



IN REPLY REFER TO:

United States Department of the Interior

NATIONAL PARK SERVICE
Lowell National Historical Park
67 Kirk Street
Lowell, Massachusetts 01852-1029

February 3, 2021

Kevin M. Webb, Licensing Manager
Central Rivers Power
Boott Hydropower, LLC
Subsidiary of Central Rivers Power US, LLC
670 N. Commercial Street, Suite 204
Manchester, NH 03102

**RE: REQUESTED INFORMATION in response to
Central Rivers Power letter dated 01/20/2021 2019-2020**

**Lowell Hydroelectric Project (FERC No. 2790-072) Water Level and Flow Effects
on Historic Resources Study**

Dear Mr. Webb:

We are in receipt of your January 20, 2021 letter regarding the Lowell Hydroelectric Project (FERC No. 2790-072) Water Level and Flow Effects on Historic Resources Study and Central Rivers Powers' request for "*records of previous damage, maintenance, or repairs to structures along the Upper Pawtucket or Northern canals that have resulted from Project-related flows or water levels.*"

Lowell National Historical Park reviewed your request and the historical structures located in proposed licensing area at the Northern Canal and Upper Pawtucket Canalway for adverse effects to historical structures that have resulted from the Lowell Hydroelectric Project (Project) and related flows or fluctuations in water levels and water level events.

Changes to the elevation of water or flow rates throughout the system directly affect the condition of historic resources as well as public recreational access to and within the canals. Abnormally high-water levels in the Northern Canal, for example, have caused damage to wooden structural elements of the Northern Canal Waste Gatehouse and structural undermining of the Great River Wall. A high-water backflow event in August 2018 at the Northern Canal Gatehouse (also known as Pawtucket Gatehouse) damaged existing lock chamber gates that had been secured in the closed position for safety.

The combination of high-water levels and debris movement have also resulted in impact damage at Guard Gate Complex (Francis Folly) at the upriver side of the Guard Gate Complex Sluice

Gatehouse (Guard Dam) exterior siding, windows and lower level access doorway and granite steps.

Conversely, extended drain downs and low water levels have caused damage to historic turbines and waterwheels made of wood and leather elsewhere in the system. There is also a correlation between water levels and flows and trash accumulation and vegetation growth previously documented in other sections of the canal way system.

Documented damage to Historical Structures by Water Level and Flow Effects – Pawtucket Canalway and Guard Gate Complex

Upper Pawtucket Canal – Guard Gate Complex

The 1796 Pawtucket Canal was originally built as a transportation canal to circumvent the Pawtucket Falls of the Merrimack River in Lowell, Massachusetts. The Pawtucket Canal Guard Dam was designed to protect from flooding downstream into downtown Lowell. The first 1st dam on site was constructed in 1822; replaced after 1831 flooding; and raised higher in 1848 & rebuilt 1870. The Guard Gate Sluice Gatehouse incorporates hydraulic lift system developed by Eng. J. B. Francis. It is on the National Registry of Historical Buildings (LCS # 040588), Management Category A, must be preserved and maintained.

The park operates tour boats that travel through the complex locks as part of their presentation of the canal history, making the preservation, operation and interpretation of the complex essential to the operation of the park and integral to the cultural landscape of the Pawtucket Canalway.

High river water events and debris impacting the Guard Gate Sluice Gatehouse (Guard Dam) have caused damage to the upriver clapboard siding, mid-level windows and lower level access doorway and resulting in washout of existing granite steps. The Park is in the process of obtaining funding to perform a pre-design scoping report to be used in the preparation of contract documents for repairs and rehabilitation to the Guard Gate Sluice Gatehouse and the Lock House Gates and Lock Chamber.

The following supporting documents identifying areas of adverse effects are being transmitted for CRP's information and use:

- A. Guard Gate Complex, "Binder1_Francis Gate HAER Documents.pdf"
- B. Guard Gate Complex, "Guard Gate Sluice Gatehouse EX Photos.pdf"

Documented damage to Historical Structures by Water Level and Flow Effects – Northern Canal and Northern Canal Guard Gate and Northern Canal Waste Gate and Great Wall

Northern Canal Guard Gate Complex

The Northern Canal Guard Gate Complex is a multi-component site, parts of which, in one form or another, have been continuously operating or in place since 1792. This site contains the guard sluice gates, their brick gate house, and a navigation lock, all part of the northern canal construction project of 1846-1847. The ten sluice gates were operated by a mechanical system that consisted of a turbine located in a chamber beneath the deck of the School Street Bridge. The complex serves as the entrance to the Northern Canal from the Merrimack River for water

flow to the Project and in prior years for NPS interpretative and educational boat tours. The Guard Gatehouse contains Chief Eng. J. B. Francis' control system: inward-flow turbine worked 20 large hoisting screws to raise/lower sluice gates in 1848. The turbine is still in place under the bridge, but the gates now operate electrically.

It is on the National Registry of Historical Buildings (LCS # 040593), Management Category A, must be preserved and maintained for its significance with industrial history.

The lock chamber gates were secured in place in the years leading up to a significant backflow water event, that pushed waters down the Northern Canal from the Project towards the Guard Gate Lock Chamber gates in August 2018 that resulted in damage to the gate ends where they overlap and preserve a water seal to the lock chamber. Since that event, the gates had been chained to secure and limit movement, but the seal was not intact due to timber damage. In Fall 2020, in coordination with NPS, the gates were removed to an off-site location for repairs and rehabilitation by CRP. CRP also removed a sunken barge and debris from the upriver side of the complex.

Historical gate construction document drawings were provided to CRP for repair and rehabilitation work on the gates. NPS continues to provide consultation to CRP, and their contractor, as the repairs and rehabilitation work progresses.

The following supporting documents identifying areas of adverse effects are being transmitted for CRP's information and use:

- A. Northern Canal Guard Gate, "Binder1-Pawtucket Gatehouse gate drawings 1.pdf"
- B. Northern Canal Guard Gate, "Binder1-Pawtucket Gatehouse gate drawings 2.pdf"
- C. Northern Canal Guard Gate, "Binder1-Pawtucket Gatehouse gate drawings 3.pdf"
- D. Northern Canal Guard Gate, "Binder1-Northern Canal Lock Gates - EX Photos Fall 2020.pd

Northern Canal Waste Gate Gatehouse and Great Wall

The Northern Canal Waste Gate Gatehouse consists of a single-story, heavy-timber-framed building that measures approximately 70' by 15' in plan. The building was built circa 1872 atop a dam that was built circa 1847 and houses the canal gates, including the machinery that operates the Gatehouse gates. The Gatehouse straddles the top of the Great Wall. It is on the National Registry of Historical Buildings (LCS # 40602), Management Category A, must be preserved and maintained for its significance with industrial history.

This Gatehouse site, "which comprises the downstream end of the Great River Wall, originally included four waste gates and their manually powered operating machinery, along with a waste weir divided into multiple bays by cast iron standards. These works were completed in 1847 as part of the Great River Wall project. Major modification took place in 1872 when one of the scouring holes was converted into a wheel pit where a turbine was installed to power mechanical gate operating equipment which was added atop the original manually operated mechanisms. At the same time, a flat roofed heavy timber framed building was erected over the waste gates, and a hip roofed light timber framed building was built over the waste weir."

In 2017, NPS retained an architecture and engineering team from EYP, Inc. to perform a historic structure pre-design scoping report in order to prepare repair and rehabilitation contract documents for extensive damage to structural carrying timbers and foundation caused by years of high-water levels in the Northern Canalway that have undermined the timber carrying beams

through rot and also timber horizontal bending due to high water loading estimated as a condition occurring early 1990's up to installation of river bladder dam structure). EYP, Inc. developed a complete set of drawings and specifications and a Class-A government estimate of construction costs to repair the Gatehouse structure.

The following supporting documents identifying areas of adverse effects are being transmitted for CRP's information and use:

- A. Northern Canal Waste Gate Gatehouse EX Photos, (FOLDER W/ field photographs from 2017).
- B. Northern Canal Waste Gate Gatehouse, "NPS LOWE - Northern Canal Waste Gatehouse Project Scoping Report 2017.pdf"
- C. Northern Canal Waste Gate Gatehouse, Construction Documents, NPS;
 1. "NCWG-2018-06-28 100% drawings.pdf"
 2. "NCWG-2018-06-28 100% specifications.pdf"
 3. "NPS Lowell - Northern Canal Waste Gatehouse - Class A Estimate 20180202.pdf"

The Study Summary for the Water Level and Flow Effects on Historic Resources states that the scope for study will include review of existing architectural and engineering documentation of the condition of the Great River Wall and various other historic structures. NPS has not studied the cumulative, long-term and potentially adverse effects of operating higher water levels and flows than the 1847 system was designed for in relation to the structural integrity of the Great River Wall. The details for this concern were filed in the April 9, 2020 NPS Comments on the Initial Study Report. In the study request and following filings, NPS requested a condition assessment of the Great River Wall by a structural engineer to understand the Project affects on the historic resource.

The Park also previously requested that future water levels and flows as a result of reasonably foreseeable changes to the Project operation, such as decommissioning certain facilities or modifying operations for fish passage, be evaluated for impacts to historic resources. These Project changes have not been evaluated by NPS and therefore, we do not have records to share out, but would like to see an evaluation in the study report.

On behalf of the Lowell National Historical Park, I would like to thank you for requesting the additional information that will assist in Central Rivers Powers' development of the Water Level and Flow Effects on Historic Resources Study section of the relicensing report.

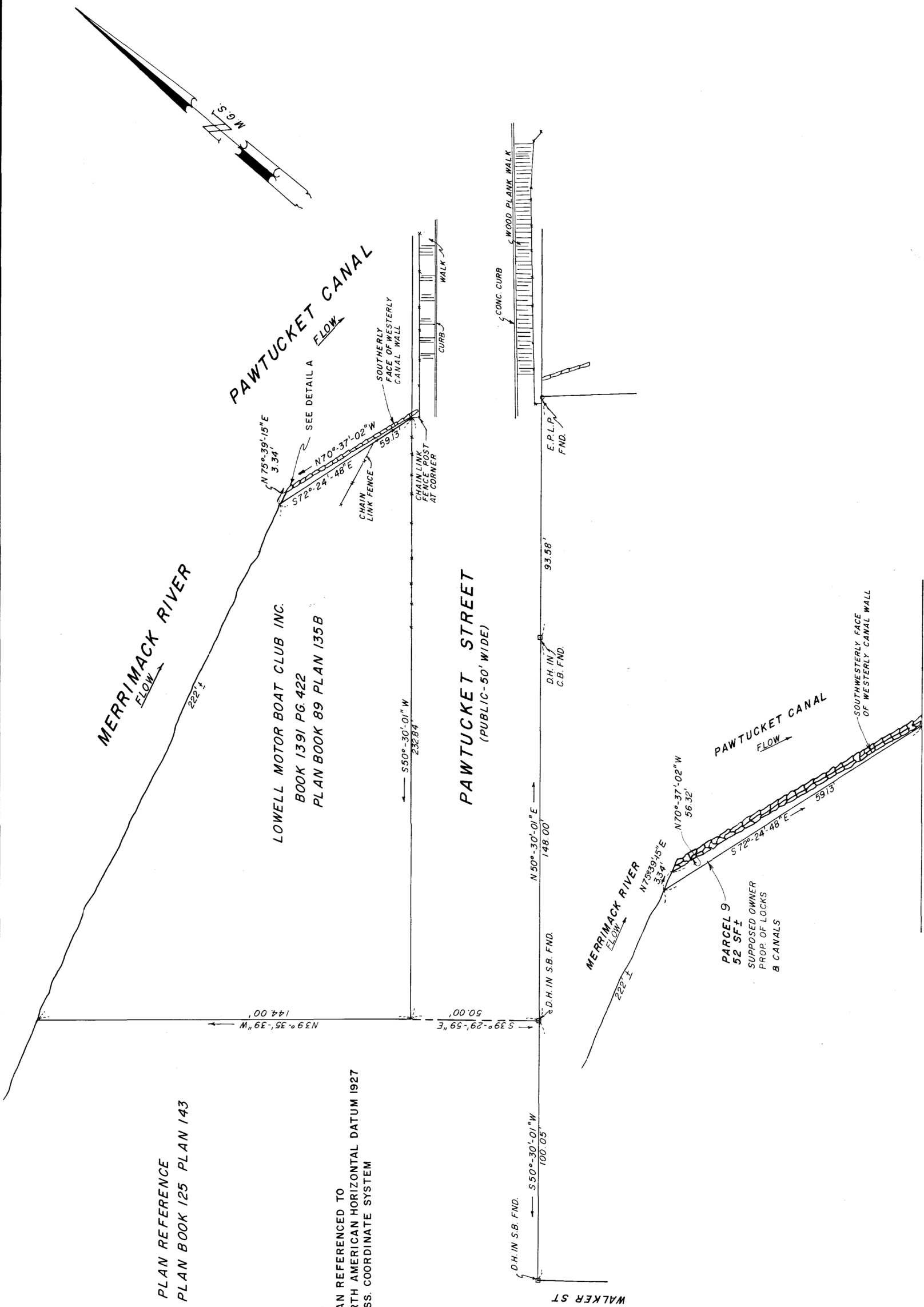
If you have any questions on the provided information, please contact David Michael Lieb, Historical Architect at (978) 423-6185.

