number 1, it remained sequential until it reached at least number 4697 before being superseded by the newer scheme. Number 4697 is the last number clearly incorporated into the current shelf/folio or pigeon hole compound-numbering scheme at drawing number C-134-4697. This is also reflected in "Consecutive Index of Drawings". However, a classification mechanism which unfortunately did not allow for plan number growth within its classifications was superimposed on this older sequential PL&C consecutive numbering scheme prior to the use of the "C-" pre-prefix location designators. It resulted in anomalies such as broken plan number sequences within shelf/folio numbers, e.g. C-117-154-188 & 282-342. In this case, since the numbers between 189 and 381 had already been incorporated into shelf/folio C-118, the only thing to do was jump to the next unused sequence of numbers. The point at which

this scheme was introduced seems to have been at the time of the construction of the Northern Canal in 1846-47.

Normally, in a compound numbering scheme of the type originally employed by PL&C, one would expect to see the earliest sequential plan numbers falling within the earliest sequential shelf/folio number. However, that is not the case with these drawings. The earliest shelf/folio number is 105 (currently C-105) but it contains plans numbers 402-535. In fact, it is folio 114 (currently C-114) that contains drawings 1-61, followed by folio 115 (currently C-115) which continues with drawings 62-93. Both of these folios were devoted to the topic "Northern Canal. Sections 1 and 2. General Plans. Excavations. Masonry. 1846-47." Thus it seems that earlier classified numbering scheme for this drawings sub-series appeared about 1846 and that it must also have had to incorporate all the earlier drawings which had been generated up that time (over 200 by date from 1801 through 1845). Since James B. Francis was the chief engineer for PL&C at the time of the construction the Northern Canal, he may very well have developed this earlier classified plans numbering system. That could explain why drawing number 1 is a Northern Canal drawing rather than being the earliest drawing generated by PL&C Again, probably in answer to the awkwardness of the original compound numbering scheme, PL&C seems to have instituted, about the turn of the 20th century, a uniform plan numbering scheme for new drawings within which each numbered shelf/folio began its own internal sequence of drawing numbers starting with the number 1., e.g. 136-1>, 140-1>, etc.

PL&C Generated Drawings Collection Indices:

1. **The Card Index File.** This extensive subject index to the collection utilizes typed 4x6 ruled cards and is contained in a hardwood case that was evidently a custom-made by or for PL&C.

Intellectually, it is organized systematically using an alphabetically-arranged controlled subject-indexing vocabulary developed by PL&C. In this respect, it is similar in appearance and organization to library subject catalogues, albeit utilizing a much more restricted indexing vocabulary than Sear's or the Library of Congress List of Subject Headings. The broader subject headings (e.g. Boott Cotton Mills) can have secondary level subject groups within them (e.g. Waterwheels and Equipment) which can have, in turn, tertiary level subject groups within them (e.g. Draft Tubes). Tacked to the inside of the lid of the card file case is a typed list showing the subject-indexing vocabulary and the secondary and tertiary levels beneath whatever primary headings have secondary or tertiary level indexing. The subject cards themselves have either buff or blue colored tab divider cards to indicate their subject categories: buff for a primary subject level, blue for secondary and tertiary subject levels. Their subject headings reflect those of the typed list.

As with library subject catalogues, there can be multiple references in this subject catalogue to the same work since every drawing, like every book, is about more than just one thing. The entries on the subject cards consist of a subject heading at the tops of the cards with plan numbers and short form titles and, sometimes, dates and references to the type of the plan (e.g. BP, for blueprint) or the support of the plan (e.g. TP for tracing paper) listed below.

This was the finding aid that came with the collection when it was received by LOWE in 1989. Processing the collection was made more difficult by this subject index because it acted as only an imperfect check list owing to the existence of multiple entries, which often had conflicting or ambiguous information for the same plan number. For example, questions constantly arose as to

whether the subject card references were to original drawing or to copies of original drawings. In addition, it is not complete in that quite a number of drawings were found in the collection that were not listed in this index.

2. The Consecutive Index of Drawings Belonging to Proprietors of the Locks and Canals on the Merrimack River. This plan number index exists in the form of typed letter sized sheets. It functions in the same way as a library shelf list, that is, as a simple first number to last number list of the total plans collection with only one entry per drawing. It came to LOWE in 1997 with the final transaction between PL&C and LOWE for the disposition of the collection and has proven very helpful in resolving anomalies within the drawings collection itself. Its only drawback is that, like the card form subject index, it is not complete in that, again, quite a number of drawings were found in the collection that were not listed in this index (a selection forms Appendix 1).

3. Other lists. As noted above, under **PL&C drawings sub-series numbering schemes**, the Assets Division of Boott Mills sub-series, the Maps sub-series, and the Merrimack Valley sewers project of 1948 sub-series each had typed contents lists associated with them showing, at the least, a short form title (Appendices 4 and 5). The Maps sub-series list also numbered the maps starting with 1 and ending with 54. Like the Card Index File and the Consecutive Index, none of these lists was complete and each drawings sub-series contained many more drawings than were shown on its respective list.

