ROBERT T. SMART, JR., ESQ.
ATTORNEY AT LAW
399 CHESTNUT STREET
NEEDHAM, MASSACHUSETTS 02492

TEL (781) 444-9344 FAX (781) 449-0242
E-MAIL bob@robertsmart.net WEBSITE www.robertsmart.net

BY HAND
August 23, 2024

Needham Planning Board
500 Dedham Avenue
Needham, MA 02492

Re: Needham Housing Authority, Linden Street Redevelopment, 0 Linden Street and 5 Chambers Street, Needham

Dear Planning Board Members:

The Needham Housing Authority (NHA) hereby submits to the Board an application for site plan review of its proposal to redevelop its Linden-Chambers property at 0 Linden Street and 5 Chambers Street, a site with 478,540 square feet of land, being approximately 10.9858 acres (the "Property"). The redevelopment would result in an increase in the number of affordable housing units on the Property from the current 152 units to 216 units, an increase of 64 units.

Pursuant to Chapter 40A of the Massachusetts General Laws, the Needham Zoning Bylaw, and the Planning Board Rules, the NHA hereby submits three copies of the following:

1. Application for Site Plan Review;

2. Plan Set titled "Schematic Design Plans for Linden Street Redevelopment, Needham Housing Authority", prepared by Bargmann Hendrie + Archetype Inc., which includes the following, all dated August 23, 2024, unless noted otherwise:
   a. Sheet 000 - Cover / List of Drawings/Zoning Table
   b. Civil Drawings containing the following:
      i. Sheet Survey 1 – Existing Conditions Plan
      ii. Sheet C1 – Phasing Plan
      iii. Sheet C2 – Demolition, Soil Erosion, and Sediment Control
      iv. Sheet C3 – Site Layout and Materials Plan
      v. Sheet C4 -Grading and Drainage
      vi. Sheet C5 – Utility Plan
      vii. Sheet C6 – Construction Details I
      viii. Sheet C6.1 – Construction Details II
   c. Landscape Drawings containing the following:

i. Sheet L099 – Tree Protection Plan
ii. Sheet L102A – Materials Plan
iii. Sheet L102B – Materials Plan
iv. Sheet L104 – Planting Plan
v. Sheet L105 – Lighting Plan
vi. Sheet L501 – Details
vii. Sheet L503 - Details
viii. Sheet L504 - Details
ix. Sheet L505 – Details
x. Sheet L506 - Details
xi. Sheet L510 – Details

d. Architectural Drawings containing the following:
i. Sheet A100 – Phase 1 Plans
ii. Sheet A101 – Phase 1A First Floor Plans
iii. Sheet A102 – Phase 1A Typical Floor Plans
iv. Sheet A103 – Phase 1B First Floor Plans
v. Sheet A104 – Phase 1B Typical Floor Plans
vi. Sheet A200 – Phase 1 Elevations
vii. Sheet A201 – Phase 1A Elevations
viii. Sheet A202 – Phase 1B Elevations
ix. Sheet A300 – Building Sections

e. Electrical Drawings containing the following:
i. Sheet E000 - Electrical Notes
ii. Sheet E100 – Electrical Site Plan
iii. Sheet E101 – Electrical Site Plan Photometric

3. Traffic Impact Analysis, titled "Linden Street Redevelopment Needham, Massachusetts", by Pare Corporation, dated April, 2024;

4. Stormwater Report, titled "Stormwater Report In Support of Notice of Intent for Linden Street Redevelopment (Map 133, Lots 23 and 24) Needham MA" by Hancock Associates, dated 8/23/24;

5. Plan of Land in Needham, by Hancock Associates, dated 12/21/23 (the lot consolidation plan);

6. Zoning letter by Robert T. Smart, Jr., Esq., dated August 23, 2024.

The NHA requests that the Planning Board waive the site plan review filing fee, and any fees for project review by outside consultants, as in-kind contributions by the Town.

The NHA further requests, pursuant to Zoning Bylaw Section 7.44, that the Board waive the submission of any of the required information not submitted herewith.

Very truly yours,

RTS

Robert T. Smart, Jr.

Cc: Needham Housing Authority

TOWN OF NEEDHAM
MASSACHUSETTS

500 Dedham Avenue
Needham, MA 02492
781-455-755

PLANNING BOARD

APPLICATION FOR SITE PLAN REVIEW

Project Determination: (circle one) (Major Project) Minor Project

This application must be completed, signed, and submitted with the filing fee by the applicant or his representative in accordance with the Planning Board's Rules as adopted under its jurisdiction as a Special Permit Granting Authority. Section 7.4 of the By-Laws.

Location of Property	0 Linden Street and 5 Chambers Street, Needham, MA 02492
Name of Applicant	Needham Housing Authority
Applicant's Address	21 Highland Circle, Suite 10, Needham, MA 02494
Phone Number	781-444-3011 x 218

Applicant is: Owner ✓ Tenant _____
Agent/Attorney _____ Purchaser _____

Property Owner's Name	Needham Housing Authority
Property Owner's Address	21 Highland Circle, Suite 10, Needham, MA 02494
Telephone Number	781-444-3011 x 218

Characteristics of Property: Lot Area: 478,540 SF (10.9858 acres)
Present Use: Multifamily Residential
Map #133, Parcels #23 + 24, Map #134, Parcel #41
Zoning District: Affordable Housing District*

*The property is located in the Affordable Housing District pursuant to the amendments of the Zoning By-Law voted at the May 2024 Annual Town Meeting, which amendments remain subject to review and approval by the Massachusetts Attorney General.

Description of Project for Site Plan Review under Section 7.4 of the Zoning By-Law:

Please see the filing and zoning letters submitted herewith.

Signature of Applicant (or representative) Cheryl Fossum, ED 8-29-24
Address if not applicant: N/A
Telephone #781-444-3011 x 218, or 339-222-6187
Owner's permission if other than applicant: N/A

SUMMARY OF PLANNING BOARD ACTION

Received by Planning Board _____ Date _____
Hearing Date _____ Parties of Interest Notified of Public Hearing _____
Decision Required by _____ Decision/Notices of Decision sent _____
Granted _____
Denied _____ Fee Paid _____ Fee Waived _____
Withdrawn _____
NOTE: Reports on Minor Projects must be issued within 35 days of filing date.

ROBERT T. SMART, JR., ESQ.
ATTORNEY AT LAW
399 CHESTNUT STREET
NEEDHAM, MASSACHUSETTS 02492

TEL (781) 444-9344 FAX (781) 449-0242
E-MAIL bob@robertsmart.net WEBSITE www.robertsmart.net

BY HAND
August 23, 2024

Needham Planning Board
500 Dedham Avenue
Needham, MA 02492

Re: Zoning Letter for the Needham Housing Authority, Linden Street Redevelopment, 0 Linden Street and 5 Chambers Street, Site Plan Review Application

Dear Planning Board Members:

The Needham Housing Authority (NHA) has submitted to the Board an application for site plan review of its proposal to redevelop its Linden-Chambers property at 0 Linden Street and 5 Chambers Street, a site with 478,540 square feet of land, being approximately 10.9858 acres (the "Property"). The redevelopment would result in an increase in the number of affordable housing units on the Property from the current 152 units to 216 units, an increase of 64 units.

The NHA proposes to redevelop the Property in two Phases. Phase I involves the Linden Street buildings on the Property, and it is divided into Phases 1A and 1B. The subject of this site plan review application is Phase I. Phase II involves the five Chambers Street buildings on the Property, the redevelopment of which is not part of this application.

During Phase IA, the NHA will demolish 10 existing buildings at 138, 140, 144, 146, 150, 152, 156, 158, 166, and 168 Linden Street. The 40 residents living in those units will be temporarily relocated, at no cost to them, to comparable or better dwelling units until they can be moved back into new units. Phase 1A of the redevelopment, providing 76 units and the common facilities for the proposed new Linden Street building, will be constructed. Then the original residents of the 10 buildings will be allowed to move into the north wing.

During Phase IB, the NHA will demolish the 8 remaining buildings at 170, 172, 174, 180, 182, 184, 186, and 188 Linden Street. The 32 residents of those buildings will be moved into the new building which was constructed during Phase 1A. The construction of the second, southerly wing of the new Linden Street building, with 60 new units, will proceed.

The NHA was established by the Town in 1948, for the purpose of constructing, managing and operating multifamily residential buildings that are affordable for persons of low

income. Pursuant to several votes of the Needham Town Meeting, the Town conveyed the land which comprises the current Property to the NHA, between 1957 to 1970. The NHA subsequently constructed the current buildings on the Property, and it has managed the development for the benefit of its low-income residents and the Town since that time. The buildings are worn out, and in dire need of replacement.

The NHA has conducted numerous meetings with the current residents of the Property, nearby property owners, and Town officials, boards and Town Meeting members over the last 16 months. The comments received have been considered by the NHA, and many of them have been incorporated in the current redevelopment proposal.

In May of 2024, the Needham Town Meeting adopted, by nearly unanimous vote, four Articles relating to the redevelopment of the Property: Article 18 (Affordable Housing District), Article 19 (Map Change for Affordable Housing District), Article 22 (Appropriate for Linden Street Redevelopment), and Article 41 (Authorize Select Board to Remove Restrictions). It is expected that the Massachusetts Attorney General will approve the zoning Articles shortly, as they were submitted by the Town Clerk on June 13, 2024.

Zoning Analysis

The Property is entirely located within the newly established Affordable Housing District.

The proposed use of the Property is for an AHD project, defined in Section 3.16.3 of the Zoning Bylaw as "a multi-family housing development of affordable housing units, as defined in Section 1.3 of this By-Law". All units will be affordable to and occupied by households with incomes at or below eighty (80) percent of the area median income. This use is allowed as a matter of right, subject to site plan review under Section 7.4 of the Zoning Bylaw.

The NHA proposal contemplates the construction of multiple buildings on the Property, all of which will comply with requirements of the Affordable Housing District. Multiple buildings on a lot are allowed by right under Section 3.16.5 of the Zoning Bylaw.

The NHA proposal meets all the density requirements of the Affordable Housing District. It proposes, in two Phases, the replacement of the existing 72 studio apartments on the Linden Street portion of the Property with 136 units, an increase of 64 units. Of the new units, 128 will be one-bedroom, and 8 will be two-bedroom. The new units, averaging 595 square feet, will be significantly larger than the existing units, which average 405 square feet. The proposed density of 19.7 units per acre will be less than the 25 units per acre standard. The proposed floor area ratio is .36, less than the .50 maximum. The proposed lot coverage ratio is 12.4%, less than the 20% maximum.

The NHA is not proposing any changes to the five Chambers Street buildings on the Property with this application. The 80 units in those buildings will remain.

Once Phases 1A and 1B have been completed, there will be 216 units on the Property: 76 in the north wing of the new Linden Street building, 60 in the south wing of the new Linden Street building, and the 80 existing units in the five Chambers Street buildings.

The NHA proposal meets all the dimensional requirements of the Affordable Housing District. The NHA proposes a maximum building height of 53 feet, which is less than the 58-foot maximum, and 4 stories, which is the allowed maximum. The front setback of 88 feet exceeds the 40-foot minimum, the side setbacks of 283 feet on the south side and 155 feet on the north side exceeds the 25-foot minimum, and the rear setback of 33 feet exceeds the 25-foot minimum. The setback areas will be landscaped, vegetative buffer areas to the extent required under Section 3.16.6.

The NHA site plan for the Linden Street Redevelopment shows two parking lots, located in front of the two wings of the proposed new Linden Street building, along Linden Street. The two lots, combined, will provide 70 parking spaces, 2 more than the 68 spaces required under the .5 parking spaces per dwelling unit standard in Section 3.16.7. All new parking spaces for Phase 1A and 1B will comply with the Parking Plan and Design requirements of By-Law Section 5.1.3. The existing 41 space parking lot for the Chambers buildings, which will remain as is during the Phase IA and Phase 1B development, contains one space more than the 40 spaces required under the Affordable Housing District zoning.

Off-site drainage concerns will be managed through an onsite storm water management system that will have sufficient capacity to contain surface and roof water run-offs within the Property.

A copy of the zoning table for the Linden Street Redevelopment is attached hereto.

Because the NHA proposal will meet all the requirements of the Affordable Housing District, no zoning waivers are necessary. However, to the extent the applicant has failed to notice an applicable zoning requirement, and the proposal fails to meet such requirement(s), appropriate waivers are requested.

Very truly yours,

RTS

Robert T. Smart, Jr.

	REQUIRED ZONING	PROPOSED PROJECT - PHASE 1 *	COMPLIANCE	NOTES
ZONING DISTRICT	**Affordable Housing District (AHD)**	**Affordable Housing District (AHD)**		
USES	Affordable Multi-Family	Affordable Multi-Family		
ZONING DIMENSIONAL ANALYSIS				
Gross Lot Area	-	478,540 sq. ft.	-	10,9858 acres per Consolidated Plan
Minimum Lot Size	20,000 sq. ft.	182,400 sq. ft.	Y	
Frontage	150 ft	740 ft	Y	
# Of Dwelling Units	-	216	-	* PHASES 1A/1B/CHAMBERS (EXIST.)
Front yard	40 ft	88 ft	Y	
Side Yard - north	25 ft	155 ft	Y	
Side Yard - south	25 ft	283 ft	Y	lawful pe-existing Chambers Building 50 ft
Rear Yard	25 ft	33 ft	Y	
Height	58 ft	53 ft	Y	
Mechanical Height	15 ft	8 ft	Y	
Mechanical Roof Coverage	25%	<1%	Y	
Stories	4	4	Y	PHASES 1A/1B
FAR	0.5	0.36	Y	* PHASES 1A/1B/CHAMBERS (EXIST.)
Units per Acre	25	19.7	Y	* PHASES 1A/1B/CHAMBERS (EXIST.)
Lot Coverage	20%	12.4%	Y	
Parking				
Parking Spaces	0.5/unit	0.5/unit	Y	PHASES 1A/1B = 136 units requires 68 parking spaces
Parking Lot Illumination	per 5.1.3 (a)	per 5.1.3 (a)	Y	
Loading Requirement	per 5.1.3 (b)	per 5.1.3 (b)	Y	
Handicapped Parking	per 5.1.3 (c)	per 5.1.3 (c)	Y	
Driveway Openings	per 5.1.3 (d)	per 5.1.3 (d)	Y	
Compact Cars	per 5.1.3 (e)	per 5.1.3 (e)	Y	
Parking Space Size	per 5.1.3 (f)	per 5.1.3 (f)	Y	
Bumper Overhang	per 5.1.3 (g)	per 5.1.3 (g)	Y	
Parking Space Layout	per 5.1.3 (h)	per 5.1.3 (h)	Y	
Width of Maneuvering Aisle	per 5.1.3 (i)	per 5.1.3 (i)	Y	
Parking Setbacks	per 5.1.3 (j)	per 5.1.3 (j)	Y	
Landscape Areas	per 5.1.3 (k)	per 5.1.3 (k)	Y	
Trees	per 5.1.3 (l)	per 5.1.3 (l)	Y	
Location	per 5.1.3 (m)	per 5.1.3 (m)	Y	
Bicycle Racks	per 5.1.3 (n)	per 5.1.3 (n)	Y	

* The Linden Street Redevelopment includes Phase 1A and 1B, which will replace the 18 Linden Street buildings, increasing the number of Linden units from 72 to 136. This redevelopment will not affect the 80 existing Chambers Street units which will remain until replaced during a future Phase 2.

NOT OFFICIAL COPY

NOT OFFICIAL COPY

Norfolk Registry of Deeds
Dedham, Mass.
Received July 23 **2024**
With - - - -
- - - -
- - - -
Filed as Page 7
Pl. Bk. 736
Attest: Pat Powers **Register**

FOR REGISTRY USE

I CERTIFY THAT THE PROPERTY LINES SHOWN ARE THE LINES DIVIDING EXISTING OWNERSHIPS AND THE LINES OF STREETS AND WAYS SHOWN ARE THOSE OF PUBLIC OR PRIVATE STREETS OR WAYS ALREADY ESTABLISHED, AND THAT NO NEW LINES FOR DIVISION OF EXISTING OWNERSHIPS OR FOR NEW WAYS ARE SHOWN. (MASS. GEN. LAWS CHAPTER 41, SECTION 81X)

7/9/24
DATE

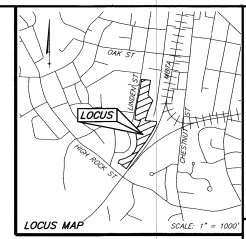
PROFESSIONAL LAND SURVEYOR

I CERTIFY THAT THIS PLAN CONFORMS TO THE RULES AND REGULATIONS OF THE REGISTERS OF DEEDS.

7/9/24
DATE

PROFESSIONAL LAND SURVEYOR

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD83) - MAINLAND ZONE



LEGEND

(R)		RECORD
(C)		CALCULATED
(R/H)		RECORD AND HELD
(FD)		FOUND
DH	⊛	DRILL HOLE
DHCB	▫	DRILL HOLE IN CONCRETE BOUND
DHSB	▫	DRILL HOLE IN STONE BOUND
I.PIPE	○	IRON PIPE
I.ROD	○	IRON ROD
C.TR.		CENTER

SYLVAN ROAD (PUBLIC - 40' WIDE)

LINDEN STREET (PUBLIC - 40' WIDE) (1952 TOWN LAY-OUT)

PARCEL 1
303,894±S.F.(C)

PARCEL 2
60,263±S.F.(C)

PARCEL 3
114,363±S.F.(C)

LOT "A"
478,540±S.F.
10.9858±Ac

"MAPLE STREET"

"ASH STREET"

TOWN OF NEEDHAM
DEED BOOK 2374, PAGE 109
(AREA = 714±S.F.)

MASSACHUSETTS BAY TRANSPORTATION AUTHORITY

NEEDHAM HOUSING AUTHORITY
CERT.# 37981
L.C.C. 4382-A

HIGH ROCK HOMES CONSTRUCTION, LLC
DEED BOOK 37556, PAGE 450
PLAN NO. 1108 OF 1956

HIGH ROCK HOMES, LLC
DEED BOOK 37556, PAGE 450
PLAN NO. 1108 OF 1956

MEI LI & CHAOHUI WU
CERT.# 194566
L.C.C. 4382-Q

LEONID K. PISHCHIK & ANNA N. ZABOROVSKY
CERT.# 142685
L.C.C. 4382-Q

MEHMET E. CEYHAN & AYSUN SUNNETCI
CERT.# 187727
L.C.C. 4382-Q

THE 207-209 MAPLE STREET CONDOMINIUM
DEED BOOK 14703, PAGE 456
PLAN BOOK 483, PAGE 1

THE 210-212 MAPLE STREET CONDOMINIUM
DEED BOOK 9245, PAGE 463
PLAN NO. 219 OF 1992

THE 204-206 MAPLE STREET CONDOMINIUM
DEED BOOK 14763, PAGE 255
PLAN NO. 126 OF 2001

THE 189-201 MAPLE STREET CONDOMINIUM
DEED BOOK 9225, PAGE 39
PLAN BOOK 483, PAGE 39

NEEDHAM ENTERPRISES, LLC
DEED BOOK 10858, PAGE 439
PLAN NO. 1108 OF 1956

PAUL D. BORRELLI
DEED BOOK 10858, PAGE 401
PLAN NO. 1108 OF 1956

169-171 MAPLE STREET CONDOMINIUM
DEED BOOK 9245, PAGE 461
PLAN BOOK 483, PAGE 39

PAUL D. BORRELLI
DEED BOOK 10858, PAGE 401
PLAN NO. 1108 OF 1956

PAUL D. BORRELLI
DEED BOOK 10858, PAGE 401
PLAN NO. 1108 OF 1956

KIM M. & JOHN M. MCNARD
DEED BOOK 10731, PAGE 275
PLAN NO. 1108 OF 1956

EV-ELMVIEW REALTY, LLC
DEED BOOK 36758, PAGE 5
PLAN NO. 1108 OF 1956

RB2 ASSOCIATES, LLC
DEED BOOK 14871, PAGE 249
PLAN NO. 1102 OF 1956

TOWN OF NEEDHAM
DEED BOOK 2374, PAGE 109
(AREA = 714±S.F.)

DHCB(FD) (HELD)
DHCB (FD)
DHSB (FD)
C.TR. (FD)
I.ROD (FD)
I.PIPE (FD)

N68°54'37"W 40.91'(TIE)
N81°57'40"E (R&D) 71.55'
S81°57'40"W (R&D) 71.55'
S68°54'37"E (R&D) 40.91'(TIE)
N53°34'23"W 45.30'
S53°34'23"E 45.30'
N53°34'23"W 64.60'(C) 64.41'(R)
S53°34'23"E 64.60'(C) 64.41'(R)
S54°24'30"E 159.96'
N54°24'30"W 159.96'
S53°17'00"E 275.88'(C) 275.75'(R)
N53°17'00"W 275.88'(C) 275.75'(R)
N86°04'45"W 22.72'
N03°01'15"E 116.07'
N43°37'54"E 103.44'
N86°04'45"E 59.86'
S88°37'00"E 37.49'
S86°37'44"E 162.90'
S86°19'44"E 26.25'
S3°19'52"E 54.35'
L=57.41'
R=2817.93'
N03°40'16"E 21.23'
N43°11'14"E 126.65'
N01°58'58"E 118.07'
N40°49'41"E 118.66'
N59°35'49"E 118.66'
N72°52'45"E 165.00'
N74°08'46"W 39.96'
N01°51'14"E 10.00'
N01°51'14"E 175.47'
S37°58'40"W 530.98'
L=668.84'
R=5879.65'
N=1,000.00'
E=1,000.00'



ASSESSORS:

PARCEL ID:
199/134.0-0041-0000.0 (PARCEL 1)
199/133.0-0023-0000.0 (PARCEL 2)
199/133.0-0024-0000.0 (PARCEL 3)

RECORD OWNER:

NEEDHAM HOUSING AUTHORITY
28 CAPTAIN ROBERT COOK DRIVE
NEEDHAM, MA 02494

REFERENCES:

DEED BOOK 3600, PAGE 519
DEED BOOK 3871, PAGE 27
DEED BOOK 3936, PAGES 354-357
DEED BOOK 3939, PAGE 3
DEED BOOK 4426, PAGE 484
DEED BOOK 25375, PAGE 359
L.C. CERT. #37981
PLAN NO. 932 OF 1947
PLAN NO. 1108 OF 1956
PLAN NO. 738 OF 1961
PLAN NO. 31 OF 2007
L.C.C. 4382-A
L.C.C. 4788-A

NOTES:

1) THE PURPOSE OF THIS PLAN IS TO CONSOLIDATE PARCELS 1, 2 & 3 INTO ONE CONTIGUOUS LOT IDENTIFIED AS LOT "A".

2) PARCELS 1, 2 & 3 ARE CURRENTLY OWNED BY NEEDHAM HOUSING AUTHORITY.

#5 CHAMBERS STREET & #0 LINDEN STREET

Needham, Massachusetts 02492

PREPARED FOR

BARGMANN HENDRIE + ARCHETYPE, INC.

9 Channel Center St, Suite 300
Boston, Massachusetts 02210

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

185 CENTRE STREET, DANVERS, MA 01923
VOICE (978) 777-3050, FAX (978) 774-7816
WWW.HANCOCKASSOCIATES.COM

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE: 12/21/2023 DRAWN BY: JML
SCALE: 1" = 80' CHECK BY: JAE

PLAN OF LAND IN NEEDHAM, MA

PLOT DATE: Jul 09, 2024 - 9:50 am
P:\PROJ\26774 St Project\26774 - SRA - Needham\Dwr\ANR\

DWG: 26774anr.dwg
LAYOUT: ANR
SHEET: 1 OF 1
PROJECT NO.: 26774

7-23-2024

LINDEN STREET REDEVELOPMENT
Needham Housing Authority

PHASE 1
138-188 LINDEN STREET

NEEDHAM, MASSACHUSSETTS 02492
PREPARED FOR
NEEDHAM HOUSING AUTHORITY
21 HIGHLAND CIRCLE
NEEDHAM, MA 02494
199/133-23-00
199/133-24-00
199/133-41-00

APPLICANT/OWNER
NEEDHAM HOUSING AUTHORITY
21 HIGHLAND CIRCLE
NEEDHAM, MA 02494

ARCHITECT
BARGMANN HENDRIE + ARCHETYPE, INC.
9 CHANNEL CENTER STREET, SUITE 300
BOSTON, MA 02210
(617) 350 0450

CIVIL ENGINEER
HANCKOCK ASSOCIATES
121 EAST BERKELEY ST.
BOSTON, MA 02118

SURVEYOR
HANCOCK ASSOCIATES
121 EAST BERKELEY ST.
BOSTON, MA 02118

LANDSCAPE ARCHITECT
GROUND LANDSCAPE, INC.
285 WASHINGTON STREET, UNIT G
SOMERVILLE, MA 02143

ZONING COMPLIANCE CHART

	REQUIRED ZONING	PROPOSED PROJECT - PHASE 1 *	COMPLIANCE	NOTES
ZONING DISTRICT	**Affordable Housing District (AHD)**	**Affordable Housing District (AHD)**		
USES	Affordable Multi-Family	Affordable Multi-Family		
ZONING DIMENSIONAL ANALYSIS				
Gross Lot Area	-	478,540 sq. ft.	-	10,9858 acres per Consolidated Plan
Minimum Lot Size	20,000 sq. ft.	182,400 sq. ft.	Y	
Frontage	150 ft	740 ft	Y	
# Of Dwelling Units	-	216	-	* PHASES 1A/1B/CHAMBERS (EXIST.)
Front yard	40 ft	88 ft	Y	
Side Yard - north	25 ft	155 ft	Y	
Side Yard - south	25 ft	283 ft	Y	lawful pe-existing Chambers Building 50 ft
Rear Yard	25 ft	33 ft	Y	
Height	58 ft	53 ft	Y	
Mechanical Height	15 ft	8 ft	Y	
Mechanical Roof Coverage	25%	< 1%	Y	
Stories	4	4	Y	PHASES 1A/1B
FAR	0.5	0.36	Y	* PHASES 1A/1B/CHAMBERS (EXIST.)
Units per Acre	25	19.7	Y	* PHASES 1A/1B/CHAMBERS (EXIST.)
Lot Coverage	20%	12.4%	Y	
Parking				
Parking Spaces	0.5/unit	0.5/unit	Y	PHASES 1A/1B = 136 units requires 68 parking spaces
Parking Lot Illumination	per 5.1.3 (a)	per 5.1.3 (a)	Y	
Loading Requirement	per 5.1.3 (b)	per 5.1.3 (b)	Y	
Handicapped Parking	per 5.1.3 (c)	per 5.1.3 (c)	Y	
Driveway Openings	per 5.1.3 (d)	per 5.1.3 (d)	Y	
Compact Cars	per 5.1.3 (e)	per 5.1.3 (e)	Y	
Parking Space Size	per 5.1.3 (f)	per 5.1.3 (f)	Y	
Bumper Overhang	per 5.1.3 (g)	per 5.1.3 (g)	Y	
Parking Space Layout	per 5.1.3 (h)	per 5.1.3 (h)	Y	
Width of Maneuvering Aisle	per 5.1.3 (i)	per 5.1.3 (i)	Y	
Parking Setbacks	per 5.1.3 (j)	per 5.1.3 (j)	Y	
Landscape Areas	per 5.1.3 (k)	per 5.1.3 (k)	Y	
Trees	per 5.1.3 (l)	per 5.1.3 (l)	Y	
Location	per 5.1.3 (m)	per 5.1.3 (m)	Y	
Bicycle Racks	per 5.1.3 (n)	per 5.1.3 (n)	Y	

* The Linden Street Redevelopment includes Phase 1A and 1B, which will replace the 18 Linden Street buildings, increasing the number of Linden units from 72 to 136. This redevelopment will not affect the 80 existing Chambers Street units which will remain until replaced during a future Phase 2.

LIST OF DRAWINGS

A000 Cover Sheet

CIVIL
C0 Existing Conditions Plan
C1 Phasing Plan
C2 Demolition, Soil Erosion, and Sediment Control Plan
C3 Site Layout and Materials Plan I
C4 Grading and Drainage
C5 Utility Plan
C6 Construction Details I
C6.1 Construction Details II

LANDSCAPE
L099 Tree Protection Plan
L102A Material Plan
L102B Material Plan
L104 Planting Plan
L105 Site Lighting Plan
L501 Details
L503 Details
L504 Details
L505 Details
L506 Details
L510 Details

ARCHITECTURAL
A100 Phase 1 - Plans
A101 Phase 1A - First Floor Plan
A102 Phase 1A - Typical Floor Plan - Floors 2-4
A104 Phase 1B - First Floor Plan
A105 Phase 1B - Typical Floor Plan - Floors 2-4
A200 Phase 1 - Elevations
A201 Phase 1A - Elevations
A202 Phase 1A - Elevations
A203 Phase 1B - Elevations
A300 Building Sections

ELECTRICAL
E000 Electrical Legend, Notes, and Abbreviations
E100 Electrical Site Plan
E101 Electrical Site Plan Photometrics



Locus Plan



Area Plan
1" = 200'-0"

SITE PLAN REVIEW - 08/23/2024

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Neeham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS
DATE

DRAWING TITLE
Cover Sheet

DRAWING INFORMATION
08/23/2024 DATE OF ISSUE
Site Plan Review DESCRIPTION
1" = 200'-0" SCALE
Author DRAWN BY
3489.00 PROJECT #
revit.rvt FILE NAME

DRAWING NUMBER
000

Copyright BH+A, Inc.

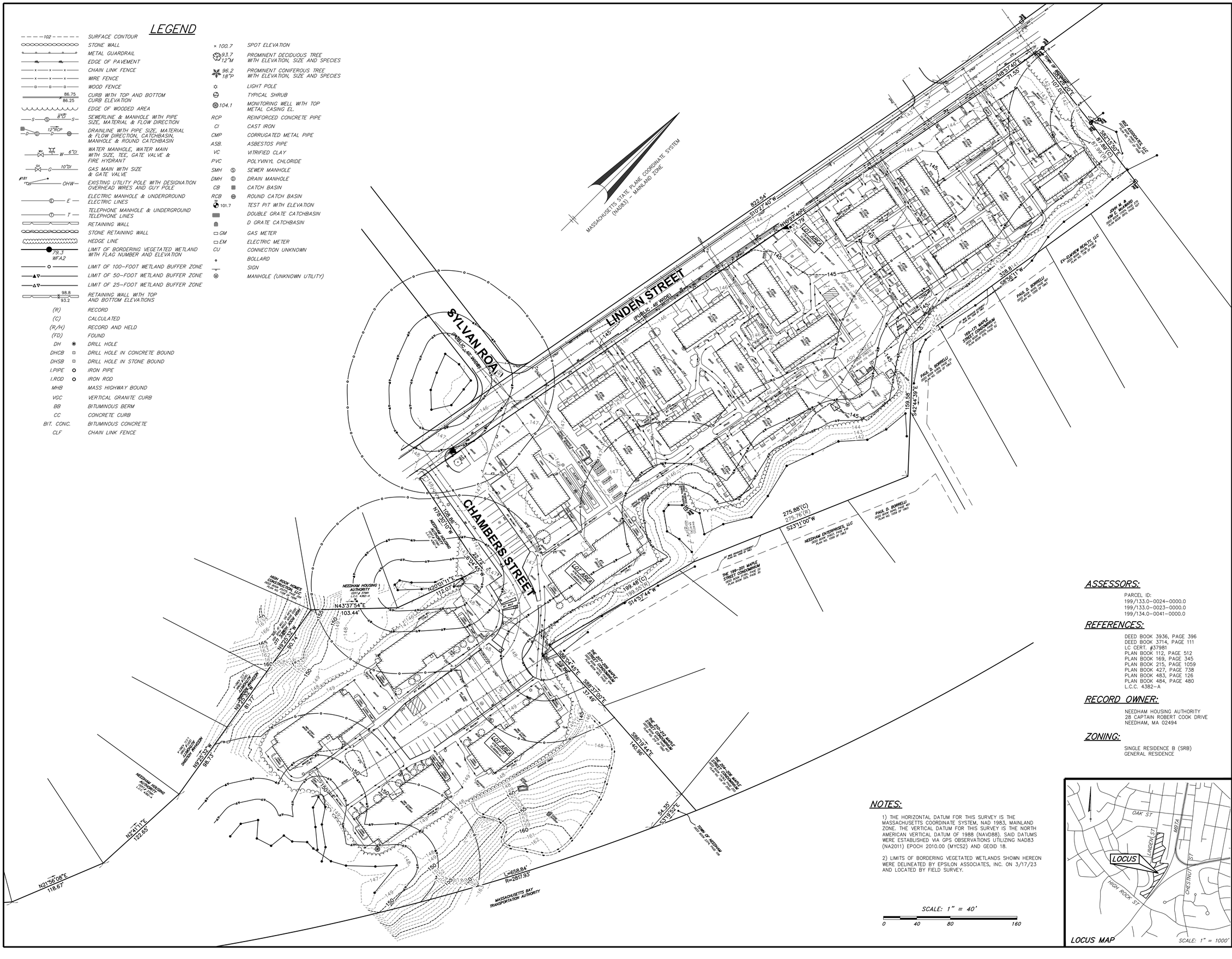
V.2.1

C:\Users\dfitzwater\Documents\3489 Linden Chambers Redevelopment NHA_R23_DD_dfitzwater5KQD6.rvt
8/23/2024 12:34:32 PM Author

LEGEND

102	SURFACE CONTOUR
	STONE WALL
	METAL GUARDRAIL
	EDGE OF PAVEMENT
x x x	CHAIN LINK FENCE
x x x	WIRE FENCE
	WOOD FENCE
86.75 / 86.25	CURB WITH TOP AND BOTTOM CURB ELEVATION
	EDGE OF WOODED AREA
S 8"VC S	SEWERLINE & MANHOLE WITH PIPE SIZE, MATERIAL & FLOW DIRECTION
D 12"RCP D	DRAINLINE WITH PIPE SIZE, MATERIAL & FLOW DIRECTION, CATCHBASIN, MANHOLE & ROUND CATCHBASIN
W 6"DI	WATER MANHOLE, WATER MAIN WITH SIZE, TEE, GATE VALVE & FIRE HYDRANT
G 10"DI	GAS MAIN WITH SIZE & GATE VALVE
#181 OHW	EXISTING UTILITY POLE WITH DESIGNATION OVERHEAD WIRES AND GUY POLE
E	ELECTRIC MANHOLE & UNDERGROUND ELECTRIC LINES
T	TELEPHONE MANHOLE & UNDERGROUND TELEPHONE LINES
	RETAINING WALL
	STONE RETAINING WALL
	HEDGE LINE
79.3 WFA2	LIMIT OF BORDERING VEGETATED WETLAND WITH FLAG NUMBER AND ELEVATION
	LIMIT OF 100-FOOT WETLAND BUFFER ZONE
	LIMIT OF 50-FOOT WETLAND BUFFER ZONE
	LIMIT OF 25-FOOT WETLAND BUFFER ZONE
98.8 / 93.2	RETAINING WALL WITH TOP AND BOTTOM ELEVATIONS
(R)	RECORD
(C)	CALCULATED
(R/H)	RECORD AND HELD
(FD)	FOUND
DH	DRILL HOLE
DHCB	DRILL HOLE IN CONCRETE BOUND
DHSB	DRILL HOLE IN STONE BOUND
I.PIPE	IRON PIPE
I.ROD	IRON ROD
MHB	MASS HIGHWAY BOUND
VGC	VERTICAL GRANITE CURB
BB	BITUMINOUS BERM
CC	CONCRETE CURB
BIT. CONC.	BITUMINOUS CONCRETE
CLF	CHAIN LINK FENCE

× 100.7	SPOT ELEVATION
93.7 / 12"M	PROMINENT DECIDUOUS TREE WITH ELEVATION, SIZE AND SPECIES
96.2 / 18"P	PROMINENT CONIFEROUS TREE WITH ELEVATION, SIZE AND SPECIES
	LIGHT POLE
	TYPICAL SHRUB
MW 104.1	MONITORING WELL WITH TOP METAL CASING EL.
RCP	REINFORCED CONCRETE PIPE
CI	CAST IRON
CMP	CORRUGATED METAL PIPE
ASB.	ASBESTOS PIPE
VC	VITRIFIED CLAY
PVC	POLYVINYL CHLORIDE
SMH	SEWER MANHOLE
DMH	DRAIN MANHOLE
CB	CATCH BASIN
RCB	ROUND CATCH BASIN
TP 101.7	TEST PIT WITH ELEVATION
	DOUBLE GRATE CATCHBASIN
	D GRATE CATCHBASIN
GM	GAS METER
EM	ELECTRIC METER
CU	CONNECTION UNKNOWN
	BOLLARD
	SIGN
MH	MANHOLE (UNKNOWN UTILITY)



ASSESSORS:

PARCEL ID:
199/133.0-0024-0000.0
199/133.0-0023-0000.0
199/134.0-0041-0000.0

REFERENCES:

DEED BOOK 3936, PAGE 396
DEED BOOK 3714, PAGE 111
LC CERT. #37981
PLAN BOOK 112, PAGE 512
PLAN BOOK 169, PAGE 345
PLAN BOOK 215, PAGE 1059
PLAN BOOK 427, PAGE 738
PLAN BOOK 483, PAGE 126
PLAN BOOK 484, PAGE 480
L.C.C. 4382-A

RECORD OWNER:

NEEDHAM HOUSING AUTHORITY
28 CAPTAIN ROBERT COOK DRIVE
NEEDHAM, MA 02494

ZONING:

SINGLE RESIDENCE B (SRB)
GENERAL RESIDENCE

NOTES:

1) THE HORIZONTAL DATUM FOR THIS SURVEY IS THE MASSACHUSETTS COORDINATE SYSTEM, NAD 1983, MAINLAND ZONE. THE VERTICAL DATUM FOR THIS SURVEY IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). SAID DATUMS WERE ESTABLISHED VIA GPS OBSERVATIONS UTILIZING NAD83 (NA2011) EPOCH 2010.00 (MYCS2) AND GEOID 18.

2) LIMITS OF BORDERING VEGETATED WETLANDS SHOWN HEREON WERE DELINEATED BY EPSILON ASSOCIATES, INC. ON 3/17/23 AND LOCATED BY FIELD SURVEY.

LOCUS MAP SCALE: 1" = 1000'

LINDEN/ CHAMBERS REDEVELOPMENT

667 Linden St & 5 Chambers St
Needham, Massachusetts 02492

PREPARED FOR:

BARGMANN HENDRIE + ARCHETYPE, INC.