Sincerely,



Celeste Bernardo,
Superintendent

cc: FERC, Secretary (e-filed)
NPS, Brian Strack (via email)
NPS, Jonathan Meade (via email)
NPS, Kevin Mendik (via email)
NPS, Duncan Hay (via email)
NPS, Christine Bruins (via email)
NPS, David Uschold (via email)
DOI, Andrew Tittler (via email)
USFWS, Kenneth Hogan (via email)
MHC/SHPO, Brona Simon (via mail)
DCR, Tom Walsh (via email)
City of Lowell, Eileen Donoghue (via email)



PLAN REFERENCE
PLAN BOOK 125 PLAN 143

NOTE:
PLAN REFERENCED TO
NORTH AMERICAN HORIZONTAL DATUM 1927
MASS. COORDINATE SYSTEM

LOWELL MOTOR BOAT CLUB INC.
BOOK 1391 PG. 422
PLAN BOOK 89 PLAN 135B

PAWTUCKET STREET
(PUBLIC-50' WIDE)

PARCEL 9
52 SF±
SUPPOSED OWNER
PROP. OF LOCKS
& CANALS

DETAIL A
1" = 10'

NOTE
PLAN AND DEED REFERENCES RECITED HEREON REFER TO
PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY
REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN
CONFORMANCE WITH THE RULES AND REGULATIONS OF THE
REGISTERS OF DEEDS.

21 JUNE 1983
DATE

PREPARED BY
John Paul

APPROVAL UNDER THE SUBDIVISION
CONTROL LAW NOT REQUIRED.

REC 3 1986
Carol Sammarco

Frank W. Kennedy
CITY ENGINEER
12.5.86

LOWELL PLANNING BOARD

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
66 Rand Street
Lynn, MA 01904



6 JULY 1983
DATE

Nicholas W. Blundin
REGISTERED LAND SURVEYOR

SCALE: 1" = 20'
0 20' 40'
feet

Commonwealth of Massachusetts DEPARTMENT OF ENVIRONMENTAL MANAGEMENT Division of Forests and Parks	LOWELL HERITAGE STATE PARK Lowell, Massachusetts Project No. 97-82 Contract No. 97-82
TITLE: LOWELL CANAL SYSTEM	
DATE: JUNE 20, 1983	SHEET NO. 1 OF 38

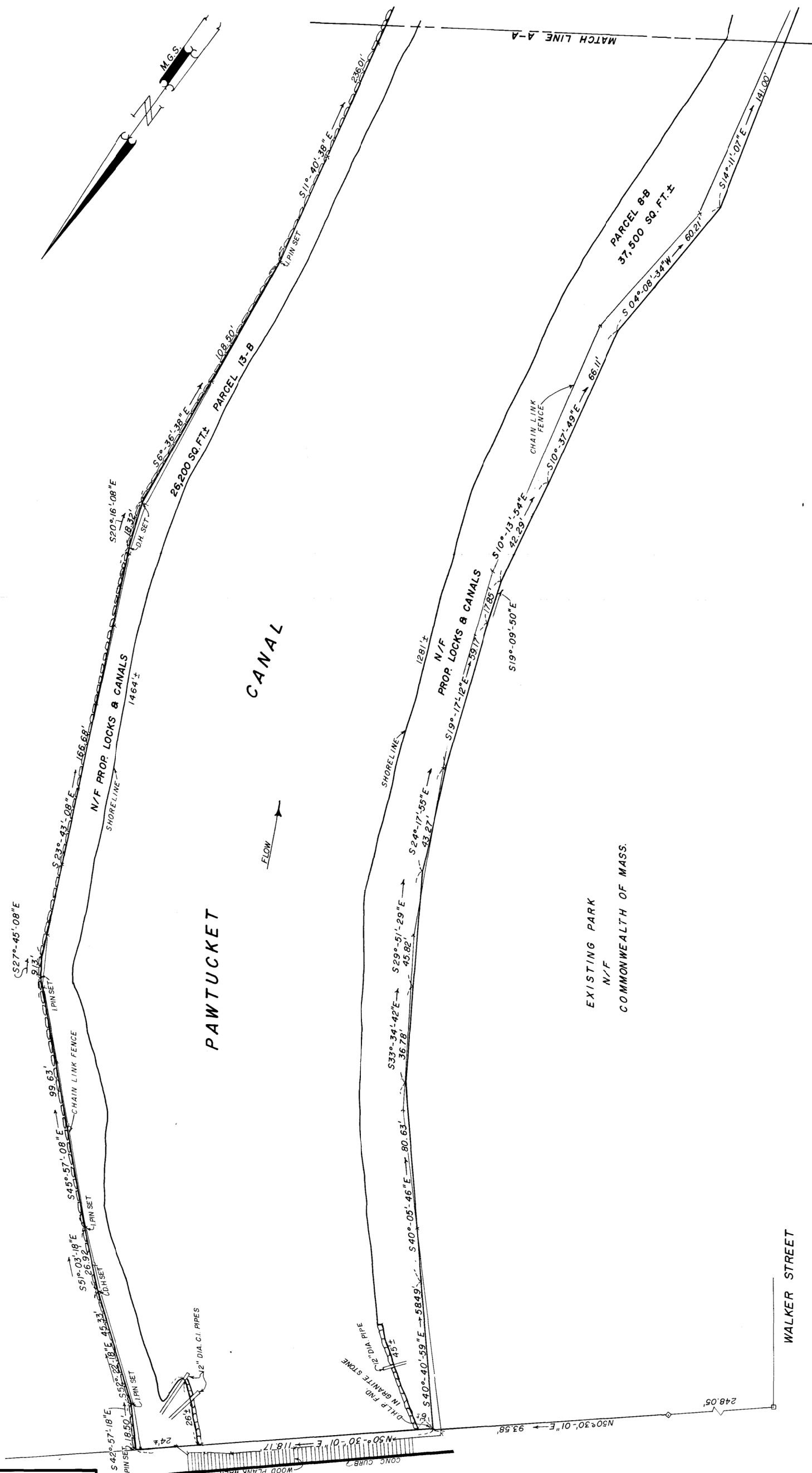
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REVISIONS
DATE
BY
DESCRIPTION

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Sheet 1 of 38 sheets

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 sheet 2 of 3 sheets
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DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 LOWELL HERITAGE STATE PARK
 PARCELS: 8-A, 8-B, 8-C, 13B, TYNG STREET, FRANCIS GATE HOUSE, LOCKING GATE HOUSE, HYDRAULIC GATE HOUSE

SHEET 1 OF 3
 Commonwealth of Massachusetts
 DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 Division of Forests and Parks
 LOWELL HERITAGE STATE PARK
 Lowell, Massachusetts
 Project No. 97-82
 Contract No. 97-82
 TITLE: LOWELL CANAL SYSTEM

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
 46 Rand Street
 Lynn, MA 01904

24 MAY 1983
 DATE

20' 10' 0' 20' 40'
 SCALE: 1" = 20'

23 May 1983
 DATE

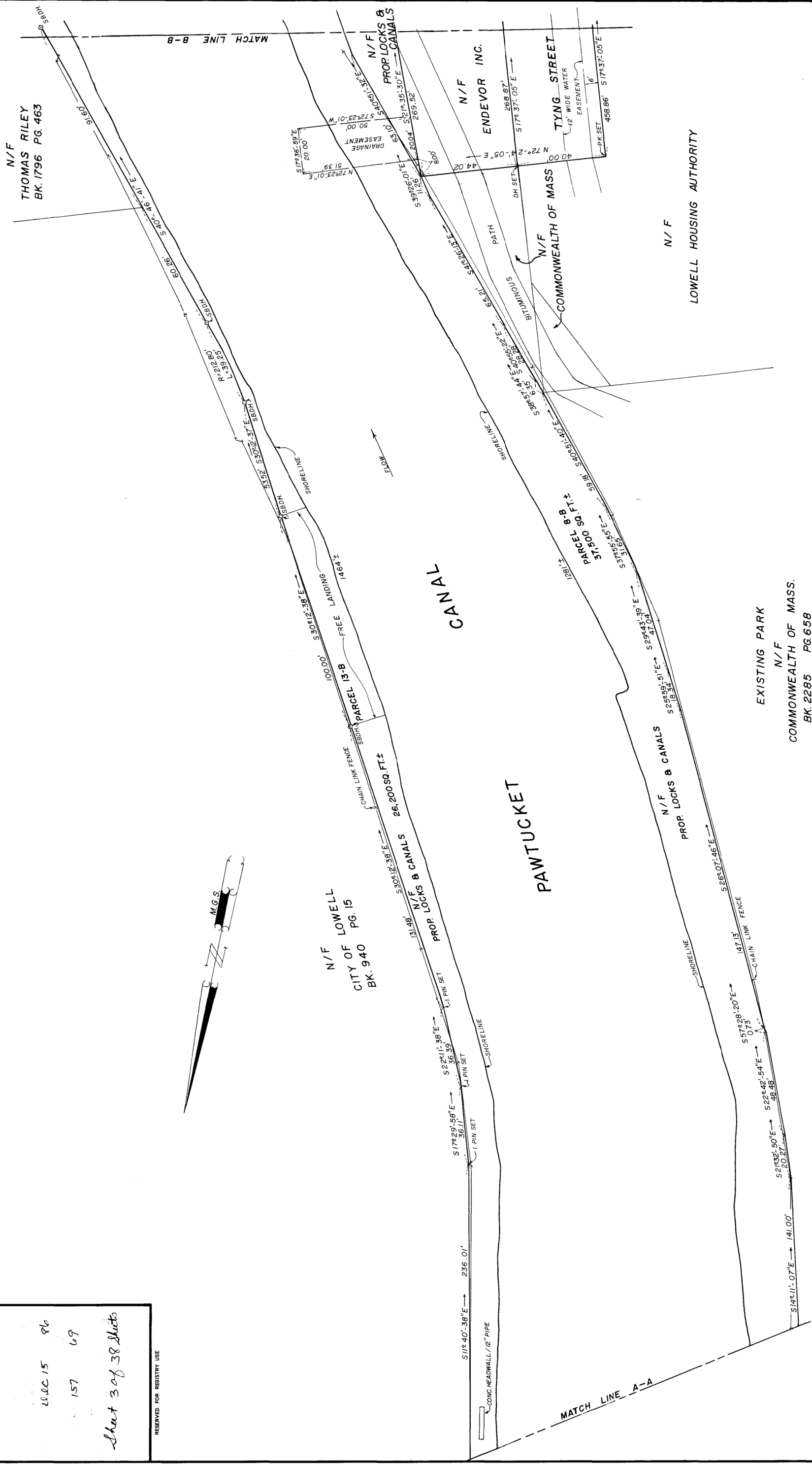
REGISTERED LAND SURVEYOR

NOTE
 I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

PREPARED BY
 Frank D. Lundy
 CITY ENGINEER
 12-5-86

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
 Dec 3 1986
 Donald J. Sammons
 CITY ENGINEER

LOWELL PLANNING BOARD



SHEET 2 OF 3

ATLANTIC ENGINEERING AND SURVEY CORPORATION
 66 Rand Street
 Lynn, MA 01904



22 MAY 1983
 DATE

Nicholas M. Blodgett
 REGISTERED LAND SURVEYOR

SCALE: 1" = 20'
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DATE: MAY 23, 1983
 SHEET NO.: 3 OF 38

Commonwealth of Massachusetts
 DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 Division of Forests and Parks

LOWELL HERITAGE STATE PARK
 Lowell, Massachusetts
 Project No. 97-82
 Contract No. 97-82

TITLE: LOWELL CANAL SYSTEM

NOTE
 PLAN AND DEED REFERENCES RECITED HEREON REFER TO
 PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY
 REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

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 CONFORMANCE WITH THE RULES AND REGULATIONS OF THE
 REGISTERS OF DEEDS.

23 MAY 1983
 DATE

Nicholas M. Blodgett
 PREPARED BY

APPROVAL UNDER THE SUBDIVISION
 CONTROL LAW NOT REQUIRED.

Dec 3 1986
Donald Samuels

Frank S. H. Hardy
 CITY ENGINEER
 12-5-86

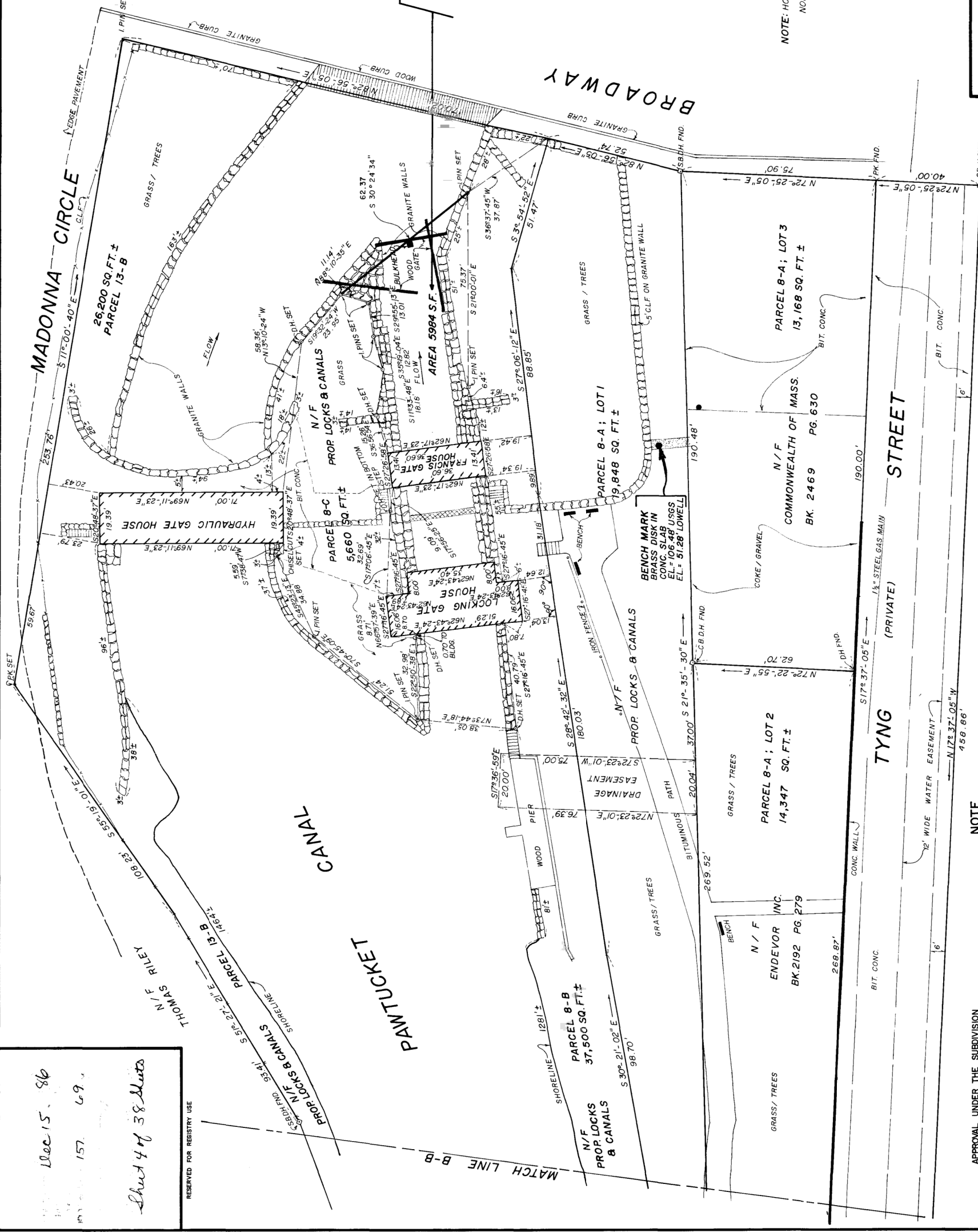
LOWELL PLANNING BOARD

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 sheet 3 of 38 sheets

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Dec 15, 86
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Sheet 4 of 38 Mats