Ultimate Disposition of the P. L. & C. Drawings Collection:

In October 1996, Lowell National Historical Park purchased the PL&C Architectural and Engineering drawings collection except for a selection of drawings donated earlier by the PL&C to what was then the Lowell Textile Institute (later incorporated into the University of Massachusetts, Lowell). The PL&C Consecutive Index of Drawings notes, on its [Pigeon Hole and Shelf Index Upper Vault](#) page, the shelf/folio numbers whose drawings were donated to the Lowell Textile Institute. They are: shelf/folio C-105, C-106, C-107, C-108, C-109, C-110, C-111, C-112, C-113, C-119, C-120, C-121, C-129, and C-130.

The drawings from that donation are currently maintained at the UMASS Lowell Center for Lowell History. There they have been entered into a shelf list on standard library catalogue cards and will also be found in the LOWE Access database for the drawings collection. Indeed, the entries in that database were made from the Center for Lowell History's shelf list in order to create a single, comprehensive list for entire collection. The drawings at the UMASS Center for Lowell History are given a location designator in comprehensive database for the collection.

The upper vault index page also notes that shelf/folio C-122 "Locks & Canals Office Plans" is "Gone" and that shelf/folios C-123 and C-124, both holding "Old Land Plans", were "not indexed". In fact, these notations are accurate in that no C-122 drawings were found in the processing of this collection and that C-123 and C-124 drawings do not appear in either the Card Index File or the Consecutive Index of Drawings.

The drawings collection is, however, only one element in the larger PL&C archives. Other elements are its 1) Photographs collection, 2) Directors' Records, 3) General Files, 4) Deeds, 5) Flowage Records, 6) Tax Records, 7) Stock Records, 8) Physical Data of Canal Operations

Records, and 9) 355 volumes of management records including papers of the early principals of the company such as James B. Francis and Uriah Boyden, at the Baker Library, Harvard Business School.

The Photographs collection, like the drawings collection, is shared between Lowell National Historical Park, which holds the bulk of the historic prints, and UMASS Lowell Center for Lowell History, which holds the glass plate negatives and some historic prints. The photographs held by LOWE have been catalogued and are publicly accessible through the National Park Service web catalogue beginning with number LOWE-7001. The glass plate negatives held by UMASS Lowell Center for Lowell History have been reproduced and printed and are publicly available there on-site. In addition, according to its inventory, Baker Library also holds a small number of photographs relating to canal construction.

The Directors' Records and General Files are held by Lowell National Historical Park under catalogue number LOWE-5058. They have been processed and have had a comprehensive finding aid produced for them. According to its inventory, Baker Library holds microfilm copies of the Directors' Records.

The Deeds, Flowage Records, Tax Records, Stock Records, and Physical Data of Canal Operations Records are also held by Lowell National Park under catalogue number LOWE-5058. They too have been processed and have had a comprehensive finding aid produced for them as well. Again, according to its inventory, Baker Library holds some of the types of records noted above as Physical data of Canal Operations such as Daybooks (1826-1831 and 1839-1845. LOWE holds six daybooks covering the period 1853 through 1883) or Computations on Northern Canal 1846-1848.

The large body of PL&C business records was donated to the Baker Library, Harvard Business School, in 1960 has been processed by them to the point where an inventory exists for their holdings.

The Collection as Administered by Lowell National Historical Park:

The Inventory Process:

Although Lowell National Historical Park only took formal title of all the drawings collections through purchase on October 24, 1996, its responsibilities to the Numbered sub-series, the Maps sub-series, and the Massachusetts Mills sub-series began with the signing of a Memorandum of Understanding of June 20, 1984, between the PL&C and LOWE regarding the disposition of the drawings. Thus, the National Park Service provided funding for professional conservation for the earliest of the Numbered sub-series of drawings covered by the terms of that agreement. This MOU also stipulated that a loan agreement would be arrived at between the two parties. This was effected in October, 1989, and it gave LOWE the right of first refusal in any future purchase of the collection. The loan agreement stipulated that LOWE would inventory the drawings collection.

At that point, the inventorying of the collections began in earnest. The LOWE Collection Manager developed a uniform manual inventory spreadsheet form and the process of entering drawings data onto that form began. The collection, as it was received in 1988, was accounted for on these forms, folio by folio, pigeon hole by pigeon hole, drawing by drawing. Thus, the manual inventory serves to document the "original" order of the collection as it was received by LOWE

from PL&C This is worthy of note here since the order in which those drawings were received was not the order in which PL&C intended them to be maintained according to its finding aids. In fact, the mildly chaotic order in which the drawings were received represented substantial disorder in terms of the organizational structure for them created by PL&C itself as shown in its finding aids. Returning the collection to the order intended for it by PL&C, then, would be part of the final product of the processing of the collection. The inventory process would also reveal the inclusion of the Maps and Massachusetts Mills drawings with the Numbered sub-series of drawings although they are not to be found in either the Card Index File or the Consecutive Index of Drawings.