9 Channel Center St, Suite 300
Boston, Massachusetts 02210

HANCOCK ASSOCIATES

Civil Engineers

Land Surveyors

Wetland Scientists

121 EAST BERKELEY STREET, BOSTON, MA 02118
VOICE (617) 357-8145, FAX (617) 357-9495
WWW.HANCOCKASSOCIATES.COM

COMMONWEALTH OF MASSACHUSETTS
JASON M. ELLIS
No. 49052
REGISTERED PROFESSIONAL LAND SURVEYOR

NO.	BY	APP	DATE	ISSUE/REVISION DESCRIPTION

DATE: 5/11/2023 DESIGN BY: JML
SCALE: 1" = 40' CHECK BY: JAE

EXISTING CONDITIONS PLAN OF LAND IN NEEDHAM, MA

PLOT DATE: Aug 23, 2024 12:26 pm
PATH: O:\Civil 3D Projects\26774 - BHA - Needham\Surv\DWG\

DWG: 26774ec.dwg
LAYOUT: EC(30x42)
SHEET: X OF X

PROJECT NO.: 26774

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD 83)

PHASE 1B WORK AREA

PHASE 1A WORK AREA

LINDEN STREET

(PUBLIC WAY)

FIRE TRUCK ACCESS TO EXISTING PHASE 1B BUILDINGS STILL IN SERVICE DURING PHASE 1A CONSTRUCTION

HIGH ROCK HOMES CONSTRUCTION, LLC DEED BOOK 29375, PAGE 359 PLAN NO. 1109 OF 1986

CAP PHASE 1A STORM DRAIN

INSTALL GATE VALVE FOR PHASE 1B FIRE WATER LINE

CAP PHASE 1A STORM DRAIN

LIMIT OF PHASE 1A BUILDING CONSTRUCTION

LIMIT OF PHASE 1A SITE DEMOLITION

PHASE 1A PLAN

SCALE: 1"=40'

PHASE 1B WORK AREA

PHASE 1A WORK AREA

LINDEN STREET

HIGH ROCK HOMES CONSTRUCTION, LLC DEED BOOK 29375, PAGE 359 PLAN NO. 1109 OF 1986

CONNECT TO PHASE 1A STORM DRAIN

CONNECT WATERLINE TO GATE VALVE FOR PHASE 1B FIRE WATER LINE

CONNECT TO PHASE 1A STORM DRAIN

PHASE 1B PLAN

SCALE: 1"=40'

SCALE: 1" = 40'

0 40 80 160

THIS PLAN IS TO BE UTILIZED FOR DEMOLITION, SOIL EROSION AND SEDIMENT CONTROL PURPOSES ONLY

NOT FOR CONSTRUCTION - PERMITTING USE ONLY

C:\local Revit\3489 Linden Chambers Redevelopment NHA_SD_dtlzwaiter5kKDd.rvt Author

5/6/2024 2:45:36 PM

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

138-188 Linden St, Needham MA, 02494
Assessor's Map:
199/133-23-00
199/133-24-00
199/134-41-00

CLIENT

Needham Housing Authority

21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

#	COMMENT/DESCRIPTION	DATE

DRAWING TITLE

PHASING PLAN

DRAWING INFORMATION

COMMONWEALTH OF MASSACHUSETTS ANTHONY DEMARCO CIVIL No. 49578 REGISTERED PROFESSIONAL ENGINEER

08/23/2024
DATE OF ISSUE

SITE PLAN REVIEW
DESCRIPTION

SCALE

OMR
DRAWN BY

26774
PROJECT #

FILE NAME

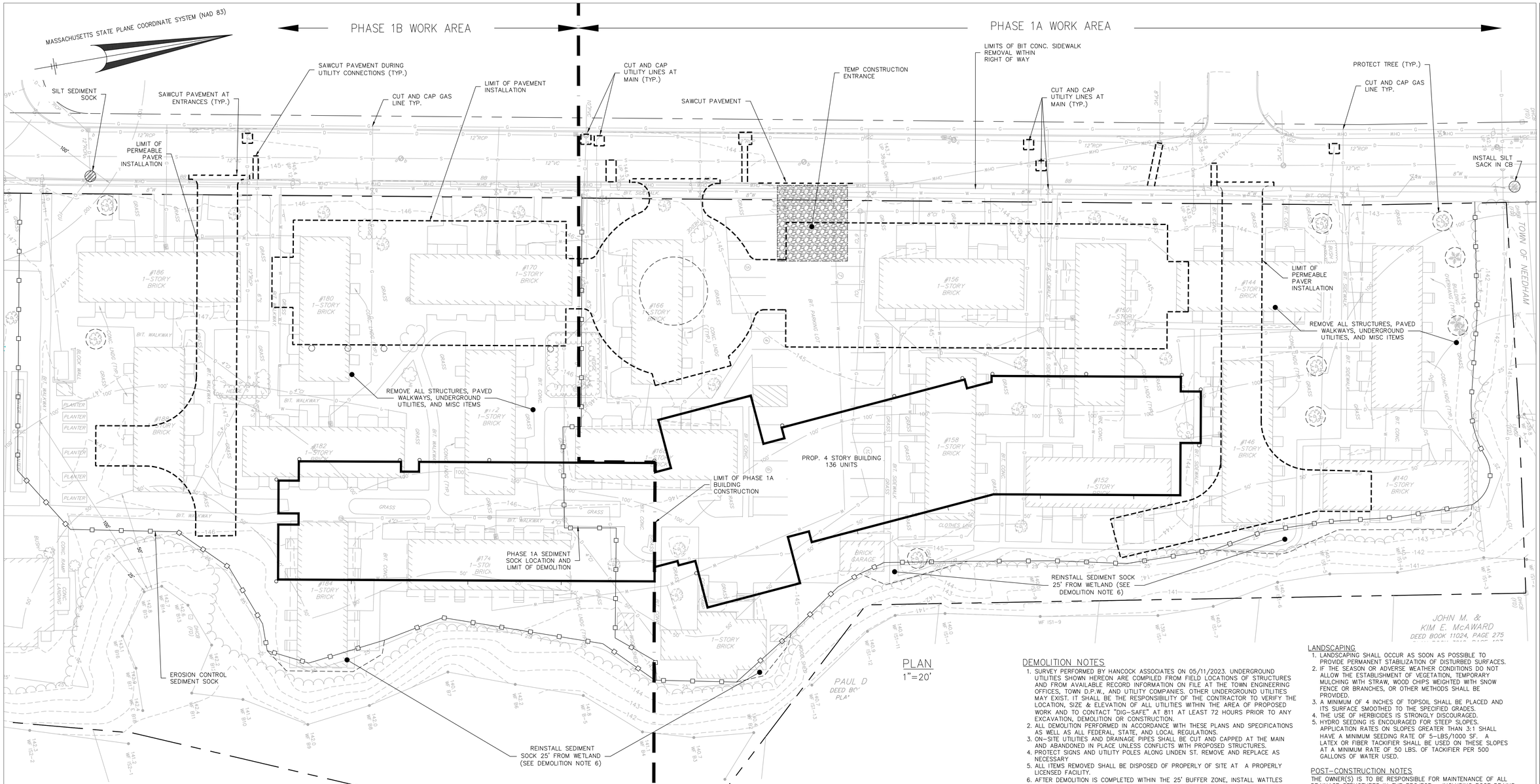
DRAWING NUMBER

C1

SHEET NUMBER 1 OF 7

Copyright BH+A, Inc.

V.2.1



PLAN
1"=20'

DEMOLITION NOTES

1. SURVEY PERFORMED BY HANCOCK ASSOCIATES ON 05/11/2023. UNDERGROUND UTILITIES SHOWN HEREON ARE COMPILED FROM FIELD LOCATIONS OF STRUCTURES AND FROM AVAILABLE RECORD INFORMATION ON FILE AT THE TOWN ENGINEERING OFFICES, TOWN D.P.W., AND UTILITY COMPANIES. OTHER UNDERGROUND UTILITIES MAY EXIST. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION, SIZE & ELEVATION OF ALL UTILITIES WITHIN THE AREA OF PROPOSED WORK AND TO CONTACT "DIG–SAFE" AT 811 AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION.
2. ALL DEMOLITION PERFORMED IN ACCORDANCE WITH THESE PLANS AND SPECIFICATIONS AS WELL AS ALL FEDERAL, STATE, AND LOCAL REGULATIONS.
3. ON–SITE UTILITIES AND DRAINAGE PIPES SHALL BE CUT AND CAPPED AT THE MAIN AND ABANDONED IN PLACE UNLESS CONFLICTS WITH PROPOSED STRUCTURES.
4. PROTECT SIGNS AND UTILITY POLES ALONG LINDEN ST. REMOVE AND REPLACE AS NECESSARY
5. ALL ITEMS REMOVED SHALL BE DISPOSED OF PROPERLY OF SITE AT A PROPERLY LICENSED FACILITY.
6. AFTER DEMOLITION IS COMPLETED WITHIN THE 25' BUFFER ZONE, INSTALL WATTLES ALONG THE 25' BUFFER BUT DO NOT REMOVE EXISTING EROSION CONTROL. NEXT, STABILIZE AND ESTABLISH NATIVE PLANTINGS, SEE LANDSCAPE ARCHITECT'S PLANS FOR DETAILS. ONCE PLANTINGS ARE ESTABLISHED, REMOVE THE DOWNSLOPE WATTLES THAT ARE IN WITHIN THE 25' BUFFER ZONE.

EROSION AND SEDIMENTATION NOTES

PRE–CONSTRUCTION

1. THE CONTRACTOR SHALL HAVE A STOCKPILE OF MATERIALS REQUIRED TO CONTROL EROSION ON–SITE TO BE USED TO SUPPLEMENT OR REPAIR EROSION CONTROL DEVICES. THESE MATERIALS SHALL INCLUDE, BUT ARE NOT LIMITED TO STRAW WATTLES, SILT FENCE AND CRUSHED STONE.
2. THE CONTRACTOR IS RESPONSIBLE FOR EROSION CONTROL ON SITE AND SHALL UTILIZE EROSION CONTROL MEASURES WHERE NEEDED, REGARDLESS OF WHETHER THE MEASURES ARE SPECIFIED ON THE PLAN OR IN THE ORDER OF CONDITIONS.
3. UNSUITABLE EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE.
4. CONSTRUCTION ENTRANCE SHALL BE INSTALLED.
5. EXISTING CATCH BASINS SHALL BE PROTECTED WITH SILT SACKS.

PRELIMINARY SITE WORK

1. EXCAVATED MATERIALS SHOULD BE STOCKPILED, SEPARATING THE TOPSOIL FOR FUTURE USE ON THE SITE. EROSION CONTROL SHALL BE UTILIZED ALONG THE DOWN SLOPE SIDE OF THE PILES AND SIDE SLOPES SHALL NOT EXCEED 2:1.
2. IF INTENSE RAINFALL IS ANTICIPATED, THE INSTALLATION OF SUPPLEMENTAL STRAW BALE DIKES, SILT FENCES, OR ARMORED DIKES SHALL BE CONSIDERED.

ONGOING SITE WORK

1. EROSION CONTROL MEASURES SHALL BE INSPECTED DAILY AND REPLACED AS NEEDED. SEDIMENT BUILT UP BEHIND SILT FENCES SHALL BE REMOVED WHEN LEVEL REACHES ONE HALF WATTLE HEIGHT AND DISPOSED IN ACCORDANCE WITH APPLICABLE REGULATIONS.
2. DEWATERING SHALL BE DONE IN A MANNER SO AS NOT TO TRANSMIT SILT, SAND, OR PARTICULATE MATTER TO THE RECEIVING WATER OR EXISTING DRAINAGE SYSTEM.
3. CATCH BASIN SILT SACKS SHALL BE INSPECTED WEEKLY. SILT SACKS SHALL BE REMOVED AND CLEANED WHEN SEDIMENT IS WITHIN 6" OF THE BOTTOM OF THE GRATE. SEDIMENT SHALL BE DISPOSED IN ACCORDANCE WITH APPLICABLE REGULATIONS.
4. CONSTRUCTION ENTRANCE SHALL BE INSPECTED WEEKLY. STONE SHALL BE REMOVED AND REPLACED WHEN SEDIMENT REACHES TOP OF STONE.
5. LINDEN STREET SHALL BE INSPECTED DAILY AND SWEPT AS NEEDED TO KEEP PAVED SURFACE FREE OF SOIL AND DEBRIS.
6. DUST SHALL BE CONTROLLED VIA MECHANICAL WATER SPRAYING.
7. NO EXISTING UTILITIES SHALL BE ABANDONED IN PLACE.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING A FUNCTIONAL STORM DRAINAGE SYSTEM IN LINDEN STREET AT ALL TIMES DURING CONSTRUCTION, INCLUDING PERIODIC CLEAN OUT OF SEDIMENT.

LANDSCAPING

1. LANDSCAPING SHALL OCCUR AS SOON AS POSSIBLE TO PROVIDE PERMANENT STABILIZATION OF DISTURBED SURFACES.
2. IF THE SEASON OR ADVERSE WEATHER CONDITIONS DO NOT ALLOW THE ESTABLISHMENT OF VEGETATION, TEMPORARY MULCHING WITH STRAW, WOOD CHIPS WEIGHTED WITH SNOW FENCE OR BRANCHES, OR OTHER METHODS SHALL BE PROVIDED.
3. A MINIMUM OF 4 INCHES OF TOPSOIL SHALL BE PLACED AND ITS SURFACE SMOOTHED TO THE SPECIFIED GRADES.
4. THE USE OF HERBICIDES IS STRONGLY DISCOURAGED.
5. HYDRO SEEDING IS ENCOURAGED FOR STEEP SLOPES. APPLICATION RATES ON SLOPES GREATER THAN 3:1 SHALL HAVE A MINIMUM SEEDING RATE OF 5–LBS/1000 SF. A LATEX OR FIBER TACKIFIER SHALL BE USED ON THESE SLOPES AT A MINIMUM RATE OF 50 LBS. OF TACKIFIER PER 500 GALLONS OF WATER USED.

POST–CONSTRUCTION NOTES

THE OWNER(S) IS TO BE RESPONSIBLE FOR MAINTENANCE OF ALL DRAINAGE STRUCTURES IN THE PROJECT – INCLUDING ROOF DRAINS, DRAIN PIPES, CATCH BASINS, AND DRAIN MANHOLES.

REGULAR MAINTENANCE IS TO INCLUDE THE FOLLOWING:

1. INSPECTION OF ALL DRAINAGE FACILITIES (CATCH BASINS, PIPES, OUTLET CONTROL STRUCTURES, AND DETENTION BASINS) EVERY THREE MONTHS. DURING THESE INSPECTIONS, THE INSPECTOR (A REGISTERED PROFESSIONAL CIVIL ENGINEER QUALIFIED IN DRAINAGE SYSTEMS) SHALL LOOK FOR EVIDENCE OF THE FOLLOWING: STRUCTURAL DAMAGE, SILT ACCUMULATION (NEAR INLET INVERTS ON CATCH BASINS AND OUTLET CONTROL STRUCTURES), AND IMPROPER FUNCTION. A REPORT ON THE SYSTEM SHALL BE DELIVERED TO THE OWNER.
2. AFTER INSPECTION, IF ANY OF THE ABOVE CONDITIONS EXIST, THE INSPECTOR SHALL NOTIFY THE OWNER. WHO SHALL IMMEDIATELY ARRANGE FOR ALL NECESSARY REPAIRS AND/OR SEDIMENT REMOVAL.
3. THE PAVEMENT AREA IS TO BE SWEPT CLEAN, AS REQUIRED (I.E., VISUALLY NOTICEABLE DEBRIS BUILD–UP). A MINIMUM OF ONCE PER YEAR.
4. ALL GRADED SLOPES SHALL BE INSPECTED EVERY SPRING FOR EROSION. UPON DISCOVERY OF ANY FAILURE (IE. EROSION), LOAM AND SEED SHALL BE PUT IN PLACE AND NURTURED.
5. DURING THE WINTER MONTHS, ALL SNOW IS TO BE STORED SUCH THAT SNOW MELT IS CONTROLLED WITHIN THE PAVED AREA.

CONSTRUCTION SEQUENCE

1. INSTALL CONSTRUCTION ENTRANCE
2. INSTALL EROSION CONTROL AND SILT SACKS
3. SITE DEMOLITION AND PREPARATION PER PLAN.
4. UTILITY AND FOUNDATION CONSTRUCTION.
5. BACKFILL OF UTILITIES AND FOUNDATIONS.
6. PARKING LOT AND BUILDING CONSTRUCTION.
7. REMOVE CONSTRUCTION ENTRANCE.
8. FINAL GRADING, AND PAVING.
9. LANDSCAPING, LOAM AND SEED.
10. REMOVAL OF EROSION CONTROL AND SILT SACKS ONCE FULLY STABILIZED.

LEGEND

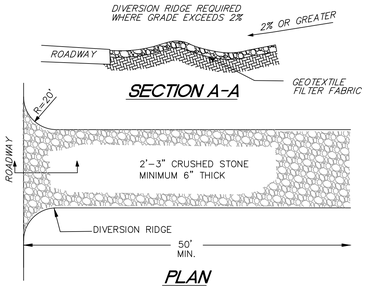
- TEMPORARY CONSTRUCTION ENTRANCE
- SAWCUT
- SEDIMENT SOCK
- SEDIMENT SOCK LOCATION DURING DEMOLITION

SCALE: 1" = 20'

0 20 40 80

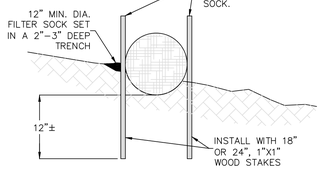
THIS PLAN IS TO BE UTILIZED FOR DEMOLITION, SOIL EROSION AND SEDIMENT CONTROL PURPOSES ONLY

NOT FOR CONSTRUCTION - PERMITTING USE ONLY



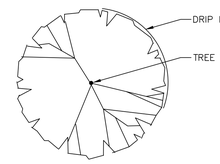
NOTES:
1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT–OF–WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY WHEELS SHALL BE CLEANED PRIOPR TO ENTRANCE ONTO PUBLIC RIGHT–OF–WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABLIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.

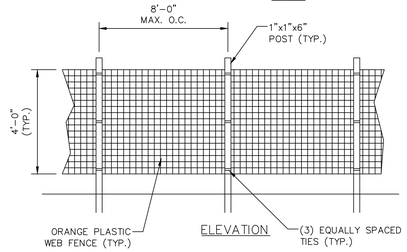
TEMPORARY GRAVEL CONSTRUCTION ENTRANCE/EXIT
NOT TO SCALE



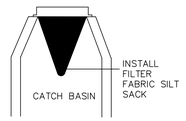
NOTES:
1. SOCK SIZE DEPICTED IS FOR GENERAL USE. GREATER SLOPES MAY REQUIRE LARGER SOCK.
2. COMPOST MATERIAL MAY BE DISPERSED ON SITE AT THE DISCRETION OF THE APPROVING AUTHORITY.
3. PRIOR TO SETTING THE SOCK REMOVE LOOSE LITTER, BRANCHES AND OTHER MATERIAL THAT MAY PREVENT THE SOCK FROM DIRECT CONTACT WITH SOIL.

WATTLE
NOT TO SCALE





TREE PROTECTION DETAIL
NOT TO SCALE



CATCH BASIN SEDIMENT TRAP
NOT TO SCALE

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment
138-188 Linden St, Needham MA, 02494
Assessor's Map:
199/133-23-00
199/133-24-00
199/134-41-00

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

#	COMMENT/DESCRIPTION	DATE

DRAWING TITLE
DEMOLITION, SOIL EROSION, AND SEDIMENTATION CONTROL PLAN

DRAWING INFORMATION

ANTHONY DENINO CIVIL No. 49350 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

08/23/2024
DATE OF ISSUE
SITE PLAN REVIEW
DESCRIPTION
OMR
SCALE
DRAWN BY
26774
PROJECT #
FILE NAME

DRAWING NUMBER
C2.0
SHEET NUMBER 2 OF 7

Copyright BH+A, Inc.
V.2.1

C:\local Revit\34893 Linden Chambers Redevelopment NHA_SD_cflowtaer5HOD6.rvt
5/6/2024 2:45:36 PM
Author

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD 83)

PHASE 1B WORK AREA

PHASE 1A WORK AREA

LINDEN STREET
(PUBLIC - 40' WIDE)

LIMIT OF SIDEWALK REPLACEMENT
PROP. VERT GRANITE CURB (TYP.V9-4)
PROP. DRIVEWAY CURB CUT W/ CEM. CONC. ENTRANCE APRON
PROP. 5' WIDE CEMENT CONCRETE SIDEWALK
REPLACE EX. SIDEWALK W/ 5' CEMENT CONC.
PROP. LANDSCAPING (TYP.)
15'X13' PERMEABLE PAVERS (TYP. BOTH SIDES)
ACCESSIBLE RAMP TO LEVEL LANDING (TYP.)
SLOPED GRANITE CURB
SET EX. HYDRANT ON PROP PAVERS
ACCESSIBLE RAMP TO LEVEL LANDING (TYP.)
CROSSWALK (TYP.)
SNOW STORAGE (TYP.)
6" VERT GRANITE CURB
2' D-STONE CURB RADIUS (TYP. LEFT/RIGHT ENTRANCE)
PROP. DRIVEWAY CURB CUT (TYP.) W/ CEM. CONC. APRON
PROP. VERT GRANITE CURB (TYP.V9-4)
LIMIT OF SIDEWALK REPLACEMENT
GARDEN FENCE SEE ARCH. PLANS FOR DIMENSIONS, EXACT LOCATION AND MATERIAL
POROUS PAVEMENT
PROP. BIT CONC. PAVEMENT (TYP.)
PROP. ACCESSIBLE RAMP (TYP.)
TRANSITION CURB (TYP.)
PROP. BIT CONC. PAVEMENT (TYP.)
6" GRANITE CURB (TYP.)
FRONT YARD SETBACK 86'
LANDSCAPED AREA SEE LANDSCAPING PLANS FOR DETAILS
5' WALKING PATH (SEE LANDSCAPE PLANS FOR DETAILS)
POROUS PAVEMENT
15'x15' SMOKING SHED
20' FIRE LANE
SIDE YARD SETBACK 157'
PERMEABLE PAVERS (SEE LANDSCAPE PLANS FOR DETAILS)
EMERGENCY GENERATOR
DUMPSTER ENCLOSURE AREA (SEE LANDSCAPE PLANS)
BIKE RACK
EV READY DOUBLE USE STATION (TYP. 3)
PROP. LANDSCAPE WALL
EV CHARGING STATION W/ 2 BOLLARDS (TYP. 3 DOUBLE USE)
EV CHARGING STATION W/ 2 BOLLARDS (1 SINGLE USE)
EV READY SINGLE USE STATION
ACCESSIBLE PARKING SIGN (TYP. 4)
ACCESSIBLE PARKING (2) W/ LOADING ZONE
PROP. CURB TRANSITION
ACCESSIBLE PARKING (2) W/ LOADING ZONE
PROP. LANDSCAPE WALL
CONC TRANSFORMER PAD
FLUSH CURB W/ 6" BOLLARDS SPACED 7' O.C
PROP. 4 STORY RESIDENTIAL BUILDING 28,330 SF FOUNDATION AREA
SIDE YARD SETBACK 283.5'
BIKE RACK
15'x15' SMOKING SHED
PHASE 1B BUILDING
PERMEABLE PAVERS
REAR YARD SETBACK 33'
PROP. 6" BOLLARD(TYP. 2)
PROP. 5' WIDE CEMENT CONCRETE SIDEWALK

PLAN
1"=20'

BUILDING ANALYSIS TABLE (PHASE 1)	
GROSS FLOOR AREA	–
BUILDING COVERAGE (PHASE 1A & AB)	28,330 SF(16%)
LANDSCAPE OPEN SPACE (PHASE 1A & 1B)	55%
BUILDING HEIGHT	4 STORY
MAX FLOOR AREA RATIO	0.22
PARKING REQUIREMENT (0.5 SPACES PER UNIT)	68 SPACES
UNITS	136
IMPERVIOUS PAVEMENT	46,960 SF (27%)

NOTES
1. SURVEY PERFORMED BY HANCOCK ASSOCIATES ON 05/11/2023. UNDERGROUND UTILITIES SHOWN HEREON ARE COMPILED FROM FIELD LOCATIONS OF STRUCTURES AND FROM AVAILABLE RECORD INFORMATION ON FILE AT THE TOWN ENGINEERING OFFICES, TOWN D.P.W., MASSDOT AND UTILITY COMPANIES. OTHER UNDERGROUND UTILITIES MAY EXIST. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY THE LOCATION, SIZE & ELEVATION OF ALL UTILITIES WITHIN THE AREA OF PROPOSED WORK AND TO CONTACT "DIG-SAFE" AT 811 AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION, DEMOLITION OR CONSTRUCTION.
2. CONTRACTOR SHALL OBTAIN REQUIRED PERMITS PRIOR TO CONSTRUCTION.
3. ALL WORK TO BE PERFORMED IN STRICT ACCORDANCE WITH PLANS AND SPECIFICATIONS AND REQUIREMENTS OF THE TOWN OF NEEDHAM.
4. DEBRIS SHALL NOT BE BURIED ON SITE. ALL UNSUITABLE MATERIAL AND DEBRIS SHALL BE DISPOSED OF OFF SITE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REQUIREMENTS.
5. CONTRACTOR IS RESPONSIBLE FOR ALL SHORING REQUIRED DURING EXCAVATION AND CONSTRUCTION TO BE PERFORMED IN ACCORDANCE WITH OSHA STANDARDS.
6. SEE LANDSCAPING PLANS FOR PROPOSED PLANTINGS AND SITE FEATURES (BIKE RACK, SMOKING SHED, ETC)

LEGEND
- PROP. SNOW STORAGE
- # PARKING SPACE COUNT
- LANDSCAPING WALL
- POROUS PAVEMENT
- CEMENT CONCRETE
- PERMEABLE PAVERS
- TP1 TEST PIT LOCATION
- ACCESSIBLE PARKING SPACE SYMBOL
- B-3 BORING LOCATION
- PAINTED CROSSWALK
- SEDIMENT SOCK

SCALE: 1" = 20'
0 20 40 80

NOT FOR CONSTRUCTION - PERMITTING USE ONLY

C:\local Revit\34893 Linden Chambers Redevelopment NHA_SD_cfowler5HZO6.rvt
5/6/2024 2:45:36 PM Author

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment
138-188 Linden St, Needham MA, 02494
Assessor's Map:
199/133-23-00
199/133-24-00
199/134-41-00

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

#	COMMENT/DESCRIPTION	DATE

DRAWING TITLE
SITE LAYOUT AND MATERIALS PLAN

DRAWING INFORMATION

ANTHONY DEMARCO CIVIL No. 49125 REGISTERED PROFESSIONAL ENGINEER COMMONWEALTH OF MASSACHUSETTS

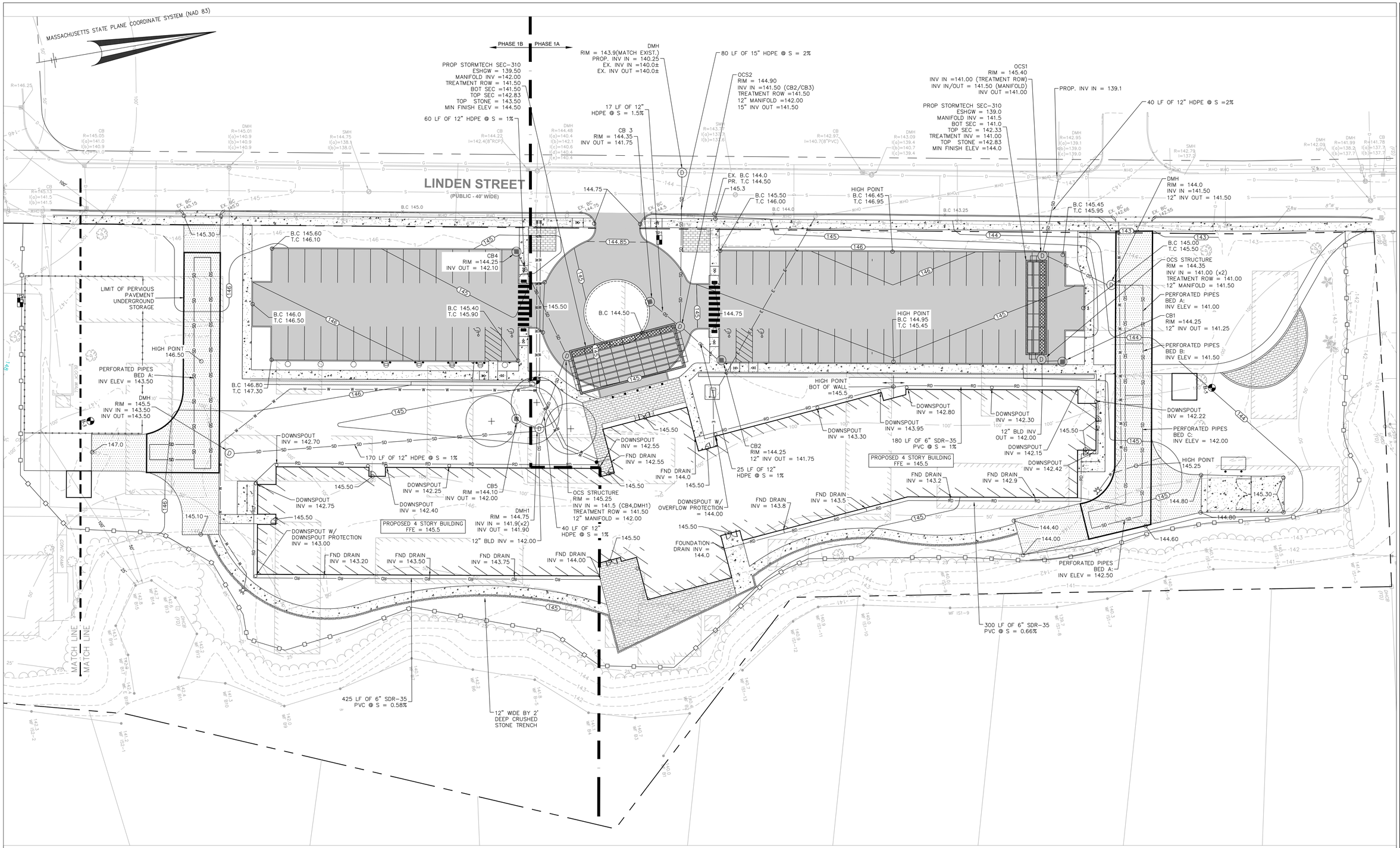
08/23/2024
DATE OF ISSUE
SITE PLAN REVIEW
DESCRIPTION
SCALE
OMR
DRAWN BY
26774
PROJECT #
FILE NAME

DRAWING NUMBER
C3.0

SHEET NUMBER 3 OF 7

Copyright BH+A, Inc.

V.2.1



PLAN
1"=20'

NOTES:
1. LOCATION OF ALL EXISTING AND PROPOSED SERVICES MUST BE CONFIRMED IN THE FIELD PRIOR TO CONSTRUCTION. ALL DISCREPANCIES MUST BE REPORTED TO THE ENGINEER.
2. ALL UTILITIES AND SERVICES WITHIN LIMITS OF DISTURBANCES SHALL BE VERTICALLY AND HORIZONTALLY LOCATED.
3. CONTRACTOR TO COMPLY WITH UTILITY NOTIFICATION REQUIREMENTS.
4. ALL NEW UTILITIES/SERVICES ARE TO BE INSTALLED UNDERGROUND

LEGEND

	EXISTING	PROPOSED
DRAIN MANHOLE	ⓓ	ⓓ
CATCH BASIN	⊞	⊞
DRAIN PIPE	—SD—	—SD—
CONTOUR	— — —	—(x)—
BORE LOCATION	◕	

SCALE: 1" = 20'
0 20 40 80

NOT FOR CONSTRUCTION - PERMITTING USE ONLY

C:\local Revit\3489 Linden Chambers Redevelopment NVA_SD_cfitzwalter5HZO6.rvt
5/8/2024 2:45:38 PM Author

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment
138-188 Linden St, Needham MA, 02494
Assessor's Map:
199/133-23-00
199/133-24-00
199/134-41-00

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

#	COMMENT/DESCRIPTION	DATE

DRAWING TITLE
GRADING AND DRAINAGE

DRAWING INFORMATION

COMMONWEALTH OF MASS. ANTHONY ODHIAMBO CIVIL REGISTERED PROFESSIONAL ENGINEER

08/23/2024 DATE OF ISSUE
SITE PLAN REVIEW DESCRIPTION
SCALE
OMR DRAWN BY
26774 PROJECT #
FILE NAME

DRAWING NUMBER
C4.0

SHEET NUMBER 4 OF 7

Copyright BH+A, Inc. V.2.1

MASSACHUSETTS STATE PLANE COORDINATE SYSTEM (NAD 83)

PHASE 1B | PHASE 1A

LINDEN STREET
(PUBLIC - 40' WIDE) 12"VC

PROP. SEWER CONNECTION INV UNKNOWN, MATCH EXIST. (PHASE 1B)

180 LF OF 6" CLDI SEWER LINE S = 2%± (PHASE 1B)

PROP. 8" FIRE WATER LINE CONNECT VIA TAPPING SLEEVE AND VALVE

PROP 6" WATER LINE CONNECT TO EXISTING MAIN VIA TAPPING SLEEVE AND VALVE

PROP. SEWER CONNECTION INV = 137.8±

90 LF OF 6" CLDI SEWER LINE @ S = 1%

PROP. 4" DUCT BANK

CONNECT PROP. DUCT BANK TO EX. UTILITY POLE

PROP. SEWER CONNECTION INV = 137.25±

130 LF OF 6" CLDI SEWER LINE @ S = 3.5%

WATER INV=140.25
STORM DRAIN INV=141.9

SEWER INV=138.5
STORM DRAIN INV=141.7

SMH
RIM=145.4
INV IN = 138.80
INV OUT = 138.70

PROP. 6"x6"x2" TEE (INSTALL GATE VALVE DURING PHASE 1A)

SEWER INV=138.9
STORM DRAIN INV=141.6

WATER INV=140.0
STORM DRAIN INV=141.8

SEWER INV=141.2±
STORM DRAIN INV=143.5
WATER INV = 140.0

6" SEWER INV OUT = 139.80

SMH
RIM=145.0
INV IN = 139.60
INV OUT = 139.50

36 LF OF 6" CLDI SEWER LINE @ S = 2%

PROP. 4" DOMESTIC WATER LINE W/ CURB STOP

SEWER INV OUT = 142.5 (PHASE 1B)

SMH (PHASE 1B)
RIM=145.0
INV IN = 142.25
INV OUT = 142.00

PROP. 6" WATER LINE (PHASE 1B)

PROP. HYDRANT WITH GATE VALVE (PHASE 1B)

PROP. TRANSFORMER

SMH
RIM=145.0
INV IN = 142.0
INV OUT = 141.75

SEWER INV OUT = 142.5

PROP. FIRE HYDRANT WITH GATE VALVE

PROP 6"WATER LINE

TRASH

EMERGENCY GENERATOR

TOWN OF NEEDHAM

PAUL D. BORRELLI
DEED BOOK 6369, PAGE 131
PLAN NO. 1059 OF 1963

169–171 MAPLE STREET CONDOMINIUM
DEED BOOK 20520, PAGE 11
PLAN BOOK 518, PAGE 52

PAUL D. BORRELLI
DEED BOOK 9245, PAGE 461
PLAN NO. 1059 OF 1963

EV–ELMVIEW REALTY, LLC
DEED BOOK 36138, PAGE 8
PLAN NO. 738 OF 1961

JOHN M. & KIM E. McAWARD
DEED BOOK 11024, PAGE 275
PLAN BOOK 3910, PAGE 427

THE 199–201 MAPLE STREET CONDOMINIUM
DEED BOOK 21391, PAGE 22
PLAN BOOK 525, PAGE 30

NEEDHAM ENTERPRISES, LLC
DEED BOOK 31607, PAGE
PLAN NO.

NOTES:
1. LOCATION OF ALL EXISTING AND PROPOSED SERVICES MUST BE CONFIRMED IN THE FIELD PRIOR TO CONSTRUCTION. ALL DISCREPANCIES MUST BE REPORTED TO THE ENGINEER.
2. ALL UTILITIES AND SERVICES WITHIN LIMITS OF DISTURBANCES SHALL BE VERTICALLY AND HORIZONTALLY LOCATED.
3. CONTRACTOR TO COMPLY WITH UTILITY NOTIFICATION REQUIREMENTS.
4. ALL NEW UTILITIES/SERVICES ARE TO BE INSTALLED UNDERGROUND

LEGEND

	EXISTING	PROPOSED
UNDERGROUND WATER LINE	—W—	—W—
UNDERGROUND ELECTRIC	—E—	—E—
SANITARY SEWER LINE	—SS—	—SS—
HYDRANT		

SCALE: 1" = 20'
0 20 40 80

NOT FOR CONSTRUCTION - PERMITTING USE ONLY

C:\local Revit\34389 Linden Chambers Redevelopment NHA_SD_cfitzwater@HDQK.rvt
5/6/2024 2:45:36 PM Author

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment
138-188 Linden St, Needham MA, 02494
Assessor's Map:
199/133-23-00
199/133-24-00
199/134-41-00

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

#	COMMENT/DESCRIPTION	DATE

DRAWING TITLE
UTILITY PLAN

DRAWING INFORMATION

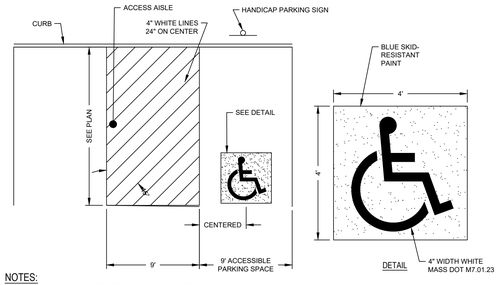
COMMONWEALTH OF MASSACHUSETTS
ANTHONY DEMARCO
CIVIL
No. 52,870
REGISTERED PROFESSIONAL ENGINEER

08/23/2024
DATE OF ISSUE
SITE PLAN REVIEW
DESCRIPTION
OMR
DRAWN BY
SCALE
26774
PROJECT #
FILE NAME

DRAWING NUMBER
C5.0

SHEET NUMBER 5 OF 7

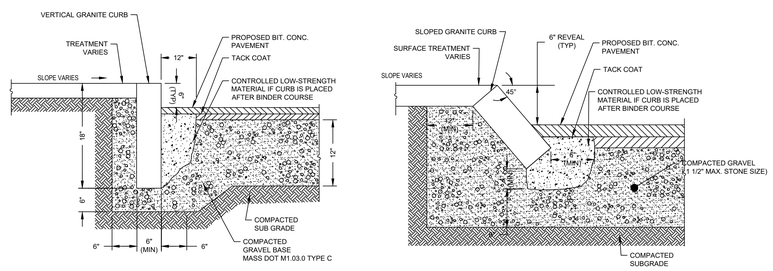
Copyright BH+A, Inc.
V.2.1



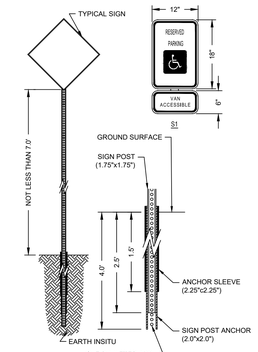
NOTES:

1. ALL DIMENSIONS TO EDGES OF 4" PAVEMENT STRIPING.
2. ALL STRIPING SHALL BE 4" WIDE SOLID WHITE PAVEMENT MARKINGS UNLESS OTHERWISE NOTED. MASS DOT M7.01.23 FAST DRYING WHITE WATER-BORNE TRAFFIC PAINT.