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LOCK CHAMBER
AREA - 5984 S. F. ±

NOTE: HORIZONTAL DATUM
NORTH AMERICAN 1927, MASS. COORDINATE SYSTEM

SHEET 3 OF 3

Commonwealth of Massachusetts
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Division of Forests and Parks

LOWELL HERITAGE STATE PARK
Lowell, Massachusetts
Project No. 97-82
Contract No. 97-82

TITLE: LOWELL CANAL SYSTEM
DATE: MAY 1993
REGISTERED LAND SURVEYOR
SCALE: 1" = 20'
DATE: MAY 23, 1983
SHEET NO. 4 OF 38

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN
CONFORMANCE WITH THE RULES AND REGULATIONS OF THE
REGISTERS OF DEEDS.
23 May 1983
DATE

NOTE
PLAN AND DEED REFERENCES RECITED HEREON REFER TO
PLANS AND DEEDS, RECORDED AT THE MIDDLESEX COUNTY
REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

PLAN BK.	21	PLAN	25
"	89	"	128A
"	94	"	50
"	95	"	141
"	122	"	42
"	133	"	86
LOCKS & CANALS PLANS			
SHELF	134	PLAN	165
"	139	"	65

APPROVAL UNDER THE SUBDIVISION
CONTROL LAW NOT REQUIRED.

Dec 3, 1986
Lowell, Massachusetts

LOWELL PLANNING BOARD

Franklin County
CITY ENGINEER
12.5.86

PREPARED BY
DATE

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
66 Bond Street
Lowell, MA 01804



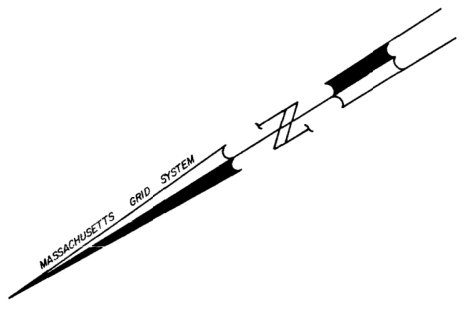
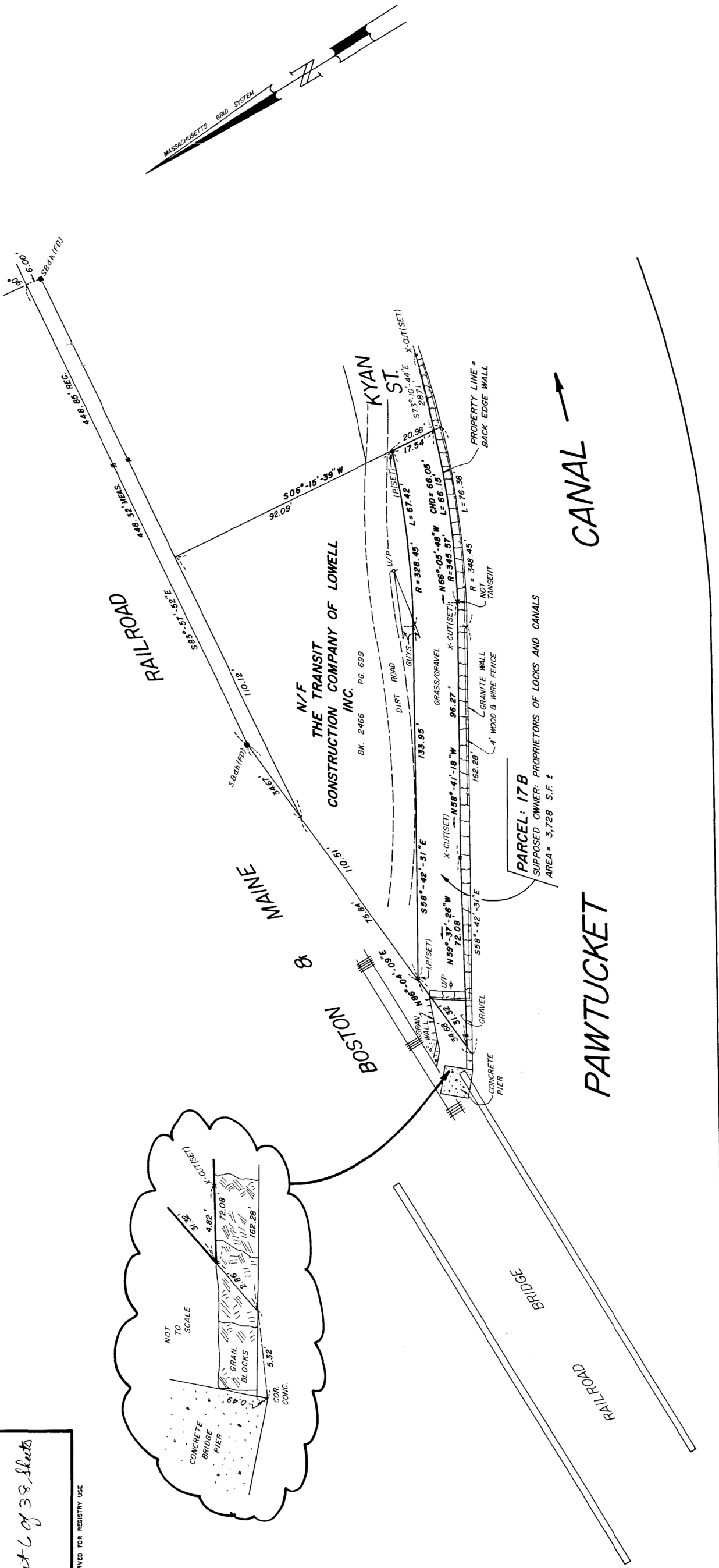
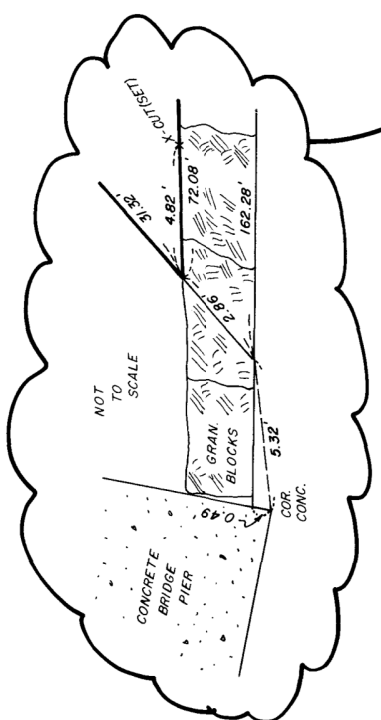
NICHOLAS M. BLUMSTEIN
REGISTERED LAND SURVEYOR

SCALE: 1" = 20'
40'
20'
0
20'
40'
feet

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
LOWELL HERITAGE STATE PARK
PARCELS: 8-A, 8-B, 8-C, 13-B, TYNG STREET, FRANCIS GATE HOUSE,
LOCKING GATE HOUSE, HYDRAULIC GATE HOUSE, LOCK CHAMBER

Dec 15 86
157 69
Sheet 6 of 38 sheets

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APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.

Dec 3 1986
[Signature]

Frank W. Brady
CITY ENGINEER
12-5-86
LOWELL PLANNING BOARD

NOTE
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FILED AT OFFICE OF THE PROPRIETORS OF LOCKS AND CANALS:
SHELF 139 ENV. 46 NO. 8
139

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

27 JUNE 1983
DATE

[Signature]
PREPARED BY

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
66 Rand Street
Lynn, MA 01904



July 1983
DATE

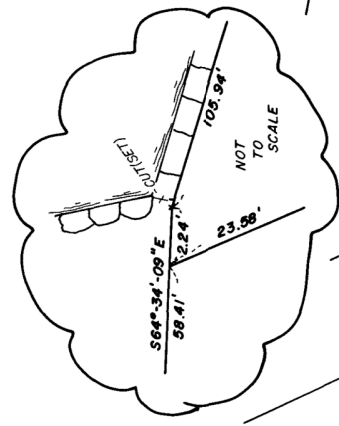
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REGISTERED LAND SURVEYOR

Scale: 1" = 20'
0 20 40 feet

Commonwealth of Massachusetts
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Division of Forests and Parks
LOWELL HERITAGE STATE PARK
Lowell, Massachusetts
Project No. 97-82
Contract No. 97-82
TITLE: LOWELL CANAL SYSTEM
DATE: JUNE 27, 1983
SHEET NO.: 6 OF 38

Loc. 15 86
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Sheet 8 of 38 sheets

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SEE SHEET 3

PARCEL: CB-A/5
SUSPOSED OWNER: PROPRIETORS OF
LOCKS AND CANALS
AREA = 39,000 S.F. ±

PAWTUCKET

CANAL

PEVEY ST.

SCHOOL ST.

ST.

SEE SHEET 1

N/F DENISE E. BELLEY
BK. 2421 P. 56

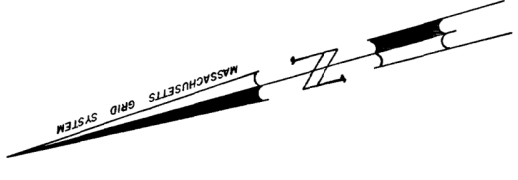
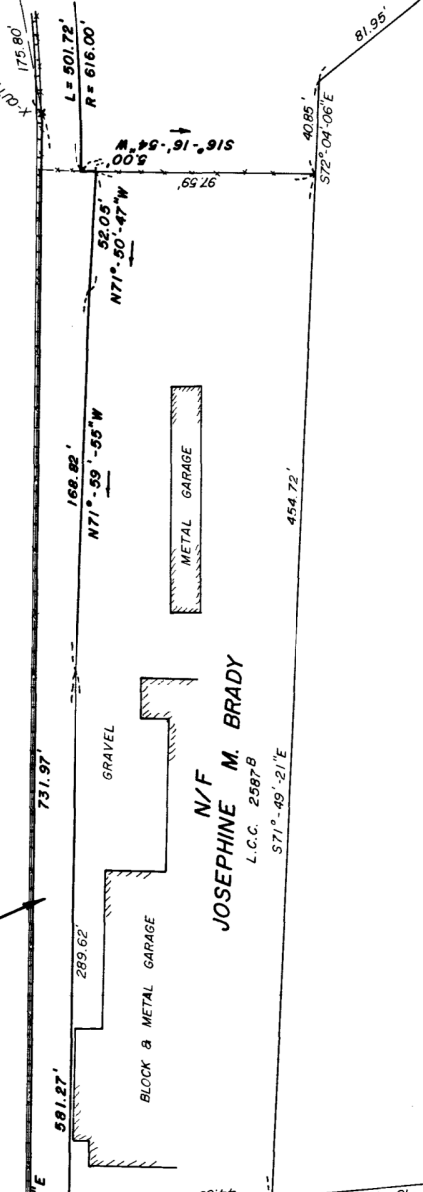
N/F DONALD A. DELMORE

N/F JOSEPHINE M. BRADY
L.C.C. 2587 B
S71°-49'-21"E

STREET

SAUNDERS ST.

PAYNE



APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.