In addition to acting as a record of the order in which the Numbered sub-series, the Maps sub-series, and the Massachusetts Mills sub-series collection was received, the manual spreadsheet inventory form was created with the ultimate objective in mind of generating an electronic database from it. It should be noted here that the Assets Division of Boott Mills drawings, the LIDC boiler sub-series drawings, and the Merrimack Valley sewers sub-series drawings were entered directly into their respective data files without being first entered first onto any manual inventory form. Advances in computer technology by 1997 had made a one step inventory process much more feasible that it had been in 1988 although the same basic data entry matrix, which reflected the old manual inventory form, was used for all of the component drawings sub-series.

That goal was accomplished and since the database incorporates both the LOWE portion of the Numbered drawings sub-series and the UMASS Lowell Center for Lowell History portion of the Numbered drawings sub-series as well as the other five drawings sub-series, and all of the information contained in both the PL&C generated Card Index File and Consecutive Index of Drawings and its Other Lists, it serves as the most complete and comprehensive access tool the total collection that currently exists.

The P. L.& C. Drawings Databases in Detail:

All six of the drawings databases are basically constructed in the same way as the original Numbered sub-series database is constructed. The data fields in order from left to right are as follows: Plan Number, Title, Date, Scale, Draftsman, Dimensions, Medium, Support, Type, Condition, Conserved, Notes, LC Topic, LC Index 1, LC Index 2, LC Index 3, Inventory Page Number, Location, Photo Negative, Photo Print, Photo Transparency. This is from the most fully developed example of a database record, namely, the Numbered sub-series of drawings.

Other sub-series may have fewer fields. If there would be no potential data for input into a particular field in a given sub-series, that field was not created for that sub-series' database. For example: the Assets division of Boott Mills sub-series, Lowell Industrial Development Company boiler sub-series, and the Massachusetts Mills sub-series do not have a Type field since there were no indexes or lists for these sub-series to compare the received body of drawings against. Again, most drawings sub-series do not have a Draftsman field since only historically significant draftsmen (e.g. James B. Francis, Uriah Boyden, etc.) were recorded in this field and the drawings in most of the sub-series were not produced directly by such individuals. Only one drawings sub-series uses a field unique to that sub-series, namely, the Assets Division of Boott Mills sub-series which uses a field titled Other Numbers. Most of the drawings in this sub-series are copies of drawings from other sub-series and, as copies, they bear the plan numbers of the originals from which they were made. Although those numbers were not applied by PL&C to

these drawings in this drawings sub-series, it proved useful to record them for cross-referencing purposes.

Data fields primarily used for drawings management purposes:

The fields Dimensions, Condition, Conserved, Inventory Page Number, Location, Photo Negative, Photo Print, and Photo Transparency are basically object management fields and do not contain information that really contributes to any genuine understanding of any of the drawings. The Dimensions are recorded for defining storage configuration needs; Condition is recorded to aid in defining potential conservation needs; Conserved defines whether, when, and by whom a plan has had professional conservation; Inventory Page Number is recorded in order to find the original manual inventory entry (there are 2426 pages in the manual inventory) in the event it has to be consulted; Location records a plan's current storage location which makes retrieval and refiling possible and also can be used for inventory control and management; the three Photo fields identify the location of any contemporary photographic copy of drawings regardless of format of why they were produced.

Data fields primarily used for description and understanding of the drawings:

The fields that are significant for understanding the drawings are Plan Number, Title, Date, Scale, Draftsman, Medium, Support, Type, Notes, LC Topic, LC Index 1, LC Index 2, and LC Index 3.

The Data Fields Described:

Plan number: The plan number is, of course, a fundamental element. Each drawing has to have a unique identifier and that identifier is the plan number. The individual numbering schemes for the various plans sub-series have been described above under P.L. & C. drawing sub-series numbering schemes and, thus, do not need to be repeated here. But it is necessary to define the use of square bracketing in the plan numbers as they appear in the databases because this bracketing was not developed by PL&C but, rather, represent LOWE inclusions.

Square brackets indicate elements in a plan number that came from some source other than PL&C

Because the database was prepared in Access, which does not support highlights such as Italics, or bolding, square brackets were the only device available to identify plan number elements that needed to be added by LOWE staff in order to provide a complete and unique drawing number and, thereby, properly incorporate plans left partially numbered or completely unnumbered by PL&C into the database. Most commonly, square brackets involve copy numbers added by LOWE to otherwise complete PL&C plan numbers, as found on the plans themselves or in the Card Index File or the Consecutive Index of Drawings (e.g. 131-001 and 131-001-[Copy 1]), where the number on the copy did not have such a suffix. This inclusion was necessary for database creation purposes but at the same time needed to be highlighted as not part of the original PL&C number as found.