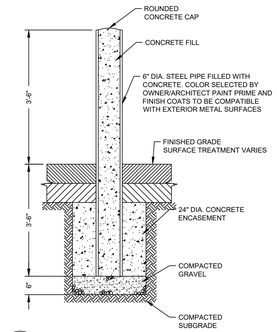
1 ACCESSIBLE PARKING SPACE
NOT TO SCALE



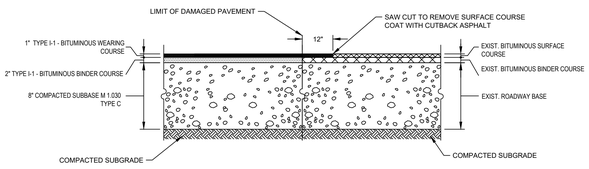
2 VERTICAL GRANITE CURB & SLOPED GRANITE CURB
NOT TO SCALE



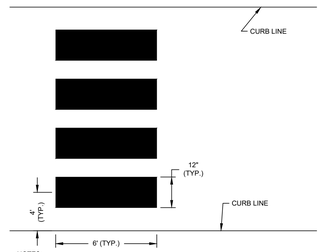
3 SIGN POST DETAIL
NOT TO SCALE



4 BOLLARD
NOT TO SCALE



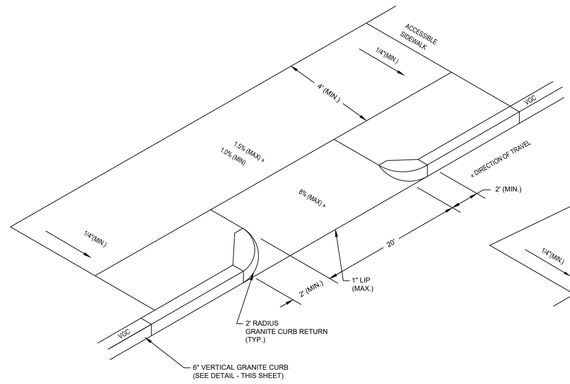
5 BIT. CONC. PAVEMENT PAVEMENT DETAIL
NOT TO SCALE

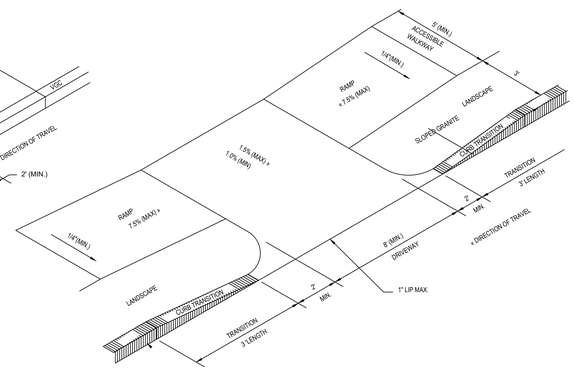


NOTES:

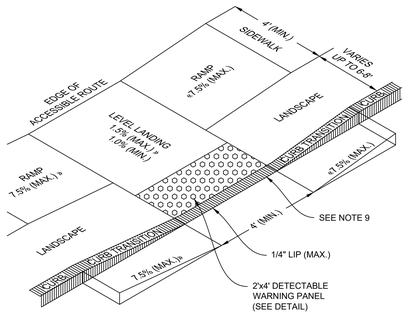
1. TWELVE INCH (12") LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6 INCH LINES) WILL BE ACCEPTED.
2. LONGITUDINAL CROSSWALK LINES TO BE PARALLEL TO CURB LINE.
3. ALL LONGITUDINAL CROSSWALK LINES TO BE THE SAME LENGTH AND PROPERLY ALIGNED.
4. CROSS WALK SIDE SLOPE SHALL NOT EXCEED 1.5%.

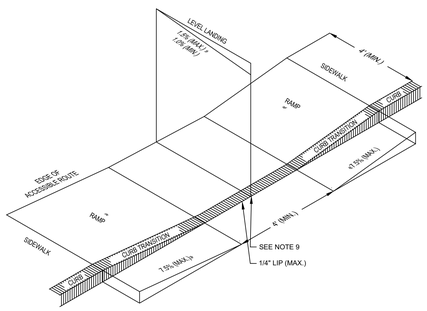
6 CROSSWALK
NOT TO SCALE

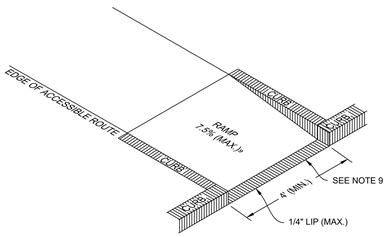




7 TYPICAL ENTRANCE
NOT TO SCALE



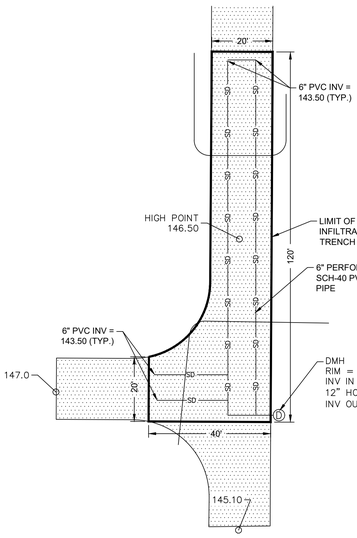




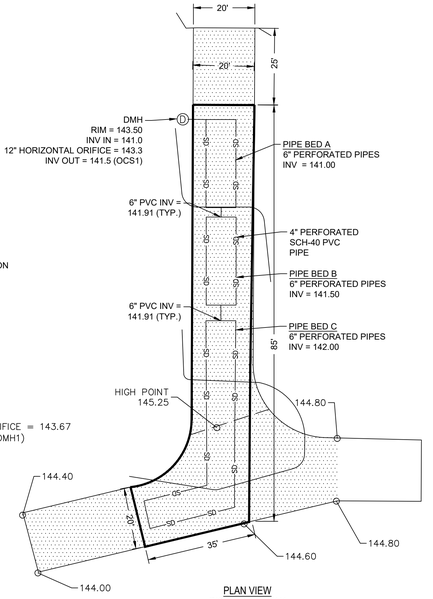
NOTES:

1. THE MAXIMUM ALLOWABLE SIDEWALK AND RAMP CROSS SLOPES SHALL BE 1.5% (1% MIN).
2. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE EXCLUDING CURB RAMPS SHALL BE 5%.
3. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL BE 7.5%.
4. A MINIMUM OF 3 FEET CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.)
5. CURB TREATMENT VARIES, SEE PLAN FOR CURB TYPE.
6. RAMP, CURB AND ADJACENT PAVEMENTS SHALL BE GRADED TO PREVENT PONDING.
7. SEE TYPICAL SIDEWALK SECTION FOR RAMP CONSTRUCTION.
8. WHERE ACCESSIBLE ROUTES ARE LESS THAN 5' IN WIDTH (EXCLUDING CURBING) A 5'x5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FEET.
9. ELIMINATE CURBING AT RAMP WHERE IT ABUTS ROADWAY, EXCEPT WHERE VERTICAL CURBING IS INDICATED ON THE DRAWINGS TO BE INSTALLED AND SET FLUSH.

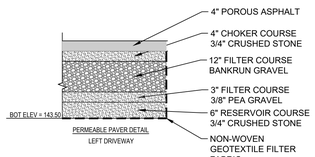
8 ACCESSIBLE CURB RAMP
NOT TO SCALE



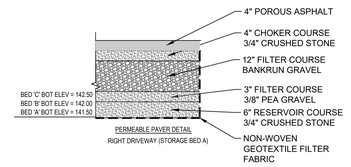
PLAN VIEW
LEFT DRIVEWAY



PLAN VIEW
RIGHT DRIVEWAY



PERMEABLE PAVER DETAIL
LEFT DRIVEWAY



PERMEABLE PAVER DETAIL
RIGHT DRIVEWAY (STORAGE BED A)

14 PERVIOUS ASPHALT
NOT TO SCALE

NOT FOR CONSTRUCTION - PERMITTING USE ONLY

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment
138-188 Linden St, Needham MA, 02494
Assessor's Map:
199/133-23-00
199/133-24-00
199/134-41-00

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

#	COMMENT/DESCRIPTION	DATE

DRAWING TITLE
CONSTRUCTION DETAILS I

DRAWING INFORMATION

COMMONWEALTH OF MASSACHUSETTS
ANTHONY DENUCCI
No. 52653
REGISTERED PROFESSIONAL ENGINEER

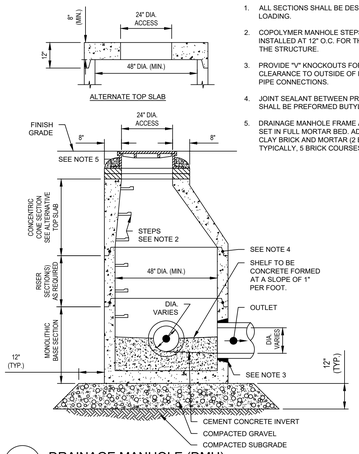
08/23/2024
DATE OF ISSUE
SITE PLAN REVIEW
DESCRIPTION
SCALE
OMR
DRAWN BY
26774
PROJECT #
FILE NAME

DRAWING NUMBER
C6.0

SHEET NUMBER 6 OF 7

Copyright BH+A, Inc. V.2.1

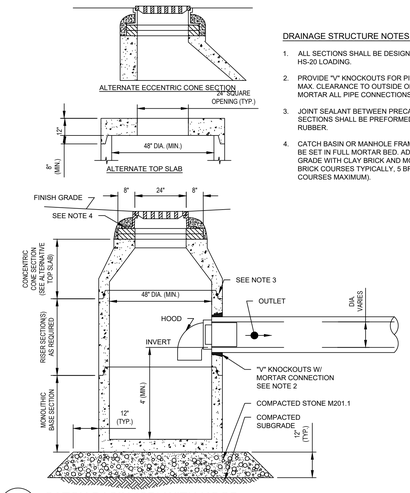
C:\local Revit\3489 Linden Chambers Redevelopment NHA_SD_dtzwaster5HZG6.rvt
5/6/2024 2:45:36 PM Author



NOTES:

1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
2. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.
3. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
5. DRAINAGE MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM).

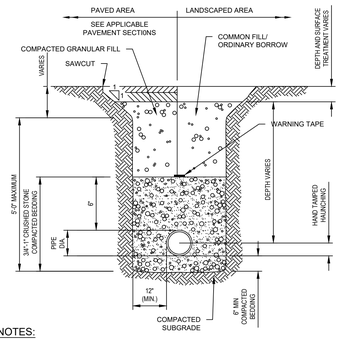
1 DRAINAGE MANHOLE (DMH)
1



DRAINAGE STRUCTURE NOTES:

1. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
4. CATCH BASIN OR MANHOLE FRAMES SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR (2 BRICK COURSES TYPICALLY, 5 BRICK COURSES MAXIMUM).

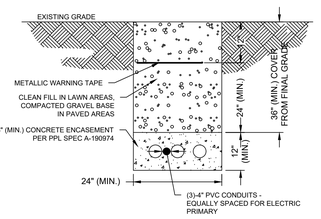
2 CATCH BASIN (CB) WITH HOOD
1



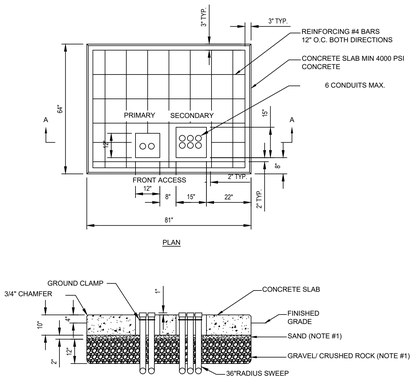
NOTES:

1. WHERE UTILITY TRENCHES ARE CONSTRUCTED THROUGH DETENTION BASIN BERMS OR OTHER SUCH SPECIAL SECTIONS, PLACE TRENCH BACKFILL WITH MATERIALS SIMILAR TO THE SPECIAL SECTION REQUIREMENTS.
2. USE METALLIC TRACING/WARNING TAPE OVER ALL PIPES.

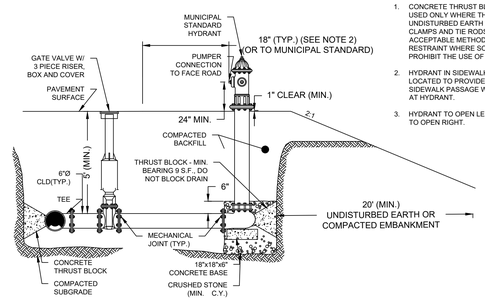
3 UTILITY TRENCH
1



4 ELECTRIC PRIMARY DUCT BANK
1



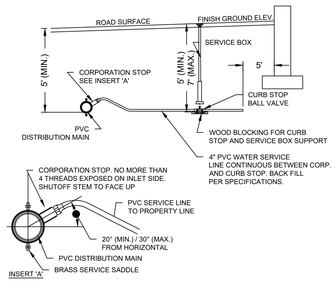
5 TRANSFORMER PAD DETAIL
1



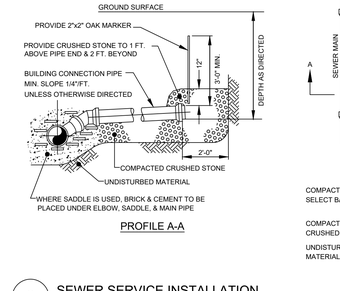
NOTES:

1. CONCRETE THRUST BLOCKS TO BE USED ONLY WHERE THEY CAN BEAR ON UNDISTURBED EARTH AS SHOWN. USE CLAMPS AND TIE RODS OR OTHER ACCEPTABLE METHOD OF JOINT RESTRAINT WHERE SOIL CONDITIONS PROHIBIT THE USE OF THRUST BLOCKS.
2. HYDRANT IN SIDEWALK AREAS TO BE LOCATED TO PROVIDE MINIMUM CLEAR SIDEWALK PASSAGE WIDTH OF 3 FEET AT HYDRANT.
3. HYDRANT TO OPEN LEFT. GATE VALVES TO OPEN RIGHT.

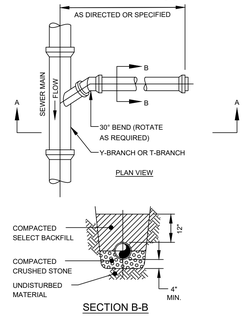
6 HYDRANT CONNECTION
1



7 WATER SERVICE INSTALLATION
1

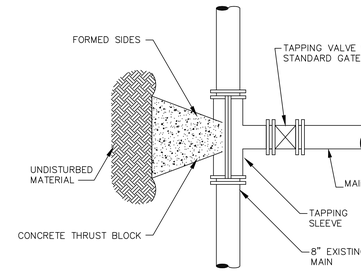


PROFILE A-A

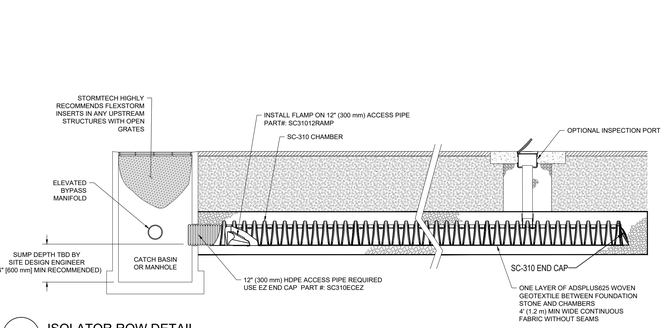


SECTION B-B

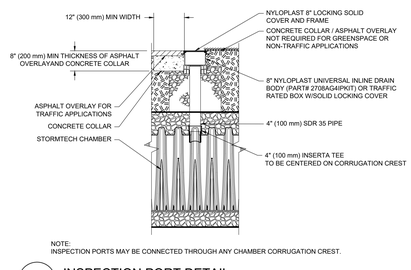
8 SEWER SERVICE INSTALLATION
1



9 TAPPING SLEEVE AND VALVE
1

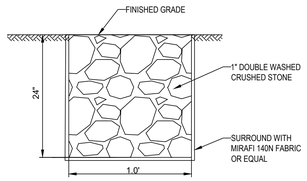


10 ISOLATOR ROW DETAIL
1

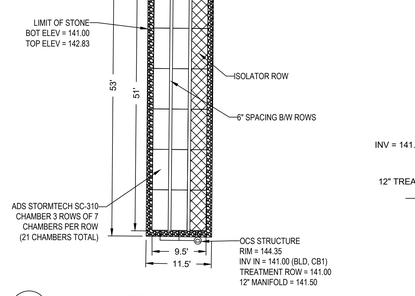


NOTE:
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

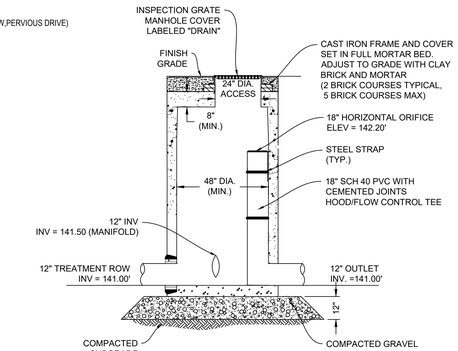
11 INSPECTION PORT DETAIL
1



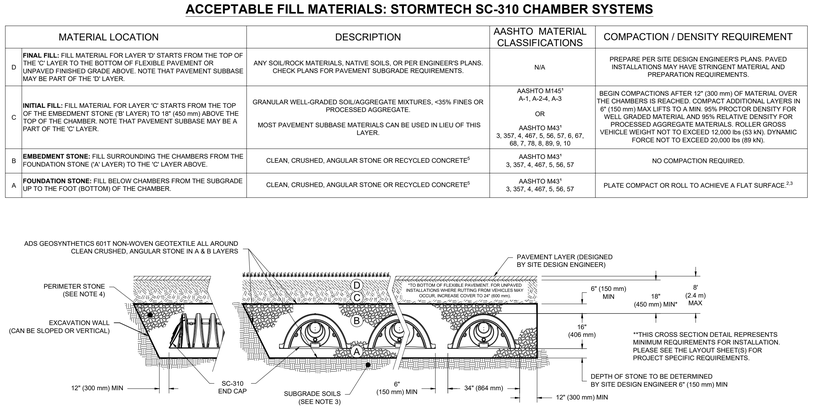
12 STONE INFILTRATION TRENCH
1



13 SC-310 SYSTEM 1
1



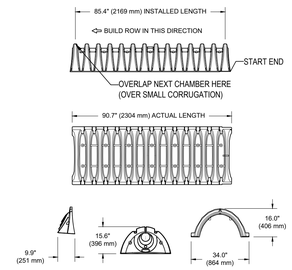
OUTLET CONTROL STRUCTURE 1 (OCS1)



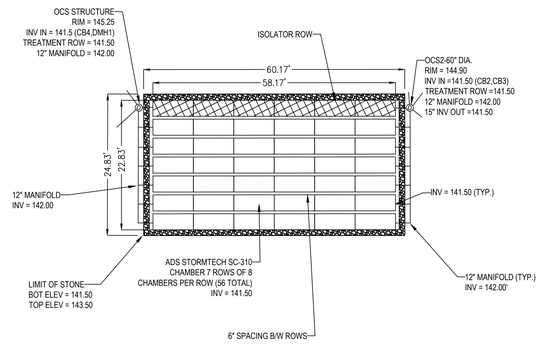
14 SC-310 SECTION DETAIL
1

ACCEPTABLE FILL MATERIALS: STORMTECH SC-310 CHAMBER SYSTEMS

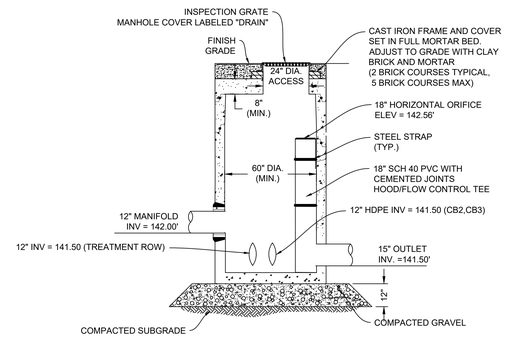
	MATERIAL LOCATION	DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DESIGN REQUIREMENT
D	**FINAL FILL:** FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	**INITIAL FILL:** FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE (9" LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145[4] A-1, A-2-4, A-3 OR AASHTO M43[4] 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	**EMBEDMENT STONE:** FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[3] 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	**FOUNDATION STONE:** FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE[5]	AASHTO M43[3] 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE.[2,3]



15 SC-310 CHAMBER DETAILS
1



16 SC-310 SYSTEM 2
1



OUTLET CONTROL STRUCTURE 2 (OCS2)

NOT FOR CONSTRUCTION - PERMITTING USE ONLY

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment
138-188 Linden St, Needham MA, 02494
Assessor's Map:
199/133-23-00
199/133-24-00
199/134-41-00

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

#	COMMENT/DESCRIPTION	DATE

DRAWING TITLE
CONSTRUCTION DETAILS II

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE
SITE PLAN REVIEW
DESCRIPTION
SCALE
CMR
DRAWN BY
26774
PROJECT #
FILE NAME

DRAWING NUMBER
C6.1

SHEET NUMBER 7 OF 7

Copyright BH+A, Inc.

V.2.1

C:\local Revit\3489 Linden Chambers Redevelopment NHA_SD_cfiovatier@SCD6.rvt
5/6/2024 2:45:36 PM
Author

TREE INVENTORY

ID#	DBH	Common Name	Health	Status	Notes
1	14	Hemlock	Poor	Remove	Half dead
2	12	Hemlock	Fair	Preserve	
3	13	Hemlock	Fair	Preserve	
4	15	Hemlock	Fair	Preserve	
5	16	Crabapple	Fair	Preserve	
6	15	Crabapple	Fair	Remove	Poor Structure
7	21	Honeylocust	Fair	Preserve	
8	18	Crabapple	Poor	Remove	Decline in canopy
9	10	Crabapple	Poor	Remove	Decline in canopy
10	12	Crabapple	Poor	Remove	Decline in canopy
11	24	Honey locust	Good	Preserve	
12	12	Crabapple	Poor	Remove	Decline in canopy
13	12	Crabapple	Poor	Remove	Decline in canopy
14	21	Honeylocust	Good	Preserve	
15	27	Honeylocust	Good	Preserve	
16	24	Honeylocust	Good	Preserve	
17	22	Honeylocust	Good	Remove	
18	13	Norway maple	Fair	Remove	Invasive species, thin canopy
19	12	Crabapple	Fair	Remove	Many cavities
20	19	Norway maple	Fair	Remove	Invasive species, thin canopy
21	10	Dogwood	Fair	Remove	Disease prone
22	19	Norway maple	Fair	Remove	Invasive species, disfigured by utilities, in decline

ID#	DBH	Common Name	Health	Status	Notes
23	14	Crabapple	Fair	Preserve	
24	17	Magnolia	Poor	Remove	Poor health
25	12	Honeylocust	Good	Remove	
26	29	Tulip Tree	Good	Preserve	
27	10	Kwanzan cherry	Good	Remove	Near dead
28	23	Red maple	Poor	Remove	In decline- girdling roots
29	23	Red maple	Poor	Remove	Girdling roots, disfigured by utilities
30	21	London Plane	Poor	Remove	Near dead
31	21	Crabapple	Poor	Remove	Sooty mold
32	22	Honeylocust	Fair	Remove	
33	18	Norway maple	Good	Remove	Invasive species
34	21	Silver maple	Fair	Preserve	
35	17	Silver maple	Good	Preserve	
36	17	Silver maple	Poor	Remove	Weak, in decline
37	19	Silver maple	Poor	Remove	Poor health
38	23	Silver maple	Fair	Preserve	
39	10	Crabapple	Good	Preserve	
40	16	Crabapple	Good	Preserve	
41	14	Crabapple	Good	Preserve	
42	13	Crabapple	Good	Preserve	
43	24	Silver maple	Good	Preserve	

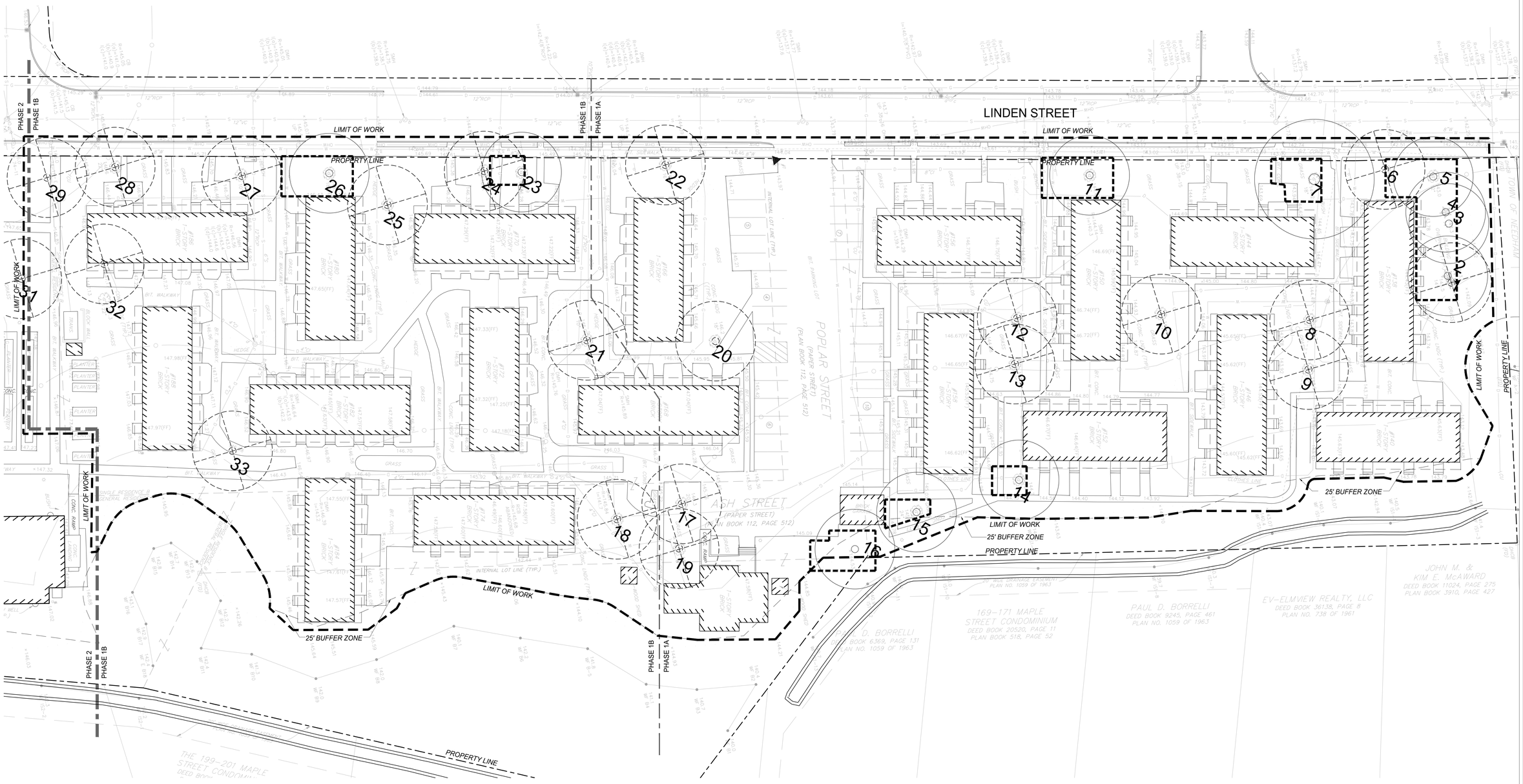
LEGEND

TREE PROTECTION FENCE

EXISTING TREES TO REMOVE

EXISTING TREES TO REMAIN

TREE ID NUMBER 26



ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
TREE PROTECTION PLAN

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

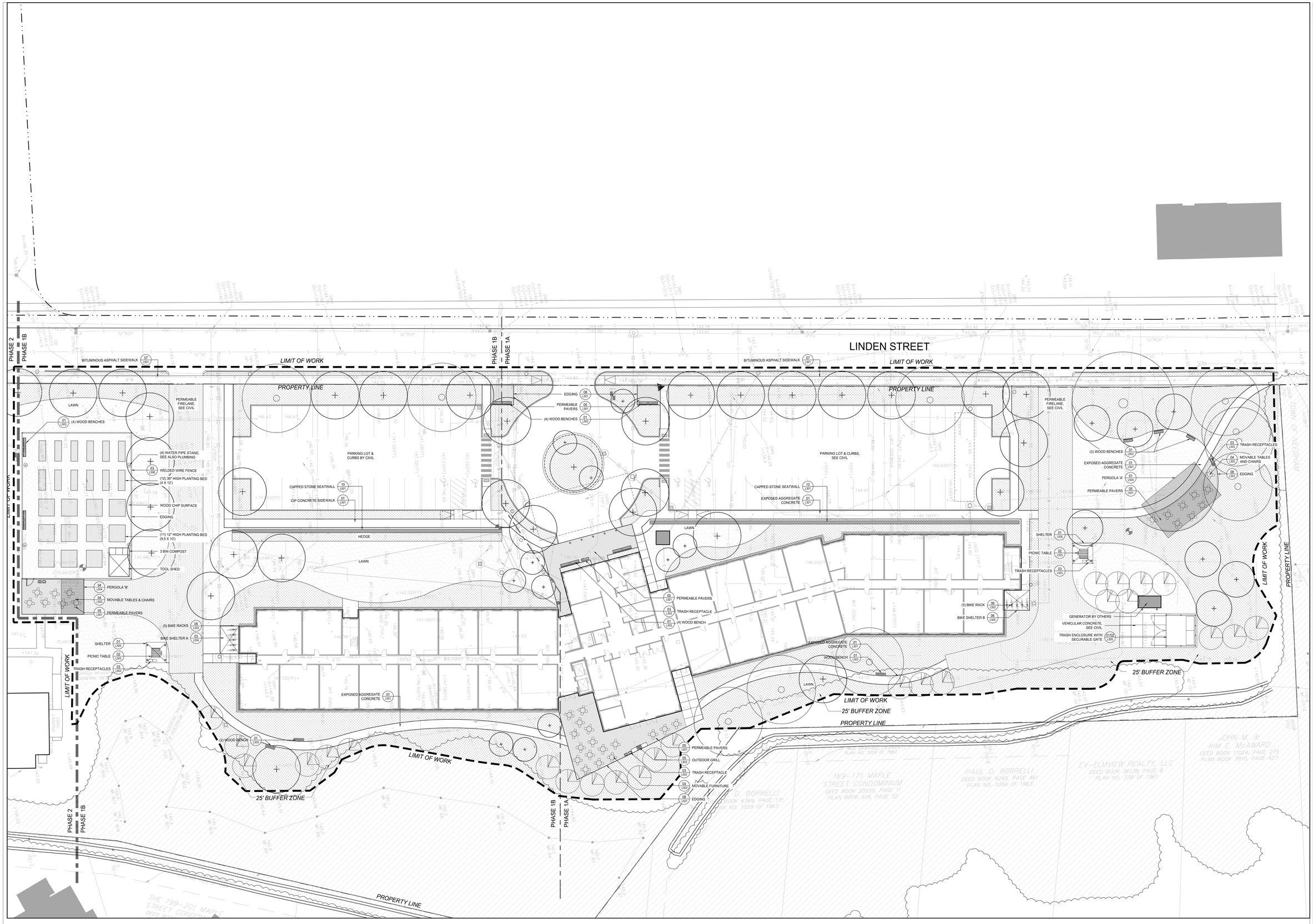
1" = 20'
SCALE

CP
DRAWN BY

3489.00
PROJECT #

FILE NAME

DRAWING NUMBER
L099



ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

MATERIAL PLAN

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

1" = 20'
SCALE

CP
DRAWN BY

3489.00
PROJECT #

FILE NAME

DRAWING NUMBER

L102A



SCALE: 1" = 20'

0 20 40 80

N

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

MATERIAL PLAN

DRAWING INFORMATION

09/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

1" = 20'
SCALE

CP
DRAWN BY

3489.00
PROJECT #

TILE NAME

DRAWING NUMBER

L102B

Linden Chambers Plant Palettes

Plant material will be selected from the following lists or similar species

North Garden Palette

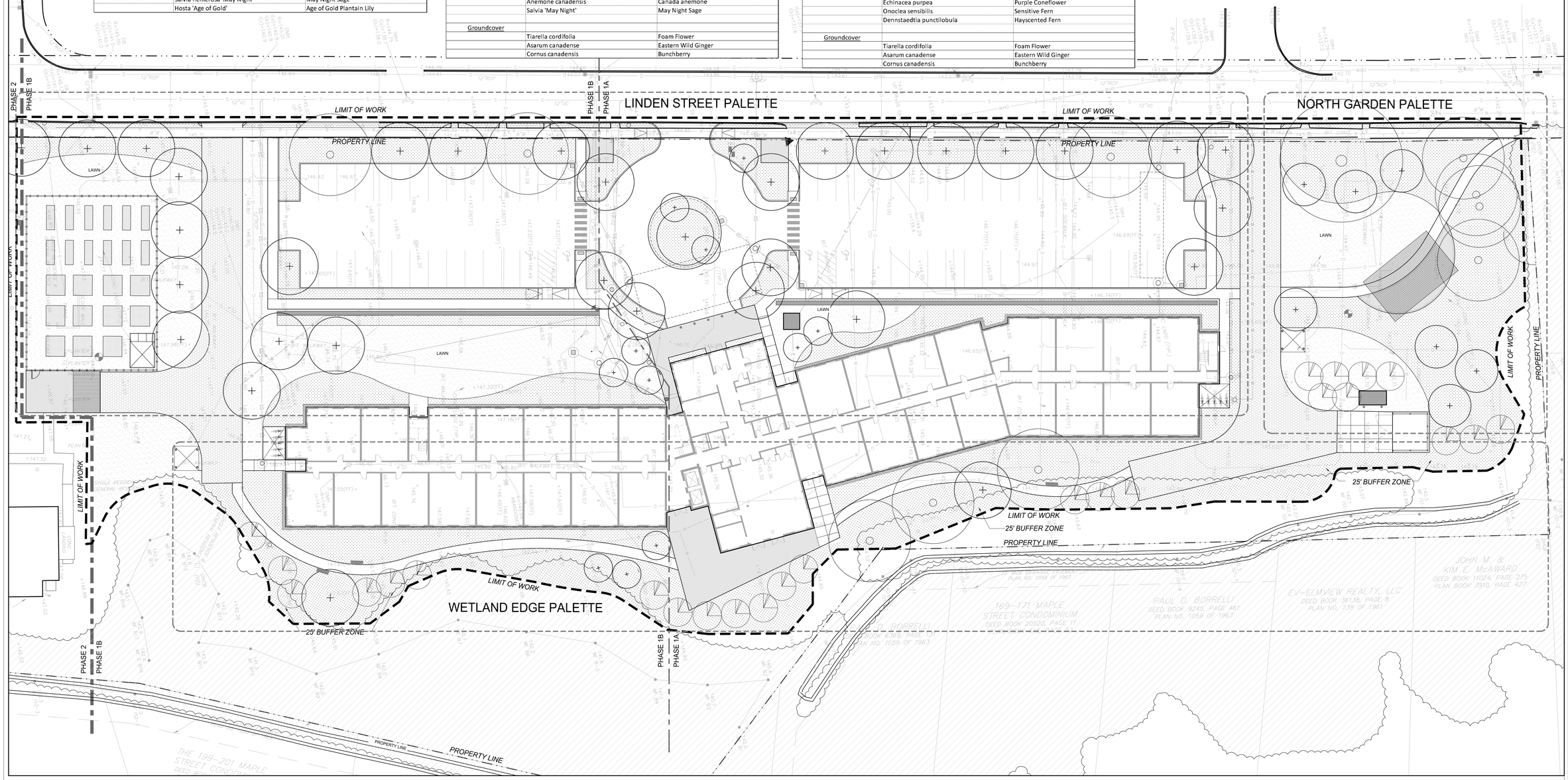
	Botanical Name	Commom Name
Trees - Canopy		
	Liriodendron tulipifera	Tulip Tree
	Acer rubrum	Red Maple
	Ulmus americana	American Elm
	Quercus rubra	Red Oak
Trees - Understory		
	Cornus alternifolia	Pagoda Dogwood
	Amelanchier canadensis	Serviceberry
	Cornus kousa	Kousa Dogwood
Shrubs		
	Buxus 'Green Gem'	Green Gem Boxwood
	Rosa 'Apricot Drift'	Apricot Drift Rose
	Rosa 'Blushing Knockout'	Blushing Knockout Rose
	Ilx glabra	Inkberry
	Rhododendron 'Cunningham White'	Cunningham White Rhododendron
Perennials		
	Geranium maculatum	Geranium
	Leucanthemum x superbum	Shasta Daisy
	Lobelia cardinalis	Cardinal Flower
	Rudbeckia fulgida 'Goldstrum'	Black Eyed Susans
	Hemerocalis 'Stella D'Oro'	Stella D'Oro Daylily
	Nepeta x faassenii 'Walkers Low'	Walkers Low Catmint
	Symphyotrichum novae-angliae	New England Aster
	Echinacea purpea	Purple Coneflower
	Anemone canadensis	Canada anemone
	Salvia nemerosa 'May Night'	May Night Sage
	Hosta 'Age of Gold'	Age of Gold Plantain Lily

Linden Street Palette

	Botanical Name	Commom Name
Trees - Canopy		
	Liriodendron tulipifera	Tulip Tree
	Acer rubrum	Red Maple
	Ulmus americana	American Elm
	Ostrya virginiana	Eastern Hophornbeam
	Nyssa sylvatica	Black Gum
	Gleditsia triacanthos 'Shademaster'	Shademaster Honeylocust
Trees - Understory		
	Cercis canadensis	Redbud
	Amelanchier canadensis	Serviceberry
	Cornus kousa	Kousa Dogwood
Shrubs		
	Hydrangea 'Endless Summer'	Endless Summer Hydrangea
	Clethra alnifolia	Summersweet
	Rhododendron 'Cunningham White'	Cunningham White Rhododendron
	Rosa 'Apricot Drift'	Apricot Drift Rose
	Rosa virginiana	Virginia Rose
Grasses		
	Pennisetum alopecuroides 'Hameln'	Hameln Dwarf Fountain Grass
	Eragrostis spectabilis	Purple Lovegrass
	Deschampsia cespitosa	Tufted Hair Grass
	Carex pennsylvanica	Pennsylvania Sedge
Perennials		
	Nepeta x faassenii 'Walkers Low'	Walkers Low Catmint
	Symphyotrichum novae-angliae	New England Aster
	Echinacea purpea	Purple Coneflower
	Onoclea sensibilis	Sensitive Fern
	Anemone canadensis	Canada anemone
	Salvia 'May Night'	May Night Sage
Groundcover		
	Tiarella cordifolia	Foam Flower
	Asarum canadense	Eastern Wild Ginger
	Cornus canadensis	Bunchberry

Wetland Edge Palette

	Botanical Name	Commom Name
Trees - Canopy		
	Betula nigra	River Birch
	Quercus rubra	Northern Red Oak
	Quercus alba	White Oak
	Acer rubrum	Red Maple
Trees - Understory		
	Cercis canadensis	Redbud
	Amelanchier canadensis	Serviceberry
	Hamemalis virginiana	Witchhazel
Shrubs		
	Aronia melanocarpa	Chokeberry
	Clethra alnifolia	Summersweet
	Myrica pennsylvanica	Bayberry
	Ilex glabra	Inkberry
	Viburnum acerifolium	Mapleleaf Viburnum
	Spirea tomentosa	Steeplebush
	Hypericum calycinum	St. John's Wort
	Cornus sericea	Red osier Dogwood
Grasses		
	Eragrostis spectabilis	Purple Lovegrass
	Schizachyrium scoparium	Little Bluestem
	Deschampsia cespitosa	Tufted Hair Grass
	Carex pennsylvanica	Pennsylvania Sedge
Perennials		
	Asclepias tuberosa	Butterfly Milkweed
	Symphyotrichum novae-angliae	New England Aster
	Monarda didyma	Bee Balm
	Echinacea purpea	Purple Coneflower
	Onoclea sensibilis	Sensitive Fern
	Dennstaedtia punctilobula	Hayscented Fern
Groundcover		
	Tiarella cordifolia	Foam Flower
	Asarum canadense	Eastern Wild Ginger
	Cornus canadensis	Bunchberry



ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

PLANTING PLAN

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

1" = 20'
SCALE

CP
DRAWN BY

3489.00
PROJECT #

FILE NAME

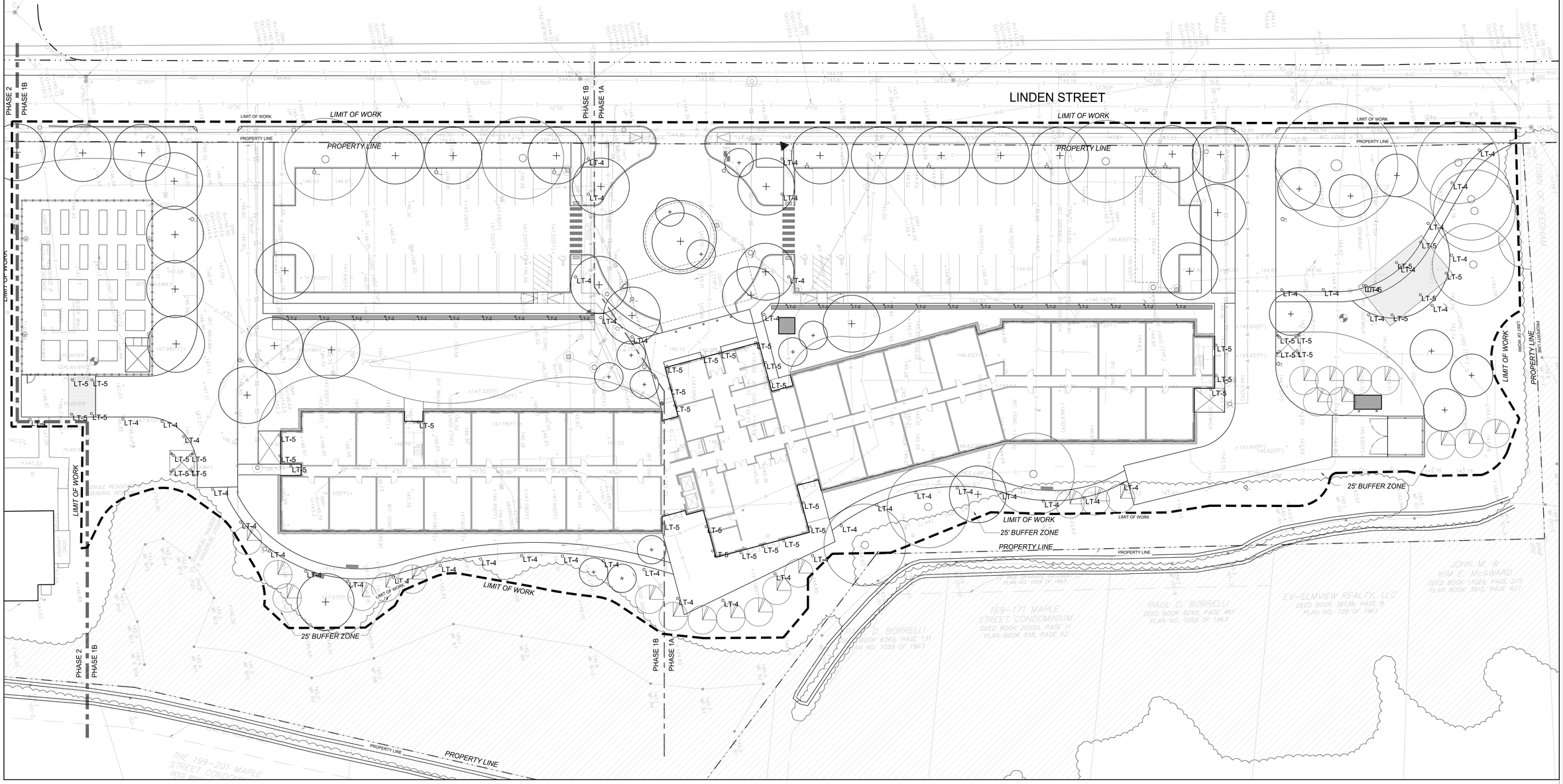
DRAWING NUMBER

L104

SCHEDULE

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Light Loss Factor	Wattage
	LT-1	5	Lumenpulse	PURXXXT VOLT CSL M150 30K CRI 80 3BLS FINISH DIM XX TN4	Pure T Area Light | Type 3 w/ Backlight Control | *ADVISE POLE*	0.9	132
	LT-1B	9	Lumenpulse	PURXXXT VOLT CSL M150 30K CRI 80 4BLS FINISH DIM XX TN4	Pure T Area Light | Type 4 w/ Backlight Control | *ADVISE POLE*	0.9	132
	LT-2	23	Sage Lighting	SLVR 27 FINISH	SLVR Step Light	0.9	2.98
	LT-4	45	Spitzer	BRA F42 24LC VOLTAGE CC D3 FINISH	Architectural Round Bollard | 3'-5"	0.9	21.6769
	LT-5	35	Luminis Lighting	SYP400 L1L10 VWD K40 VOLTAGE FINISH MOUNTING XX	Syrios Pro	0.9	12

NOTE: FOR LIGHTING SPECIFICATIONS SEE ELECTRICAL.
LANDSCAPE FOR LOCATION ONLY.