[Signature]
CITY ENGINEER
LOWELL PLANNING BOARD

NOTE
PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

FILED AT OFFICE OF THE PROPRIETORS OF LOCKS AND CANALS:
SHELF 139 NO. 33

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

5 JULY 1983
DATE

[Signature]
PREPARED BY

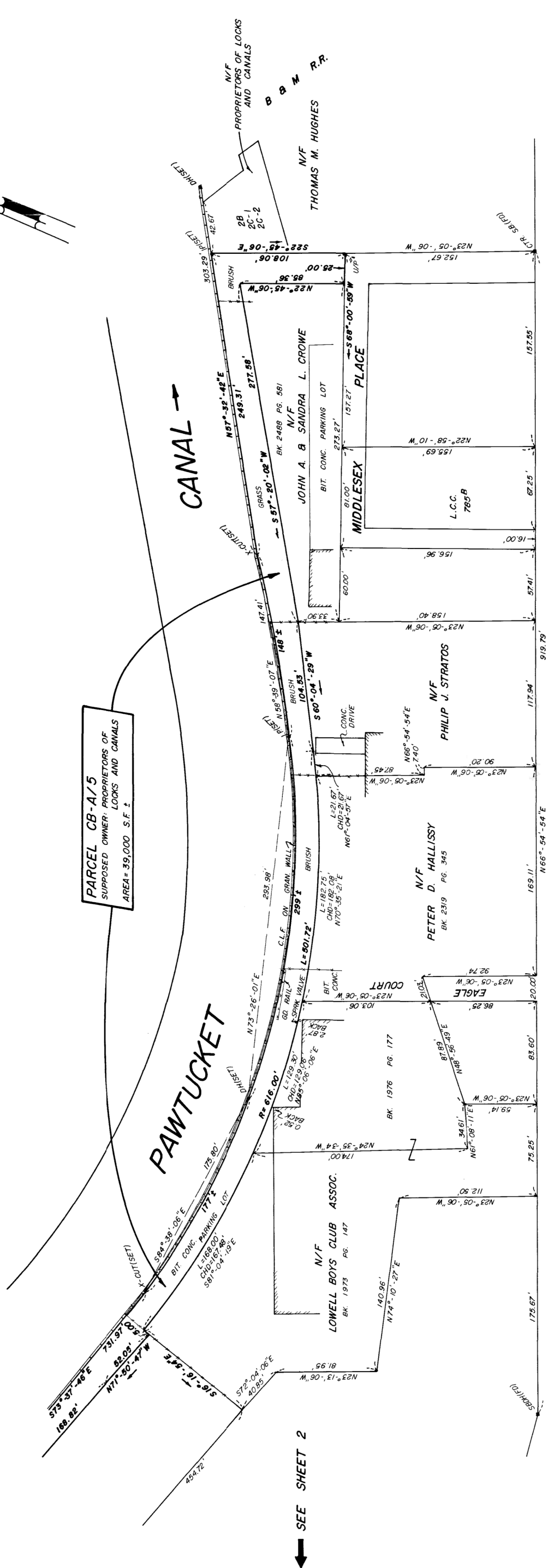
[Signature]
CITY ENGINEER
12-5-86

SHEET 2 OF 3

		Commonwealht of Massachusetts DEPARTMENT OF ENVIRONMENTAL MANAGEMENT Division of Forests and Parks
	DATE 5 JULY 1983	TITLE: LOWELL CANAL SYSTEM
SCALE: 1" = 40' 		DATE: JULY 5, 1983 SHEET NO.: 8 OF 38

Dec 15 86
157 69
Sheet 9 of 38 sheets

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SEE SHEET 2

SHEET 3 OF 3

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
LOWELL HERITAGE STATE PARK
PARCEL CB-A/5

Commonwealth of Massachusetts
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Division of Forests and Parks

LOWELL HERITAGE STATE PARK
Lowell, Massachusetts
Project No. 97-82
Contract No. 97-82

TITLE: LOWELL CANAL SYSTEM

DATE: 5 JULY 1983

REGISTERED LAND SURVEYOR
Richard W. Blumenthal

SCALE: 1" = 40'
0 40 80 feet

DATE: JULY 5, 1983
SHEET NO: 9 OF 38

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

5 JULY 1983
DATE

Richard W. Blumenthal
PREPARED BY

NOTE
PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

PLAN BK. 112 PLAN 169
126 " 74

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
Dec 3 1986
Charles...

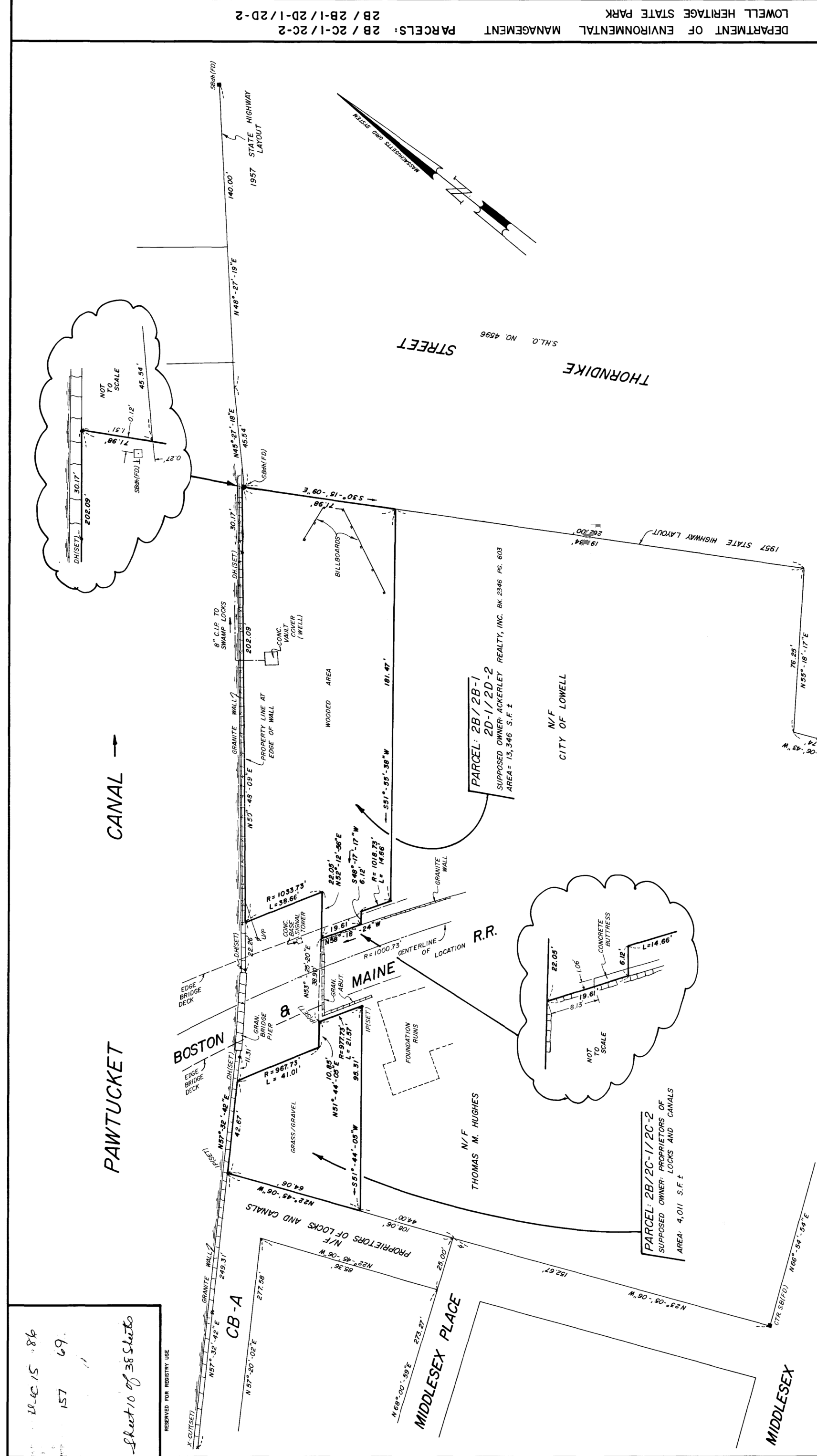
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SHELF 139 NO. 22

Frank W. Steady
CITY ENGINEER
12-5-86

LOWELL PLANNING BOARD

REV 15 86
157 69
Sheet 10 of 38 Sheets

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DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
LOWELL HERITAGE STATE PARK
PARCELS: 2B / 2C-1/2C-2 2B / 2B-1/2D-1/2D-2

Commonwealth of Massachusetts
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Division of Forests and Parks

LOWELL HERITAGE STATE PARK
Lowell, Massachusetts
Project No. 97-82
Contract No. 97-82

TITLE: LOWELL CANAL SYSTEM

2 JULY 1983
DATE

NICHOLAS
IN HOW
NO. 781-F
REGISTERED LAND SURVEYOR

100 Bond Street
Lowell, MA 01504

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS

SCALE: 1" = 20'
DATE: JULY 1, 1983
SHEET NO.: 10 OF 38

NOTE
I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

1 JULY 1983
DATE

PREPARED BY
Nicholas M. Blawie
REGISTERED LAND SURVEYOR

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.

Dec 3 1985
Kendall [Signature]

Frank W. Brady
CITY ENGINEER
12.5.86

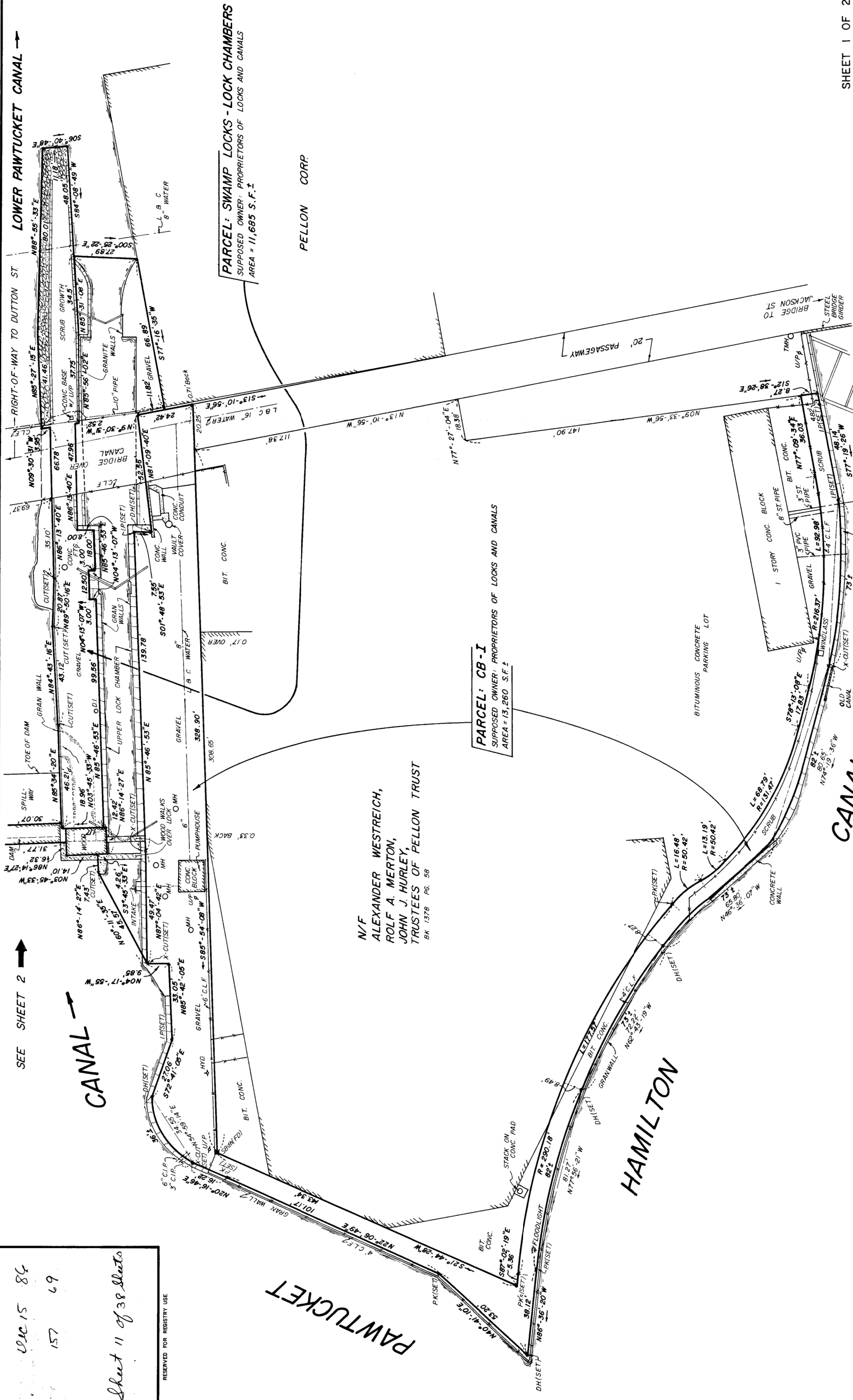
FILED AT OFFICE OF THE PROPRIETORS OF LOCKS AND CANALS:
SHELF 139 ENV. 46 NOS. 5,7,23
" 139 NO. 22

PLAN BK. 66 PLAN 57

REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

DEC 15 86
157 69
Sheet 11 of 38 sheets
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SEE SHEET 2



APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
Dec 31 1986
CITY ENGINEER
LOWELL PLANNING BOARD

NOTE
PLAN AND DEED REFERENCES RECORDED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.
PLAN BK. 68 PLAN 100 76
PLAN BK. 78 PLAN 100 76

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.
28 JUNE 1983
DATE
Nicholas W. Blawie
REGISTERED LAND SURVEYOR