In addition, wherever another plan number element was needed to make a complete number, square brackets were used in the same way, for example C-118-[345], where this drawing was found bearing the shelf/folio number C-118 without a plan number. In this case, LOWE added what would have been the next number added by PL&C if PL&C had numbered the drawing itself (C-118-344 having been the last actual number applied to a plan in this shelf/folio by PL&C).

There are other examples but they do not have to be explicated here since the general principle should be clear from the foregoing. Suffice it to say, again, that square brackets indicate elements in a plan number that came from some source other than PL&C

Title: The title is also a fundamental drawing element and titles were transcribed literally from their sources. Sources for titles are the drawings themselves, the Card Index File, the Consecutive Index of Drawings, the entries in the catalogue records created by the UMASS Lowell Center for Lowell History for the drawings it holds, and on very rare occasions, LOWE staff.

Since the titles were usually found on the drawings in title blocks, wherein they were arrayed in text lines broken to create an aesthetically appealing appearance, the line breaks created their draftsmen recorded, as found, in the title fields in the database by the use of slashes thus ...(text)/(text)... in order to preserve the sense of the title as it appears on the drawing itself. This form of title entry also unexpectedly became helpful in determining the proper plan numbers for many titled but unnumbered drawings. This convention, however, applies only to titles found on actual drawings.

Whole titles taken from any source other than the drawings themselves are recorded in square brackets. This applies to all untitled plans that were otherwise identifiable and to all plans whose titles were transcribed from the catalogue card entries of the UMASS Lowell Center for Lowell History. If more than one external source was used to construct a title, each element is bracketed separately. For example, drawing C-121-2761 is in the collection of UMASS Lowell Center for Lowell History and was given by them the title “Proprietors of the Locks and Canals on the Merrimack River. Tube.”, undoubtedly from the drawing itself. However, the title as shown in the database for drawing C-121-2761 reads “[Plans & Sections of Apparatus used in Experiments on Diffuser Pipes.] [Proprietors of the Locks and Canals on the Merrimack River. Tube.]”. Thus the database uses both the UMASS Center for Lowell History transcribed drawing title and information from the PL&C Consecutive Index of Drawings to provide more complete title information while clearly indicating that two different external sources provided that information.

This convention also applies to title elements added by LOWE staff from the PL&C Card Index File, the Consecutive Index of Drawings, or any other outside source, to drawings that have titles but whose titles were excessively laconic or lacking in important specifics. The reasoning was that if PL&C itself enhanced its drawings titles with clarifying information in its own finding aids, such clarification should be respected by being incorporated into the LOWE database as well. For example, drawing C-126-3138 bears the title “Bridge over Pawtucket Canal, as Rebuilt in 1880” but the title as shown in the database reads “[Plan & Sections of Trussed Stringer of] Bridge over Pawtucket Canal, as Rebuilt in 1880” after the inclusion of further title information from the Consecutive Index of Drawings.

Lastly, it should be pointed out that title information in the database appears in full capital letters rather than mixed upper and lower case letters both for ease of reading and in order to avoid the idiosyncratic usages of case that appear on the plans themselves. The only exception is in the use Mc or Mac.

Date: A uniform convention was developed by LOWE for this data field irrespective of any date form that appeared on any drawing, any list or index, or on records received from UMASS Lowell Center for Lowell History. The date form applied consists of year/month/day, e.g. 1900/10/22. This conventional date form allows the entire database to be displayed in date order,

which was very helpful during the inventory and analysis phase of the processing of this collection. It also allows for very convenient searching of the database by date range, e.g. the month of March, 1922.

The only caveat here is that not every drawing bears a date. If the Card Index File or the Consecutive Index of Drawings were also lacking dates for drawings that did not bear them, there is no way of finding such drawings through searching the date field in the database. This is worth noting since about 20% of the drawings in the collection lack formal dates. However, less than half of these drawings are totally dateless. Of the 20% lacking formal dating, 60% have title or other information that would enable a user to place the drawing in either a span of time or infer a specific date. In such cases, the notations “SEE TITLE” or “SEE NOTES” appear in the date field and refer the user to the Title field or the Notes field of the database record where some type of date information (e.g. a dated watermark on the drawing paper) will be found. Those drawings that are truly dateless, under 10% of the total collection, bear the note “UNDATED” in the date field. The only other exceptions to the date field convention involve drawings with months or days of the month given but without a year, e.g. 0000/02/07. There only four such drawings in the total collection.

There are no blank date fields in the database as it would be self-defeating to create a field by which the database could be meaningfully ordered but create records for it that would be outside the scope of meaningful order. When the database is put in date order, Access places the numerical dates in order first, followed by the text entries in alphabetical order.