SCALE: 1" = 20'
0 20 40 80

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

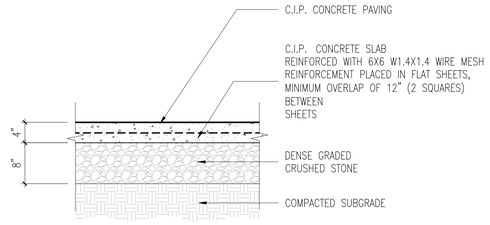
REVISIONS
DATE

DRAWING TITLE
SITE LIGHTING PLAN

DRAWING INFORMATION

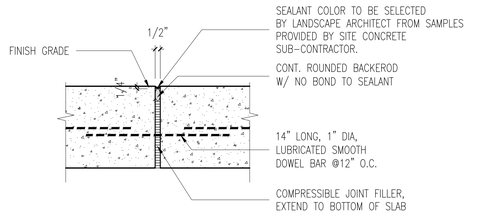
08/23/2024
DATE OF ISSUE
Site Plan Review
DESCRIPTION
1" = 20'
SCALE
CP
DRAWN BY
3489.00
PROJECT #
FILE NAME

DRAWING NUMBER
L105



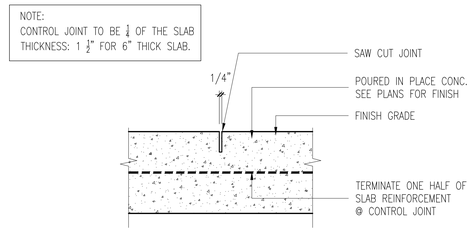
01 C.I.P CONC. PAVING - PEDESTRIAN

SCALE: 1" = 1'-0"



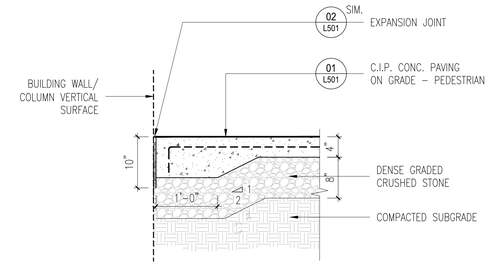
02 EXPANSION JOINT

SCALE: 2" = 1'-0"



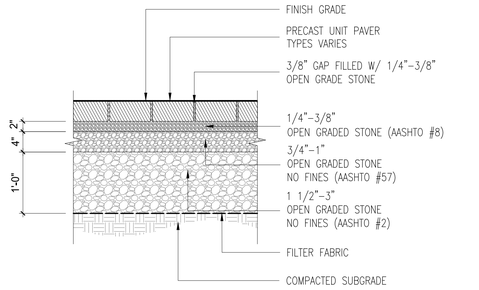
03 CONTROL JOINT

SCALE: 2" = 1'-0"



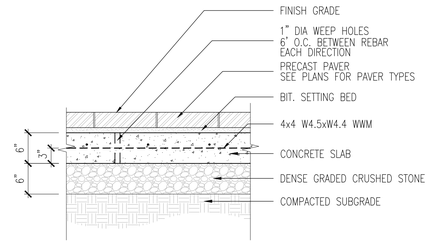
04 C.I.P CONCRETE EDGE CONDITION

SCALE: 1" = 1'-0"



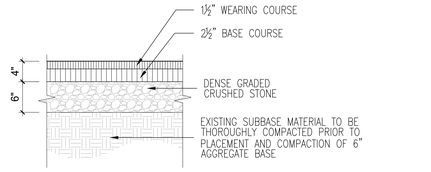
05 PERMEABLE PAVING

SCALE: 1" = 1'-0"



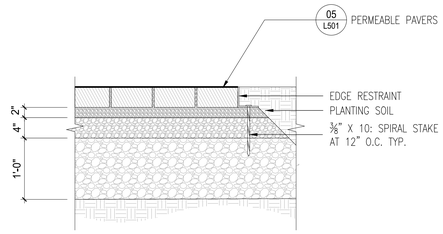
06 PRECAST PAVERS ON CONCRETE

SCALE: 1" = 1'-0"



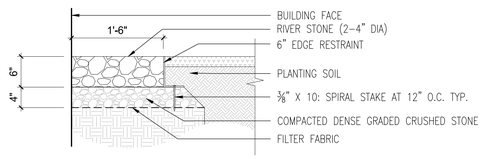
07 BITUMINOUS ASPHALT

SCALE: 1" = 1'-0"



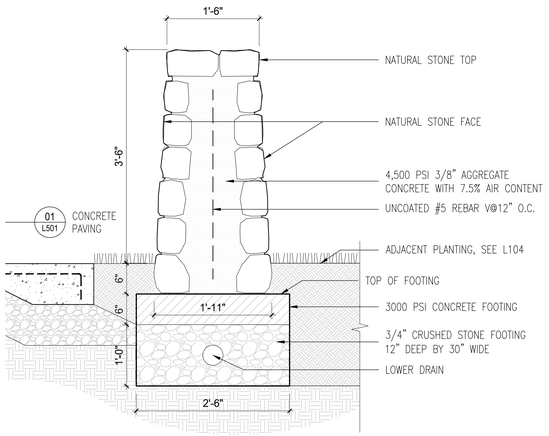
08 EDGING AT PERMEABLE PAVING

SCALE: 1" = 1'-0"



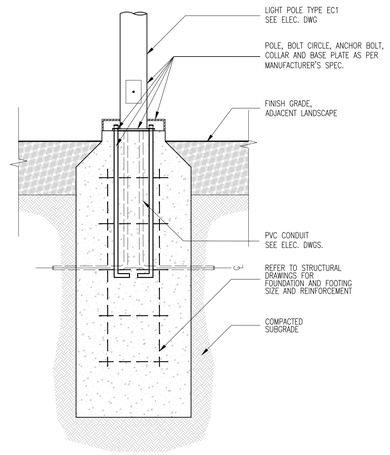
09 AGGREGATE STRIP AT BUILDING FACE

SCALE: 1" = 1'-0"



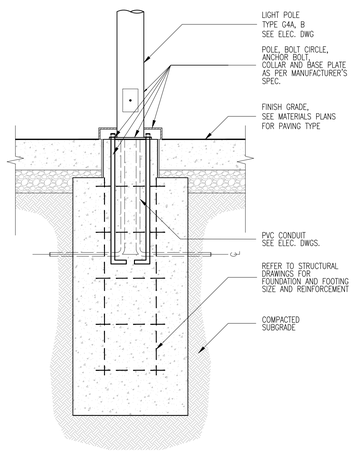
10 CAPPED STONE SEATWALL

SCALE: 1"=1'-0"



11 LIGHT POLE FOOTING IN PLANTING

SCALE: 3/4"=1'-0"



12 LIGHT POLE FOOTING IN PAVING

SCALE: 3/4"=1'-0"

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

DETAILS

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

AS NOTED
SCALE

DP
DRAWN BY

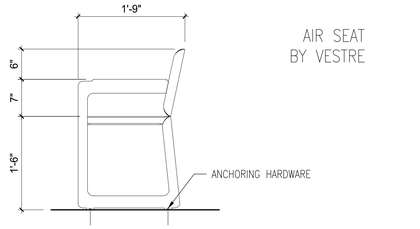
3489.00
PROJECT #

FILE NAME

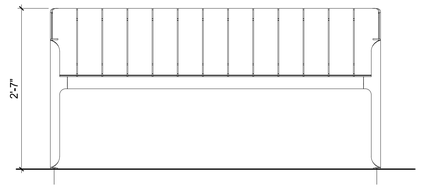
DRAWING NUMBER

L501

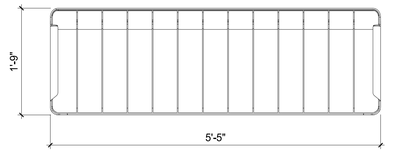
AIR SEAT
BY VESTRE



SIDE ELEVATION



FRONT ELEVATION

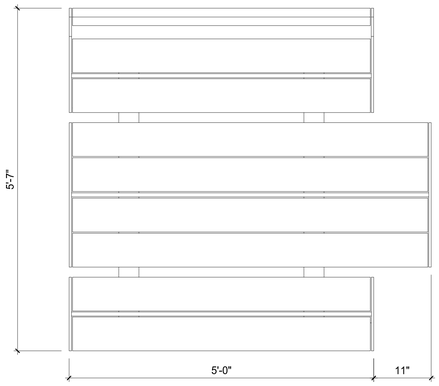


PLAN

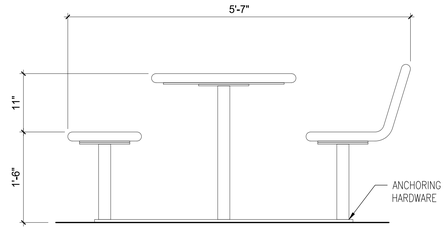
01 BACKED WOOD BENCH W/ ARMRESTS

SCALE: 1"=1'-0"

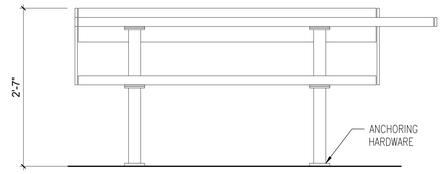
APRIL PICNIC TABLE
BY VESTRE



PLAN



SIDE ELEVATION

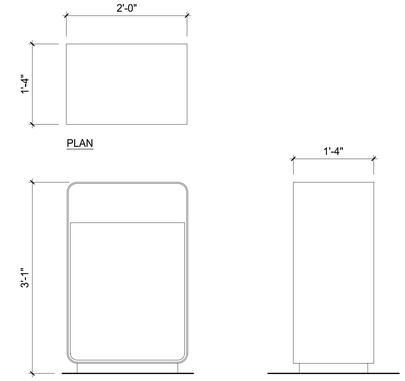


FRONT ELEVATION

02 PICNIC TABLE

SCALE: 1"=1'-0"

VROOM LITTER BIN
BY VESTRE



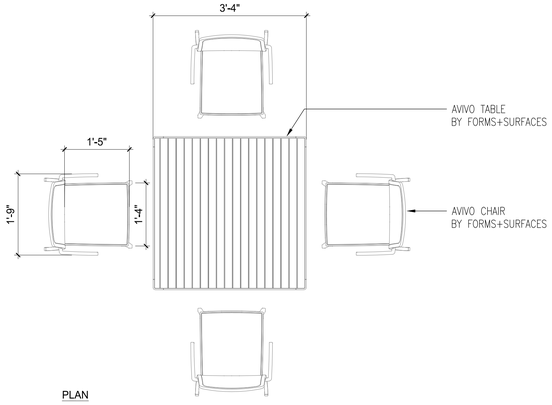
PLAN

FRONT ELEVATION

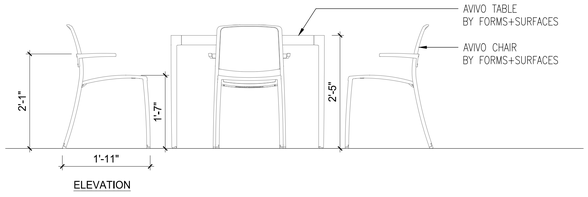
SIDE ELEVATION

03 TRASH RECEPTACLE

SCALE: 1"=1'-0"



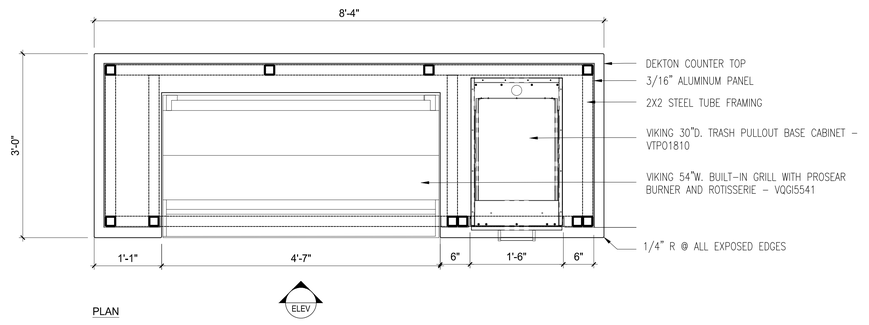
PLAN



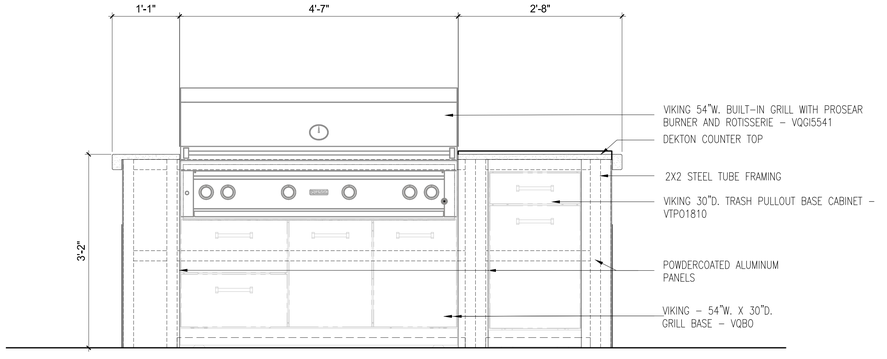
ELEVATION

04 MOVABLE TABLE AND CHAIRS

SCALE: 3/4"=1'-0"



PLAN

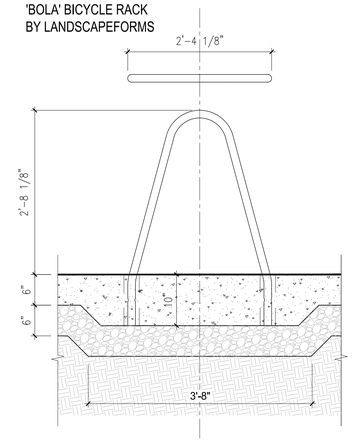


ELEVATION

05 OUTDOOR GRILL

SCALE: 1"=1'-0"

'BOLA' BICYCLE RACK
BY LANDSCAPEFORMS



06 BIKE RACK

SCALE: 1"=1'-0"

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

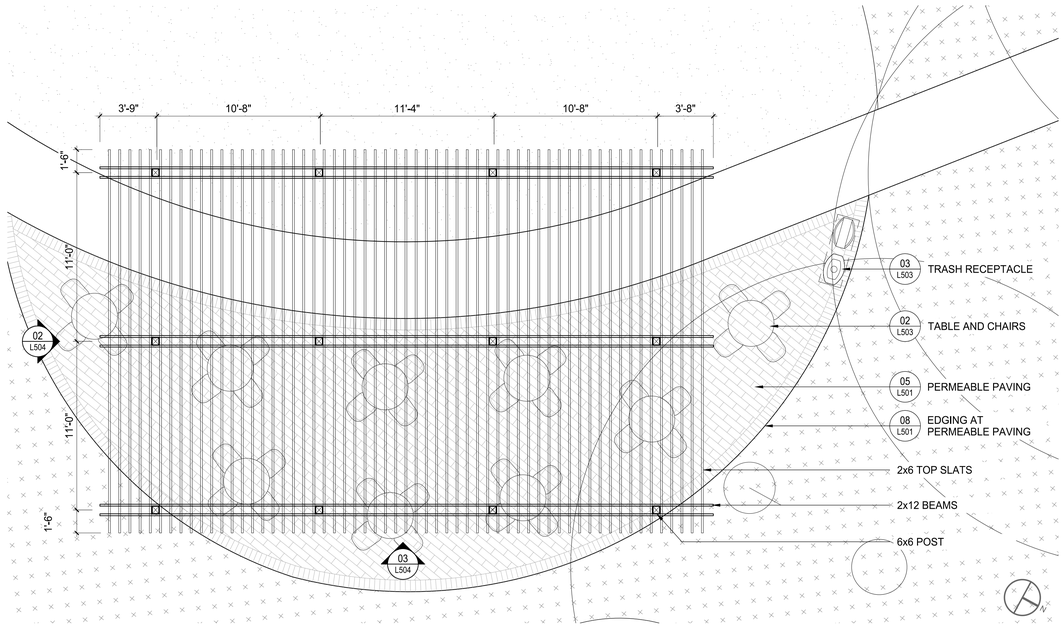
MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS
DATE

DRAWING TITLE
DETAILS

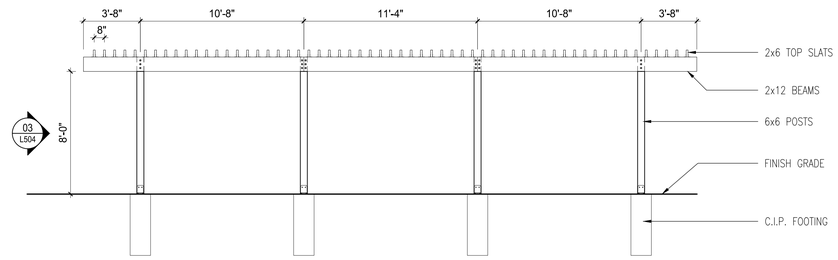
DRAWING INFORMATION
09/23/2024
DATE OF ISSUE
Site Plan Review
DESCRIPTION
AS NOTED
SCALE
CP
DRAWN BY
3489.00
PROJECT #
TILE NAME

DRAWING NUMBER
L503



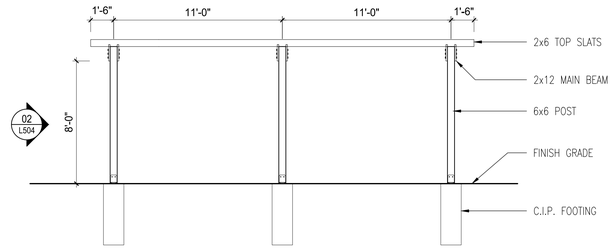
01 PERGOLA 'A' - PLAN

SCALE: 1/4"=1'-0"



02 PERGOLA 'A' - ELEVATION (EAST/ WEST)

SCALE: 1/4"=1'-0"

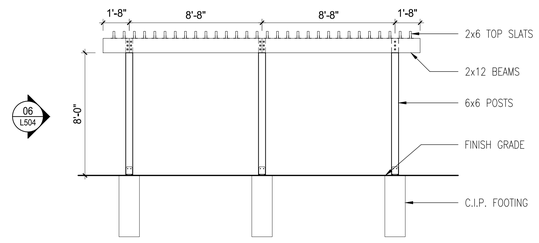


03 PERGOLA 'A' - ELEVATION (NORTH/ SOUTH)

SCALE: 1/4"=1'-0"

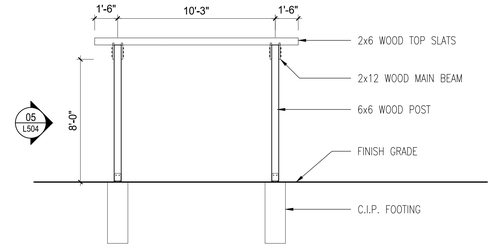
04 PERGOLA 'B' - PLAN

SCALE: 1/4"=1'-0"



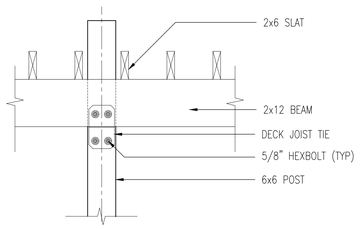
05 PERGOLA 'B' - ELEVATION (NORTH/ SOUTH)

SCALE: 1/4"=1'-0"



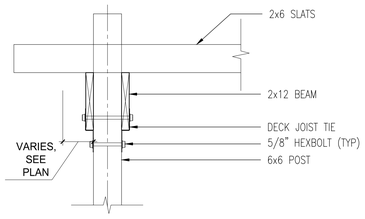
06 PERGOLA 'B' - ELEVATION (EAST/ WEST)

SCALE: 1/4"=1'-0"



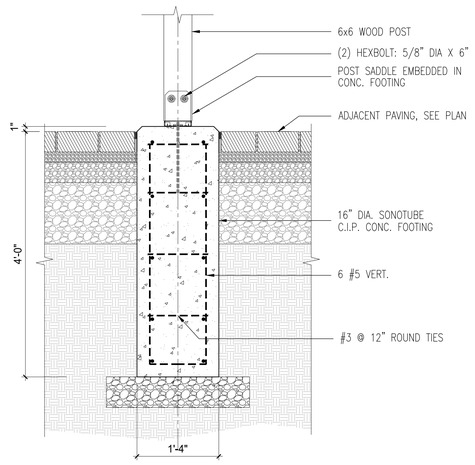
07 PERGOLA CONNECTION A

SCALE: 1"=1'-0"



08 PERGOLA CONNECTION B

SCALE: 1"=1'-0"



09 PERGOLA POST FOOTING

SCALE: 1"=1'-0"

NOTES:

- ALL CONNECTORS AND ANCHORS (I.E. POST SADDLE, DECK JOIST TIE, ETC.) TO BE STAINLESS STEEL
- PERGOLA MEMBER SIZING AND CONNECTIONS REQUIRE STRUCTURAL REVIEW OR ENGINEERED SHOP DRAWINGS

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Chambers Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

DETAILS

DRAWING INFORMATION

08/02/2024
DATE OF ISSUE

SPR PROGRESS
DESCRIPTION

AS NOTED
SCALE

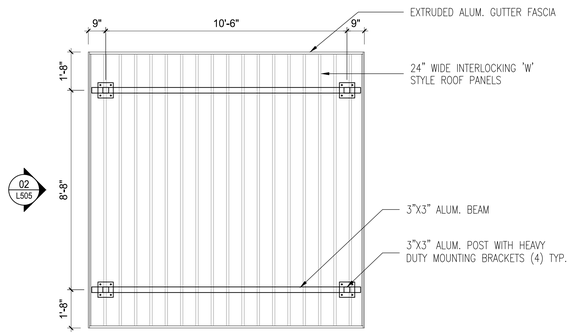
CP
DRAWN BY

PROJECT #

FILE NAME

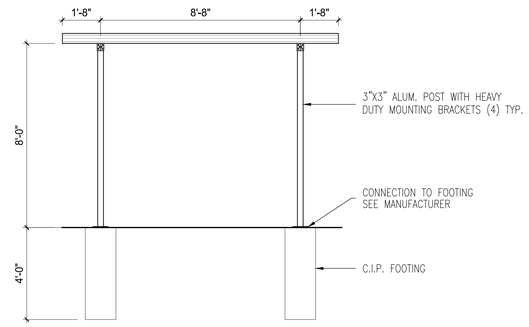
DRAWING NUMBER

L504



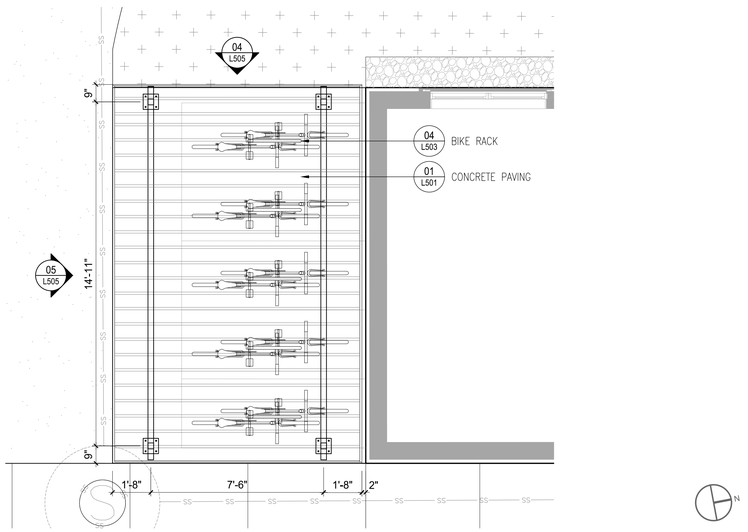
01 SHELTER- PLAN

SCALE: 3/8"=1'-0"



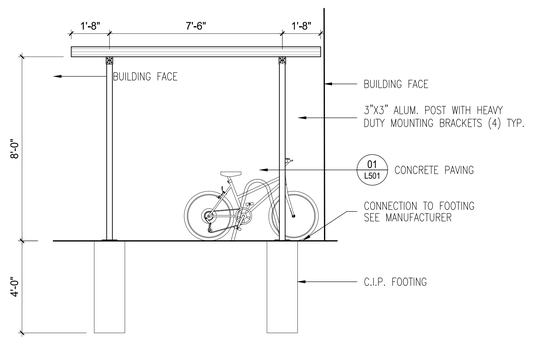
02 SHELTER- PLAN

SCALE: 3/8"=1'-0"



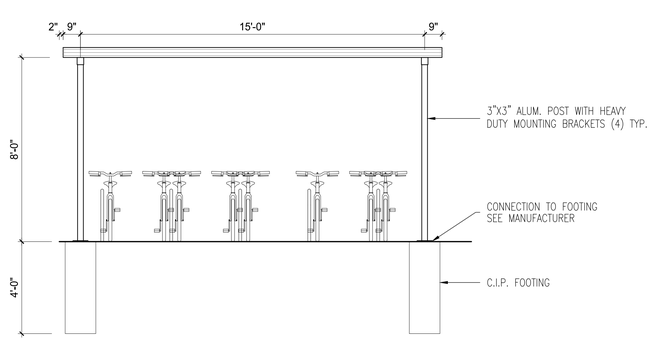
03 BIKE SHELTER 'A' - PLAN

SCALE: 1/4"=1'-0"



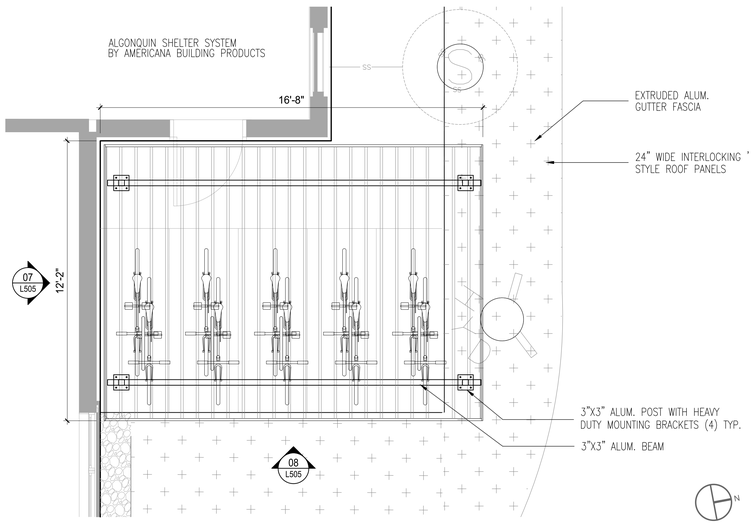
04 BIKE SHELTER 'A' - ELEVATION

SCALE: 3/8"=1'-0"



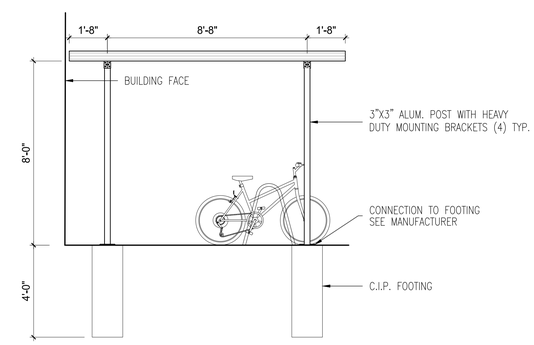
05 BIKE SHELTER 'A' - ELEVATION

SCALE: 3/8"=1'-0"



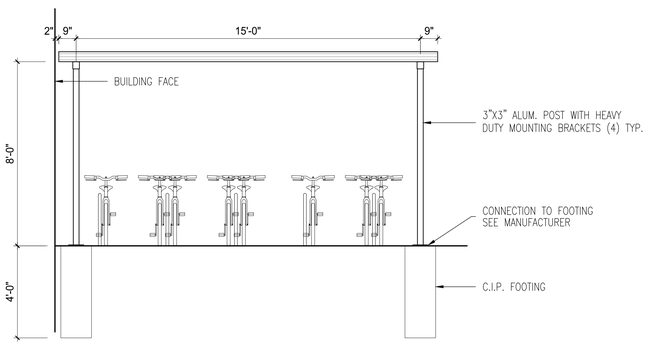
06 BIKE SHELTER 'B' - PLAN

SCALE: 1/4"=1'-0"



07 BIKE SHELTER 'B' - ELEVATION

SCALE: 3/8"=1'-0"



08 BIKE SHELTER 'B' - ELEVATION

SCALE: 3/8"=1'-0"

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

DETAILS

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

AS NOTED
SCALE

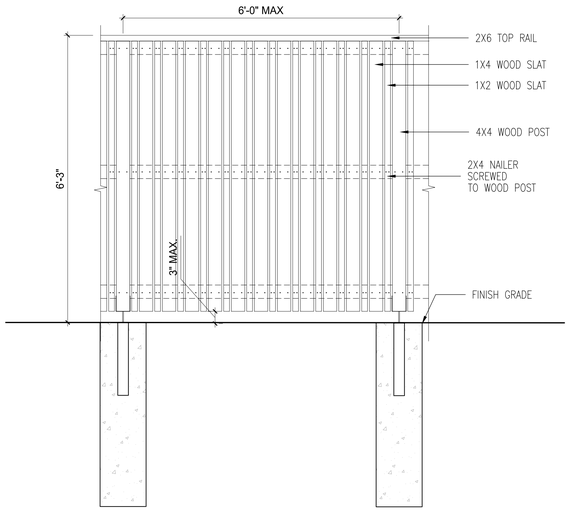
CP
DRAWN BY

3489.00
PROJECT #

FILE NAME

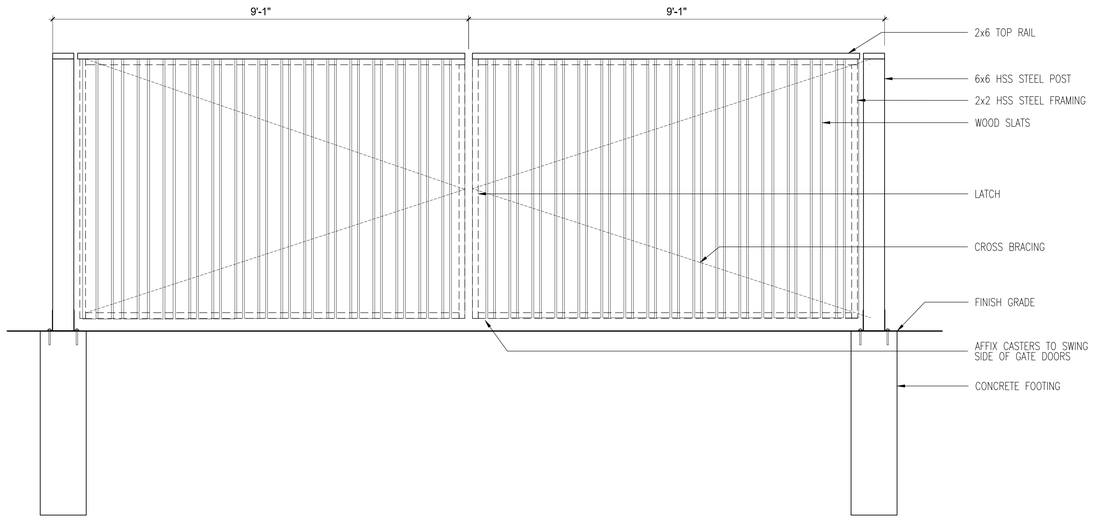
DRAWING NUMBER

L505



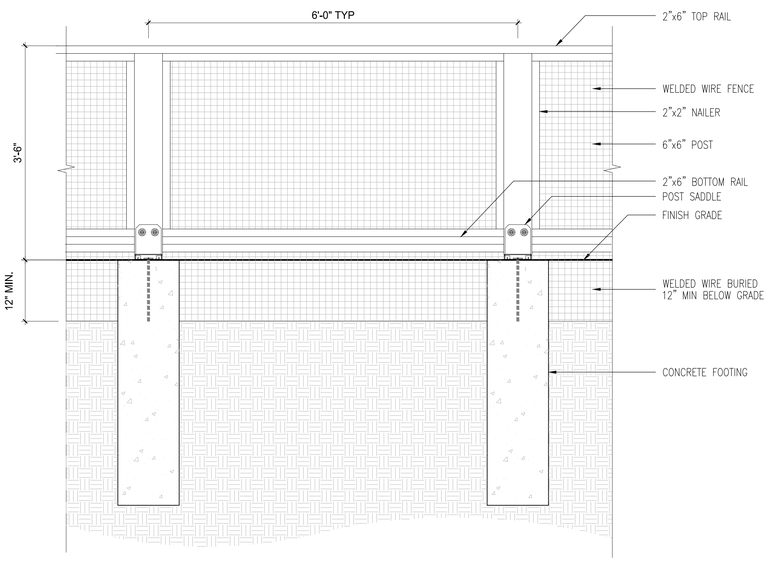
01 TRASH ENCLOSURE FENCE PANEL

SCALE: 3/4"=1'-0"



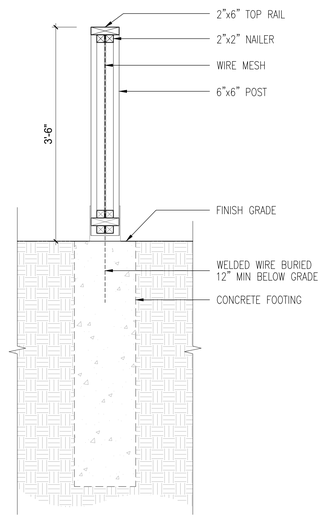
02 TRASH ENCLOSURE GATE

SCALE: 3/4"=1'-0"



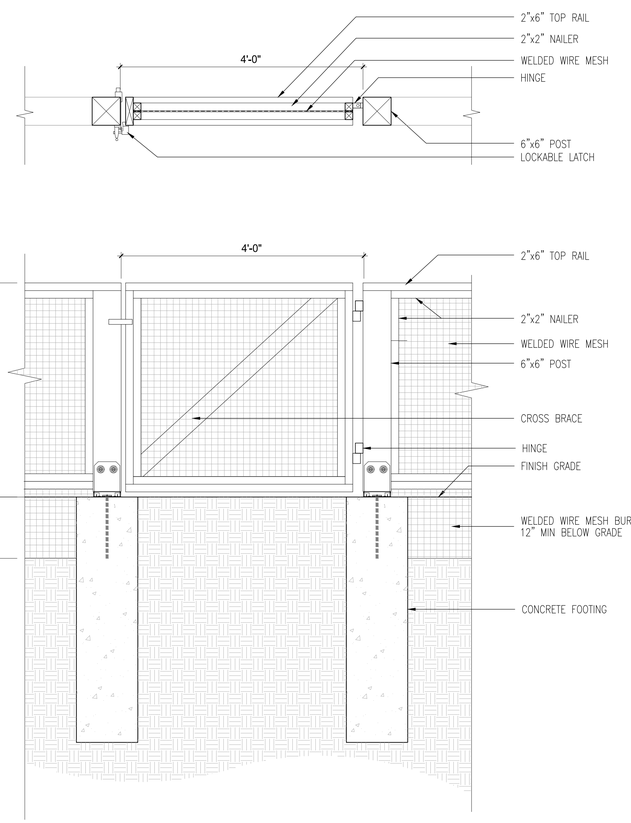
03 COMMUNITY GARDEN FENCE - ELEVATION

SCALE: 1"=1'-0"