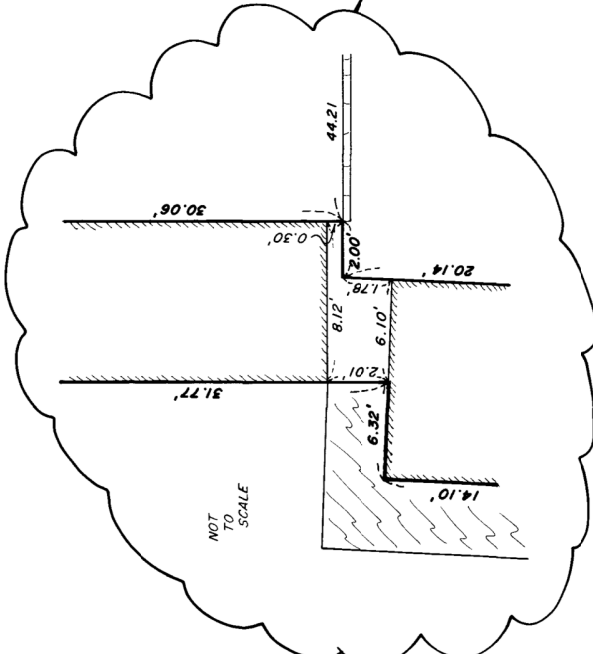
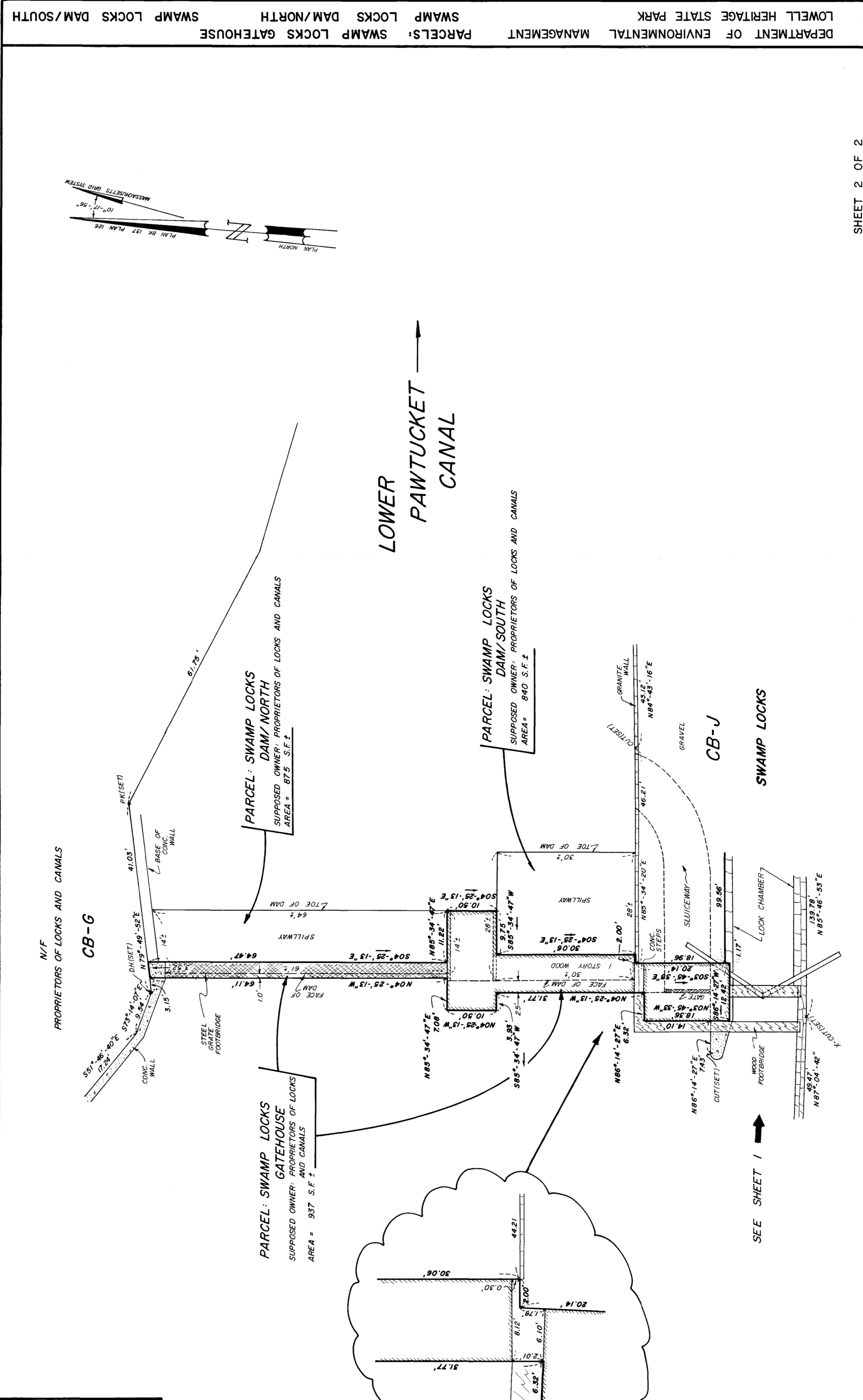
ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
66 Rand Street
Lynn, MA 01904
28 JUNE 1983
DATE
Nicholas W. Blawie
REGISTERED LAND SURVEYOR

Commonwealth of Massachusetts
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Division of Forests and Parks
LOWELL HERITAGE STATE PARK
Project No. 97-82
Contract No. 97-82
TITLE: LOWELL CANAL SYSTEM

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
LOWELL HERITAGE STATE PARK
SHEET 1 OF 2
SCALE: 1" = 20'
DATE: JUNE 29, 1983
SHEET NO.: 11 OF 38

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
LOWELL HERITAGE STATE PARK
PARCELS: CB-I SWAMP LOCKS - LOCK CHAMBERS

157 86
 157 69
 Sheet 12 of 38 sheets
 RESERVED FOR REGISTRY USE



SHEET 2 OF 2

<p>ATLANTIC ENGINEERING AND SURVEY CONSULTANTS 66 Rand Street Lynn, MA 01904</p>	<p>Commonwealth of Massachusetts DEPARTMENT OF ENVIRONMENTAL MANAGEMENT Division of Forests and Parks</p>	<p>LOWELL HERITAGE STATE PARK Lowell, Massachusetts Project No. 97-82 Contract No. 97-82</p>	<p>DATE: JULY 1, 1983 SCALE: 1" = 10'</p>
<p>2 JULY 1983 DATE</p>	<p>LOWELL HERITAGE STATE PARK Lowell, Massachusetts</p>	<p>TITLE: LOWELL CANAL SYSTEM</p>	<p>DATE: JULY 1, 1983 SHEET NO: 12 OF 38</p>
<p>1 CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.</p> <p>1 JULY 1983 DATE</p> <p><i>Nicholas M. Blomquist</i> REGISTERED LAND SURVEYOR</p>		<p>PREPARED BY <i>Nicholas M. Blomquist</i></p>	

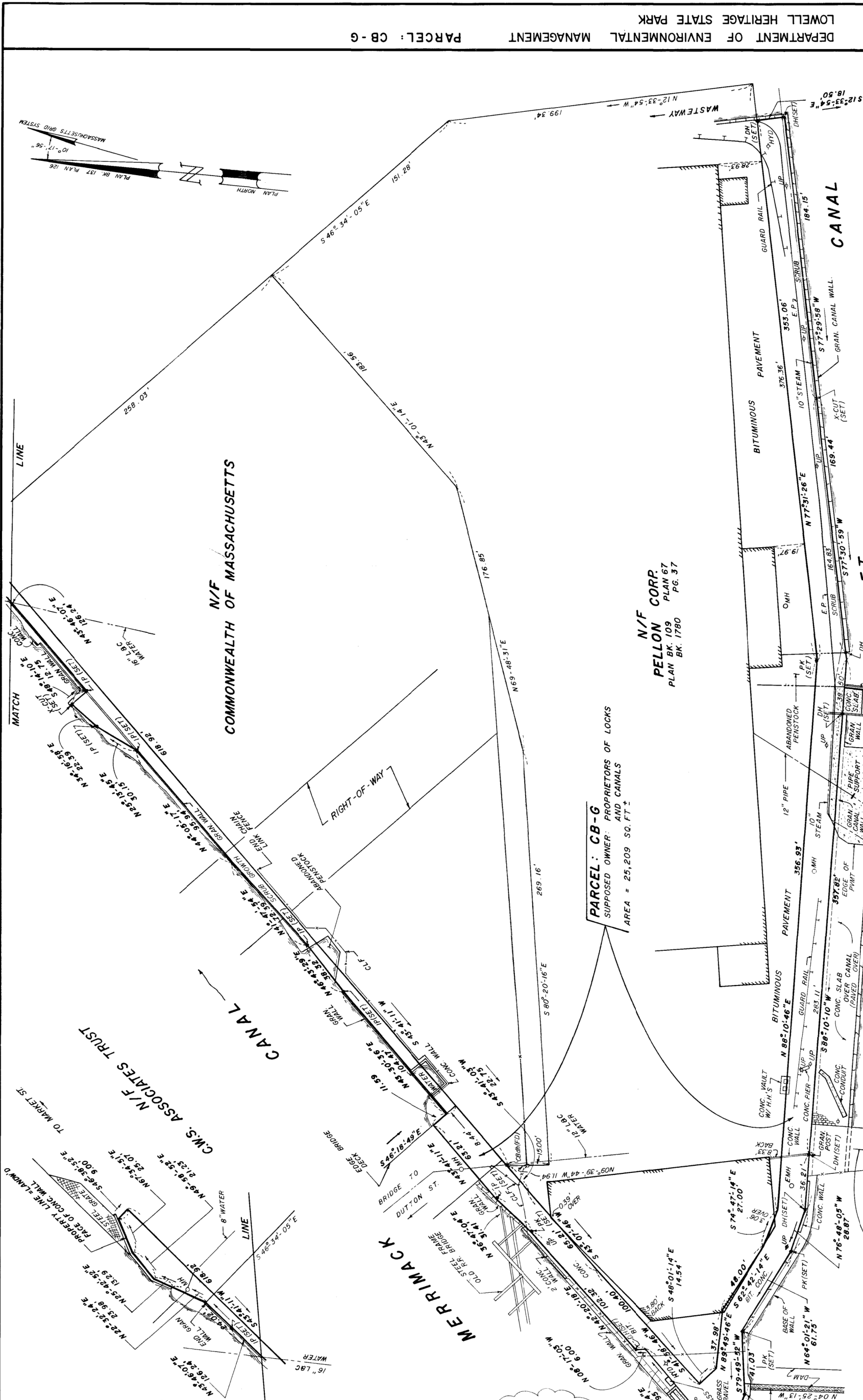
APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
 Dec 3 1986
 [Signature]
 CITY ENGINEER
 12.5.86

NOTE
 PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

Frank O'Donohue
 CITY ENGINEER
 12.5.86

LOWELL PLANNING BOARD

100-15 86
 157 69
 Sheet 13 of 38 Sheets
 RESERVED FOR REGISTRY USE



DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
LOWELL HERITAGE STATE PARK
PARCEL: CB - G

Commonwealth of Massachusetts
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 Division of Forests and Parks

LOWELL HERITAGE STATE PARK
 Lowell, Massachusetts
 Project No. 97-82
 Contract No. 97-82

TITLE: LOWELL CANAL SYSTEM

DATE: JULY 1993

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
 145 East Street
 Lynn, MA 01904

NICHOLAS BLINOW
 REGISTERED LAND SURVEYOR

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTRY OF DEEDS.

DATE: 30 JUNE 1993

PREPARED BY: Edward Vignolo

SCALE: 1" = 20'
 0 20 40 feet

DATE: JUNE 30, 1983
 SHEET NO: 13 OF 38

PARCEL: CB-G
 SUPPOSED OWNER: PROPRIETORS OF LOCKS AND CANALS
 AREA = 25,209 SQ. FT. ±

N/F PELLON CORP.
 PLAN BK. 109 PLAN 67 PG. 37
 BK. 1780

N/F COMMONWEALTH OF MASSACHUSETTS

N/F C.M.S. ASSOCIATES TRUST

NOTE:
 PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS, RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
 Dec 3, 1986

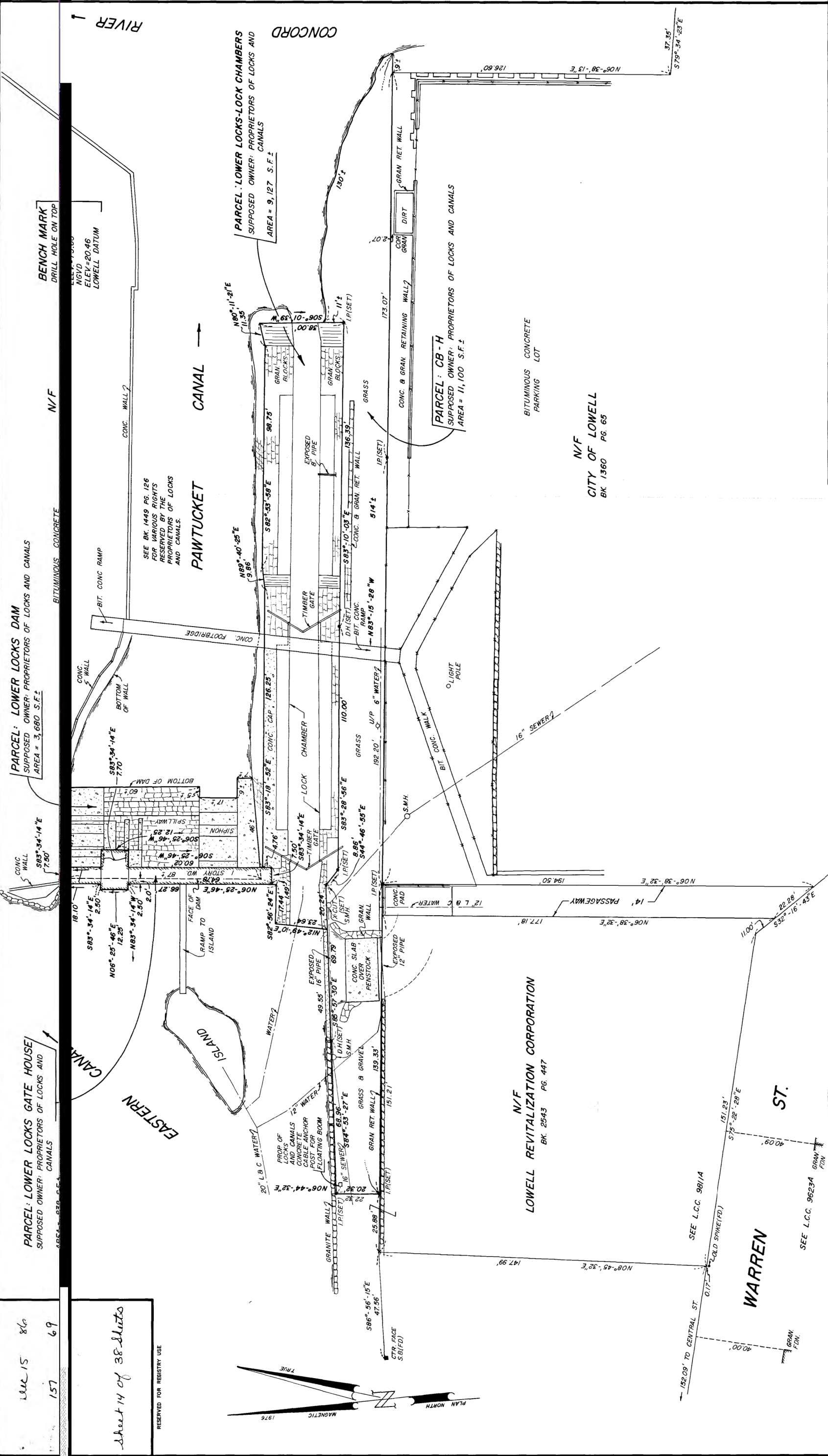
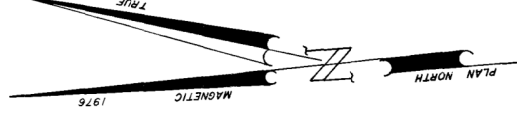
Frank W. Hardy
 CITY ENGINEER
 12-5-86

Lowell Planning Board

157 86
157 69

Sheet 14 of 38 sheets

RESERVED FOR REGISTRY USE



NOTE
 APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
 PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.
 PLAN BK. 33 PLAN 65
 " " 87 " 125
 " " 91 " 145A

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.