Scale: The drawing scale is usually entered in the database as it is found on the drawing. A surprising number of drawings did not bear formal scales. Unusual scales (e.g. Marquis scale) are entered in the Notes field with the reference “SEE NOTES” in the Scale field.

Draftsman: This field records only historically significant draftsmen. These include George R. Baldwin, John F. Baldwin, Kirk Boott, William Boott, Uriah A. Boyden, James B. Francis, Hiram Mills, Patrick Tracy Jackson, Benjamin Mather, and George Whistler. Only 150 the drawings in the Numbered plans sub-series were drawn by, or at least supervised by, these men and the majority of those drawings, 68 or 45%, were by James B. Francis. The names are into the field entered last name first in order that the field can be displayed in a useful alphabetical order.

The only two plans sub-series to employ the Draftsman field are the Numbered sub-series and the Maps sub-series and in the case of the Maps sub-series, which is largely published material, the “Draftsman” name is as often the name of publisher of the map as it is the individual who actually drew it (in many cases they were one in the same). However, it is still useful to have this information accessible in a discrete field where it is easily retrievable and able to be displayed in alphabetical order.

Medium: These drawings sub-series span a wide period of time and, because of this, the image rendering media employed in their creation are quite varied. They range from black ink, colored ink, water color, graphite and colored pencil, which were used commonly in all periods, to copying techniques used largely from the later 19th century to the 1980s.

Early 19th century copies were made by hand using the same media as the original drawings themselves. Another copy method was to use lithographed base-drawings and to add details to each copy by hand. By the 1880s blueprint copying processes were beginning to appear later to be followed by diazo process copying. Other forms of copy process were usually photographic in

nature with positive and negative images appearing on paper and on transparent supports, once chemically stable sheet-form substrates, such as acetate, began to appear in the 1930s. All of these processes are represented in the PL&C drawings collection.

Support: Because these drawings sub-series span a wide period of time there is a wide range of image supports, or substrates, to be found in the collection. It should also be noted that the drawings were produced in a wide range of sizes on the wood-pulp paper and drafting cloth supports probably because PL&C procured these supports in roll form and simply cut the stock to fit its perceived drawing size need. The cotton-rag paper and mylar or film supports were very likely produced in sheet form by their manufacturers which makes them more uniform in size, and often smaller, than the other supports. Sheet form supports also require the drawing on them to be fitted to the support rather than fitting the size of the support to the needs of the drawing.

Quite a number of drawings made between 1820 and 1863 are found on high quality cotton-rag English laid paper manufactured by J. Whatman, Turkey Mill, Kent. An American manufacturer of laid paper, J. Robeson of Philadelphia, is also found in drawings from the 1840s.

Sized cotton drafting cloth, sometimes referred to as “linen”, was used by PL&C for drawings from 1834 to well into the 20th century. Together with the laid paper, drafting cloth represents the most durable of the supports.

The availability of low-cost wood-pulp papers following the Civil War caused such paper to be routinely used for drawings as well as a publishing and host of other purposes. Since its availability coincided with the era of cyanotype blueprint copying and preceded the era of diazo copying, copies from these drawings sub-series in these rendering media are on such paper and suffer accordingly.

A small group of sheet safety film negative copies was produced by PL&C in 1955 and a negative copy on sheet acetate of a 1923 graph was produced at an unknown date.

Drafting mylar was used to by PL&C produce a another small group of drawings in 1957. Both film and mylar were very minor supports in this collection largely because PL&C was in a state of contraction by the time that these supports were becoming significant in the realm of architectural and engineering drawing production.

Type: This field was developed during the processing of these drawings in order to provide a quick reference to their existential status. During the processing phase four categories were necessary to understand any given drawing’s status.

They are:

Type A. Drawings whose existence is known from either from the Card Index File or the Consecutive Index of Drawings or the unnumbered title lists for the Assets Division drawings, the Maps, and the Merrimack Valley sewer sewers project but which were not received by LOWE from PL&C

Type B. Drawings whose existence was known from those indexes and lists and which were received by LOWE from PL&C

Type C. Drawings which were received by LOWE from PL&C but whose existence was not recorded in those indexes and lists as such.

Type D. Numbered sub-series drawings donated by PL&C to Lowell Textile Institute, now UMASS Lowell and its Center for Lowell History, prior to 1984.

Type A drawings were not received by either institution nor are they held by PL&C and are probably no longer extant. In fact, the fate of one group of type A plans (shelf/folio C-122 “Locks & Canals Office Plans”) is stated on the Consecutive Index of Drawings upper vault index page as “Gone”.

Since the completion of collection processing, the distinction between types B and C has basically become moot. In point of fact, both type B and type C drawings are owned by LOWE and the National Park Service. Type D plans continue to be owned by UMASS Lowell but this type designation applies only to Numbered sub-series drawings since PL&C did not donate any plans from the other five sub-series to Lowell Textile Institute or its successor.