04 COMMUNITY GARDEN FENCE - SECTION

SCALE: 1"=1'-0"



05 COMMUNITY GARDEN GATE - ELEVATION AND PLAN

SCALE: 1"=1'-0"

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

DETAILS

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

AS NOTED
SCALE

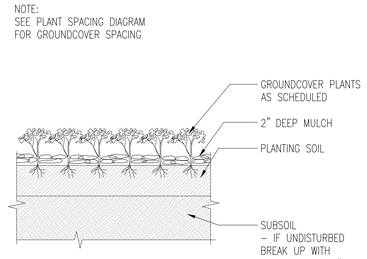
CP
DRAWN BY

3489.00
PROJECT #

FILE NAME

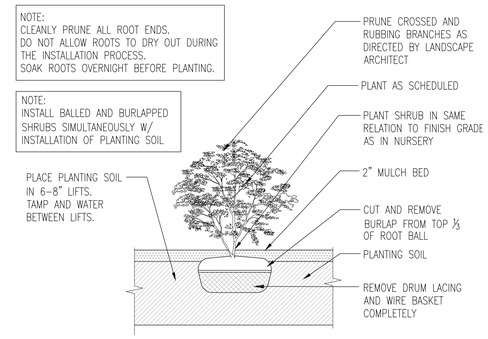
DRAWING NUMBER

L506



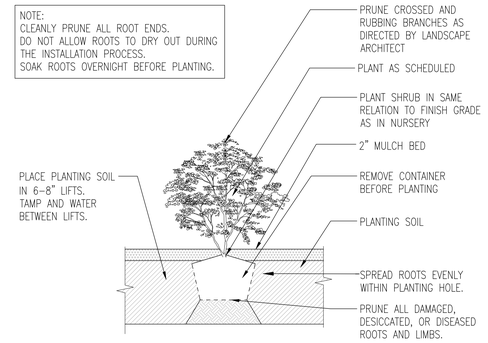
01 GROUNDCOVER PLANTING

SCALE: 1" = 1'-0"



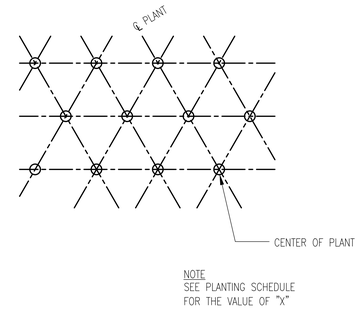
02 SHRUB PLANTING - B&B

SCALE: 3/4" = 1'-0"



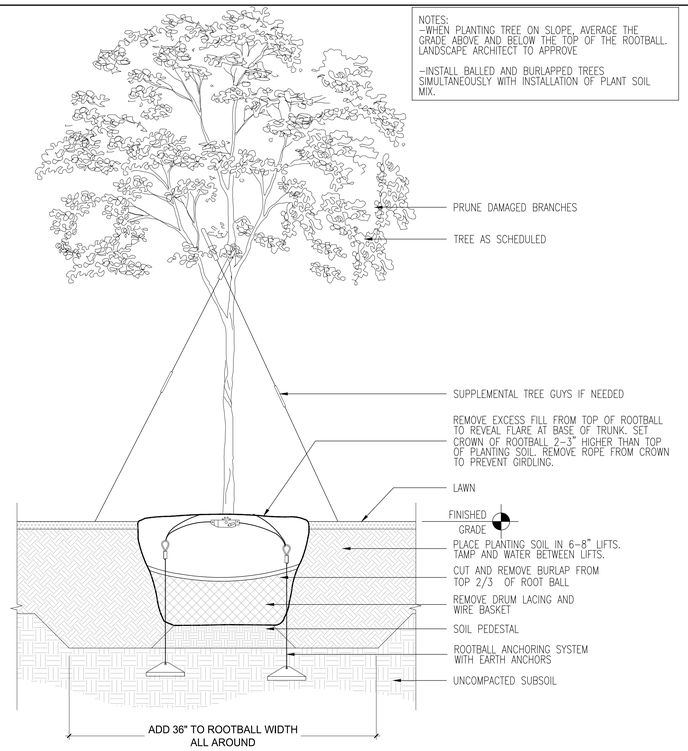
03 SHRUB/PERENNIAL - CONTAINER

SCALE: 3/4" = 1'-0"



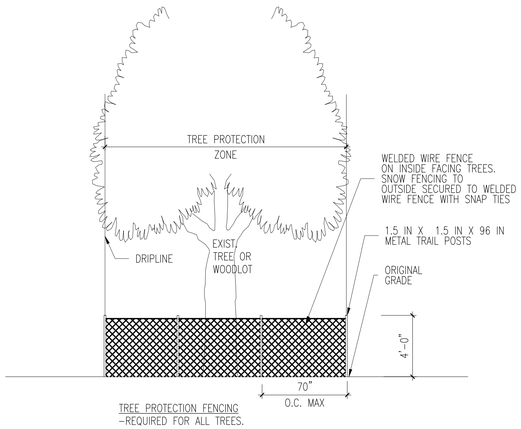
04 PLANT SPACING DIAGRAM - PLAN

SCALE: 1"=1'-0"



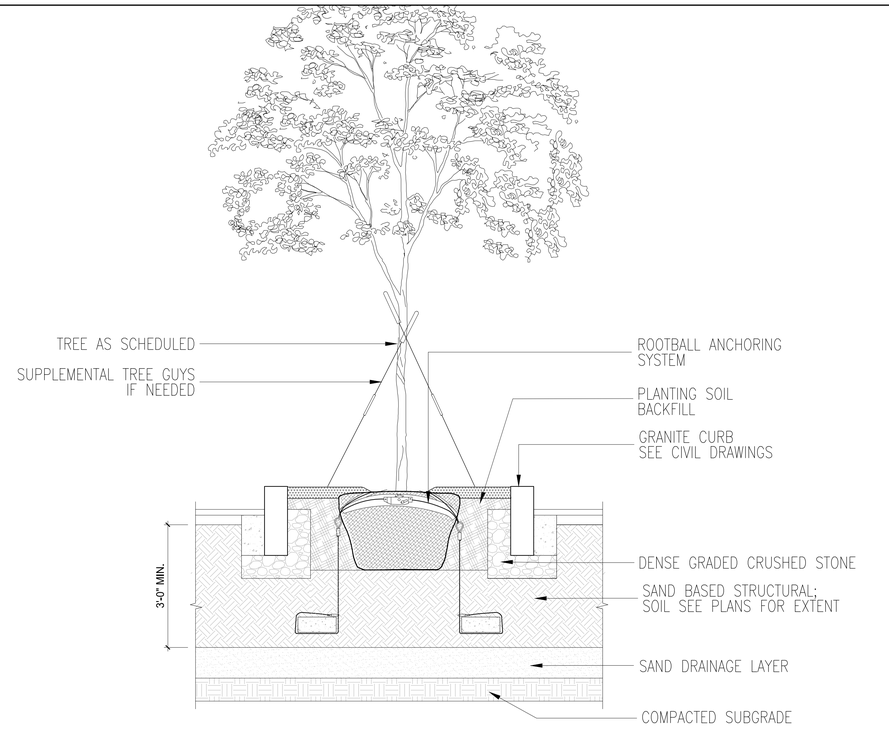
05 TREE PLANTING IN OPEN BED

SCALE: 3/4"=1'-0"



06 TREE PROTECTION

SCALE: 1/4"=1'-0"



07 TREE PLANTING IN STRUCTURAL SOIL

SCALE: 3/4"=1'-0"

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority

21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

DETAILS

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

AS NOTED
SCALE

CP
DRAWN BY

3489.00
PROJECT #

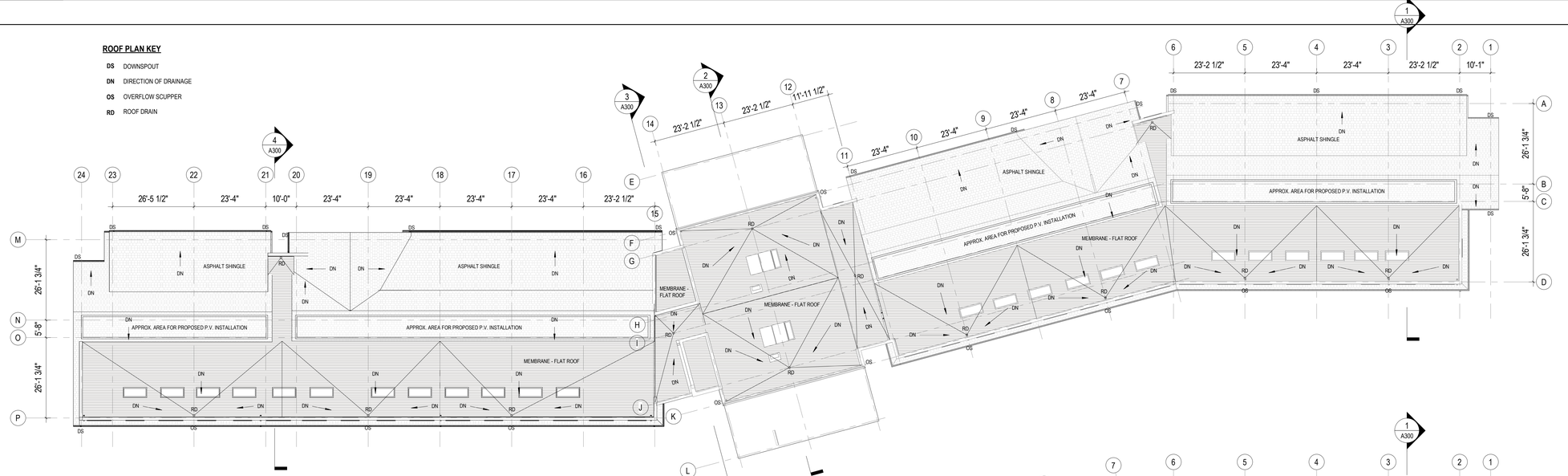
FILE NAME

DRAWING NUMBER

L510

ROOF PLAN KEY

DS	DOWNSPOUT
DN	DIRECTION OF DRAINAGE
OS	OVERFLOW SCUPPER
RD	ROOF DRAIN



3 Phase 1 - Roof Plan
1/16" = 1'-0"



2 Phase 1 - Typical Floor Plan - Floors 2-4
1/16" = 1'-0"



1 Phase 1 - First Floor Plan
1/16" = 1'-0"

0' 8' 16' 32'

N

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
Phase 1 - Plans

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE
Site Plan Review
DESCRIPTION
As indicated
SCALE
CF
DRAWN BY
3489.00
PROJECT #
nhm.rvt
FILE NAME

DRAWING NUMBER
A100

Copyright BH+A, Inc.

V.2.1

C:\Users\cfitzwalter\Documents\3489 Linden Chambers Redevelopment NHA_R23_DD_cfitzwalter92426.rvt
8/22/2024 1:48:02 PM CF



1 Phase 1A - First Floor Plan
1/8" = 1'-0"

0' 4' 8' 16'

N

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

Phase 1A - First Floor Plan

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

1/8" = 1'-0" | CF
SCALE | DRAWN BY

3489.00 | newLnd
PROJECT # | FILE NAME

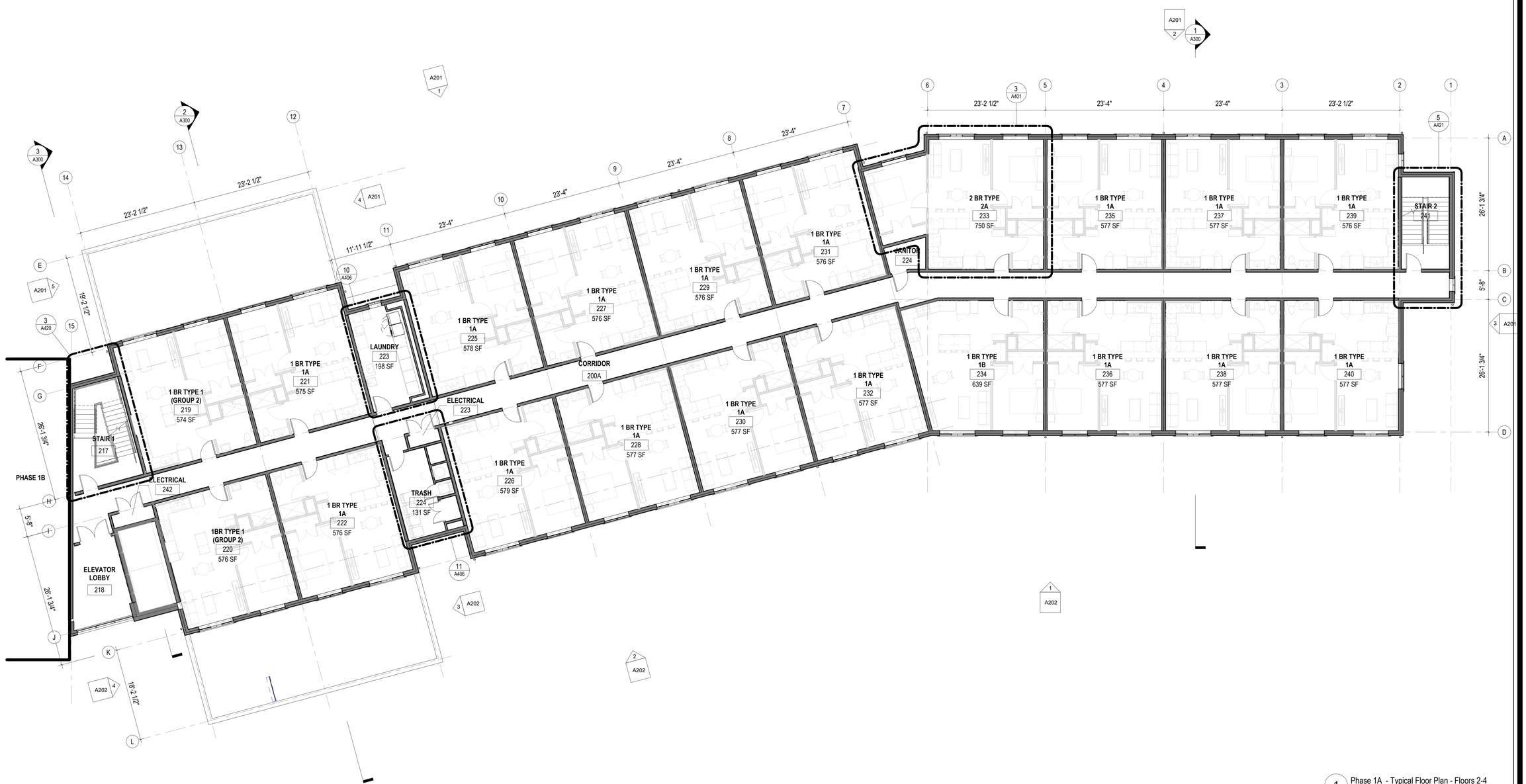
DRAWING NUMBER

A101

Copyright BH+A, Inc.

V.2.1

C:\Users\cf\owler\Documents\3489 Linden Chambers Redevelopment NHA_R23_2D_cfinwaterSHZ06.rvt
8/22/2024 5:48:06 PM CF



1 Phase 1A - Typical Floor Plan - Floors 2-4
1/8" = 1'-0"

0' 4' 8' 16'

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS
DATE

DRAWING TITLE
Phase 1A - Typical Floor Plan - Floors 2-4

DRAWING INFORMATION

08/23/2024	DATE OF ISSUE
Site Plan Review	DESCRIPTION
1/8" = 1'-0"	SCALE
CF	DRAWN BY
3489.00	PROJECT #
rev#.rvt	FILE NAME

DRAWING NUMBER
A102

Copyright BH+A, Inc. V.2.1

C:\Users\cfowler\Documents\3489 Linden Chambers Redevelopment NHA_R23_DD_cfowler9HZ0.rvt
8/22/2024 1:48:09 PM CF



1 Phase 1B - First Floor Plan
1/8" = 1'-0"

0' 4' 8' 16'

N

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

Phase 1B - First Floor Plan

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

1/8" = 1'-0" | CF
SCALE | DRAWN BY

3489.00 | revit.rvt
PROJECT # | FILE NAME

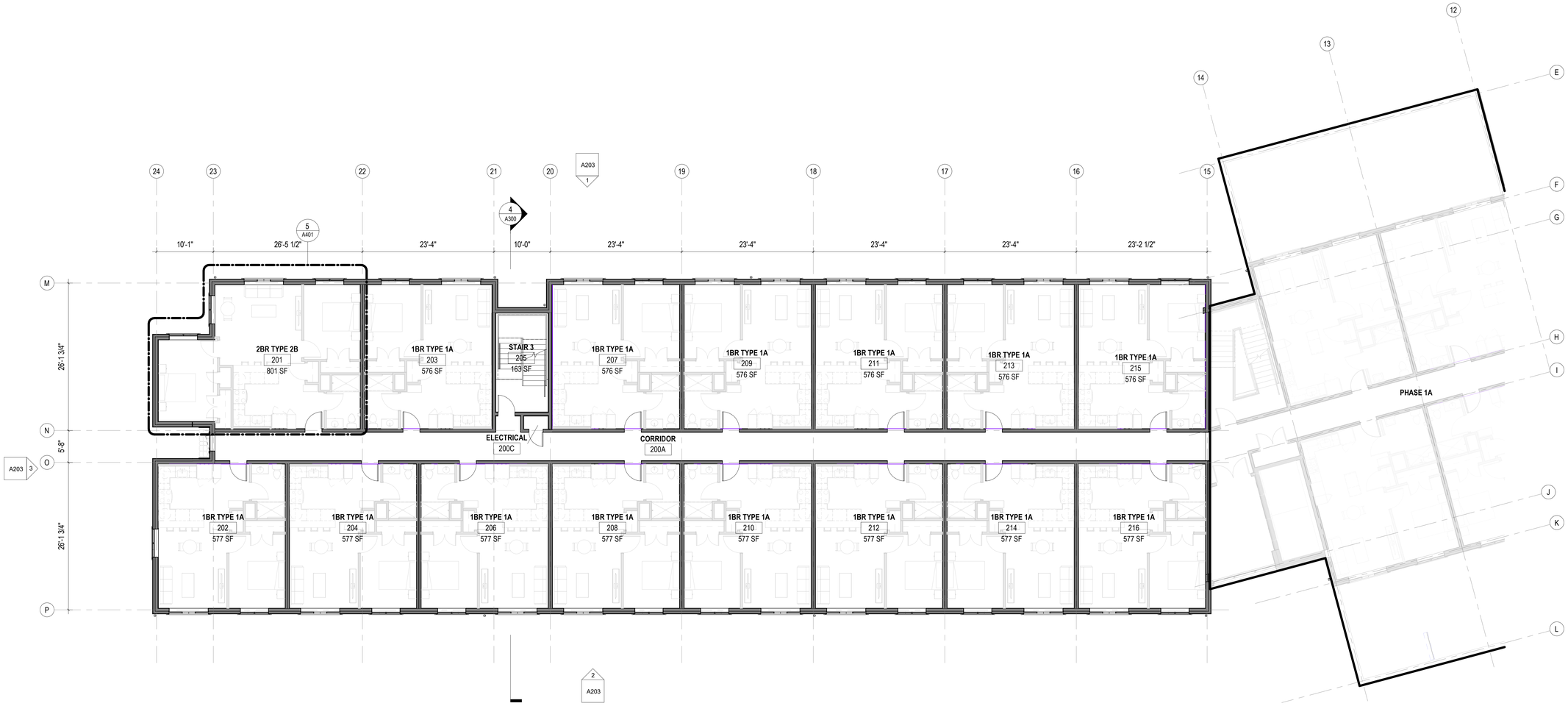
DRAWING NUMBER

A104

Copyright BH+A, Inc.

V.2.1

C:\Users\cfitzwater\Documents\3489 Linden Chambers Redevelopment NHA_RG3_DD_cfitzwaterSHZOB.rvt
8/22/2024 5:48:13 PM CF



1 Phase 1B - Typical Floor Plan - Floors 2-4
1/8" = 1'-0"

0' 4' 8' 16'

N

C:\Users\dfezekiel\Documents\3489 Linden Chambers Redevelopment NHA_R23_DD_dfezekiel5HZO6.rvt
8/22/2024 5:48:16 PM Author

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Street Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

Phase 1B - Typical Floor Plan - Floors 2-4

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

Site Plan Review
DESCRIPTION

1/8" = 1'-0" — SCALE
Author — DRAWN BY

3489.00 — PROJECT #
revit.rvt — FILE NAME

DRAWING NUMBER

A105

Copyright BH+A, Inc.

V.2.1



1 Phase 1 - West Elevation
1/16" = 1'-0"



2 Phase 1 - East Elevation
1/16" = 1'-0"



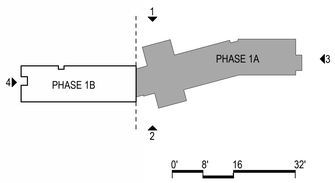
3 Phase 1 - North Elevation
1/16" = 1'-0"



4 Phase 1 - South Elevation
1/16" = 1'-0"

EXTERIOR WALL ASSEMBLY TYPES - SEE A011

EW1-1	THIN MASONRY VENEER SYSTEM AS WALL BASE WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW2-1	HIGH DENSITY FIBER CEMENT PANEL RAINSCREEN WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW3-1	THIN MASONRY VENEER SYSTEM AS WALL BASE WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW4-1	HIGH DENSITY FIBER CEMENT PANEL RAINSCREEN WITH CMU WALL ASSEMBLY



C:\Users\cf\water\Documents\3489 Linden Chambers Redevelopment NHA_R23_DD_cf\water4HZQ6.rvt
8/22/2024 5:48:22 PM CF

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
Phase 1 - Elevations

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE
Site Plan Review
DESCRIPTION
As indicated
SCALE
CF
DRAWN BY
3489.00
PROJECT #
revit.rvt
FILE NAME

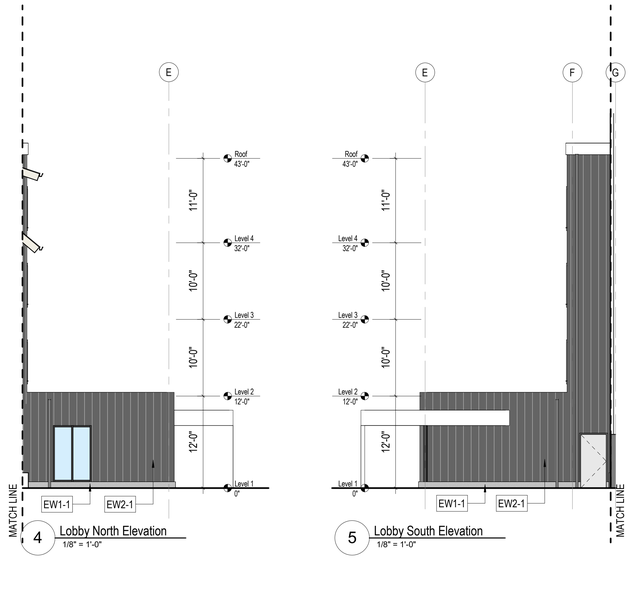
DRAWING NUMBER
A200

Copyright BH+A, Inc.

V.2.1



1 Phase 1A - West Elevation 2
1/8" = 1'-0"



4 Lobby North Elevation
1/8" = 1'-0"

5 Lobby South Elevation
1/8" = 1'-0"



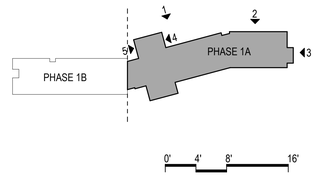
2 Phase 1A - West Elevation 1
1/8" = 1'-0"



3 Phase 1A - North Elevation
1/8" = 1'-0"

EXTERIOR WALL ASSEMBLY TYPES - SEE A011

EW1-1	THIN MASONRY VENEER SYSTEM AS WALL BASE WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW2-1	HIGH DENSITY FIBER CEMENT PANEL RAINSCREEN WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW3-1	THIN MASONRY VENEER SYSTEM AS WALL BASE WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW4-1	HIGH DENSITY FIBER CEMENT PANEL RAINSCREEN WITH CMU WALL ASSEMBLY



ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS
DATE

DRAWING TITLE
Phase 1A - Elevations

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE
Site Plan Review
DESCRIPTION
As indicated
SCALE
CF
DRAWN BY
3489.00
PROJECT #
revit.rvt
FILE NAME

DRAWING NUMBER
A201

Copyright BH+A, Inc.
V.2.1

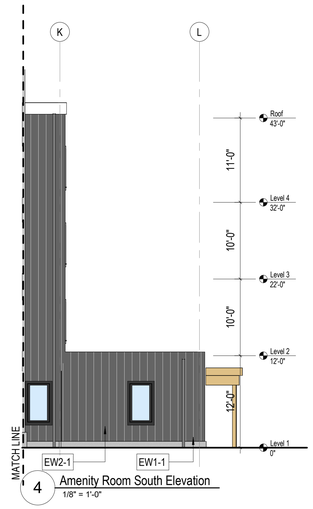
C:\Users\cfitzwater\Documents\3489 Linden Chambers Redevelopment NHA_R23_DD_cfitzwaterSHZ06.rvt
8/22/2024 5:48:24 PM CF



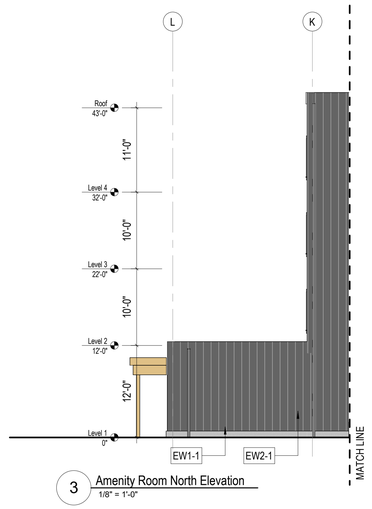
1 Phase 1A - East Elevation 1
1/8" = 1'-0"



2 Phase 1A - East Elevation 2
1/8" = 1'-0"



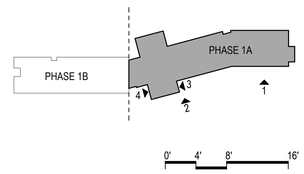
4 Amenity Room South Elevation
1/8" = 1'-0"



3 Amenity Room North Elevation
1/8" = 1'-0"

EXTERIOR WALL ASSEMBLY TYPES - SEE A011

EW1-1	THIN MASONRY VENEER SYSTEM AS WALL BASE WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW2-1	HIGH DENSITY FIBER CEMENT PANEL RAINSCREEN WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW3-1	THIN MASONRY VENEER SYSTEM AS WALL BASE WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW4-1	HIGH DENSITY FIBER CEMENT PANEL RAINSCREEN WITH CMU WALL ASSEMBLY



ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Neeham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
Phase 1A - Elevations

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE
Site Plan Review
DESCRIPTION
As indicated
SCALE
CF
DRAWN BY
3489.00
PROJECT #
revit.rvt
FILE NAME

DRAWING NUMBER
A202

Copyright BH+A, Inc.
V.2.1

C:\Users\cf\owater\Documents\3489 Linden Chambers Redevelopment NHA_R23_DD_dlZwater5KQ6.rvt
8/22/2024 5:48:26 PM CF



1 Phase 1B - West Elevation
1/8" = 1'-0"



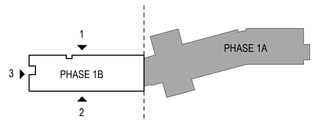
3 Phase 1B - South Elevation
1/8" = 1'-0"



2 Phase 1B - East Elevation
1/8" = 1'-0"

EXTERIOR WALL ASSEMBLY TYPES - SEE A011

EW1-1	THIN MASONRY VENEER SYSTEM AS WALL BASE WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW2-1	HIGH DENSITY FIBER CEMENT PANEL RAINSCREEN WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW3-1	THIN MASONRY VENEER SYSTEM AS WALL BASE WITH TYPICAL WOOD FRAME WALL ASSEMBLY
EW4-1	HIGH DENSITY FIBER CEMENT PANEL RAINSCREEN WITH CMU WALL ASSEMBLY



0' 4' 8' 16'

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Neeham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
Phase 1B - Elevations

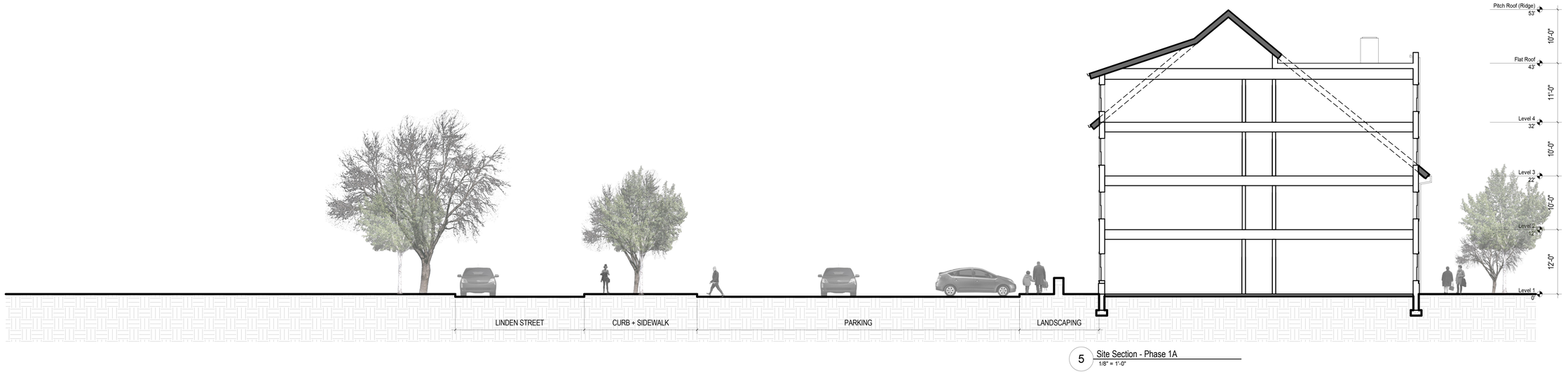
DRAWING INFORMATION

08/23/2024
DATE OF ISSUE
Site Plan Review
DESCRIPTION
As indicated
SCALE
CF
DRAWN BY
3489.00
PROJECT #
revit.rvt
FILE NAME

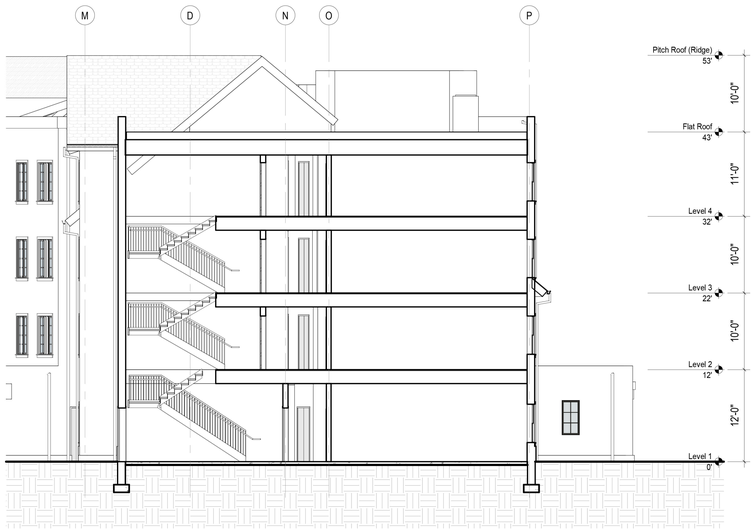
DRAWING NUMBER
A203

Copyright BH+A, Inc. V.2.1

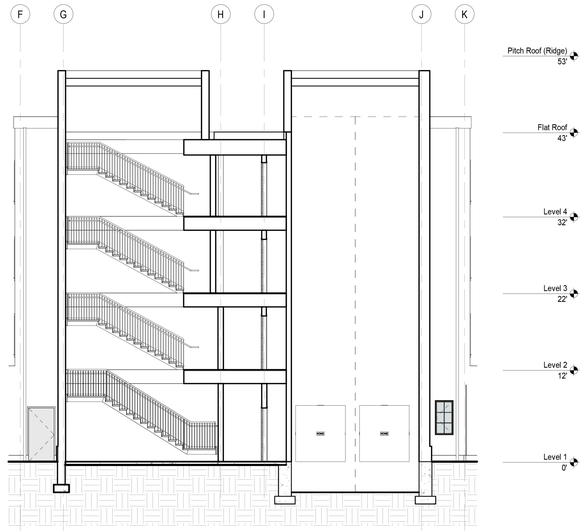
C:\Users\CfowlerDocuments\3489 Linden Chambers Redevelopment NHA_R23_DD_cfowler@HZQ6.rvt
8/22/2024 1:48:29 PM CF



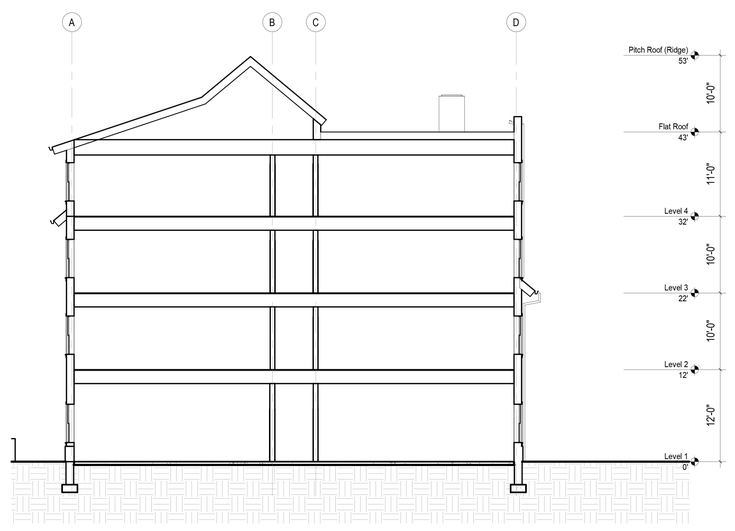
5 Site Section - Phase 1A
1/8" = 1'-0"



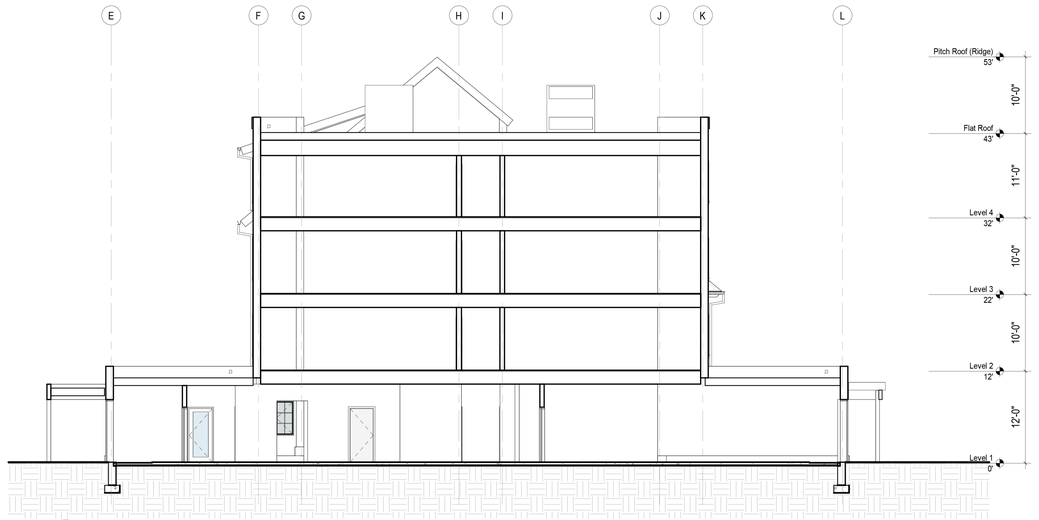
4 Building Section - Phase 1B @ Stair2
1/8" = 1'-0"



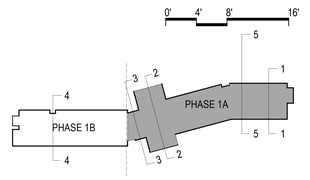
3 Building Section - Phase 1A @ Elevator
1/8" = 1'-0"



1 Building Section - Phase 1A
1/8" = 1'-0"



2 Building Section - Phase 1A @ Core
1/8" = 1'-0"



ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Street Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Neeham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
Building Sections

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE
Site Plan Review
DESCRIPTION
As indicated
SCALE
CF
DRAWN BY
3489.00
PROJECT #
revit.rvt
FILE NAME

DRAWING NUMBER
A300

Copyright BH+A, Inc. V.2.1

C:\Users\cfitzwater\Documents\3489 Linden Chambers Redevelopment NHA_R23_DD_cfitzwater5HZQ6.rvt
8/22/2024 11:54:40 AM CF

SECURITY LEGEND

SYMBOL	DESCRIPTION
DR	DOOR RELEASE BUTTON
DC	DOOR CONTACT
CR	CARD READER
RD	REQUEST TO EXIT MOTION DETECTOR
ES	ELECTRIC DOOR STRIKE
SC	SECURITY CAMERA
KP	KEY PAD
MD C	MOTION DETECTOR, WALL MOUNTED "C"- INDICATES CIRCULAR BEAM "L"- INDICATES LINEAR BEAM
MD	MOTION DETECTOR, CEILING MOUNTED
SCP	SECURITY CONTROL PANEL

TELECOMMUNICATIONS LEGEND

SYMBOL	DESCRIPTION
	FLOOR TELECOM OUTLET
	WALL TELECOM OUTLET
	CEILING TELECOM OUTLET
S LS	SPEAKER, CEILING MOUNTED "LS" INDICATES LOCAL SOUND SYSTEM "VC" INDICATES INTEGRAL VOLUME CONTROL KNOB
	PUSHBUTTON
TV	TV OUTLET, WALL MOUNTED
TV	TV OUTLET, CEILING MOUNTED DATA/VIDEO PROJECTOR OUTLET W/ CONDUIT TO TV OUTLET

SITE LEGEND

SYMBOL	DESCRIPTION
A #	UNDERGROUND SECTION, REFER TO SECTION DETAIL "A" INDICATES DETAIL LETTER "#" INDICATES DRAWING NUMBER
EM	ELECTRIC MANHOLE
TM	TELEPHONE MANHOLE / TELECOMMUNICATIONS
EH	ELECTRIC HAND HOLE
TH	TELEPHONE HAND HOLE / TELECOMMUNICATIONS
G	GROUND CABLE
UE	UNDERGROUND ELECTRIC
UT	UNDERGROUND TELEPHONE / TELECOMMUNICATIONS
UF	UNDERGROUND FIRE ALARM
OE	OVERHEAD ELECTRIC
OT	OVERHEAD TELEPHONE / TELECOMMUNICATIONS
OF	OVERHEAD FIRE ALARM

FIRE ALARM LEGEND

SYMBOL	DESCRIPTION
FACP	FIRE ALARM CONTROL PANEL
DMP	DEDICATED MONITORING PANEL
FB	FIRE ALARM MASTER BOX
RAA	REMOTE ALARM ANNUNCIATOR
ARA	