Dec 3 1986
 [Signature]

Frank W. Shady
 CITY ENGINEER
 12-5-86

LOWELL PLANNING BOARD

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

23 MAY 1983
 DATE

[Signature]
 PREPARED BY



24 MAY 1983
 DATE

[Signature]
 REGISTERED LAND SURVEYOR



SCALE: 1" = 20'

DATE: MAY 23, 1983
 SHEET NO.: 14 OF 38

Commonwealth of Massachusetts
 DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 Division of Forests and Parks
 LOWELL HERITAGE STATE PARK
 Lowell, Massachusetts
 Project No. 97-82
 Contract No. 97-82
 TITLE: LOWELL CANAL SYSTEM

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 LOWELL HERITAGE STATE PARK
 PARCELS: LOWER LOCKS GATE HOUSE, CB-H,
 LOWER LOCKS DAM, LOWER LOCKS CHAMBERS

DEC 15 '86
157 69
Sheet 15 of 38 sheets
RESERVED FOR REGISTRY USE

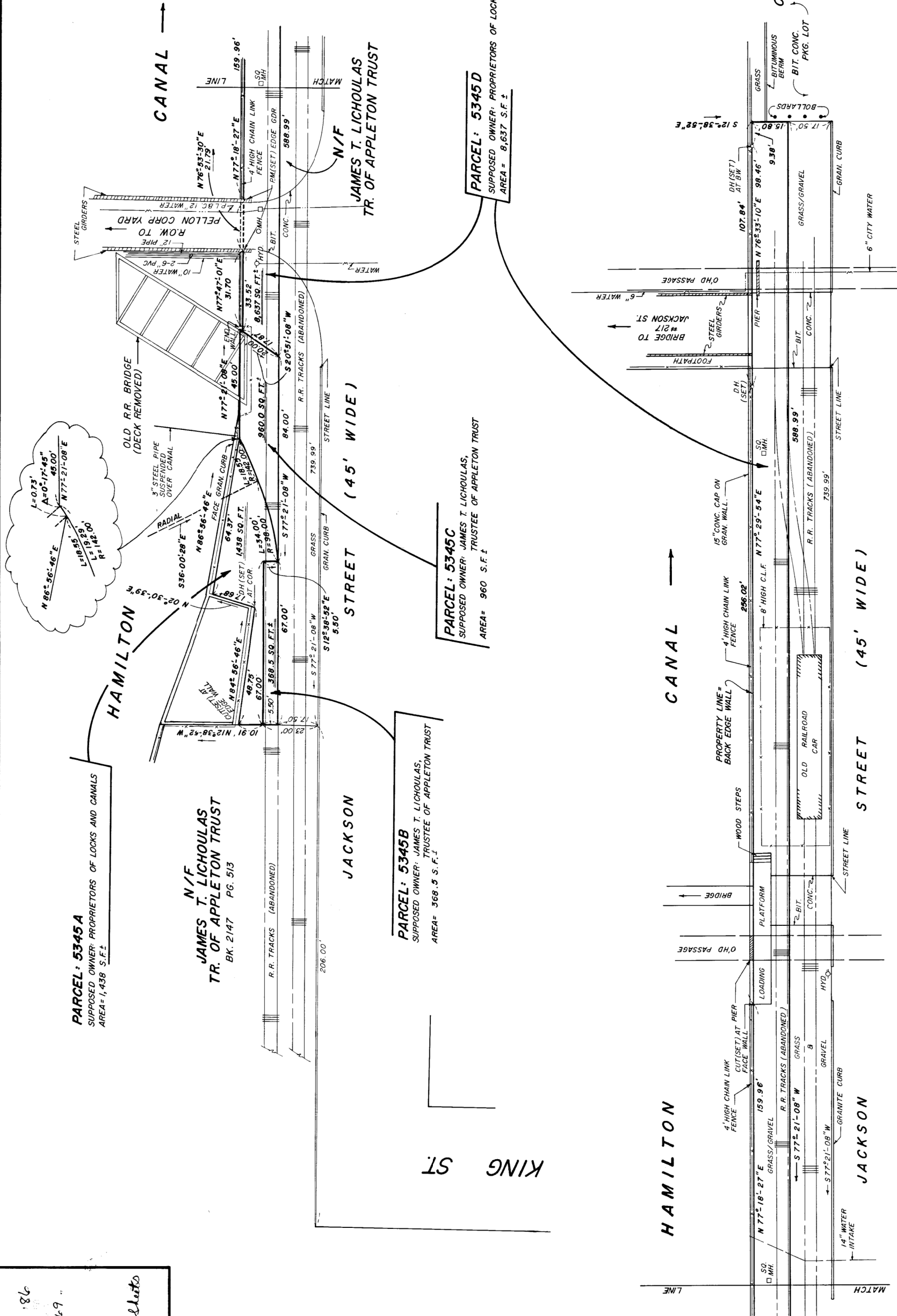
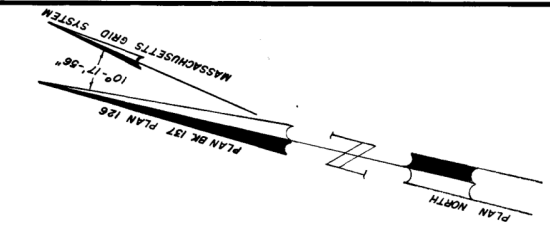
PARCEL: 5345A
SUSPOSED OWNER: PROPRIETORS OF LOCKS AND CANALS
AREA = 1,438 S.F. ±

N/F JAMES T. LICHOULAS TR. OF APPLETON TRUST
BK. 2147 PG. 513

PARCEL: 5345B
SUSPOSED OWNER: JAMES T. LICHOULAS, TRUSTEE OF APPLETON TRUST
AREA = 368.5 S.F. ±

PARCEL: 5345C
SUSPOSED OWNER: JAMES T. LICHOULAS, TRUSTEE OF APPLETON TRUST
AREA = 960 S.F. ±

PARCEL: 5345D
SUSPOSED OWNER: PROPRIETORS OF LOCKS AND CANALS
AREA = 8,637 S.F. ±



APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.

Dec 3 1986
Frank W. Shady

Frank W. Shady
CITY ENGINEER
12-5-86

NOTE
PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.
PLAN BK. 135 PLAN 110

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

29 JUNE 1983
DATE

Edmund Ligorio
REGISTERED LAND SURVEYOR



29 JUNE 1983
DATE

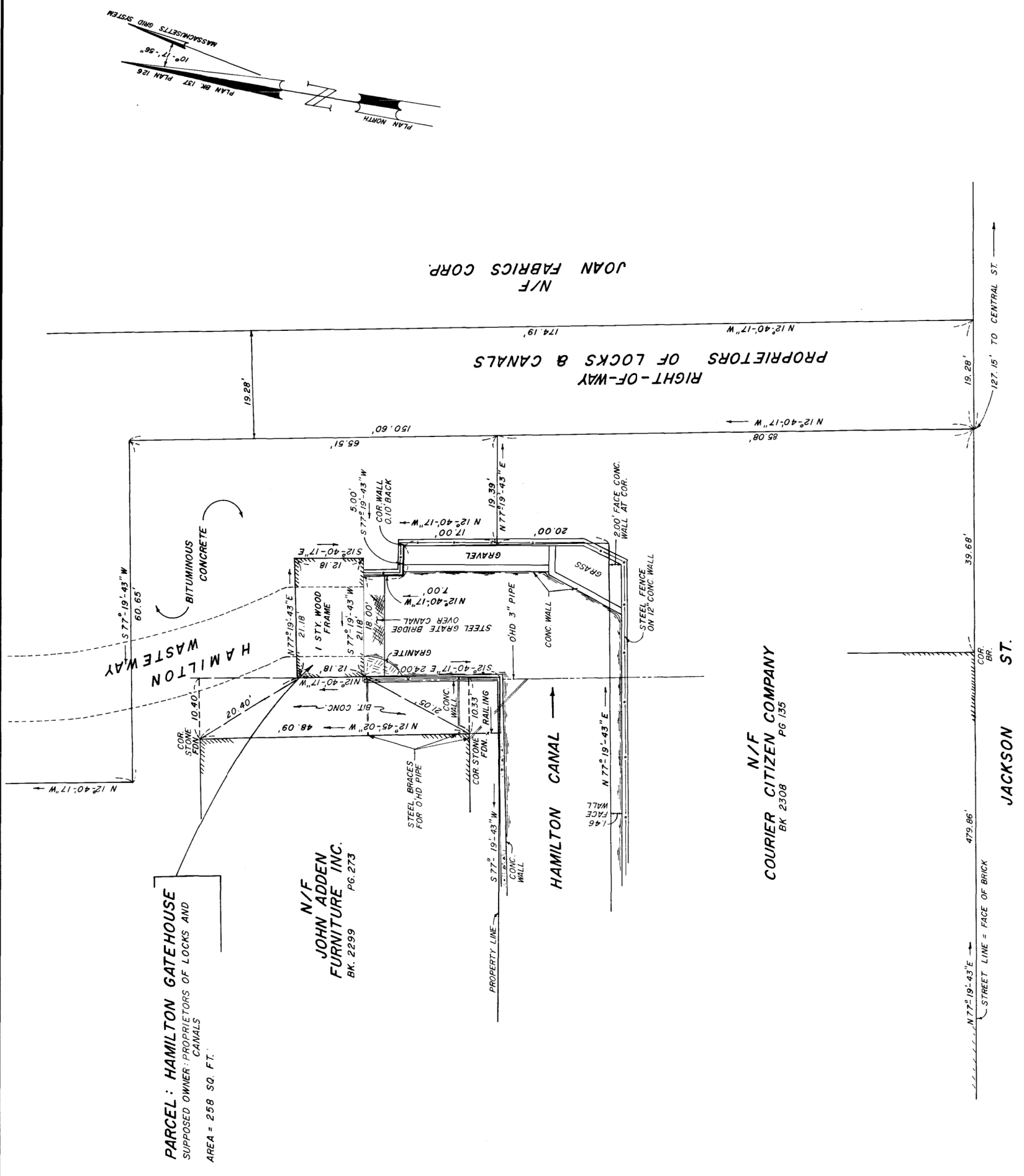
Edmund Ligorio
REGISTERED LAND SURVEYOR

LOWELL PLANNING BOARD

SCALE: 1" = 20'
0 20 40 feet

DATE: JUNE 28, 1983
SHEET NO.: 15 OF 38

LOWELL, MASS. JUL 15 1986
BOOK 157 PAGE 69
Sheet 16 of 38 sheets
RESERVED FOR REGISTRY USE

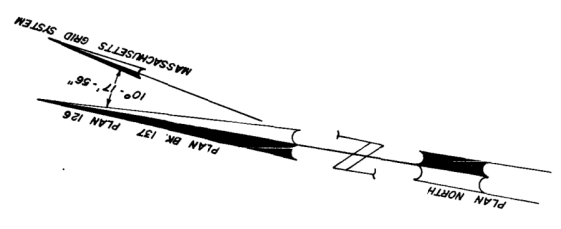


PARCEL: HAMILTON GATEHOUSE
 SUPPOSED OWNER: PROPRIETORS OF LOCKS AND CANALS
 AREA = 258 SQ. FT.

N/F JOHN ADDEN FURNITURE INC.
 BK. 2299 PG. 273

N/F COURIER CITIZEN COMPANY
 BK. 2308 PG. 135

N/F JOAN FABRICS CORP.