Notes: The Notes field is the only field in the inventory designed to receive extraneous information. It was provided for the inclusion of information considered significant, or at least potentially significant, by staff processing the collection but which had no other logical place to be put in the inventory matrix. In practice, much of what appears in the Notes field does come from PL&C sources, such as notations appearing on the drawings or from the finding aids, but inventory staff could add observations of their own such as “This plan number was used twice by PL&C” to assure any user of the database that a duplicate plan number was, in fact, created by PL&C and was not the result of processing error.

Over time, the notations in this field have shown themselves to be very helpful in locating drawings and it is well worth searching the Notes field in addition to the Title field when using the database to do comprehensive searches.

Other numbers: This field applies only to the Assets Division of Boott Mills drawings sub-series and is not found in any other datasheet. Most of the drawings in this sub-series are copies of drawings from other sub-series and, as copies, they bear the plan numbers of the originals from which they were made. Although those numbers were not applied by PL&C to these drawings in this drawings sub-series, it proved useful to record them for cross-referencing purposes.

Locks and Canals topic: This field did not originally exist in the database but was added after the Consecutive Index of Drawings was found in the PL&C Files. It reflects the subject or topic covered by the individual folio/shelves or pigeon holes of Numbered sub-series drawings as defined by PL&C in that Consecutive Index. Like the Card Index File it employs a controlled indexing vocabulary but not the same one as the Card Index File and that is the key to its value since it provides yet another way or accessing or understanding the drawings. All drawings have Locks and Canals Topic indexing. Appendix 1 provides examples of the topic headings created by PL&C for the folio/shelves and pigeon holes.

Unlike the index headings used in the Card Index File, which apply to individual drawings, the topic headings from the Consecutive Index of Drawings apply to large groups of drawings and thereby act as categorical descriptors, as opposed to the discrete descriptors used by the card

index. As a searchable field, it provides one more avenue of approach to locating the drawings any given searcher might be attempting to find.

Historically, searching plan titles for key words was not a viable search strategy option. The computer has made that possible now and, thus, key-word-in-title searches would probably be the first choice of users today. Thus, these topic headings are not as crucial today as in the past but they can still be of great utility as long as the user has access to the controlled indexing vocabulary used to create them.

Basically this field was developed for the Numbered sub-series of drawings but it has been employed by LOWE for use with the Maps sub-series and the Assets sub-series as well since they also had their own broad categories applied to them in their PL&C finding aids.

Locks and Canals index 1: This is the primary level of indexing used in the Locks and Canals subject Card Index File. All drawings have indexing at this level and that includes Type C drawings, which were not located as such in the Card Index File. In many cases Type C drawings were copies whose originals were located in the card index but were not shown in the index in any copy form. This distinction was logical and helpful at the beginning of the inventory process prior to the advent of the consecutive index because PL&C often (but not always) noted on the index cards if a drawings were a BP (blueprint) or a TP (tracing paper, but often a misnomer for drafting cloth which is as efficient as tracing paper for making copies) drawing but was no longer really significant after completion of the inventory process. Because of this, PL&C card index information was added by LOWE staff based on the indexing for the original from which the copy was made or on the subject of the plan, if discernable, in order that all drawings be searchable at this primary subject level. In a few cases this was not possible and the note "Not Assigned by PL&C" was entered in order that the field not be left blank and give the impression of being an oversight.

Locks and Canals index 2: This is the secondary level of indexing used in the Locks and Canals subject Card Index File. Unlike level 1 indexing, which PL&C applied to every drawing, they applied this level of indexing only if they believed index level 1 subjects warranted further subject breakdown. In practice, the majority of index level 1 subject headings were not developed to the secondary level.

Locks and Canals index 3: This is the tertiary level of indexing used in the Locks and Canals subject Card Index File. Indexing to this level was only used with drawings relating to the textile manufacturing firms or Saco-Lowell Shops and, even then, many drawings relating to those entities did not require subject breakdown to a third level of specificity. It is clear from the database how many fewer drawings required subject indexing to this level than even to level 2.

Appendix 3 provides the hierarchical outline structure created by PL&C for the generation and maintenance of the Card Index File and shows all of the subject headings employed by PL&C. This index and the fields it uses in the database apply only to the Numbered sub-series of drawings since, unlike the Consecutive Index of Drawings, the other sub-series have no analog to the Card Index File.

Searching the Databases:

The database format for each sub-series of drawings is basically the same structure with more or fewer fields depending on the data provided by or about each sub-series. The first and the fullest manifestation of a database is that for the Numbered sub-series of drawings. The others contain either the same number or fewer fields than the Numbered sub-series database. The only exception to this general rule is the Other Numbers field in the Assets Division of Boott Mills drawings database, which is unique and whose function is described above.