ELECTRICAL ABBREVIATIONS

#	NUMBER	LOC	LOCATION
+18"	MOUNTING HEIGHTS ARE TO CENTERLINE OF DEVICE ABOVE FINISH FLOOR OR FINISH GRADE	LOR	LOCK OUT RELAY
		LTG	LIGHTING
		LV	LOW VOLTAGE
A, AMP	AMPERES	(M)	EXISTING EQUIPMENT TO BE REWORKED/MODIFIED
A/C	AIR CONDITIONING	M, MTR	MOTOR
AC	ALTERNATING CURRENT	MG	MOTOR/GENERATOR SET
ADA	AMERICAN WITH DISABILITIES ACT	MAN	MANUAL
AF	AMPERE FRAME	MAX	MAXIMUM
AFCI	ARC FAULT CIRCUIT INTERRUPTER	MCA	MINIMUM CIRCUIT AMPS
AFF	ABOVE FINISHED FLOOR	MCB	MAIN CIRCUIT BREAKER
AFG	ABOVE FINISHED GRADE	MCC	MOTOR CONTROL CENTER
AHJ	AUTHORITY HAVING JURISDICTION	MCP	MOTOR CONTROL PANEL
AHU	AIR HANDLING UNIT	MEC	MASSACHUSETTS ELECTRICAL CODE
AIC	AMPERE INTERRUPTING CAPACITY	MECH	MECHANICAL
AL	ALUMINUM	MFR	MANUFACTURER
APPROX	APPROXIMATE	MH	MAINTENANCE HATCH
ARCH	ARCHITECT	MIN	MINIMUM
ATS	AUTOMATIC TRANSFER SWITCH	MISC	MISCELLANEOUS
AUTO	AUTOMATIC	MLO	MAIN LUGS ONLY
AVG	AVERAGE	MOCP	MAXIMUM OVER CURRENT PROTECTION
AWG	AMERICAN WIRE GAUGE	MSB	MAIN SWITCHBOARD
		MTD	MOUNTED
B	BURIED	MTG	MOUNTING
BKR	BREAKER	MTS	MANUAL TRANSFER SWITCH
BLDG	BUILDING		
		(N)	NEW LOCATION OF EXISTING WORK
C	CONDUIT	N	NEUTRAL
CA	CABLE	NA	NOT APPLICABLE
CAB	CABINET	NC	NORMALLY CLOSED
CAT	CATALOG	NEC	NATIONAL ELECTRICAL CODE
CATV	CABLE TELEVISION	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
CB	CIRCUIT BREAKER	NF	NON-FUSED
CCTV	CLOSED CIRCUIT TELEVISION	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
CEC	CALIFORNIA ELECTRICAL CODE	NIC	NOT IN CONTRACT
CKT	CIRCUIT	NO	NORMALLY OPEN
CL	CENTERLINE	NORM	NORMAL
CLF	CURRENT LIMITING FUSE	NRTL	NATIONALLY RECOGNIZED TESTING LABORATORY
CLG	CEILING	NTS	NOT TO SCALE
COL	COLUMN	NVE	NEVADA ENERGY
COMB	COMBINATION		
CONN	CONNECTION	OC	ON CENTER
CONST	CONSTRUCTION	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED
CONTR	CONTRACTOR	OH	OVERHEAD
CPU	CENTRAL PROCESSING UNIT	OPD	OVER CURRENT PROTECTION DEVICE
CS	CONTROL SWITCH	OSHPD	OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
CTRL	CONTROL		
CU	COPPER		
		P	POLE
(D)	DEMO	PB	PUSH BUTTON
dB	DECIBEL	PDU	POWER DISTRIBUTION UNIT
DB	DISTRIBUTION BOARD	PF	POWER FACTOR
DC	DIRECT CURRENT	PH(ø)	PHASE
DET	DETAIL	PL	PILOT LIGHT
DIA	DIAMETER	PNL	PANEL
DISC	DISCONNECT	POC	POINT OF CONNECTION
DIST	DISTRIBUTION	POD	POINT OF DISCONNECTION
DN	DOWN	POS	PROVIDED UNDER OTHER SECTIONS
DWG	DRAWING	PP	POWER POLE
		PTZ	PAN, TILT, ZOOM
(E), EXIST	EXISTING	PVC	POLYVINYL CHLORIDE
EA	EACH	PWR	POWER
EC	ELECTRICAL CONTRACTOR		
EHU	ELECTRIC HEATING UNIT	(R)	EXISTING WORK TO BE RELOCATED
EL	ELEVATION	RECEPT	RECEPTACLE
ELEC	ELECTRICAL	REFRIG	REFRIGERATOR
ELR	END OF LINE RESISTOR	REQ'D	REQUIRED
EMERG	EMERGENCY	RGS	RIGID GALVANIZED STEEL
EMT	ELECTRIC METALLIC TUBING	RM	ROOM
ENG	ENGINEER	RMS	ROOT MEAN SQUARE VALUE
EQUIP	EQUIPMENT	RND	ROUND
(ER)	EXISTING TO BE RELOCATED	RPM	REVOLUTIONS PER MINUTE
ETC	ELAPSED TIME CONTROLLER		
EWH	ELECTRIC WATER HEATER	SEC	SECOND
		SN	SOLID NEUTRAL
F/A	FIRE ALARM	SNEC	SOUTHERN NEVADA ELECTRICAL CODE AMENDMENTS
FAAP	FIRE ALARM ANNUNCIATOR PANEL	SPD	SURGE PROTECTIVE DEVICE
FACP	FIRE ALARM CONTROL PANEL	SPEC	SPECIFICATION
FDR	FEEDER	SQ	SQUARE
FIXT	FIXTURE	SQFT	SQUARE FEET
FL	FLOOR	SS	SAFETY SWITCH
FLA	FULL LOAD AMPS		SYNC SWITCH
FLMT	FLEXIBLE LIQUID TIGHT METALLIC TUBING	STR	STARTER
		STRUCT	STRUCTURAL
FLUOR	FLUORESCENT	SW	SWITCH
FR	FRAME	SWBD	SWITCHBOARD
FREQ	FREQUENCY	SWGR	SWITCHGEAR
FT	FOOT	SYM	SYMMETRICAL
G, GND	GROUND	T, XFMR	TRANSFORMER
GEC	GROUNDING ELECTRODE CONDUCTOR	TB	TERMINAL BLOCK
GEN	GENERATOR	TEL	TELEPHONE
GFI, GFCI	GROUND FAULT CIRCUIT INTERRUPTER	TERM	TERMINAL
GFP	GROUND FAULT PROTECTION	TS	TEMPERATURE SWITCH
		TSP	TWISTED SHIELDED-PAIR
HH	HANDHOLE	TT	THERMAL SWITCH
HID	HIGH INTENSITY DISCHARGE	TV	TELEVISION
HOA	HAND OFF AUTOMATIC	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
HORZ	HORIZONTAL	TYP	TYPICAL
HP	HORSEPOWER		
HTR	HEATER	UFD	UNDERFLOOR DUCT
HV	HIGH VOLTAGE	UG	UNDERGROUND
HVAC	HEATING, VENTILATING, AND AIR CONDITIONING	UH	UNIT HEATER
HZ	HERTZ	UL	UNDERWRITERS LABORATORIES
		UNO	UNLESS NOTED OTHERWISE
IBC	INTERNATIONAL BUILDING CODE	UPS	UNINTERRUPTIBLE POWER SUPPLY
IG	ISOLATED GROUND	UTP	UNSHIELDED TWISTED-PAIR
IMC	INTERMEDIATE METALLIC CONDUIT		
INCAND	INCANDESCENT	V	VOLT
		VA	VOLT AMPERE
JB	JUNCTION BOX	VA	VOLT-AMP
JCT	JUNCTION	VAV	VARIABLE AIR VOLUME
		VD	VOLTAGE DROP
kCMIL	THOUSAND CIRCULAR MILS	VENT	VENTILATION
KO	KNOCK OUT	VERT	VERTICAL
kV	KILOVOLT	VFD	VARIABLE FREQUENCY DRIVE
KVA	KILOVOLT AMPERES	VSD	VARIABLE SPEED DRIVE
KW	KILOWATT		
KWH	KILOWATT HOURS	W	WATT
		WP	WEATHER-PROOF (NEMA 3R)
		XP	EXPLOSION PROOF

ELECTRICAL SYMBOL LEGEND

(THIS IS A MASTER LEGEND, NOT ALL SYMBOLS MAY APPEAR ON DRAWINGS.)

GENERAL

SYMBOL	DESCRIPTION
XX	SHEET NOTE
XX	FEEDER NOTE
XX-XXX	KITCHEN EQUIPMENT TAG
1	REVISION NUMBER
MSB	ELECTRICAL EQUIPMENT TAG
-	MECHANICAL EQUIPMENT TYPE
-	MECHANICAL EQUIPMENT NUMBER - SEE HVAC AND PLUMBING DRAWINGS.
-	SECTION DRAWING NUMBER
-	REFERENCING SHEET
-	CALLOUT DRAWING NUMBER
-	REFERENCING SHEET

EXISTING DEVICE LEGEND

SYMBOL	DESCRIPTION
	NEW WORK
X(M/E)	EXISTING WORK TO REMAIN
X(D)	EXISTING WORK TO BE REMOVED (DEMO)
X(R)	EXISTING WORK TO BE RELOCATED
X(N)	NEW LOCATION OF EXISTING WORK

LIGHTING

SYMBOL	DESCRIPTION
A1 2.a	LIGHTING FIXTURE (SEE LIGHTING FIXTURE SCHEDULE) "A1" - INDICATES LIGHTING FIXTURE TYPE "2" - INDICATES CIRCUIT NUMBER "a" - INDICATES SWITCH CONTROL
	FIXTURE SHADING INDICATES FIXTURE ON EMERGENCY CIRCUIT, LIFE SAFTEY OR INTEGRAL BATTERY BACK-UP
	FIXTURE HALF SHADING INDICATES FIXTURE ON CRITICAL BRANCH CIRCUITING
	LINEAR PENDANT FIXTURE
	LINEAR STRIP FIXTURE
	RECESSED LINEAR SLOT LIGHT
LED	LINEAR LED FIXTURE
	DOWNLIGHT FIXTURE
	PENDANT FIXTURE
	TRACK LIGHT WITH FIXTURE HEADS
	WALL WASH / ACCENT LIGHT
	SPECIALTY FIXTURE - PROFILE SPOT LIGHT
	SPECIALTY FIXTURE - WASH LIGHT
	WALL MOUNTED FIXTURE
	STEP LIGHT
	POLE MOUNTED FIXTURE
	BOLLARD FIXTURE
	EXIT SIGN WITH DIRECTIONAL ARROWS AND EXIT FACE (SHADED) AS INDICATED CEILING MOUNTED
	EXIT SIGN WITH DIRECTIONAL ARROWS AND EXIT FACE (SHADED) AS INDICATED WALL MOUNTED
	EMERGENCY BATTERY LIGHTING UNIT WITH TWIN HEADS
	EMERGENCY BATTERY LIGHTING UNIT WITH TWIN HEADS AND EXIT SIGN

POWER DISTRIBUTION

SYMBOL	DESCRIPTION
	DARK SHADING ON EQUIPMENT INDICATES 208/120V, LIGHT SHADING INDICATES 480/277V
	SURFACE MOUNTED PANELBOARD
	FLUSH MOUNTED PANELBOARD
TS	DRY TYPE TRANSFORMER "TS" - INDICATES KVA RATING OF TRANSFORMER REFER TO DRY TYPE K-RATED TRANSFORMER SCHEDULE
	SWITCHBOARD, MOTOR CONTROL CENTER OR DISTRIBUTION BOARD
LCP	LIGHTING CONTROL PANEL
CP	CONTROL PANEL
	LADDER CABLE TRAY
	CHANNEL CABLE TRAY
BW	BUSWAY, HORIZONTAL, REFER TO RISER FOR RATING
BW	BUSWAY, VERTICAL, REFER TO RISER FOR RATING
BW	BUSWAY, HORIZONTAL, WITH FUSED PLUG-IN DISCONNECT
G	GROUND BAR
M	CUSTOMER METER
M	UTILITY METER AND SOCKET
CT	CURRENT TRANSFORMER CABINET

WIRING DEVICES

SYMBOL	DESCRIPTION
WP 5	RECEPTACLE RATED 20A, 125V. MOUNTED AT +18" UNLESS NOTED OTHERWISE. RECEPTACLE HEIGHTS SHALL COMPLY WITH ANSI 117.1 REQUIREMENTS "5" - INDICATES CIRCUIT NUMBER "IG" - INDICATES ISOLATED GROUND TYPE "WP" - INDICATES WEATHERPROOF GFCI RECEPTACLE "GF" - GFCI RECEPTACLE
	DUPLEX RECEPTACLE
	DOUBLE DUPLEX RECEPTACLE
	FLUSH FLOOR/CEILING DUPLEX RECEPTACLE
	FLUSH FLOOR/CEILING DOUBLE DUPLEX RECEPTACLE
XX XX XX	SPECIAL PURPOSE RECEPTACLE - WALL / FLOOR / CEILING. "XX" INDICATES TAG NUMBER. REFER TO SPECIAL PURPOSE RECEPTACLE SCHEDULE
	HOSPITAL GRADE RECEPTACLE
	HOSPITAL GRADE DOUBLE DUPLEX RECEPTACLE
	MULTI-OUTLET PLUGSTRIP
	MULTI-OUTLET ASSEMBLY, DEVICES AS INDICATED
	WALL JUNCTION BOX
	FLOOR/CEILING JUNCTION BOX
FS	JUNCTION BOX AND SWITCH WITH CONNECTION TO FIRE/SMOKE DAMPER. COORDINATE REQUIREMENTS WITH FIRE ALARM SYSTEM AND MECHANICAL CONTROL DIAGRAMS
V	JUNCTION BOX AND SWITCH WITH CONNECTION TO VARIABLE AIR VOLUME BOX. COORDINATE REQUIREMENTS WITH MECHANICAL CONTROL DIAGRAMS
DH	DOOR HOLDER
	CLOCK RECEPTACLE AT +90" UNLESS NOTED OTHERWISE
SB SB SB	SPECIALTY BOX - WALL / FLOOR / CEILING
P	FLOOR MOUNTED BOX FOR POWER CONNECTION TO PRE-WIRED FURNITURE PARTITIONS
P	WALL MOUNTED BOX FOR POWER CONNECTION TO PRE-WIRED FURNITURE PARTITIONS
FB1	FLOOR MOUNTED BOX WITH MULTIPLE DEVICES. "FB1"-INDICATES TYPE AS DEFINED IN NOTES/SCHEDULES.
PB	PULL BOX
PP	POWER POLE
	CORD DROP WITH DUPLEX RECEPTACLE
	CORD DROP WITH DOUBLE DUPLEX RECEPTACLE
XX	CORD DROP WITH SPECIAL PURPOSE RECEPTACLE, "XX" INDICATES TAG NUMBER. REFER TO SPECIAL PURPOSE RECEPTACLE SCHEDULE

BRANCH CIRCUITS AND FEEDERS

SYMBOL	DESCRIPTION
R22A-1,3,5	BRANCH CURCUIT HOME RUN TICKS INDICATE QUANTITY OF CONDUCTORS, GROUND CONDUCTORS ARE NOT INDICATED. NO TICKS INDICATES 2@12 & 1#12G IN 3/4"C MINIMUM. R22A-1,3,5 INDICATES PANEL AND CIRCUIT DESIGNATION FROM WHICH HOMERUN SHALL ORIGINATE. EACH CIRCUIT SHALL BE 20A-1P (20AMP SINGLE POLE) UNLESS NOTED OTHERWISE.
	CONDUIT BELOW FLOOR OR BELOW GRADE
	CONDUIT STUB-OUT
	CONDUIT AND/OR WIRE TURNED UP
	CONDUIT AND/OR WIRE TURNED DOWN
	FLEXIBLE CONNECTION TO EQUIPMENT. RACEWAY AND CONDUCTOR RATING TO MATCH ASSOCIATED BRANCH CIRCUIT OR FEEDER
E	BRANCH CIRCUIT FOR EMERGENCY BATTERY DC CIRCUIT, MINIMUM 2#10 IN 3/4"C. UNLESS OTHERWISE NOTED

MOTOR AND CONTROLS

SYMBOL	DESCRIPTION
S_M	MANUAL MOTOR STARTING SWITCH WITH THERMAL OVERLOAD PROTECTION
60AS 50AF	MAGNETIC MOTOR STARTER, REFER TO MAGNETIC MOTOR STARTER & VFD SCHEDULE FOR TYPE, SIZE AND ENCLOSURE
	COMBINATION FUSED DISCONNECT MAGNETIC MOTOR STARTER. REFER TO MAGNETIC MOTOR STARTER AND VFD SCHEDULE FOR TYPE, SIZE AND ENCLOSURE
C	CONTACTOR IN NEMA 1 ENCLOSURE UNLESS OTHERWISE NOTED
MCC	MOTOR CONTROL CENTER
CP	EQUIPMENT CONTROL PANEL
VFD	VARIABLE SPEED DRIVE
2	MOTOR, NUMERAL INDICATES HORSEPOWER "2" - INDICATES HORSEPOWER RATING
60AS	DISCONNECT SWITCH RATED 30AMP, 3-POLE, IN NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE NOTED "3R" - INDICATES NEMA TYPE 3R ENCLOSURE "2P" - INDICATES 2 POLE SINGLE PHASE DISCONNECT "60AS" - INDICATES 60A SWITCH
60AS 50AF	FUSED DISCONNECT SWITCH, 3-POLE, IN NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE NOTED. "3R" - INDICATES NEMA TYPE 3R ENCLOSURE "60AS" - INDICATES 60AMP SWITCH "50AF" - INDICATES 50AMP FUSES
CB	ENCLOSED CIRCUIT BREAKER IN NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE NOTED

DIAGRAMS

SYMBOL	DESCRIPTION
	TRANSFORMER
	CIRCUIT BREAKER
ST	SHUNT TRIP CIRCUIT BREAKER
	DRAW-OUT CIRCUIT BREAKER - MEDIUM VOLTAGE
	DRAW-OUT CIRCUIT BREAKER - LOW VOLTAGE
	SWITCH FUSE
G	GENERATOR
	POTENTIAL TRANSFORMER
	CURRENT TRANSFORMER
	GROUNDING ELECTRODE
M	METER
N O E	AUTOMATIC TRANSFER SWITCH
E L N	AUTOMATIC TRANSFER SWITCH WITH BYPASS MAINTENANCE
	CAPACITOR
SPD	SURGE PROTECTION DEVICE
K	KIRK KEY INTERLOCK
A	AMMETER
V	VOLTMETER
W	WATT METER
WH	WATTHOUR METER
ST	SHUNT TRIP DEVICE
PANEL R21A	PANELBOARD

SWITCHING CONTROLS

SYMBOL	DESCRIPTION
S^a	SINGLE POLE SWITCH AT +44" UNLESS NOTED OTHERWISE. MOUNTING HEIGHTS SHALL COMPLY WITH ANSI 117.1 REQUIREMENTS (AT +44" UNLESS NOTED OTHERWISE) "a" - INDICATES SWITCH CONTROL
S_2	"2" - INDICATES 2 POLE SINGLE THROW SWITCH "3" - INDICATES 3-WAY SWITCH "LV" - INDICATES LOW VOLTAGE SWITCH "LVD" - INDICATES LOW VOLTAGE DIMMER SWITCH "M" - INDICATES SWITCH WITH MOTION SENSOR "OS" - INDICATES SWITCH WITH OCCUPANCY SENSOR "WP" - INDICATES WEATHERPROOF
DL DL	CEILING/WALL DAYLIGHT SENSOR
DM	DIMMING MODULE
xx OS/VS xx	CEILING/WALL OCCUPANCY SENSOR (XX REFERS TO TYPE DESIGNATION, SEE OCCUPANCY SENSOR SCHEDULE - WALL / CEILING
PC/EC	PHOTO CELL - WALL / CEILING
R/R	RELAY - WALL / CEILING
ER	EMERGENCY SUPERVISORY BYPASS RELAY
RC	ROOM CONTROLLER
SM	SWITCHING MODULE
EPO	PUSHBUTTON TYPE CONTROL STATION, "EPO" INDICATES EMERGENCY POWER OFF
TP	TOUCH PANEL
PS	PRESET STATION

ELECTRICAL GENERAL NOTES

1. DO NOT SCALE DRAWINGS. VERIFY DIMENSIONS IN FIELD PRIOR TO COMMENCEMENT OF WORK.
2. ALL RECEPTACLES TO BE MOUNTED AT +18" UNLESS OTHERWISE NOTED. RECEPTACLE HIGHTS SHALL COMPLY WITH ANSI 117.1 REQUIREMENTS
3. REFER TO ARCHITECTURAL DEMOLITION DRAWINGS FOR LOCATION AND EXTENT OF DEMOLITION REQUIRED. CONTRACTOR SHALL VISIT SITE PRIOR TO BID TO DETERMINE EXTENT OF WORK INVOLVED. PROVIDE LABOR AND MATERIALS AS REQUIRED TO MAINTAIN AND/OR RESTORE CONTINUITY OF SERVICE TO EXISTING CIRCUITS.
4. CONTRACTOR SHALL PROVIDE ALL NECESSARY DEMOLITION TO REMOVE EXISTING UNUSED CONDUIT, WIRE, CABLE, JUNCTION BOXES, RECEPTACLES, SWITCHES, LIGHTS, ETC COMPLETE WITH ASSOCIATED CIRCUITING TO SOURCE.
5. SYSTEM OUTAGES SHALL BE PERMITTED ONLY AT TIMES APPROVED BY OWNER, IN WRITING. WORK WHICH COULD RESULT IN AN ACCIDENTAL OUTAGE (BEYOND BRANCH CIRCUITS) SHALL BE PERFORMED WITH THE OWNER'S MAINTENANCE PERSONNEL ADVISED OF SUCH WORK.
6. PRIOR TO COMMENCEMENT OF ROUGH-IN WORK, COORDINATE WITH ARCHITECT, DRAWING NOTES, ELEVATIONS, SECTIONS, SPECIFICATIONS, FURNITURE, FIXTURES, AND EQUIPMENT FOR ALL RECEPTACLE AND COMMUNICATION DEVICE MOUNTING HEIGHT AND MOUNTING LOCATION.
7. ALL 125V, SINGLE PHASE, 15 AND 20 AMP RECEPTACLE OUTLETS THAT ARE USED AS TEMPORARY POWER DURING CONSTRUCTION SHALL HAVE GFCI PROTECTION.
8. ALL PENETRATIONS, SLEEVES, OPENINGS, ETC, THROUGH SMOKE OR FIRE RATED WALLS, CEILINGS, OR FLOORS SHALL BE PROPERLY CAULKED WITH AN APPROVED FIRE CAULKING MATERIAL, APPROVED BY ENGINEER, UNLESS NOTED OTHERWISE.
9. ALL PENETRATIONS THROUGH SOUND, SECURITY OR FIRE WALLS SHALL BE SLEEVED FOR MECHANICAL PROTECTION. ALL PENETRATIONS AND SLEEVES SHALL BE SEALED WITH CAULKING AND INTUMESCENT MATERIAL (WHERE APPROPRIATE) TO MAINTAIN RESPECTIVE RATINGS OF WALL.
10. PROVIDE EQUIPMENT BONDING JUMPER GROUND CONNECTION IN ALL BOXES, ENCLOSURES, ETC, FROM THE EQUIPMENT GROUNDING CONDUCTOR.
11. ALL EMPTY RACEWAY SYSTEMS SHALL HAVE A #12 PULLWIRE OR EQUAL AND SHALL BE IDENTIFIED AT ALL JUNCTIONS, PULL AND TERMINATION POINTS, USING PERMANENT METALLIC TAGS. TAG SHALL INDICATE INTENDED USE OF CONDUIT, ORIGINATION AND TERMINATION POINTS OF EACH INDIVIDUAL CONDUIT.
12. CONTRACTOR SHALL COORDINATE INSTALLATION OF ALL LIGHT FIXTURES TO ENSURE THAT THE LIGHT FIXTURES DO NOT INTERFERE WITH ANY STRUCTURAL, MECHANICAL, OR PLUMBING COMPONENTS AND EQUIPMENT. COORDINATE RELOCATION OF ANY LIGHT FIXTURE DUE TO INTERFERENCES WITH STRUCTURAL, MECHANICAL, OR PLUMBING COMPONENTS AND EQUIPMENT.
13. FIXTURES RECESSED IN "T-BAR" CEILING SHALL BE SUPPORTED INDEPENDENTLY OF CEILING SYSTEM, WITH TWO #12 HANGER WIRES UP TO STRUCTURE. SECURE HANGER WIRES TO OPPOSITE CORNERS OF FIXTURE. CLIP FIXTURE TO GRID ON TWO SIDES WITH FACTORY-FURNISHED CLIPS. FINAL CONNECTION TO FIXTURE SHALL BE MADE WITH A FLEXIBLE UL APPROVED ASSEMBLY.
14. CONDUITS PENETRATING THROUGH ROOF SHALL HAVE ROOF FLASHING WITH CAULK TYPE COUNTER FLASHING SLEEVE. INSTALLATION SHALL BE WATERTIGHT. CONDUITS SHALL NOT BE RUN HORIZONTALLY ON THE ROOF. PENETRATIONS SHALL BE AT EQUIPMENT LOCATIONS ONLY AND SHALL BE COORDINATED WITH MECHANICAL EQUIPMENT.
15. FINAL CONNECTIONS TO MOTORS, TRANSFORMERS AND OTHER VIBRATING EQUIPMENT SHALL BE WITH FLEXIBLE METAL CONDUIT (INDOORS) OR LIQUIDTIGHT FLEXIBLE METAL CONDUIT (OUTDOORS) AND APPROVED FITTINGS. DO NOT SECURE CONDUITS, DISCONNECTS OR DEVICES TO DUCTWORK OR MECHANICAL EQUIPMENT.
16. WIRE TERMINATION PROVISIONS FOR PANELBOARDS, CIRCUIT BREAKERS, SAFETY SWITCHES, AND ALL OTHER ELECTRICAL APPARATUS SHALL BE LISTED AS SUITABLE FOR 75°C.
17. CONTRACTOR SHALL PROVIDE A VOLTAGE BARRIER IN BOXES CONTAINING MULTIPLE SWITCHES WITH A VOLTAGE POTENTIAL OF 300V OR GREATER.
18. COORDINATE ELECTRICAL DEVICES AND EQUIPMENT WITH THE INTERIOR AND ARCHITECTURAL DRAWINGS. IF CONFLICTS OCCUR, BRING THEM TO THE ARCHITECTS ATTENTION PROMPTLY.
19. CONTRACTOR SHALL COORDINATE WITH OTHER TRADES TO INSURE THAT PIPING, DUCTS, ETC INSTALLED WITHIN ELECTRICAL ROOMS OR SPACES SHALL BE INSTALLED PER NEC 110-26, ALL PIPING, DUCTS, ETC SHALL BE INDICATED ON THE SHOP DRAWINGS.
20. EACH RECEPTACLE INSTALLED OUTDOORS, WITHIN 72" OF SINKS, ELECTRIC WATER COOLERS, IN DAMP OR WET AREAS, ON ROOF, BELOW GRADE ELEVATOR PITS, JANITOR CLOSETS AND TOILET ROOMS, SHALL HAVE INDIVIDUAL GROUND FAULT (GFCI) PROTECTION.
21. REFER TO MECHANICAL CONTROL DIAGRAMS FOR ADDITIONAL WIRING REQUIREMENTS. PROVIDE ALL RACEWAYS, WIRING, CONTROL SWITCHES, ETC AS REQUIRED.
22. FINAL CONNECTIONS TO EQUIPMENT SHALL BE PER MANUFACTURER'S APPROVED WIRING DIAGRAMS, DETAILS AND INSTRUCTIONS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE MATERIALS AND EQUIPMENT COMPATIBLE WITH EQUIPMENT SUPPLIED.

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Chambers Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
Electrical Legend, Notes and Abbreviations

DRAWING INFORMATION

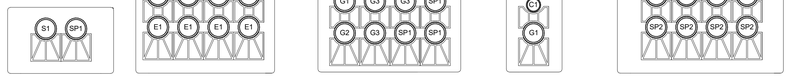
08/23/2024 DATE OF ISSUE
FOR REFERENCE DESCRIPTION
12" = 1'-0" SCALE
DJF DRAWN BY
0230097 PROJECT #
FILE NAME

DRAWING NUMBER
E000

Copyright BH+A, Inc.

V.2.1

C:\Users\Devin.Franzak\Documents\0230097_Linden Chambers Revit\p_NHA_MEPv23_Devin Franzak.rvt
8/22/2024 3:02:18 PM DJF



SECTION "A-A"
N.T.S.

SECTION "B-B"
N.T.S.

SECTION "C-C"
N.T.S.

SECTION "D-D"
N.T.S.

SECTION "E-E"
N.T.S.

NOTES:
1. REFER TO TYPICAL ELECTRICAL DUCT DETAIL THIS SHEET FOR GENERAL CONSTRUCTION REQUIREMENTS.

2. REFER TO THE DUCT BANK CONDUIT SCHEDULE THIS SHEET FOR CONDUIT AND CONDUCTOR REQUIREMENTS ASSOCIATED WITH CONDUIT TAG.

NV5 ELECTRICAL DUCT SECTIONS E504

DUCT BANK CONDUIT SCHEDULE

TAG	DESCRIPTION	CONDUIT	CONDUCTORS
ES	PRIMARY ELECTRIC	5"	SEE NOTE 6
E1	SECONDARY ELECTRIC	4"	4#600kCMIL
G1	LIFE-SAFETY BRANCH		
G2	LEGALLY REQUIRED STANDBY BRANCH		
G3	OPTIONAL STANDBY BRANCH		
C1	GENERATOR START	2"	
C2	GENERATOR AUXILLARIES	2"	
SP1	SPARE	5"	NOTE 6
SP2	SPARE	4"	NOTE 6
SP3	SPARE	2"	NOTE 6

NOTES:

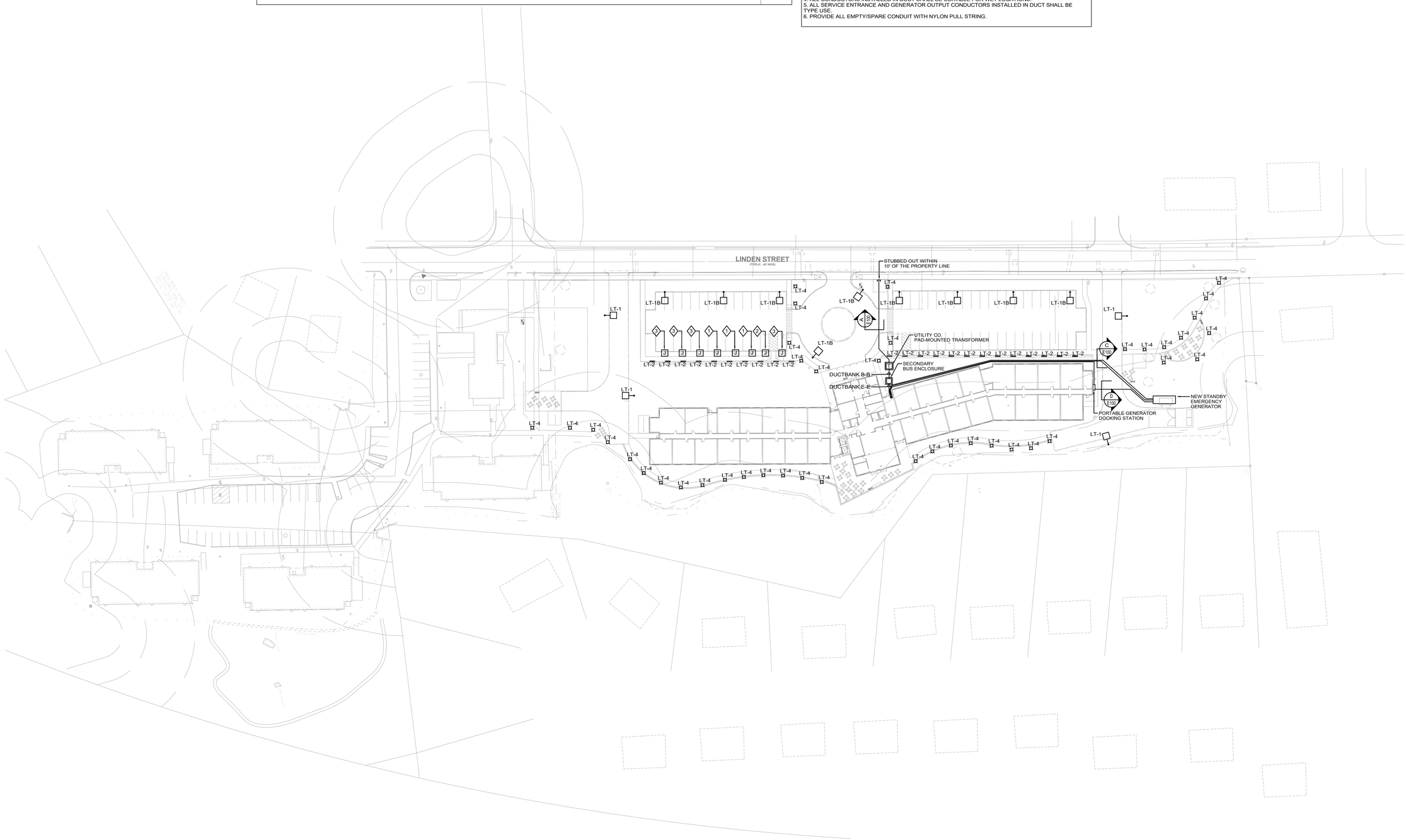
1. REFER TO DUCT BANK SECTIONS FOR CORRESPONDING CONDUIT AND CONDUCTOR.
2. REFER TO THE TYPICAL DUCTBANK SECTION FOR DETAILS REQUIRED IN THE CONSTRUCTION OF THE DUCT BANK ENVELOPE.
3. REFER TO THE SPECIFICATIONS FOR ADDITIONAL INFORMATION INCLUDING BUT NOT LIMITED TO DUCT BANK REINFORCEMENT REQUIRED UNDER PAVED AREAS INTENDED FOR VEHICULAR TRAFFIC AND AT MANHOLE/BUILDING INTERFACES.
4. ALL CONDUCTORS INSTALLED IN DUCT SHALL BE SUITABLE FOR WET LOCATIONS.
5. ALL SERVICE ENTRANCE AND GENERATOR OUTPUT CONDUCTORS INSTALLED IN DUCT SHALL BE TYPE USE.
6. PROVIDE ALL EMPTY/SPARE CONDUIT WITH NYLON PULL STRING.

KEYNOTES

1	FOR DUAL EV CHARGER MANUFACTURED BY CHARGEPOINT CP6000 SERIES - MAXIMUM 80A (POWER SHARE) DUAL PORT WITH SINGLE POWER CONNECTION RATED 19.2kW, 125A,208V/1PH. PROVIDE WEATHERPROOF (NEMA 3R) JUNCTION BOX MOUNTED AT 12" AFG. UTILIZE RIGID STEEL CONDUIT/SWEEP FOR ABOVE GRADE INSTALLATION.
2	FOR SINGLE EV CHARGER MANUFACTURED BY CHARGEPOINT CP6000 SERIES - MAXIMUM 80A (STANDARD) SINGLE PORT WITH SINGLE POWER CONNECTION RATED 19.2kW, 125A,208V/1PH. PROVIDE WEATHERPROOF (NEMA 3R) JUNCTION BOX MOUNTED AT 12" AFG. UTILIZE RIGID STEEL CONDUIT/SWEEP FOR ABOVE GRADE INSTALLATION.
3	FOR FUTURE SINGLE EV CHARGER PROVIDE WEATHERPROOF (NEMA 3R) JUNCTION BOX MOUNTED AT 12" AFG. UTILIZE RIGID STEEL CONDUIT/SWEEP FOR ABOVE GRADE INSTALLATION.

NOTES:

1 REFER TO SPECIFICATIONS, DETAILS, AND CONTROL DRAWINGS FOR ADDITIONAL INFORMATION.
2 X
3 X



1 ELECTRICAL SITE PLAN
1" = 40'-0"

C:\Users\Devin.Francek\Documents\023097_Linden Chambers ReDvlp_NHA_MEPv23_Devin.Francek.rvt
8/22/2024 3:02:19 PM DJF

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Chambers Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

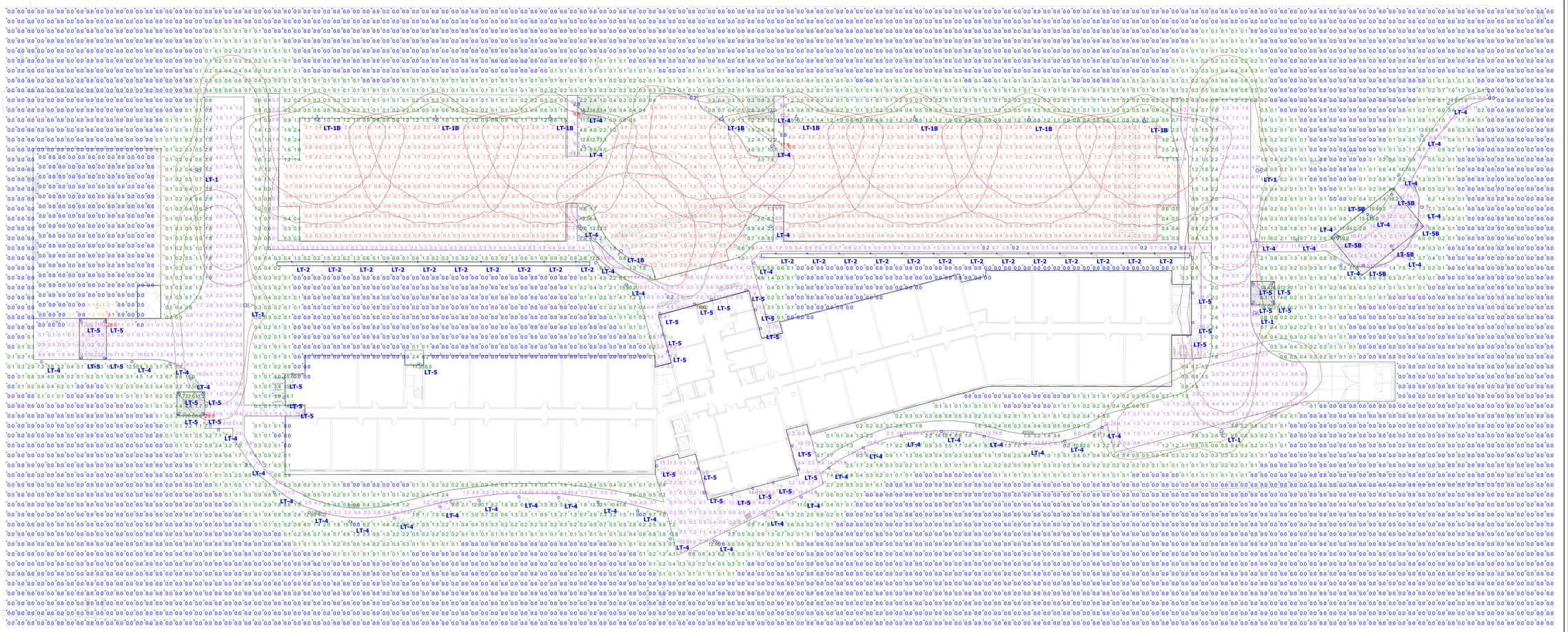
REVISIONS
DATE

DRAWING TITLE
Electrical Site Plan

DRAWING INFORMATION
08/23/2024 DATE OF ISSUE
FOR REFERENCE DESCRIPTION
As indicated SCALE
DJF DRAWN BY
023/0097 PROJECT #
FILE NAME

DRAWING NUMBER
E100

Copyright BH+A, Inc. V.2.1



STATISTICS

DESCRIPTION	SYMBOL	AVG.	MAX	MIN.	MAX/MIN	AVG/MIN
GARDEN	+	0.0 fc	3.1 fc	0.0 fc	N/A	N/A
Outer Perimeter	+	0.5 fc	29.9 fc	0.0 fc	N/A	N/A
PARKING	+	1.3 fc	6.0 fc	0.2 fc	30.0:1	6.5:1
WALKING PATH	+	6.4 fc	9.8 fc	2.8 fc	3.5:1	2.3:1
WALKING PATH	+	10.4 fc	17.4 fc	5.5 fc	3.2:1	1.9:1
WALKING PATH	+	2.7 fc	19.6 fc	0.2 fc	98.0:1	13.5:1
ACCESS ROAD / PATH	+	3.9 fc	28.5 fc	0.0 fc	N/A	N/A

SCHEDULE

Symbol	Label	Quantity	Manufacturer	Catalog Number	Description	Light Loss Factor	Wattage
	LT-1	5	Lumenpulse	PURXXXT VOLT CSL M150 30K CRI 80 3BLS FINISH DIM XX TN4	Pure T Area Light | Type 3 w/ Backlight Control | *ADVISE POLE*	0.9	132
	LT-1B	9	Lumenpulse	PURXXXT VOLT CSL M150 30K CRI 80 4BLS FINISH DIM XX TN4	Pure T Area Light | Type 4 w/ Backlight Control | *ADVISE POLE*	0.9	132
	LT-2	23	Sage Lighting	SLVR 27 FINISH	SLVR Step Light	0.9	2.98
	LT-4	47	Spitzer	BRA F42 24LC VOLTAGE CC D3 FINISH	Architectural Round Bollard | 3'-5"	0.9	21.6769
	LT-5	35	Luminis Lighting	SYP400 L1L10 VWD K40 VOLTAGE FINISH MOUNTING XX	Syrios Pro - Wall Mount	0.9	12
	LT-5B	6	Luminis Lighting	SYP410 L1L10 VWD K40 VOLTAGE FINISH MOUNTING XX	Syrios Pro - Surface Mount	0.9	12

ARCHITECT

bh+a

Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME

Linden Chambers Redevelopment

CLIENT

Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE

Electrical Site Plan Photometrics

DRAWING INFORMATION

08/23/2024
DATE OF ISSUE

FOR REFERENCE
DESCRIPTION

NTS
SCALE

DJF
DRAWN BY

0230097
PROJECT #

FILE NAME

DRAWING NUMBER

E101

Copyright BH+A, Inc.