NOTE
 PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

PLAN BK.	57	PLAN	46
"	68	"	54
"	126	"	12

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.
 28 JUNE 1983
 DATE

PREPARED BY
Edmund Vignolo

Frank W. Study
 CITY ENGINEER
 12-5-86

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
 Dec 3 1986
Donald J. [Signature]

LOWELL PLANNING BOARD

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
 66 Reed Street
 Lynn, MA 01904

REGISTERED LAND SURVEYOR
Nicholas M. Blum
 DATE: 1 JULY 1983

SEAL OF NICHOLAS M. BLUM
 REGISTERED LAND SURVEYOR
 No. 10170
 EXPIRES 1990



SCALE: 1"=10'
 DATE: JUNE 28, 1983
 SHEET NO: 16 OF 38

Commonwealth of Massachusetts
 DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 Division of Forests and Parks

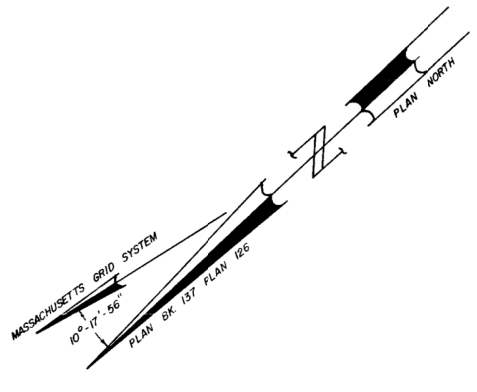
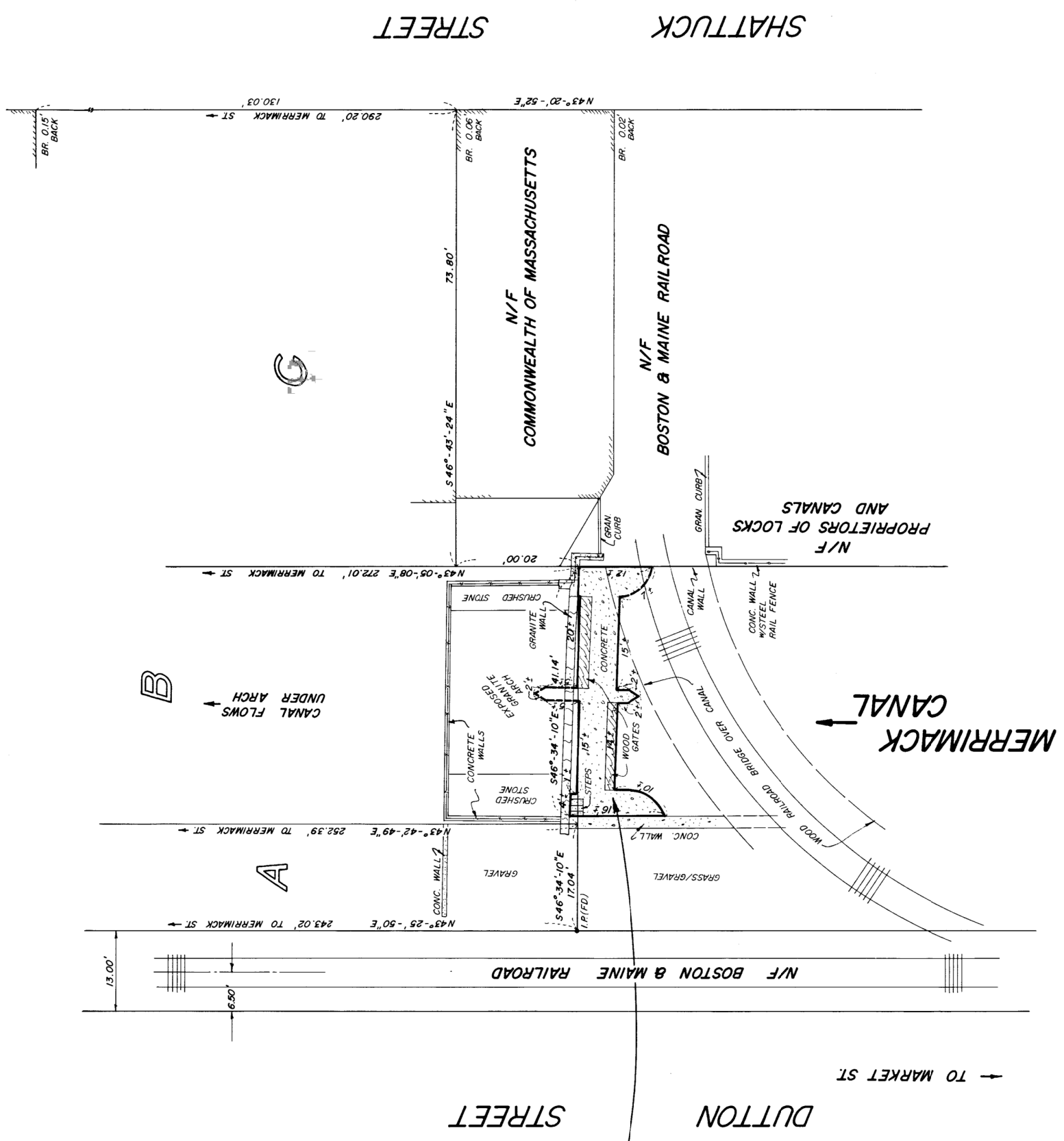
LOWELL HERITAGE STATE PARK
 Lowell, Massachusetts
 Project No. 97-82
 Contract No. 97-82

TITLE: LOWELL CANAL SYSTEM

APPROVAL DATE: Dec 15 86
 SHEET NO: 157 of 159
 SHEET 17 of 38 sheets

RESERVED FOR REGISTRY USE

PARCEL: Y.M.C.A. GATES
 SUPPOSED OWNER: PROPRIETORS OF LOCKS AND CANALS
 AREA = 300 S.F.



DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 LOWELL HERITAGE STATE PARK
 PARCEL: YMCA GATES

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.
 Dec 3 1986
 [Signature]
 Frank W. Brady
 CITY ENGINEER
 12-5-86

NOTE
 PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

2 Aug. 1983
 DATE
 Nicholas W. Blundell
 PREPARED BY

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
 66 Rand Street
 Lynn, MA 01904



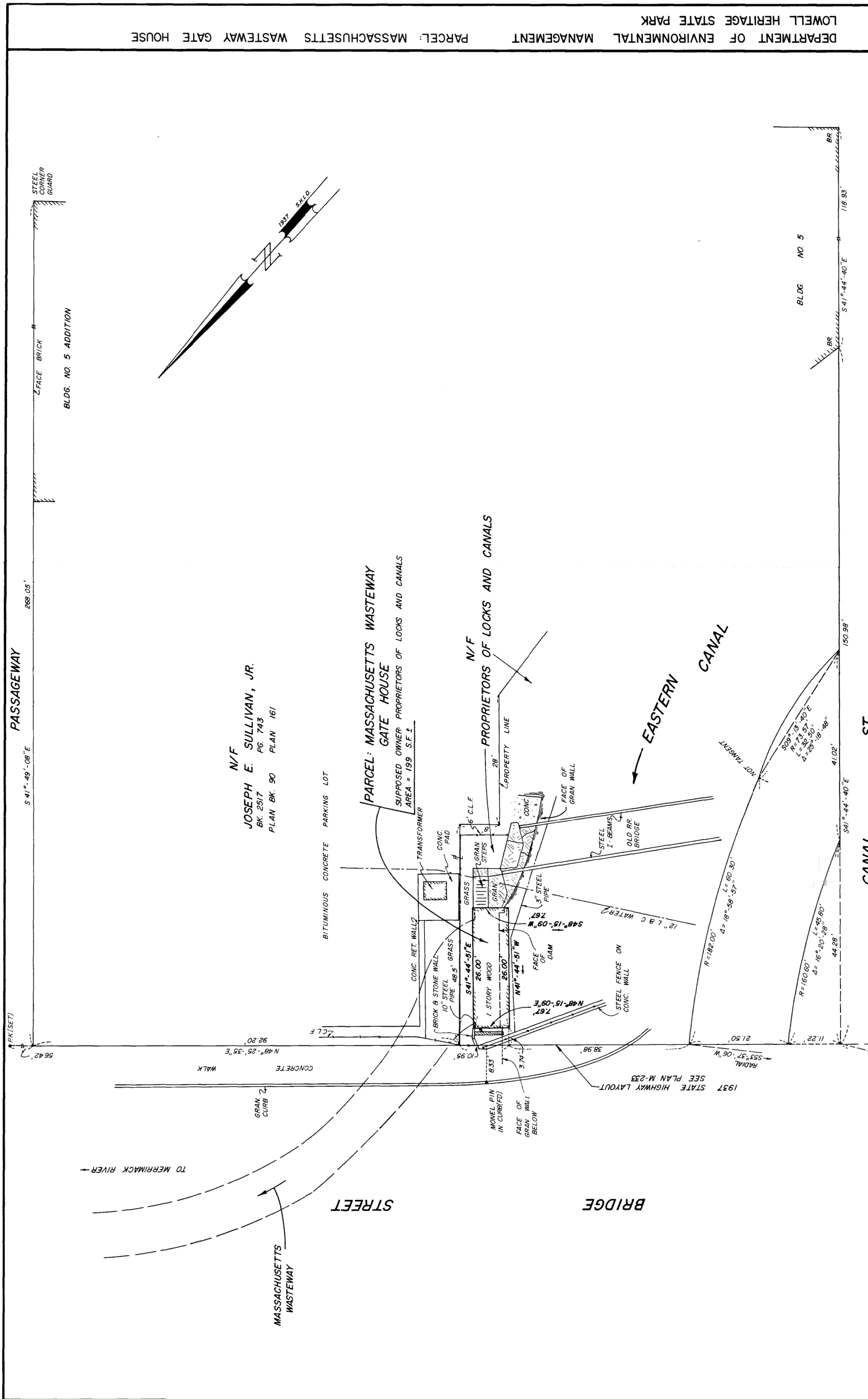
2 Aug. 1983
 DATE
 Nicholas W. Blundell
 REGISTERED LAND SURVEYOR



Commonwealth of Massachusetts
 DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 Division of Forests and Parks
 LOWELL HERITAGE STATE PARK
 Lowell, Massachusetts
 Project No. 97-82
 Contract No. 97-82
 TITLE: LOWELL CANAL SYSTEM
 SCALE: 1" = 10'
 DATE: AUGUST 2, 1983
 SHEET NO. 17 OF 38

APPROVED BY: Dec 15, 86
 REC'D BY: 157
 SHEET NO. OF 38 SHEETS
 RESERVED FOR REGISTRY USE

RESERVED FOR REGISTRY USE



NOTE
 PLAN AND DEED REFERENCES RECITED HEREON REFER TO PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.

Dec 3, 1986
 [Signature]

LOWELL PLANNING BOARD

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

23 MAY 1983 DATE

PREPARED BY: [Signature]
 REGISTERED LAND SURVEYOR

CANAL

ST.

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
 66 Rand Street
 Lynn, MA 01904

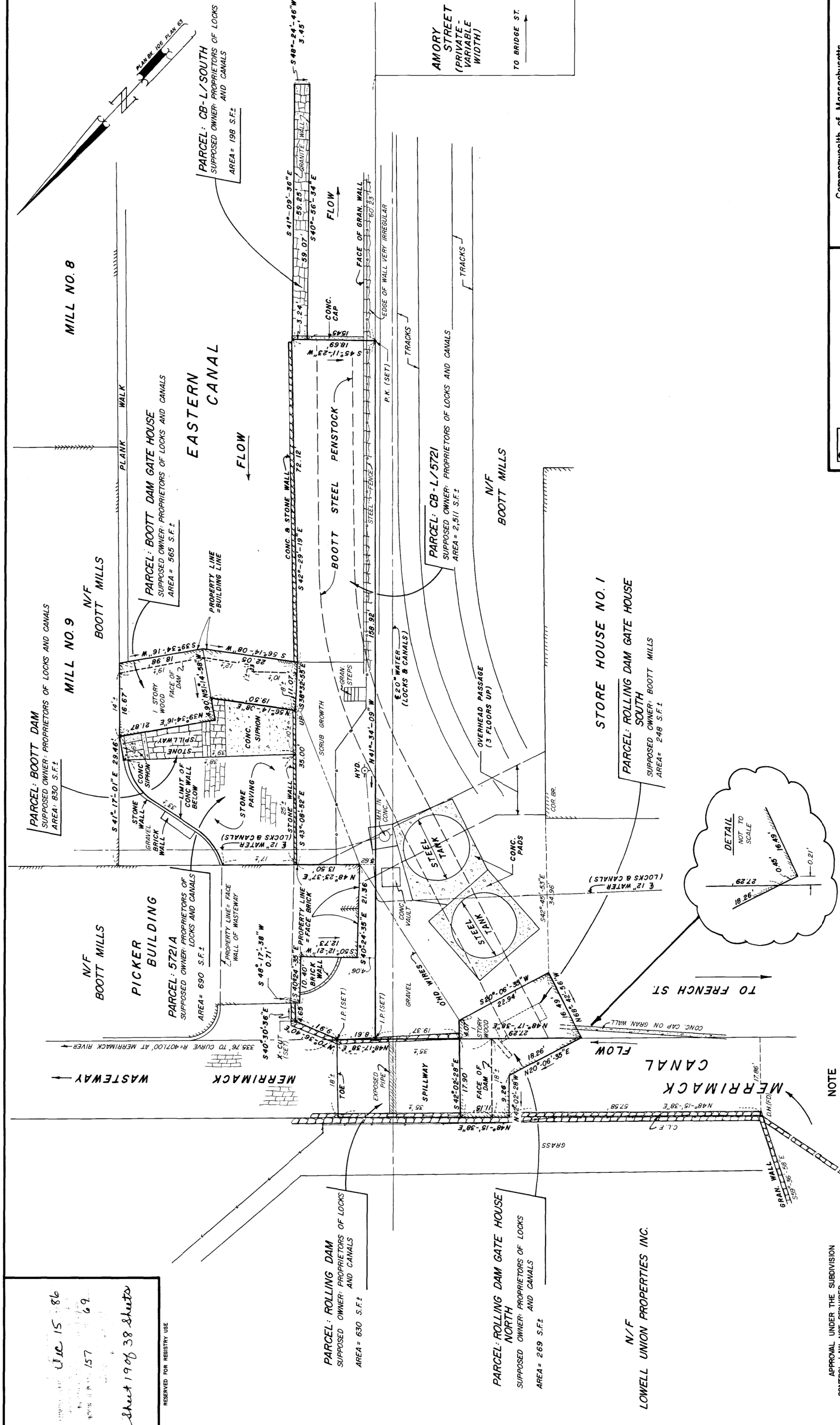


24 MAY 1983 DATE

[Signature]
 REGISTERED LAND SURVEYOR



DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 LOWELL HERITAGE STATE PARK
 PARCEL: MASSACHUSETTS WASTEWAY GATE HOUSE



RESERVED FOR REGISTRY USE

Sheet 19 of 38 sheets
 Dec 15 86
 157 69

PARCEL: ROLLING DAM
 SUPPOSED OWNER: PROPRIETORS OF LOCKS AND CANALS
 AREA = 630 S.F.±

PARCEL: ROLLING DAM GATE HOUSE
 NORTH
 SUPPOSED OWNER: PROPRIETORS OF LOCKS AND CANALS
 AREA = 269 S.F.±

N/F
 LOWELL UNION PROPERTIES INC.