Since the datasheet for each sub-series uses the same basic matrix, they are easily comprehended when moving from one drawing sub-series to the next. In addition, they all function the same way. For example, any datafield in any drawings sub-series can be searched for any specific search term for that entire drawings sub-series. Simply highlight the datafield, in column, and click on the binoculars icon in the Access toolbar. When the “Find and Replace” window pops up, enter your search term but be certain to select “Any part of Field” in the “Match” block rather than “Whole Field”. Traditionally this feature is most often used for Title and Notes field searches since they are the largest narrative fields and contain the type of data most amenable to word searches. But any field can be searched in this way. The other choices in the “Match” block are not as useful as “Any part of Field” for general searching.

Another helpful function is the ability to arrange any datafield in alphabetical or numerical order for an entire drawings sub-series. Again, simply highlight the datafield, in column, and click on the binoculars icon in the Access toolbar. When the “Find and Replace” window pops up, enter your search term but be certain to select “Any part of Field” in the “Match” block rather than “Whole Field”. This feature is particularly useful with the Plan Number field, the Date field, the Type field, the Locks and Canals Topic field, the three Locks and Canals Index fields, and the Location field.

This ability permits the use of the Location field as an inventory control field by identifying drawings as well simply a drawing locator field. For example, used this way the drawings can be arranged in folder number (created by LOWE) order within shelf/folio (created by PL&C) The only drawback is that the drawings within that field order do not display in plan number order but entry order. However, this is only a minor inconvenience.

For the other fields, arranging the data in hierarchical order by that field enables one to 1) keep the drawings sub-series data in plan number order or return them to that order as the basic order, 2) arrange the sub-series data in date order to easily survey plans grouped by year, and within year, by month and day, 3) easily survey the entire sub-series by holder and group all Type A (not received) plans together, 4) arrange and search the drawings by their PL&C Topic headings (if they apply to the sub-series one is searching), and 5) arrange and search the Numbered sub-series drawings in PL&C Card Index File headings. As with the arranging the database in the Location field order, the drawings within that field order do not display in plan number order but entry order.

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Appendix 1

Consecutive Index of Drawings Belonging to Proprietors of the Locks and Canals on the Merrimack River: Cover sheet, Upper Vault (C- prefix) and Lower Vault summary sheets, and example of first sheet of detailed C- prefix (Upper Vault) drawings list. Because this index is both incomplete and 330 pages in length, it is not appended in full. The C- prefix detailed sheet is included to illustrate how that prefix's function was discovered given the fact that the Upper Vault summary sheet created by P.L.& C inexplicably does not show the C- prefix. This index was created by the Proprietors of the Locks and Canals.

Appendix 2

Proprietors of the Locks and Canals Architectural and Engineering Drawings Collection: Numbered Drawings Sub-series Topic Headings

This list was created by LNHP staff to supplement the Consecutive Index of Drawings Upper and Lower Vault summary sheets by providing a current and complete list of the folio/shelf and pigeon hole topic headings. This was necessary because those summary sheets, as created by P.L.& C., are incomplete in this respect due to the fact that they had not been properly updated by them. Thus, this list provides the necessary indexing vocabulary for searching the LCTOPIC field in the database.

These topic headings were taken from the individual shelf/folio and pigeon hole lists generated by P.L.& C. as constituent parts of the Consecutive Index of Drawings. They represent a more complete list than sum of those headings found on the Upper Vault and Lower Vault summary sheets alone because those summaries were properly not updated by P. L.& C. This list is meant to supplement those vault summary sheets, which are also part of this Appendix, in order to provide a complete list topic headings for database users wishing to search the database field LCTOPIC in the Numbered sub-series of drawings.

1936 FLOOD

AMOSKEAG MFG. CO.

APPLETON MFG. CO.

B. & M. R.R. TRACKS

BIGELOW CARPET COMPANY

BLACKWATER PROJECT

BOOTT COTTON MILLS

BOOTT PENSTOCK

BOYDEN PATENTS & ATLANTIC MILLS

BRIDGE STREET & MERRIMACK RIVER BRIDGE

BRIDGES

BRIDGES & CONCORD RIVER

BROADWAY BRIDGE AT PAWTUCKET CANAL

CANAL MARGINS & CANALS

CANAL SECTIONS
CANAL SYSTEM & PARTS, ALSO FENCES
CANALS
CANALS & SWAMP LOCKS
CANALS, SLOPES & BOOMS
CANALS, WASTEWAYS, & WASTE DAMS
CENTRAL STREET BRIDGE DRAWINGS
CENTRIFUGAL PUMPS
COLUMBIA TEXTILE & IPSWICH CO.
COLUMBIA TEXTILE & SACO-LOWELL
CORPORATION HOSPITAL
CROTON ACQUADUCT COMMISSION
DRAWINGS OF BOOTT MILLS 1700 HP UNIT
DYNAMOMETER
ELECTRIC INTERCONNECTION
FACTORY MUTUAL YARD PLANS
FIRST ST. BOULEVARD
FLOOD DATA
FLOW OF WATER IN PIPES & CONDUITS
FLOWAGE-FIFTH FLASHBOARD
GRIST MILL
GRIST MILL-KYANIZING & ROSIN OIL APPARATUS
HAMILTON MFG. CO.
HAMILTON WASTEWAY
HEAD GATES, GUARD GATES & DAMS