V.2.1

C:\Users\Devin.Francek\Documents\0230097_Linden Chambers ReAlp_NHA_MEPv23_Devin.Francek.rvt
8/23/2024 12:08:45 PM DJF

TRAFFIC IMPACT ANALYSIS

Pare Project No. 23085.00

Linden Street Redevelopment
Needham, Massachusetts

Prepared for:
Bargmann Hendrie+Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210

Prepared by:

Pare Corporation
8 Blackstone Valley Place
Lincoln, RI 02865

April 2024

PARE CORPORATION
ENGINEERS SCIENTISTS PLANNERS

TABLE OF CONTENTS

DESCRIPTION PAGE

Introduction 1
Data Collection 5
Existing Conditions 6
Study Area Roadways 6
Existing Traffic Volumes 15
Safety Analysis 17
Crash Data 17
Sight Distance 18
No-Build Conditions 21
Build Conditions 23
Trip Generation 23
Trip Distribution 23
Capacity Analyses 26
Conclusion 31

APPENDICES

Appendix A Traffic Count Data
Appendix B Crash Data
Appendix C Speed Study Data
Appendix D Census Data
Appendix E Trip Generation Worksheet
Appendix F Capacity Analysis Worksheets
Appendix G Traffic Signal Plans

TABLES

Table 1: Crash Data Summary 17
Table 2: Linden Street Speed Study Summary 18
Table 3: Sight Distance Summary 20
Table 4: Trip Generation Summary 23
Table 5: LOS Criteria for Signalized and Unsignalized Intersections 26
Table 6: Morning Peak Hour LOS Summary 27
Table 7: Afternoon Peak Hour LOS Summary 28

FIGURES

Figure 1: Locus Map 2
Figure 2a: Site Layout – Phase 1A and Phase 1B 3
Figure 2b: Site Layout – Phase 1A, Phase 1B, and Phase 2 4
Figure 3: Morning Arrival Operations 12
Figure 4: Afternoon Dismissal Operations 14
Figure 5: Existing Traffic Volumes 16
Figure 6: No-Build (2031) Traffic Volumes 22
Figure 7: Site Generated Traffic Volumes 24
Figure 8: Build (2031) Traffic Volumes 25

APPENDICES

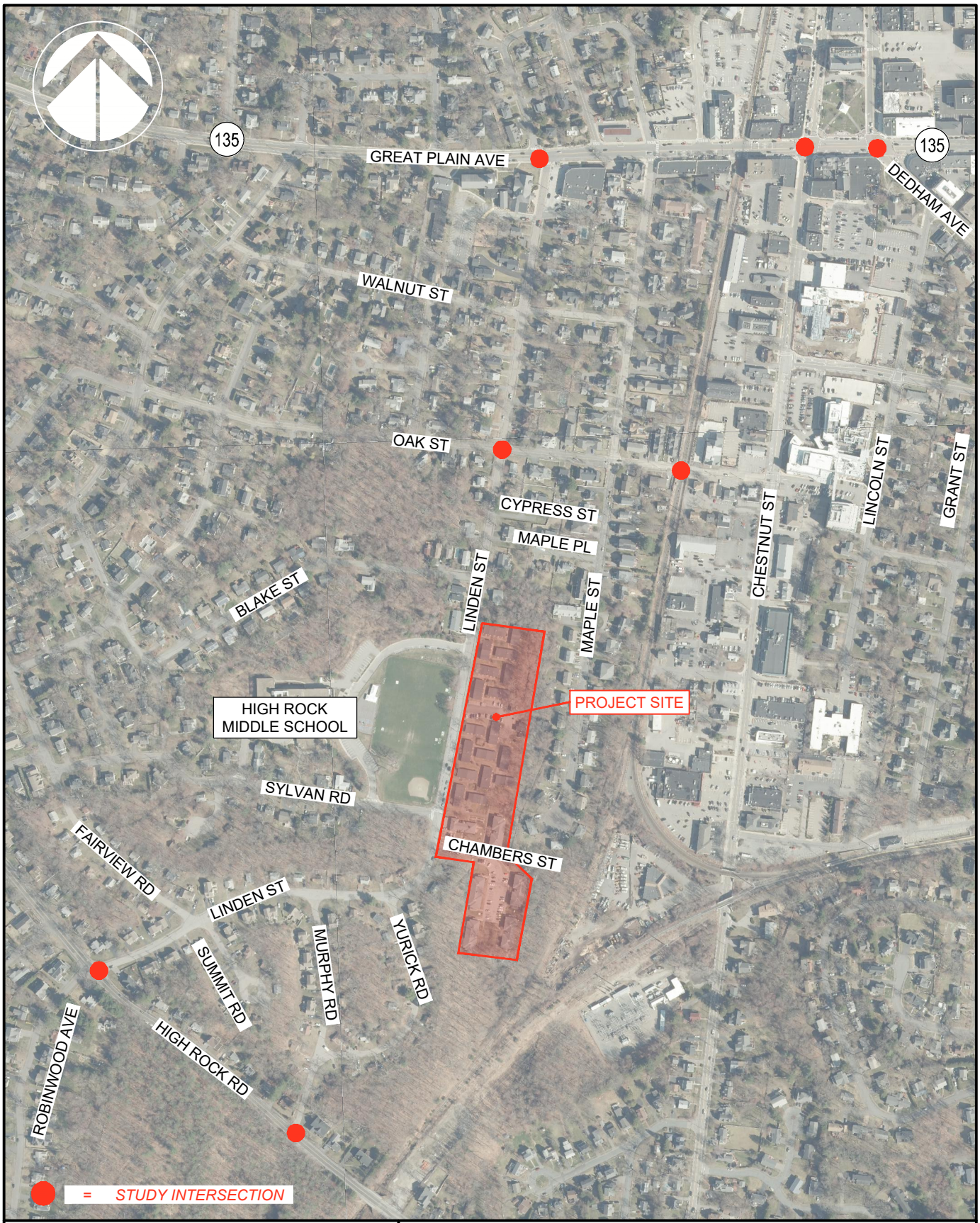
Appendix A Traffic Counts
Appendix B Crash Data
Appendix C Speed Study
Appendix D Census Data
Appendix E Trip Generation & Distribution
Appendix F Traffic Capacity Analysis
Appendix G Traffic Signal Plans

INTRODUCTION

The following report represents a traffic study completed for a proposed redevelopment of the senior and disabled housing development located on Linden Street and Chambers Street in Needham, Massachusetts. The Needham Housing Authority (NHA) aims to redevelop the housing from the current 152 units to a maximum of approximately 275 units.

Due to its proximity to a nearby middle school: High Rock School, traffic circulation patterns were observed during the morning arrival and afternoon dismissal periods.

Presented within are existing conditions in the vicinity of the project site, a safety analysis of the study area, and an analysis of the traffic based on existing, future (2031) no-build and future (2031) build conditions. A locus map of the study area is provided in **Figure 1** and the proposed site layout is shown in **Figure 2A** and **Figure 2B**. **Figure 2A** shows the Phase 1 development, while **Figure 2B** shows the full buildout including Phase 1 and 2.



PROJECT NO. 23085.00 DATE: JUNE 2023

PARE

FIGURE 1

LOCUS MAP

LINDEN-CHAMBERS HOUSING REDEVELOPMENT
NEEDHAM, MASSACHUSETTS



1 Site Plan A Phase 1
1" = 40'-0"

0' 20' 40' 80'

N

C:\local Revit\3489 Linden Chambers Redevelopment NHA_SD_cfitzwater@HDK.rvt
4/26/2024 2:42:52 PM Author

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Chambers Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
Site Plan - Proposed Phase 1

DRAWING INFORMATION

12/06/2023
DATE OF ISSUE

Schematic Design
DESCRIPTION

1" = 40'-0"
SCALE

Author
DRAWN BY

3489.00
PROJECT #

revit.rvt
FILE NAME

DRAWING NUMBER
A002-E

Copyright BH+A, Inc.
V.2.1



1 Site Plan Proposed
1" = 40'-0"

ARCHITECT
bh+a
Bargmann Hendrie + Archetype, Inc.
9 Channel Center Street, Suite 300
Boston, MA 02210
(617) 350 0450

PROJECT NAME
Linden Chambers Redevelopment

CLIENT
Needham Housing Authority
21 Highland Circle,
Needham, MA, 02494

PROJECT TEAM

Civil Engineer
Hancock Associates
121 East Berkeley Street, 4th Floor
Boston, MA 02118
617.357.8145

Landscape Architect
Ground Landscape Inc.
285 Washington Street, Unit G
Somerville, MA 02143
617.718.0889

Structural Engineer
RSE Associates Inc.
63 Pleasant Street, Suite 300
Watertown, MA 02472
617.926.9300

MEP/FP Engineer
NV5
200 Brickstone Square
Andover, MA 01810
978.296.6219

REVISIONS

DATE

DRAWING TITLE
Site Plan - Proposed

DRAWING INFORMATION

12/06/2023
DATE OF ISSUE
Schematic Design
DESCRIPTION
As indicated — SCALE
Author — DRAWN BY
3489.00 — PROJECT #
revit.rvt — FILE NAME

DRAWING NUMBER
A002-A

Copyright BH+A, Inc.

V.2.1

C:\Local Revit\3489 Linden Chambers Redevelopment\NHA_SD_gw95cc1.rvt
4/26/2024 3:55:00 PM Author

DATA COLLECTION

Seven study intersections have been identified for examination with regards to traffic capacity and safety as part of this study. The study intersections include:

- High Rock Street at Linden Street
- High Rock Street at Murphy Road
- Great Plain Avenue at Linden Street
- Great Plain Avenue at Chestnut Street/Chapel Street
- Great Plain Avenue at Dedham Avenue/Highland Avenue
- Linden Street at Oak Street
- Chestnut Street at Oak Street

On May 10, 2023 manual turning movement counts (MTMCs) were conducted at all of the study area intersections between the hours of 7:00 a.m. and 9:00 a.m. and 2:00 p.m. and 6:00 p.m.

Crash data for the roadway network in the vicinity of the project site was retrieved from the Massachusetts Department of Transportation (MassDOT) Crash Query and Visualization Tool for the period of May 2018 through April 2023. A crash review is included in this report to identify any potential trends that may require mitigation.

A field review of the study area was conducted on Tuesday, May 9, 2023. Geometric measurements and other field observations were recorded at the significant intersections in the vicinity of the project site, the information obtained was used in the analysis of the study area intersections.

The Planning Department for the Town of Needham was contacted to determine if there are currently any developments proposed whose trip generation information should be included in the study, of which none were noted.

EXISTING CONDITIONS

The study area is defined as the significant roadways and intersections in the vicinity of the site that may be impacted by the construction of the residential development. Listed below are the roadways and intersections included in the study area.

Study Area Roadways:

- High Rock Street
- Linden Street
- Murphy Road
- Great Plain Avenue
- Chestnut Street
- Chapel Street
- Dedham Avenue
- Highland Avenue
- Oak Street

Study Area Intersections:

- High Rock Street at Linden Street
- High Rock Street at Murphy Road
- Great Plain Avenue at Linden Street
- Great Plain Avenue at Chestnut Street/Chapel Street
- Great Plain Avenue at Dedham Avenue/Highland Avenue
- Linden Street at Oak Street
- Chestnut Street at Oak Street

Study Area Roadways

High Rock Street

High Rock Street is classified as a major collector and is under town jurisdiction. This street corridor runs in a general northwest/southeast direction within the study area. The typical roadway cross-section of High Rock Street consists of one lane in each direction separated by a double yellow center line. The northwest approach contains an 11-foot-wide lane and a three-foot-wide shoulder. The southeast approach contains a 15-foot-wide lane. Sidewalks are present along most of the roadway. Land use surrounding this roadway is predominantly residential.

Linden Street

Linden Street is a local road and is under town jurisdiction. This roadway runs along the north/south direction within the study area. It is a two-way 24-foot-wide street without lane striping. Sidewalks are present along the roadway. On-street parking is allowed throughout the whole length of Linden Street except for stricter parking regulations along the Linden Chambers Housing Development and High Rock School. Within these areas, parking is prohibited on the western side of the road, while parking is prohibited during the school's arrival and dismissal periods, 7:00 a.m. to 8:00 a.m. and 2:00 p.m. to 3:00 p.m. on weekdays from September 1st through June 30th. Land uses along this roadway are predominantly residential.

Murphy Road

Murphy Road is a two-way, 23-foot-wide local road and under town jurisdiction. This roadway runs along the north/south direction within the study area. No sidewalks are present along this roadway. Land use along this road is residential.

Great Plain Avenue

Great Plain Avenue is classified as a principal arterial under town jurisdiction. It is also known as Route 135 and runs along the east/west direction within the study area. The typical roadway cross section of Great Plain Avenue varies throughout its length. West of Linden Street, it consists of 11-foot-wide travel lanes in each direction, a four-foot-wide shoulder on the northern side, and on-street parking on the south side. East of Linden Street, the cross-section varies, but it widens to have two travel lanes in each direction with on-street parking on both sides of the street east of an at-grade railroad crossing located approximately 700 feet east of its intersection with Linden Street. Sidewalks are present on both sides of the street throughout the study area. Land uses surrounding this roadway are predominantly commercial and recreational.

Chestnut Street

Chestnut Street is classified as a minor arterial under town jurisdiction. This roadway runs along the north/south direction within the study area. The cross-section of Chestnut Street consists of an 11-foot-wide travel lane in each direction. Turn lanes are present at various intersections, and where there are no turn lanes, on-street parking is present on one side of the street. There are sidewalks on both sides of the street along the length of the roadway. Permitted, paid, and permit-required parking is provided in various locations throughout its length. The Route 59 bus stop is located on the west side of Chestnut Street just south of Great Plain Avenue. Land uses surrounding the roadway are predominantly commercial.

Chapel Street

Chapel Street is classified as a principial arterial under town jurisdiction. This roadway runs along the north/south direction within the study area. The typical cross-section of Chapel Street consists of a 10-foot-wide travel lane in each direction, an 8-foot-wide parking lane and an 8-foot sidewalk on both sides. Land uses surrounding the roadway are predominantly commercial and recreational. A Route 59 bus stop is located on the east side of Chestnut Street just north of Great Plain Avenue. In addition, the Needham Center Train Station is accessed from Chapel Street approximately 500 feet north of Great Plain Avenue.

Dedham Avenue

Dedham Avenue is classified as a principal arterial under town jurisdiction. This roadway runs in the general northwest/southeast direction within the study area. Typically, Dedham Avenue consists of a 10-foot-wide travel lane and a five-foot-wide shoulder. Sidewalks are present on both sides of the roadway. Land uses are predominantly residential.

Highland Avenue

Highland Avenue is classified as a principal arterial under town jurisdiction. This roadway runs in the general north/south direction within the study area. The roadway cross section consists of a 15-foot-wide travel lane in each direction. Permitted, paid, and permit-required on-street parking is provided in various locations throughout its length. Sidewalks are present along both sides of the roadway. Land use is mostly commercial.

Oak Street

Oak Street is classified as a major collector street and is under the town's jurisdiction. This roadway runs generally in an east/west direction within the study area. Oak Street has a width of approximately 22 feet within the study area with one 11-foot-wide travel lane in each direction. On-street parking is not permitted at any time on either side of the street. There are sidewalks on both sides of the street along the length of the roadway. An at-grade railroad crossing is located approximately 300 feet west of Chestnut Street. There are no bus stops on Oak Street, however, there are bus stops on Chestnut Street just north of its intersection with Oak Street. Land uses surrounding Oak Street are predominantly residential over most of its length, with some commercial uses between the railroad crossing and Chestnut Street.

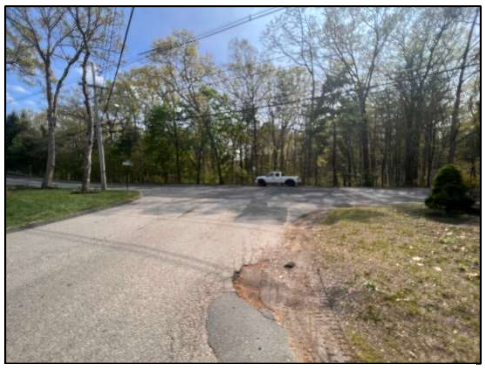
Study Area Intersections

High Rock Street at Linden Street/Robinwood Avenue



Photo 1. Intersection of High Rock Street at Linden Street and Robinwood Avenue

The intersection of High Rock Street at Linden Street and Robinwood Avenue forms an offset four-legged, two-way stop-controlled intersection. High Rock makes up the northern and southern legs, Linden Street makes up the eastern leg, and Robinwood makes up the western leg. Linden Street and Robinwood Avenue are stop-controlled while High Rock Street operates freely. All four approaches have a single vehicular lane. In the area of the intersection High Rock Street has sidewalks on both sides of the street while Linden Street and Robinwood Avenue both have sidewalks on their northern side only.


Photo 2. Intersection of High Rock Street at Murphy Road

High Rock Street at Murphy Road

High Rock Street at Murphy Road is a three-legged unsignalized intersection. High Rock Street makes up the northern and southern legs and Murphy Road makes up the eastern leg. All approaches to the intersection have a single approach lane. Murphy Road is stop-controlled while High Rock Street operates freely. Sidewalks are present along both sides of High Rock Street north of the intersection and along the west side of the street south of the intersection. There are no sidewalks along Murphy Road.

Great Plain Avenue at Linden Street/Washburn Avenue



Photo 3. Intersection of Great Plain Avenue at Linden Street and Washburn Avenue

Great Plain Avenue at Linden Street and Washburn Avenue is an offset four-legged unsignalized intersection. Great Plain Avenue makes up the eastern and western legs, Linden Street makes up the southern leg, and Washburn Avenue makes up the northern leg. All approaches to the intersection have a single vehicular approach lane. The northern and southern approaches are stop-controlled, while Great Plain Avenue operates freely. There are sidewalks on both sides of all intersection legs. Marked crosswalks are present across Linden Street and Washburn Avenue approaches, and a marked crosswalk across Great Plain Avenue connecting the north side of Linden Street and the south side of Washburn Avenue.



Photo 4. Intersection of Great Plain Avenue at Chestnut Street and Chapel Street

Great Plain Avenue at Chestnut Street/Chapel Street

The intersection of Great Plain Avenue at Chestnut Street and Chapel Street forms a four-legged signalized intersection. Great Plain Avenue makes up the eastern and western legs, Chestnut Street makes up the southern leg, and Chapel Street makes up the northern leg. The northbound and southbound approaches consist of a left-turn lane only and a shared through and right turn lane. The eastbound and westbound approaches consist of two lanes in each direction. Bicycle sharrow markings are present in the westbound right lane. The intersection is raised and paved with bricks as a shared area for vehicles and pedestrians, so there are no marked crosswalks across any of the approaches. Concrete sidewalks are present along the entire perimeter of the intersection. Pedestrian push buttons are provided at each corner of the intersection.

The traffic signal operates under five phases. The first phase serves westbound movements only. The second phase grants movements to westbound and eastbound movements with permitted left movement. The third phase serves northbound movements only with a protected left-turn. The fourth phase grants movements to northbound and southbound movements with permitted left movement. Finally, there is a dedicated pedestrian phase that is only served if a call is made via a push button. The traffic signal is coordinated with the signalized railroad crossing to the west of the intersection and the signalized intersection at Dedham Avenue and Highland Avenue.

Great Plain Avenue at Dedham Avenue/ Highland Avenue



Photo 5. Intersection of Great Plain Avenue at Dedham Avenue and Highland Avenue

The intersection of Great Plain Avenue at Dedham Avenue and Highland Avenue forms a four-legged signalized intersection. Highland Avenue makes up the northern leg, Dedham Avenue makes up the southern leg, and Great Plain Avenue makes up the eastern and western legs. The southbound and eastbound approaches both consist of a shared left/through lane and a right turn lane. The westbound approach is comprised of one shared through/right land and a through lane – left turns are not allowed for this leg. The northbound approach consists of two lanes, including a dedicated left turn lane and a shared through and right turn lane. The northbound right turn is channelized. This intersection is also raised and therefore has no marked crosswalks across its approaches, except for a crosswalk across the channelized northbound right turn lane. There are sidewalks along the entire perimeter of this intersection.

This intersection operates under four phases. The first phase serves northbound movements only. The second phase grants movement for southbound vehicles only. The third phase allows movement for all eastbound and westbound vehicles, with a permitted left for eastbound vehicles. Finally, there is a dedicated pedestrian phase that is only served if a call is made via a push button.



Photo 6. Intersection of Oak Street at Linden Street

Oak Street at Linden Street

Oak Street at Linden Street is a four-legged all-way stop-controlled intersection. Oak Street makes up the eastern and western legs and Linden Street makes up the northern and southern legs. All approaches to the intersection have a single vehicular approach lane. There are sidewalks on both sides of all intersection legs. Marked crosswalks are located across all four intersection legs.

Oak Street at Chestnut Street



Photo 7. Intersection of Oak Street at Chestnut Street

The intersection of Oak Street at Chestnut Street forms a four-legged signalized intersection. Oak Street is the western leg, Chestnut Street makes up the northern and southern legs, and a driveway to Beth Israel Deaconess Hospital makes up the eastern leg. The northbound and southbound approaches consist of two lanes, including a left-turn lane only and a shared through and right turn lane northbound and a dedicated right turn lane and shared through and left turn lane southbound. The eastbound and westbound approaches consist of one lane for all movements. Marked crosswalks are located

across all four legs of the intersection. Sidewalks are present along the entire perimeter of the intersection. Pedestrian push buttons are provided at each corner of the intersection.

The traffic signal operates under three phases. The first phase serves all Chestnut Street traffic. The second phase is a dedicated pedestrian phase that is only served if a call is made via a push button. The third phase serves Oak Street and the hospital driveway approaches. The traffic signal operates independently of the railroad crossing located approximately 300 feet west of the intersection.

School Observations

Due to the proximity of Linden Chambers Housing Development to High Rock School, a review of the existing traffic conditions at and around the school was completed through field observations conducted during school arrival and dismissal periods. Parking occupancy was also recorded in the school parking lot. All observations at High Rock School were conducted on Tuesday, May 9, 2023, while the school was operating under typical conditions.

High Rock School serves all 6th grade students in the Town of Needham, totaling 438 students during the 2022-2023 school year. The school currently has three driveways, including one each on Ferndale Road, Sylvan Road, and Linden Street. During morning arrival and afternoon dismissal periods, the Linden Street access becomes entry-only and the Sylvan Road access a left-turn exit-only. Parking is available for staff to use along the eastern side of the building, while visitors can park in the lot on the western side of the building, accessed via Ferndale Road.

Morning Arrival Operations

During the morning arrival period, parents, faculty, and staff enter the driveway located on Linden Street, while buses enter through Ferndale Road. A crossing guard is assigned at the intersection of Linden Street and Sylvan Road to direct vehicles and student walkers.

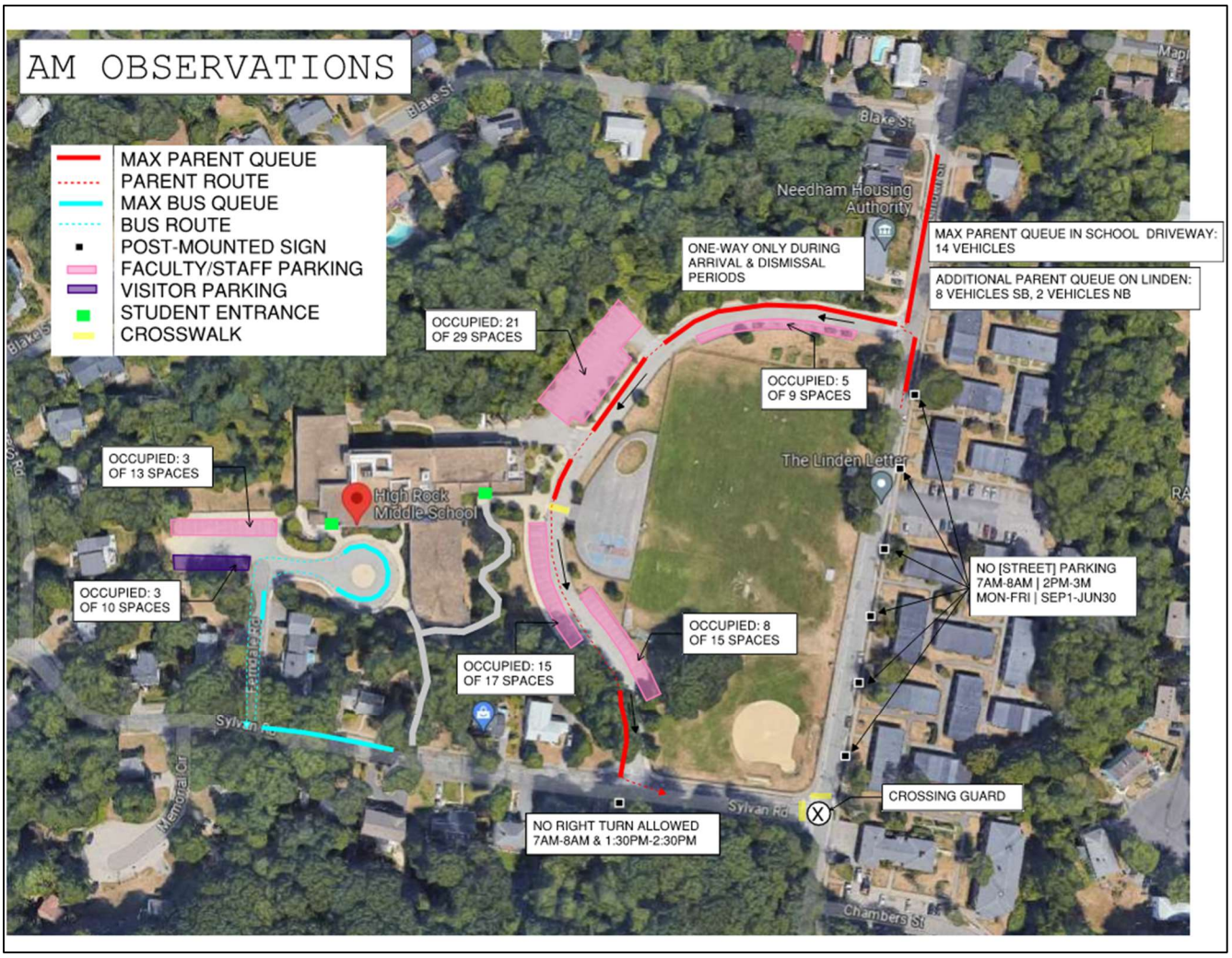
Bus drop-off occurs on the ring driveway at the end of Ferndale Road (**Photo 5**). A total of 22 buses were observed entering and exiting the driveway between 7:12 a.m. and 7:40 a.m. Five buses unloaded students along the ring driveway at a time, though a maximum of 11 buses were observed to be queuing at the same time. This queue extended with one bus on Ferndale Road, and five buses along Sylvan Road. Students unloaded from the buses enter through the west entrance. Buses then circulate around the ring driveway and exit back out through Ferndale Road.

Parent traffic uses the approximately 900-foot-long driveway located on the eastern side of the building, entering from Linden Street and exiting onto Sylvan Road. Queuing begins north of the crosswalk located near the east entrance at roughly 7:19 a.m. and peaks at 7:25 a.m. A maximum of 14 vehicles were observed queued on the driveway, with an additional 10 vehicles queued on Linden Street. Students are unloaded as soon as they get close to the building. As soon as students are unloaded from the vehicles, parents follow the driveway and turn left on Sylvan Road to exit. By 7:40 a.m., traffic calms down in the area.

Student walkers were observed walking to the site from Sylvan Road and Linden Street. A total of 15 bikers were observed arriving in the morning.

Figure 3 below graphically displays the arrival operations of the school.

Figure 3: Morning Arrival Operations



Afternoon Dismissal Operations

The afternoon dismissal procedure operates in a similar pattern to the morning arrival procedure. **Figure 4** graphically displays the dismissal operations of the school.

Four buses were observed to start queuing by 1:44 p.m. with a maximum queue of 20 buses by 2:10 p.m. A total of 22 buses were observed during the whole dismissal period. Unlike the morning, six buses were observed to be parked along the ring driveway loading students, while two were parked in the western parking lot. No buses were observed to be parked along Ferndale Road. Instead, the remaining buses lined up along the shoulder of Sylvan Road and extended to the intersection of Sylvan Road and Linden Street. A faculty member was observed to be present to assist with loading students into the buses. Once all the students are loaded, the buses exit through Ferndale Road. As soon as a bus exited through Ferndale Road, a bus initially queued on Sylvan Road would enter. By 2:18 p.m., all buses had departed, and traffic had calmed down in the area.

Parent traffic was observed beginning to queue along the eastern driveway well before the 2:10 p.m. dismissal. The queue starts at 1:22 p.m. and dissipates by 2:15 p.m. At peak, the maximum vehicle queue observed was 20 vehicles; 12 vehicles were in the driveway, while the other eight vehicles were idling along Linden Street. Students used the sidewalk to access their parent's vehicles. Once they are in the vehicle, parents would pass the vehicles in front and continue towards the end of the driveway to exit left on Sylvan Road.

Walkers and bikers used a similar route to depart the school as they used to arrive in the morning.

Figure 4: Afternoon Dismissal Operations



EXISTING TRAFFIC VOLUMES

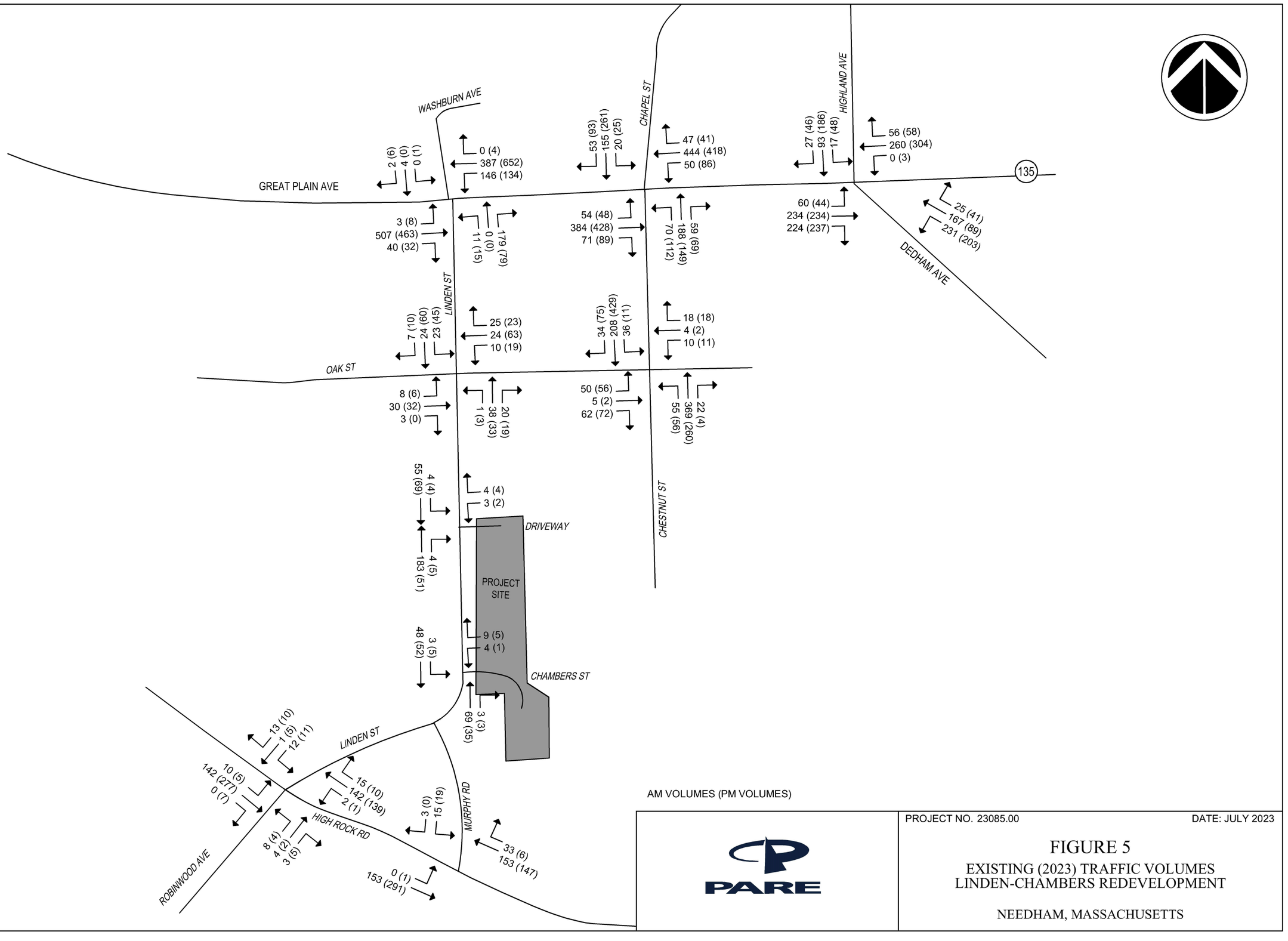
Manual turning movement counts (MTMCs) were conducted on May 10, 2023 during the hours of 7:00 a.m. to 9:00 a.m. and 2:00 p.m. to 6:00 p.m. for the following intersections:

- High Rock Street at Linden Street
- High Rock Street at Murphy Road
- Great Plain Avenue at Linden Street
- Great Plain Avenue at Chestnut Street/Chapel Street
- Great Plain Avenue at Dedham Avenue/Highland Avenue

Subsequently, MTMCs were conducted on June 21, 2023 during the hours of 7:00 a.m. to 9:00 a.m. and 4:00 p.m. to 6:00 p.m. for the following intersections:

- Linden Street at Oak Street
- Chestnut Street at Oak Street

Copies of all count data are provided in Appendix A. Existing traffic volumes for the morning peak hour and afternoon peak hour are shown in Figure 5.



AM VOLUMES (PM VOLUMES)

PARE

PROJECT NO. 23085.00 DATE: JULY 2023

FIGURE 5

EXISTING (2023) TRAFFIC VOLUMES LINDEN-CHAMBERS REDEVELOPMENT

NEEDHAM, MASSACHUSETTS

SAFETY ANALYSIS

Crash Data

Crash data was collected from the Massachusetts Department of Transportation Crash Query and Visualization Tool for the most recent 5-year period, from May 2018 through April 2023 for the study area.

Table 1 below provides a breakdown of the crashes based on type and severity. The complete crash data summary is provided in Appendix B.

Table 1: Crash Data Summary

Roadway/ Intersection	Total Crashes	Non-Fatal Injuries	Angle	Head On	Single Vehicle	Rear End	Sideswipe	Unknown
Chambers Street	2	0	0	0	1	0	0	1
Chapel Street	3	1	0	0	0	1	2	0
Chestnut Street	3	0	1	0	0	2	0	0
Dedham Avenue	2	0	0	0	0	0	2	0
Great Plain Avenue	68	0	17	0	11	11	27	2
Highland Avenue	6	0	2	0	1	3	0	0
Linden Street	7	0	5	0	0	0	2	0
Oak Street	4	1	2	0	0	1	0	1
Great Plain Avenue at Chestnut/ Chapel Street	19	3	8	1	0	2	8	0
Great Plain Avenue at Highland/ Dedham Avenue	3	0	2	0	0	0	1	0
Great Plain Avenue at Linden Street	5	3	1	0	1	1	2	0
High Rock Street at Linden Street	3	0	3	0	0	0	0	0
Linden Street at Chambers Street	1	0	1	0	0	0	0	0
Oak Street at Linden Street	5	1	4	0	0	0	1	0
Oak Street at Chestnut Street	1	1	0	0	1	0	0	0
TOTAL	**132**	**10**	**46**	**1**	**15**	**21**	**45**	**4**

From May 2018 through April 2023, a total of 132 crashes occurred within the study area. Of the 132 crashes, ten resulted in non-fatal injuries. The most notable roadway corridor is Great Plain Avenue with 95 total crashes within the study area, roughly 72% of the total crashes within the study area. Along this roadway, 38 were sideswipe collisions, 28 were angle collisions, 12 were single-vehicle collisions and 14 were rear-end collisions. Six of these collisions resulted in injuries, none in a fatality.

Rear-end collisions are commonly the leading crash type in corridors such as Great Plain Avenue. The relatively high number of sideswipe collisions appear to be from drivers changing lanes, frequently from the left lane to the right lane to get around a left-turning vehicle waiting for an oncoming gap in traffic. Some of these crashes may also be attributed to the somewhat awkward westbound transition from two lanes to one after crossing the railroad tracks. In addition, the number of angle collisions along Great Plain Avenue appears elevated. This is likely due to drivers entering from driveways or side streets entering into traffic without a sufficiently large gap, which is common along heavily traveled arterial streets. When angle collisions happen at signals, this is typically due to red-light running. The very low number of crashes resulting in injuries (less than 10% of crashes) indicates that travel speeds along this busy corridor are relatively low.

The remainder of the study streets and intersections appear to have a relatively low number of crashes, with very few injuries and no fatalities.

There are no MassDOT-identified crash clusters located within the project area.

Sight Distance

On May 9, 2023, spot speed studies were conducted on Linden Street between the two vehicle access ways to assess driving speeds along Linden Street. The Needham prima facie speed limit of 30 miles per hour applies to most of the street, but in the area of the site and where the speed study was conducted, a school zone speed limit of 20 miles per hour is posted along Linden Street. A summary of the speed data results is shown in **Table 2** below. The most notable metric presented in the table is the 85th percentile speed, which was utilized for the sight distance analysis. Based on the speeds observed, the sight distance analysis was conducted using an operating speed of 30 miles per hour.