APPROVAL UNDER THE SUBDIVISION
 CONTROL LAW NOT REQUIRED.

Dec 3 1986
Frank W. Stoney
 CITY ENGINEER

LOWELL PLANNING BOARD

NOTE
 PLAN AND DEED REFERENCES RECITED HEREON REFER TO
 PLANS AND DEEDS RECORDED AT THE MIDDLESEX COUNTY
 REGISTRY OF DEEDS, NORTH DISTRICT, IN LOWELL.

PLAN BK.	PLAN
86	29
86	30
96	9
87	158
106	63
103	162
103	102
127	3

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN
 CONFORMANCE WITH THE RULES AND REGULATIONS OF THE
 REGISTERS OF DEEDS.

23 MAY 1983
 DATE

Nicholas W. Blunier
 PREPARED BY

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
 46 Reed Street
 Lynn, MA 01904



24 MAY 1983
 DATE

Nicholas W. Blunier
 REGISTERED LAND SURVEYOR

0 10 20
 scale feet

SCALE: 1" = 10'
 DATE: MAY 23, 1983
 SHEET NO. 19 OF 38

Commonwealth of Massachusetts
 DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 Division of Forests and Parks
 LOWELL HERITAGE STATE PARK
 Lowell, Massachusetts
 Project No. 97-82
 Contract No. 97-82
 TITLE: LOWELL CANAL SYSTEM

DATE: Nov 15 86
 SHEET NO: 157 of 169
 Sheet 20 of 38 sheets

RESERVED FOR REGISTRY USE

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.

Mr. J. [Signature]
 [Signature]

LOWELL PLANNING BOARD

Frank W. Hardy
 CITY ENGINEER
 12-5-86

NOTE
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 PLAN BK. 93 PLAN 59A.
 PLAN OF LAND AT LOWELL HERITAGE STATE PARK PROJECT 802-76 MARCH 1976 (UNRECORDED)
 PLAN OF LAND AT LOWELL HERITAGE STATE PARK PROJECT 994-80 AUGUST 1980. (UNRECORDED)
 PLAN BK. 26 PLAN 44.

I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

DATE: 23 May 1983

[Signature]
 PREPARED BY

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
 66 Rand Street
 Lynn, MA 01904



DATE: 24 MAY 1983

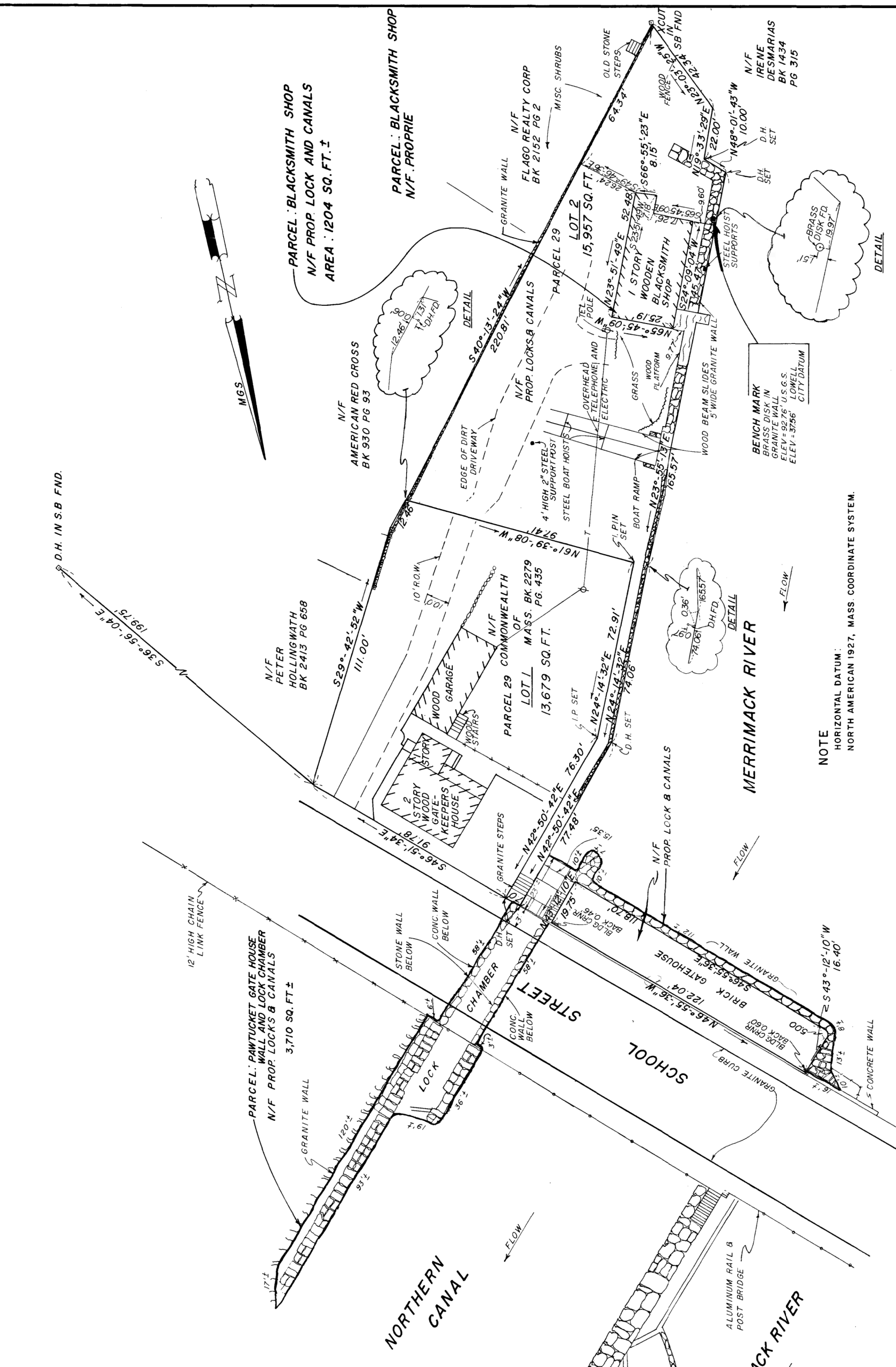
[Signature]
 REGISTERED LAND SURVEYOR

SCALE: 1" = 20'
 20' 10' 0' 20' 40'
 feet

DATE: MAY 23, 1983
 SHEET NO. 20 OF 38

Department of Environmental Management
 Lowell Heritage State Park
 Project No. 97-82
 Contract No. 97-82
 TITLE: LOWELL CANAL SYSTEM

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 LOWELL HERITAGE STATE PARK
 PARCELS: 29, BLACKSMITH SHOP, PAWTUCKET GATE HOUSE WALL AND LOCK CHAMBER AND PAWTUCKET GATE



NOTE
 HORIZONTAL DATUM:
 NORTH AMERICAN 1927, MASS COORDINATE SYSTEM.

MERRIMACK RIVER

SCHOOL STREET

NORTHERN CANAL

PARCEL: BLACKSMITH SHOP
 N/F PROP. LOCK AND CANALS
 AREA: 1204 SQ. FT. ±

PARCEL: BLACKSMITH SHOP
 N/F PROPRIE

PARCEL 29
 LOT 2
 15,957 SQ. FT.

PARCEL 29 COMMONWEALTH
 LOT 1
 MASS. BK. 2279
 PG. 435
 13,679 SQ. FT.

PARCEL: PAWTUCKET GATE HOUSE
 WALL AND LOCK CHAMBER
 N/F PROP. LOCKS & CANALS
 3,710 SQ. FT. ±

N/F PETER
 HOLLINGWATH
 BK 2413 PG 658

N/F AMERICAN RED CROSS
 BK 930 PG 93

N/F FLAGO REALTY CORP
 BK 2152 PG 2

BENCH MARK
 BRASS DISK IN
 GRANITE WALL
 ELEV = 92.76' U.S.G.S.
 ELEV = 37.56' LOWELL
 CITY DATUM

N/F IRENE
 DESMARIAS
 BK 1434
 PG 315

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
 Lowell Heritage State Park
 Project No. 97-82
 Contract No. 97-82

DEC 15 86
157 69
Sheet 21 of 38 sheets

RESERVED FOR REGISTRY USE

APPROVAL UNDER THE SUBDIVISION CONTROL LAW NOT REQUIRED.

Dec 3, 1986
[Signature]

LOWELL PLANNING BOARD

Frank W. Dwyer
CITY ENGINEER
12-5-86

NOTE

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I CERTIFY THAT THIS PLAN HAS BEEN PREPARED IN CONFORMANCE WITH THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

6 JULY 1983
DATE

John B. Pauls
PREPARED BY

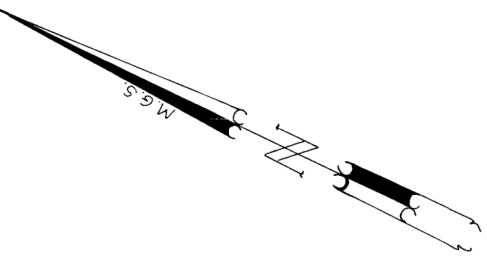
MERRIMACK RIVER

ISLAND
PARCEL 29-B 2.2 AC. ±
NIF PROP. OF LOCKS & CANALS

CANAL

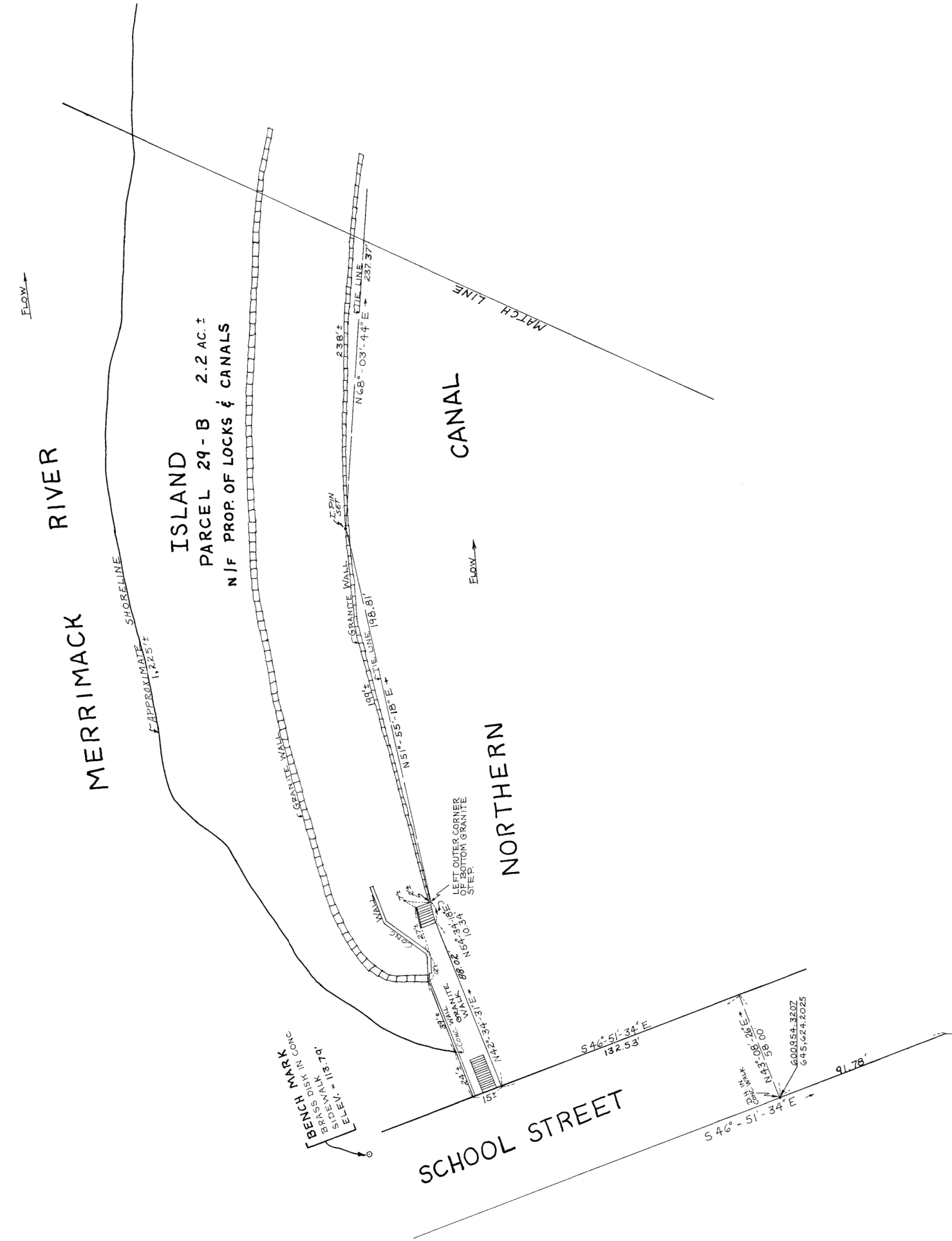
NORTHERN

SCHOOL STREET



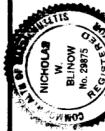
FLOW →

FLOW →



SHEET 1 OF 3

ATLANTIC ENGINEERING AND SURVEY CONSULTANTS
66 Rand Street
Lynn, MA 01904



6 JULY 1983
DATE

Nicholas W. Blundell
REGISTERED LAND SURVEYOR

Scale
30 15 0 30 60 feet

Commonwealth of Massachusetts
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Division of Forests and Parks
LOWELL HERITAGE STATE PARK
Lowell, Massachusetts
Project No. 97-82
Contract No. 97-82
TITLE: LOWELL CANAL SYSTEM

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
LOWELL HERITAGE STATE PARK
PARCEL: 29-B

DATE: JULY 6, 1983
SHEET NO: 21 OF 38