HUNTS FALLS
HUNTS FALLS & MERRIMACK RIVER
HYDRANT TESTS
J. B. FRANCIS FILE
L. & C. RESERVOIR
LAKE VILLAGE & BRISTOL N.H.
LAND PLAN OF CENTREVILLE
LAND PLAN OF LOWELL
LAND PLAN OF PAWTUCKETVILLE
LAND PLAN ON FIRST STREET
LAND PLANS
LAND PLANS AND CANALS
LAWRENCE MFG. CO.
LIVINGSTON SEWER
LOCKS & CANALS OFFICE PLANS
LOWELL INDUSTRIAL DEVELOPMENT CO.
MAP OF BOSTON
MAP OF NEW ENGLAND
MAP OF NEW YORK AND PENN.
MAPS
MAPS OF LOWELL
MASSACHUSETTS COTTON MILLS
MERRIMACK MFG. CO.
MERRIMACK MFG. CO. TURBINES
MERRIMACK RIVER

MERRIMACK RIVER HEIGHTS
MIDDLESEX CO.
MIDDLESEX MILLS
MILL YARD ELEVATIONS AND FLOOD HEIGHTS
MILL YARD PLANS
MISCELLANEOUS
MISCELLANEOUS TURBINE EXPERIMENTS
MISCELLANEOUS WATER MEASUREMENTS
MOODY ST. FEEDER & OLD GUARD LOCKS
NASHUA MFG. CO.
NASHUA RIVER
NORTHERN CANAL
NORTHERN CANAL GATEHOUSE
NOT ASSIGNED BY P.L.& C.
OLD GUARD LOCKS
OLD MILL YARD PLANS
PAWTUCKET BRIDGE
PAWTUCKET CANAL
PAWTUCKET DAM
PAWTUCKET DAM & STREETS & SEWERS
PIPE CROSSINGS & PIPE SPECIALS
PIPE LINES
PIPE LINES. 20 INCH
PIPE LINES. 24 INCH
POSTAL MAP

PRESCOTT MILLS
PROPOSED DEVELOPMENT OF NOS. 3, 4, & 5 WHEELS AT BOOTT
PROPOSED MERRIMACK RIVER CHANNEL
PROPOSED STREET
RAILROAD PLANS
RAINFALL
RESERVOIR & PIPE LINES
RESERVOIR PLANS
SACO-LOWELL & TREMENT & SUFFOLK
SACO-LOWELL SHOPS
SIPHON SPILLWAY
SMALL ORIGINALS
SUFFOLK MILLS
SUFFOLK STREET BRIDGE
SURPLUS POWER STATION PLANS
SWAMP LOCKS GATES
TAX ABATEMENT CASE 1933-1934
TRACING OF LAND PLANS
TREMONT & SUFFOLK MILLS
TREMONT MILLS
U. S. GOV. MAP OF NEVADA
W. E. BADGER PLANS
WATER WHEEL DISCHARGE DIAGRAMS
WATER WHEELS
WESTERN CANAL

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Appendix 3

Outline of Locks & Canals Card Index File. This index was created by the Proprietors of the Locks and Canals and appears to be complete. The two- and three-level indexing structure created by P.L.& C. for some subject headings is clearly illustrated in this outline. This list provides the necessary indexing vocabulary for searching the LCINDEX 1, LCINDEX 2, and LCINDEX 3 fields in the database.

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Appendix 4

Merrimack River Valley Sewerage Disposal, Plans, Diagrams, Etc. This abbreviated drawings titles list was created by the Proprietors of the Locks and Canals and affixed to the large manila envelope in which the drawings were found.

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Finding Aid

Appendix 5

Assets Division of Boott Mills plans case drawer lists.

These abbreviated drawings titles lists were created by the Proprietors of the Locks and Canals. One copy of each list was found in the drawer with the plans to which it pertained. Neither the drawers nor the lists were numbered. The list headers were use by LNHP staff in creating the database for these drawings in the same way as the list headers in the Consecutive Index of Drawings were used for the Numbered sub-series of drawings, that is, to provide the necessary indexing vocabulary for searching the LCTOPIC field in the database.

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Finding Aid

Appendix 6

Map list. This list was created, classified, and numbered by the Proprietors of the Locks and Canals. The group headers were use by LNHP staff in creating the database for these drawings in the same way as the list headers in the Consecutive Index of Drawings were used for the Numbered sub-series of drawings, that is, to provide the necessary indexing vocabulary for searching the LCTOPIC field in the database.