Table 2: Linden Street Speed Study Summary

	Posted Speed	Average Speed	True Median (50th Percentile)	85th Percentile	10 MPH Pace	% over Posted
Northbound	20	24	24	28	18-27	80
Southbound	20	25	26	30	21-30	82

In conjunction with the spot speed study conducted, the available sight distance at the existing driveways were measured. Photos of the sight lines are shown in **Photos 8 through 11** below.



Photo 8. Sight distance looking South (left) from Chambers Street



Photo 9. Sight distance looking North (right) from Chambers Street



Photo 10. Sight distance looking South (left) from the Linden Street Parking Lot



Photo 11. Sight distance looking North (right) from the Linden Street Parking Lot

According to the latest edition of the American Association of State Highway and Transportation Officials (AASHTO) publication *A Policy on the Geometric Design of Highways and Streets*, the minimum safe stopping sight distances (SSD) for operating speeds of 30 miles per hour is 200 feet. The required intersection sight distance to avoid a collision is equal to the stopping sight distance.

In addition, AASHTO gives guidance for a more desirable intersection sight distance (ISD) for these speeds, which will not only avoid collisions, but maintain vehicular flow of at least 70 percent of the original operating speed. Meeting the desirable criteria for sight distance is more applicable to heavily traveled roadways, where maintaining steady traffic flow is important. A summary of the sight distance available for each driveway can be seen in **Table 3** below.

Table 3: Sight Distance Summary

		Required ISD (ft)	Desirable ISD (ft)	Measured ISD (ft)
Chambers Street	Looking South (left)	200	290	305
	Looking North (right)	200	335	>500
Linden Street Parking Lot	Looking South (left)	200	290	>500
	Looking North (right)	200	335	>500

ISD = Intersection Sight Distance

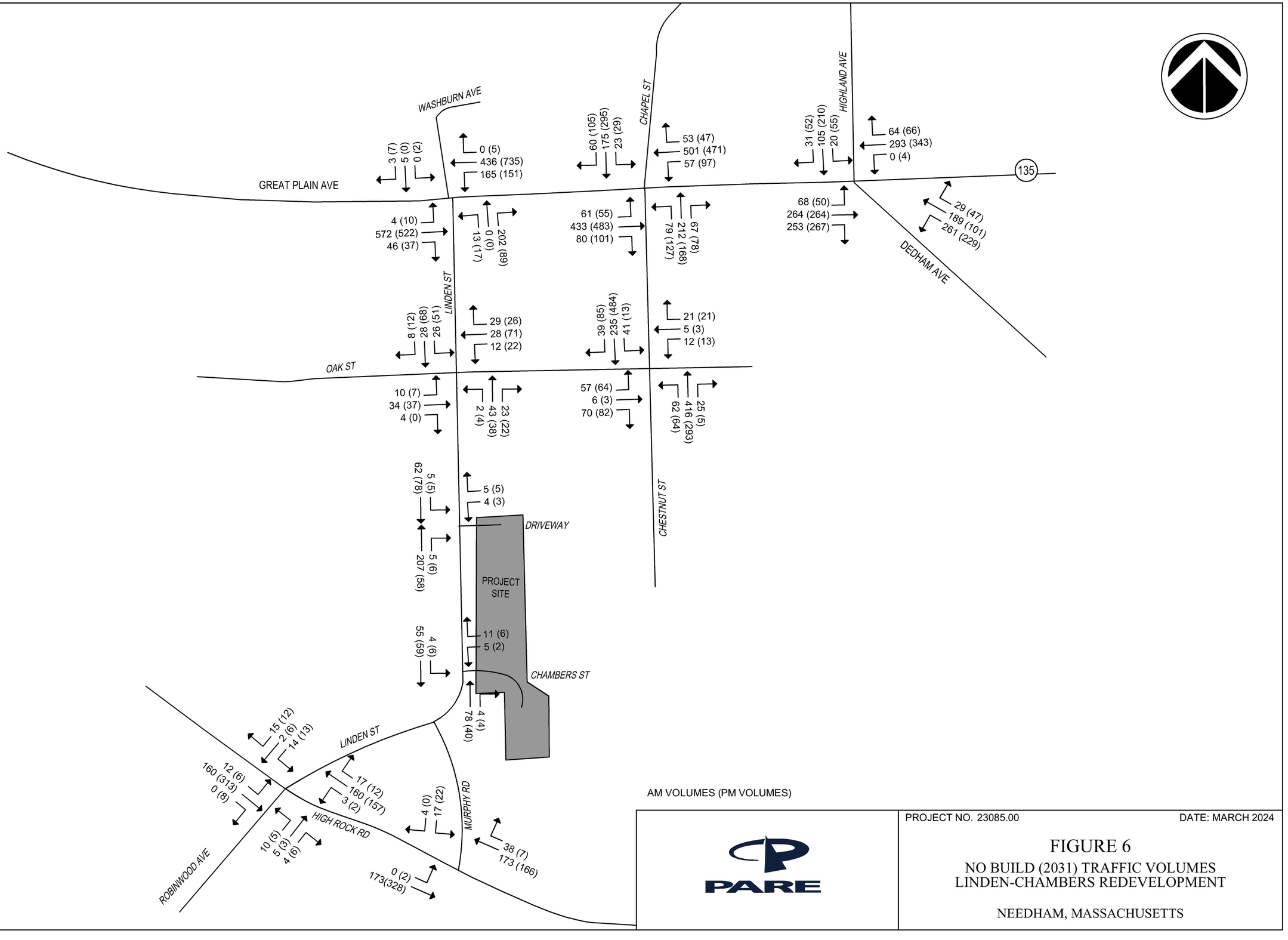
As shown, all sight distances exceed both minimum and desirable intersection sight distance standards.

NO-BUILD CONDITIONS

Future no-build traffic volumes are determined by projecting the existing traffic volumes based on a determined annual growth rate and including known potential developments within the study area. The Needham Planning Department was contacted to determine if there are currently any developments proposed within the vicinity of the site whose trip generation information should be included in this study; there were none reported.

To account for background growth along the roadways within the vicinity of the project site, the existing traffic volumes were projected forward over an eight-year horizon from 2023 to 2031. Recent census data was reviewed to determine the appropriate growth rate. The census data showed a population increase of approximately 1.06% per year from 2010 to 2020 for the Town of Needham. Therefore, a growth rate of 1.5% per year was used for the eight-year projection.

A copy of the available census data is provided in Appendix D. **Figure 6** provides the 2031 no-build volumes for the morning and afternoon peak hours.



AM VOLUMES (PM VOLUMES)

PARE

PROJECT NO. 23085.00 DATE: MARCH 2024

FIGURE 6

NO BUILD (2031) TRAFFIC VOLUMES LINDEN-CHAMBERS REDEVELOPMENT

NEEDHAM, MASSACHUSETTS

BUILD CONDITIONS

The future 2031 build condition represents the future 2031 no-build condition plus the anticipated trips due to the proposed increase of a maximum of 123 dwelling units. With the existing 152 units, the proposed additional units increase the total number to 275 units.

Trip Generation

The expected trips for the proposed residential development were determined through the use of the 11th edition of *Trip Generation,* published by the Institute of Transportation Engineers (ITE). Land Use Code (LUC) 220 for Multifamily Housing (Low-Rise) consisting of an additional 123 dwelling units. **Table 4** below summarizes the expected trips for this facility throughout the day, during the morning peak, and afternoon peak hour.

Table 4: Trip Generation Summary

		Weekday	AM Peak	PM Peak
LUC 220 – Multifamily Housing (Low-Rise) - 123 Units	Entering	432	15	46
	Exiting	432	46	27
	Total	864	61	73

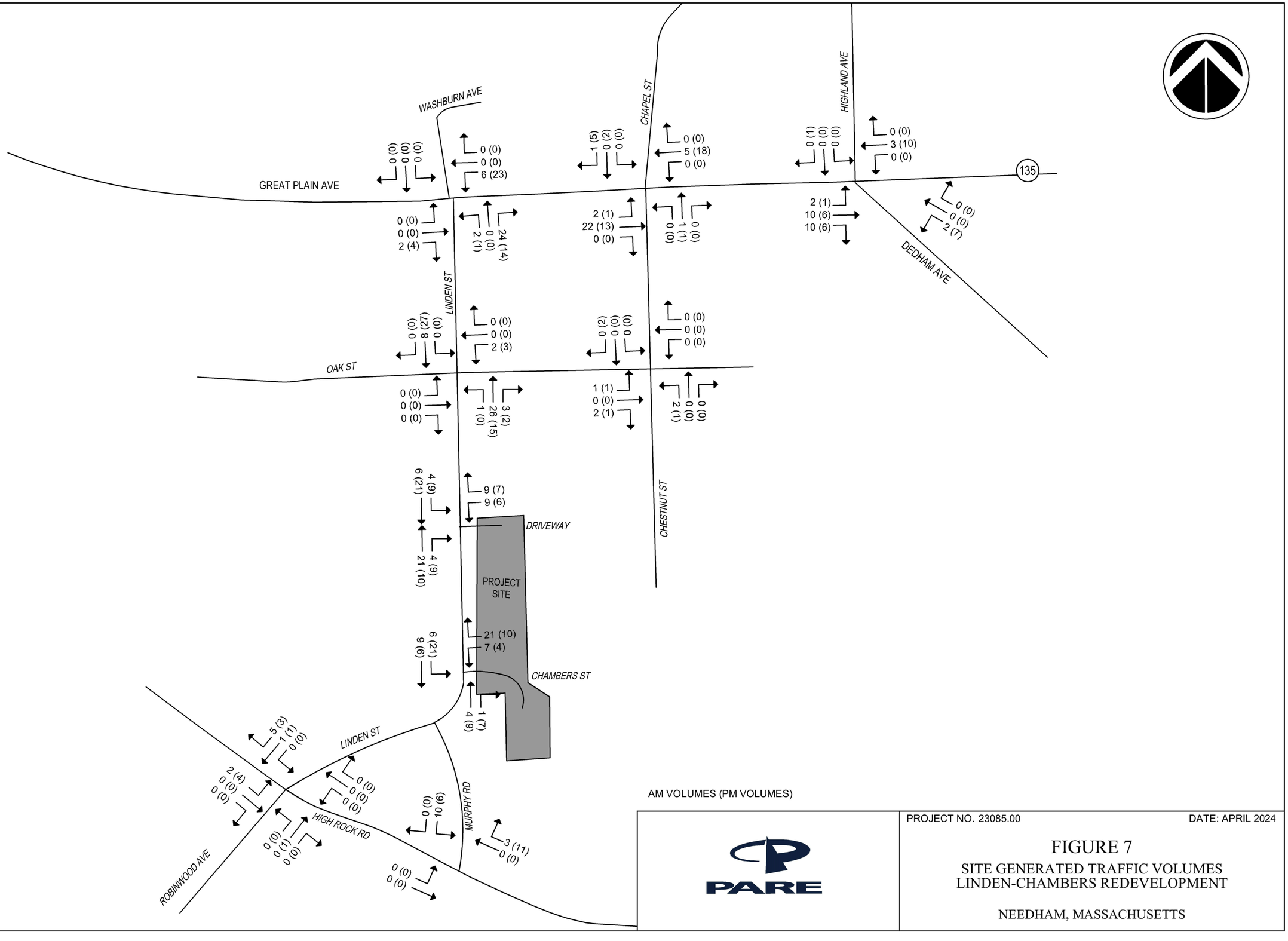
Trip Distribution

Given the land use on the site will not change, only expand, it is anticipated that trip distribution for traffic associated with the redevelopment is expected to follow similar existing traffic patterns.

South of the site, it is anticipated that vehicles will be using intersections with the most direct route. Vehicles heading east are anticipated to use the intersection of High Rock Street and Murphy Road, while vehicles heading west are anticipated to use the intersection of High Rock Street at Linden Street and Robinwood Avenue.

Site-generated traffic volumes are shown in **Figure 7** for new traffic to the development, while **Figure 8** displays the future (2031) build condition volumes.

After applying the additional site -generated trips, traffic volumes along Linden Street are anticipated to increase by approximately 14-15 percent during the morning peak hour and by between 25 and 32 percent during the afternoon peak hour in the vicinity of the proposed development.



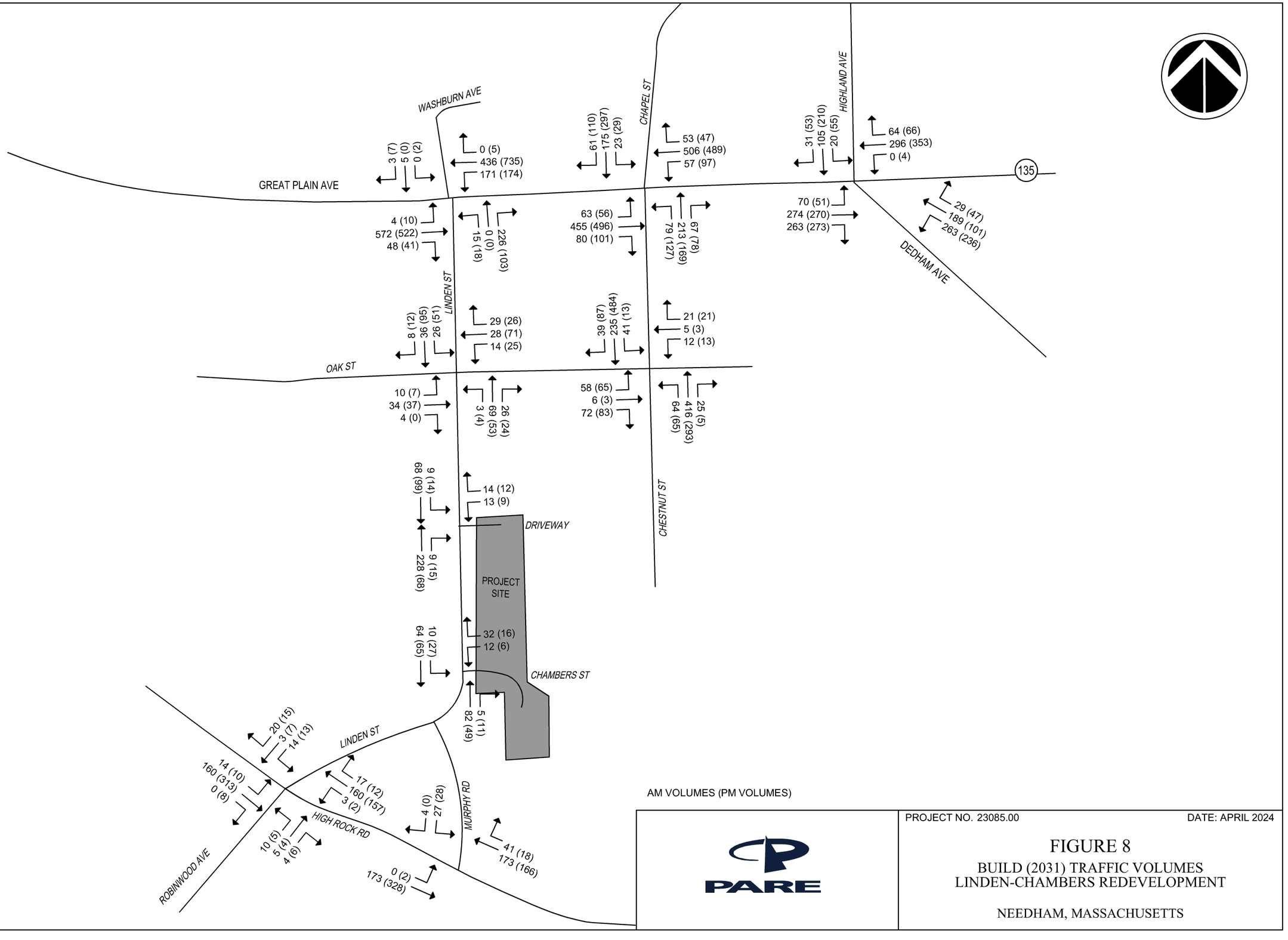
PROJECT NO. 23085.00 DATE: APRIL 2024

PARE

FIGURE 7

SITE GENERATED TRAFFIC VOLUMES
LINDEN-CHAMBERS REDEVELOPMENT

NEEDHAM, MASSACHUSETTS



AM VOLUMES (PM VOLUMES)

PROJECT NO. 23085.00 DATE: APRIL 2024

PARE

FIGURE 8

BUILD (2031) TRAFFIC VOLUMES
LINDEN-CHAMBERS REDEVELOPMENT

NEEDHAM, MASSACHUSETTS

CAPACITY ANALYSES

Capacity analyses were completed for all study intersections for existing, future no-build, and future build conditions. Capacity analyses characterize intersections based on their level of service (LOS). LOS is a quality measure describing operational conditions within a traffic stream, generally in terms of service measures such as speed, travel times, traffic interruptions, etc. Six LOS values, from A to F, are defined for each type of facility, with A representing the best operating conditions and F representing the worst operating conditions. The LOS criteria for signalized and unsignalized intersections is provided in **Table 5** below. **Tables 6 and 7** summarize the capacity analysis results for the morning and afternoon peak hours, respectively.

Table 5: LOS Criteria for Signalized and Unsignalized Intersections

	Signalized Intersection	**Unsignalized Intersection**
LOS	Delay Time (sec/veh)	Delay Time (sec/veh)
A	≤ 10	0-10
B	> 10-20	> 10-15
C	> 20-35	> 15-25
D	> 35-55	> 25-35
E	> 55-80	> 35-50
F	> 80	> 50

As shown in the tables below, there is minimal anticipated increase in overall LOS at the signalized intersections between no-build and build conditions during either the morning or afternoon peak hours. Further, all three signalized intersections are anticipated to operate at LOS C or better during the morning peak hour and LOS D or better during the afternoon peak hour. The overall impact of the proposed development is anticipated to be less than two seconds of additional delay at all signalized intersections during both peak hours. The analysis did indicate some difficult movements/approaches, including the Dedham Avenue northbound left approach and southbound left approach during both peak hours. These are existing conditions, and the proposed development is not anticipated to significantly exacerbate the delays experienced for these approaches.

Table 6: Morning Peak Hour LOS Summary

Intersection	Movement		Existing (2023)		Future (2031) No-Build		Future (2031) Build	
			LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]
Great Plain Avenue at Chestnut Street and Chapel Street	EB	LTR	B (16.4)	234	B (19.4)	275	B (19.4)	290
	WB	LTR	A (9.5)	153	B (11.5)	171	B (11.6)	172
	NB	L	D (37.1)	83	D (36.4)	93	D (37.2)	93
		TR	E (61.0)	#334	E (55.9)	#398	E (57.8)	#402
	SB	L	C (31.4)	33	C (30.2)	36	C (30.8)	36
		TR	E (66.0)	256	E (67.6)	#317	E (71.4)	#321
	Intersection		C (28.6)		C (29.6)		C (30.3)	
Great Plain Avenue at Dedham Avenue and Highland Avenue	EB	LT	C (22.1)	#377	C (23.0)	#441	C (23.5)	#467
		R	A (3.7)	32	A (4.1)	44	A (4.3)	53
	WB	LTR	C (20.3)	159	C (21.6)	180	C (21.6)	181
	NB	L	E (65.2)	270	E (67.9)	306	E (68.1)	308
		TR	D (51.7)	216	D (52.5)	247	D (52.3)	247
	SB	LT	E (77.0)	#157	F (83.5)	#194	F (83.5)	#194
		R	A (1.0)	0	A (1.2)	0	A (1.2)	< 25
	Intersection		C (33.2)		C (34.8)		C (34.7)	
Oak Street at Chestnut Street	EB	LTR	B (14.5)	58	B (16.5)	80	B (16.7)	71
	WB	LTR	C (21.8)	32	C (22.0)	36	C (22.0)	36
	NB	L	B (16.3)	41	B (17.2)	47	B (17.3)	48
		TR	C (24.3)	240	C (28.3)	281	C (28.3)	281
	SB	LT	C (20.2)	155	C (25.5)	194	C (25.5)	194
		R	A (2.8)	11	A (3.6)	13	A (3.6)	13
	Intersection		C (20.4)		C (24.0)		C (24.0)	
Great Plain Avenue at Linden Street and Washburn Avenue	EB	L	A (8.3)	< 25	A (8.5)	< 25	A (8.5)	< 25
	WB	L	A (10.0)	< 25	B (10.7)	< 25	B (10.7)	< 25
	NB	LTR	E (39.7)	148	F (110.0)	298	F (164.8)	398
	SB	LTR	E (35.9)	< 25	E (49.7)	< 25	F (52.0)	< 25
Linden Street at Oak Street	EB	LTR	A (7.6)	< 25	A (7.8)	< 25	A (8.0)	< 25
	WB	LTR	A (7.4)	< 25	A (7.6)	< 25	A (7.7)	< 25
	NB	LTR	A (7.4)	< 25	A (7.6)	< 25	A (7.9)	< 25
	SB	LTR	A (7.7)	< 25	A (7.8)	< 25	A (8.0)	< 25

Table 6 (Continued): Morning Peak Hour LOS Summary

Intersection	Movement		Existing (2023)		Future (2031) No-Build		Future (2031) Build	
			LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]
High Rock Street at Linden Street and Robinwood Avenue	EB	LTR	B (12.1)	< 25	B (12.9)	< 25	B (13.0)	< 25
	WB	LTR	B (11.0)	< 25	B (11.7)	< 25	B (11.6)	< 25
	NB	LTR	A (7.7)	< 25	A (7.8)	< 25	A (7.8)	< 25
	SB	LTR	A (7.6)	< 25	A (7.7)	< 25	A (7.7)	< 25
Linden Street at Access Driveway	WB	LR	B (11.1)	< 25	B (11.7)	< 25	B (13.0)	< 25
	SB	LT	A (8.1)	< 25	A (8.2)	< 25	A (8.4)	< 25
Linden Street at Chamber Street	WB	LR	A (9.1)	< 25	A (9.2)	< 25	A (9.5)	< 25
	SB	LT	A (7.4)	< 25	A (7.5)	< 25	A (7.5)	< 25
High Rock Street at Murphy Road	WB	LTR	B (11.6)	< 25	B (12.1)	< 25	B (12.6)	< 25
	SB	L	A (0.0)	< 25	A (0.0)	< 25	A (0.0)	< 25

1. Delay shown in seconds per vehicle.
2. Queue Length shown in feet, assuming 25 feet per vehicle at unsignalized intersections.
- 95th percentile volume exceeds capacity, value shown is queue after two consecutive 95th percentile cycles.

Table 7: Afternoon Peak Hour LOS Summary

Intersection	Movement		Existing (2023)		Future (2031) No-Build		Future (2031) Build	
			LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]
Great Plain Avenue at Chestnut Street and Chapel Street	EB	LTR	B (19.4)	273	C (21.1)	#344	C (21.6)	#360
	WB	LTR	B (13.5)	145	B (16.6)	#349	B (17.2)	#366
	NB	L	D (51.9)	#121	F (80.5)	#175	F (80.5)	#175
		TR	D (40.6)	236	D (42.7)	268	D (42.7)	269
	SB	L	C (26.4)	34	C (26.7)	37	C (26.7)	37
		TR	F (94.3)	#474	F (133.2)	#554	F (140.9)	#566
	Intersection		D (35.8)		D (46.5)		D (48.0)	
Great Plain Avenue at Dedham Avenue and Highland Avenue	EB	LT	C (20.5)	#371	C (23.9)	#446	C (24.3)	#461
		R	A (6.5)	78	A (7.3)	101	A (7.4)	103
	WB	LTR	C (23.1)	192	C (24.6)	217	C (24.8)	223
	NB	L	E (71.6)	#279	E (78.4)	#327	F (81.7)	#339
		TR	D (43.4)	146	D (44.8)	166	D (44.4)	166
	SB	LT	E (61.9)	256	E (64.9)	#293	E (64.9)	#293
		R	A (0.7)	< 25	A (1.2)	< 25	A (1.3)	< 25
	Intersection		C (33.5)		D (36.2)		D (36.7)	

Table 7 (Continued): Afternoon Peak Hour LOS Summary

Intersection	Movement		Existing (2023)		Future (2031) No-Build		Future (2031) Build	
			LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]	LOS (Delay[1])	Queue Length[2]
Oak Street at Chestnut Street	EB	LTR	B (13.4)	66	B (15.5)	80	B (15.7)	81
	WB	LTR	C (21.9)	30	C (22.3)	34	C (22.3)	34
	NB	L	B (18.8)	48	C (22.5)	58	C (22.7)	59
		TR	B (18.1)	155	B (18.9)	177	B (18.9)	177
	SB	LT	C (23.0)	264	C (25.9)	310	C (25.9)	310
		R	A (4.4)	24	A (4.2)	25	A (4.2)	26
	Intersection		B (18.8)		C (20.7)		C (20.7)	
Great Plain Avenue at Linden Street and Washburn Avenue	EB	L	A (9.3)	< 25	A (9.6)	< 25	A (9.6)	< 25
	WB	L	A (9.3)	< 25	A (9.8)	< 25	A (9.9)	< 25
	NB	LTR	E (36.2)	68	F (80.5)	135	F (124.1)	188
	SB	LTR	D (25.2)	< 25	E (48.6)	< 25	F (60.6)	< 25
Linden Street at Oak Street	EB	LTR	A (7.8)	< 25	A (8.0)	< 25	A (8.2)	A (8.0)
	WB	LTR	A (8.1)	< 25	A (8.4)	< 25	A (8.6)	A (8.4)
	NB	LTR	A (7.7)	< 25	A (7.9)	< 25	A (8.2)	A (7.9)
	SB	LTR	A (8.3)	< 25	A (8.5)	< 25	A (8.9)	A (8.5)
High Rock Street at Linden Street and Robinwood Avenue	EB	LTR	B (12.4)	< 25	B (13.4)	< 25	B (13.8)	< 25
	WB	LTR	B (12.4)	< 25	B (13.5)	< 25	B (13.5)	< 25
	NB	LTR	A (8.0)	< 25	A (8.1)	< 25	A (8.1)	< 25
	SB	LTR	A (7.6)	< 25	A (7.6)	< 25	A (7.7)	< 25
Linden Street at Access Driveway	WB	LR	A (9.0)	< 25	A (9.1)	< 25	A (9.5)	< 25
	SB	L	A (7.4)	< 25	A (7.4)	< 25	A (7.5)	< 25
Linden Street at Chamber Street	WB	LR	A (8.6)	< 25	A (8.8)	< 25	A (9.1)	< 25
	SB	L	A (7.3)	< 25	A (7.3)	< 25	A (7.4)	< 25
High Rock Street at Murphy Road	WB	LTR	B (12.9)	< 25	B (13.8)	< 25	B (14.1)	< 25
	SB	L	A (7.6)	< 25	A (7.6)	< 25	A (7.7)	< 25

1. Delay shown in seconds per vehicle.
2. Queue Length shown in feet, assuming 25 feet per vehicle at unsignalized intersections.
- 95th percentile volume exceeds capacity, value shown is queue after two consecutive 95th percentile cycles.

At the unsignalized intersections, the Linden Street approach to Great Plain Avenue currently experiences significant delays during commuter peak hours. Under the 2031 no-build condition, this approach is anticipated to operate at LOS F. These conditions are common at unsignalized approaches to heavily traveled arterial streets. The proposed development expansion adds approximately one vehicle to this approach every 105 seconds during the morning peak hour and one vehicle every 90 seconds during the afternoon peak hour. Further, these increases assume that nearly all traffic approaching Great Plain Avenue would utilize this approach. However, motorists have several other options to access Great Plain Avenue depending on their ultimate destination. These options include Curve Street, Marked Tree Road, Maple Street, and Chestnut Street. If motorists believe they can access Great Plain Avenue quicker by utilizing these paths, they likely will, reducing the impacts on the Linden Street northbound approach. Potential mitigation measures for this approach are limited. There does not appear to be enough right-of-way to add an approach lane at this intersection. Further, while the intersection would appear to meet a peak hour traffic signal warrant, it is unknown if the intersection would meet any other warrants, including a four-hour warrant or an 8-hour warrant. All other movements at the other unsignalized intersections within the study area maintain an LOS of B or better with the proposed expansion.

CONCLUSION

Pare Corporation conducted analyses of the potential impacts of the redevelopment of the senior and disabled housing development located on Linden Street and Chambers Street in Needham, Massachusetts. The Needham Housing Authority (NHA) aims to redevelop the housing from the current 152 units to a maximum of 275 units. The existing access driveways for the developments are anticipated to remain, with layout changes within the site only.

A safety review was conducted for the study of roadways and intersections. Crash data extracted from the MassDOT online crash data portal showed most of the crashes within the study area occurred along Great Plain Avenue. The crash data indicates that there are more sideswipe and angle crashes along this corridor than expected, but the rate of personal injuries was quite low and there were no fatalities. MassDOT has not identified any crash clusters anywhere along Great Plain Avenue. In addition, sight distances reviewed for the site driveways indicate more than adequate sight distances allowing vehicles exiting the driveways ample time to safely enter Linden Street.

Capacity analyses conducted at three signalized intersections and six unsignalized intersections indicate generally minor increases in delay at surrounding intersections. Signalized intersections are anticipated to have an LOS D or better for both morning and afternoon peak hours. Unsignalized intersections are anticipated to operate at an LOS B or better except for the intersection of Great Plain Avenue at Linden Street and Washburn Avenue. The stop-controlled northbound and southbound approaches of this intersection are anticipated to operate at an LOS E or F condition during both the no-build and build scenarios. The proposed housing expansion is anticipated to add less than 30 vehicles to the northbound approach during the morning peak hour and less than 20 vehicles during the afternoon peak hour to the northbound approach at this intersection, assuming none of these motorists utilize other available options to get to Great Plain Avenue. The proposed expansion is not anticipated to add any trips to the southbound approach.

In summary, Pare Corporation is of the opinion that the proposed development can be safely accommodated on the roadways and through the intersections within the study area.

HANCOCK ASSOCIATES

LAND SURVEYING

CIVIL ENGINEERING

WETLAND SCIENCE



DRAFT

Stormwater Report

In Support Of

Notice of intent

For

Linden Street Redevelopment

(Map 133, Lots 23 and 24)

Needham MA

PREPARED BY:
Hancock Associates
#26774

PREPARED FOR:
Needham Housing Authority
21 Highland Circle,
Needham MA, 02494

Table of Contents

Table of Contents 1
Tables 1
Appendices 1
Introduction 2
Standard 1: No New Untreated Discharges 2
Standard 2: Peak Rate Attenuation 3
Standard 3: Recharge 5
Standard 4: Water Quality 6
Standard 5: Land Uses with Higher Potential Pollutant Loads 7
Standard 6: Critical Area 7
Standard 7: Redevelopment 7
Standard 8: Construction Period Pollution Prevention and Erosion & Sedimentation Control 8
Standard 9: Operations and Maintenance Plan 9
Standard 10: Prohibition of Illicit Discharges 10

Tables

Table 1: Peak Rates of Runoff 5
Table 2: Treatment Train Calculation 8

Appendices

Appendix I Locus Map
Appendix II NRCS Soils Map
Appendix III FEMA Firmette
Appendix IV Existing and Proposed Drainage Figures
Appendix V HydroCAD Output
Appendix VI HydroCAD Output for Recharge Volume
Appendix VII HydroCAD Output for Recharge Volume
Appendix VIII Geotechnical Report

Introduction

Needham Housing Authority proposes to redevelop the site located at 133-188 Linden St, Needham MA with a four-story multi-unit residential building. Associated improvements will include paved vehicular parking and circulation, pedestrian walkways, recreation areas, landscaped areas, stormwater management systems, and utility services.

The project area is currently developed with single story multi-unit residential buildings, paved walkways, and grassed lawn areas. A central driveway provides parking for each unit. The buildings are serviced by municipal sewer, water, gas, and electric services. The site is abutted by residential houses to the north, east, and south. The eastern residential houses are separated from the site by a bordering vegetated wetland. There are two driveway entrances from Linden Street on the westerly side of the site. Across Linden Street is the High Rock Middle School. The site is relatively level but does slope upwards from north to south from elevation 142' to 147'.

The existing stormwater system consists of roof drains which discharge into a central subsurface drain system which discharges to the existing storm drain system located in Linden Street. Stormwater over the remainder of the site sheet flows to Linden Street to the west and the BVW to the East.

The proposed stormwater management system will include a series of deep sump hooded catch basins, drain manholes, roof drains, and grassed swales which will convey stormwater from paved areas and roof areas into two subsurface Stormtech SC-310 infiltration systems. Stormwater is treated for TSS and nutrients and groundwater recharge is provided by these two systems. The discharge from the stormwater system will discharge to the existing stormwater system located in Linden Street. There are two fire truck access lanes on the northern and southern sides of the building which will be constructed using pervious pavement and subsurface crushed gravel reservoirs. A network of perforated pvc pipes will help distribute stormwater thought the stone reservoirs and overflow pipes connect the pipes to the SC-310 infiltration systems. A crushed stone infiltration trench is proposed along the concrete sidewalk at the rear of the building to collect stormwater runoff from the sidewalk and landscaping. These will provide further stormwater storage and infiltration for runoff from the fire access drives and landscaped areas.

The proposed stormwater management system is designed to meet the Stormwater Management Standards described in the Massachusetts Stormwater Handbook to the maximum extent practicable and the Town of Needham Stormwater Standards. The following report describes the system's compliance with these standards.

Standard 1: No New Untreated Discharges

The Massachusetts Stormwater Handbook states that no new stormwater conveyances may discharge untreated stormwater directly to or cause erosions in wetlands or waters of the Commonwealth. The project does not include new stormwater conveyances.

Standard 2: Peak Rate Attenuation

The Massachusetts Stormwater Handbook states that stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. A summary of the existing and proposed discharge rates follows. The proposed condition discharge rates of runoff are at or below the existing rates to the same discharge points. Please see the attached "Existing Drainage Figure" and "Proposed Drainage Figure" figures (Appendix III) and HydroCAD output (Appendix IV) for more information.

For the purpose of these calculations the following assumptions were made:

- The project property lines, wetland boundary, and Linden Street have been used to delineate the Pre/Post Development watershed boundary.
- The same total watershed area of the drainage areas is used to compare the existing and proposed conditions.
- The Natural Resources Conservation Service (NRCS) Web Soil Survey of Essex County defines multiple soils in the project area as 655, Udorthents, wet substrate (Hydrologic Soil Group not rated). A Preliminary Geotechnical Study completed by Intertek Professional Service Industries (PSI) on February 08,2023. The report indicates that the upper layer consists of fill containing course sand, gravel and silt. The underlying layers consists of glacial till containing fine to coarse sand, some gravel and little to some silt. Soil testing was conducted by Hancock Associates and the two test pits confirm that the subsoil consists of sand.

Two (2) drainage analysis points have been modeled to represent the pre and post development watershed:

- Drainage Analysis Point DP1 defines the bordering vegetated wetlands at the rear of the site (east)
- Drainage Analysis Point DP2 defines the curb line of Linden Street along the front of the property (West)

The following sub catchments define the watershed of the Pre-development condition of the Phase 1 work area:

Subcatchment EX1 is comprised of single story buildings, asphalt walkways, concrete steps and landings, landscaped grassed lawns, and wooded areas. Stormwater flows overland to DP1 and is comprised of sheet flow and shallow concentrated flow.

Subcatchment EX2 is comprised of single story buildings, asphalt parking lot, asphalt walkways, concrete steps and landings, landscaped grassed lawns, and wooded areas. Stormwater flows overland to DP2 and is comprised of sheet flow and shallow concentrated flow.

Subcatchment EX3 is situated on HSG 'D' soils and is comprised of single story buildings, asphalt parking lot, asphalt walkways, concrete steps and landings, landscaped grassed lawns, and wooded areas. Stormwater flows overland to DP2 and is comprised of sheet flow and shallow concentrated flow.

Subcatchment BLD is comprised of all building roods. Stormwater flows via pipes to DP2.

The following sub catchments define the watershed of the Post-development condition of the Phase 1 work area:

Subcatchment P1 consists of the area at rear (east) of the building and to the north of the building that drains to DP1. The area is comprised of woods, non grazed meadow, and P1A and P1B. P1A consists of landscaped area and concrete sidewalk directly adjacent to the rear (east) side of the building. Stormwater flows overland to the stone infiltration trench (Pond 7P) which infiltrates runoff. P1B consists of the rear patio constructed from permeable pavers. All Stormwater is infiltrated through the subsurface storage below the pavers (Pond 5P).

Subcatchment P2A consists of the area that infiltrates into the upper section (Pond 1P) of the pervious pavement fire access driveway on the northeastern side of the building. The area is comprised of concrete walkway, pervious pavement, and landscape/meadow. Overflow from the system drains to subcatchment P2B via a perforated pipe underdrain or sheet flow over the pervious pavement.

Subcatchment P2B consists of the area that infiltrates into the lower section (Pond 2P & 3P) of the pervious pavement fire access driveway on the northwestern side of the building. The area is comprised of concrete

walkway, pervious pavement, and landscape/meadow. Overflow from the system drains to infiltration system 1 (IS1) via an overflow pipe or sheet flow over the pervious pavement to DP2.

Subcatchment P3 consists of the northern portion of the parking lot. Stormwater sheet flows into deep sump catch basin CB1 which then flows into SC-310 infiltration system 1 (Pond IS1). Overflow from the system drains to DP2. The area is comprised of concrete walkway, bituminous concrete parking lot, and landscaped areas.

Subcatchment P4-P6 consists of the remainder of the parking lot and entrance driveway/circle. Stormwater sheet flows into deep sump catch basins CB2, CB3, and CB4 respectively, which then flows into SC-310 system 2 (Pond IS2). Overflow from the system drains to DP2. The areas are comprised of concrete walkway, bituminous concrete parking lot, and landscaped areas.

Subcatchment P7 consists of the area between the parking lot and the south eastern portion of the building. Stormwater flows into a shallow swale which runs parallel to the building. Stormwater is collected in the low point of the swale by catch basin CB5 which discharges into SC-310 System 2 (IS2). The area is comprised of landscaped areas.

Subcatchment P8 consists of the area on the southwestern side of the building that infiltrates into the subsurface system (Pond 4P) located under the pervious asphalt driveway Overflow from the system drains to infiltration system 2 (IS2) via an overflow pipe or sheet flow over the pervious pavement to DP2. The area is comprised of concrete walkway, permeable pavement, and landscaped areas.

Subcatchment P9 consists of the area abutting Linden Street that does not enter any of the infiltration systems. Overflow from the system drains to DP1. The area is comprised of concrete walkway, permeable paved driveway, and grassed landscaped areas.

Subcatchments B1A & B1B consist of roof area which discharge to Infiltration system 1 (IS1) & 2 (IS2) respectively.

Table 1: Peak Rates of Runoff

Discharge Point	**Peak Rate (cfs)**							
	2-Year Storm (3.30" Rainfall Depth)		**10-Year Storm** (5.20" Rainfall Depth)		**25-Year Storm** (6.40" Rainfall Depth)		**100-Year Storm** (8.20" Rainfall Depth)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
DP1 (Linden St)	3.31	3.31	6.81	6.79	9.27	8.90	13.16	11.46
DP2 (Wetland)	0.05	0.00	0.75	0.00	1.64	0.01	3.23	0.41

Table 2: Runoff Volume

Discharge Point	**Volume (cf)**							
	2-Year Storm (3.30" Rainfall Depth)		**10-Year Storm** (5.20" Rainfall Depth)		**25-Year Storm** (6.40" Rainfall Depth)		**100-Year Storm** (8.20" Rainfall Depth)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
DP1 (Linden St)	11,658	3,746	22,602	10,840	30,303	16,453	42,573	26,102
DP2 (wetland)	626	0.00	3,568	38	6,300	385	11,291	1,715

Standard 3: Recharge

The Massachusetts Stormwater Handbook states that loss of annual recharge to groundwater shall be eliminated or minimized. The annual recharge from the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. Recharge volumes are provided for all the proposed impervious areas. For the purpose of these calculations, all of the project areas are considered to be Hydrologic Soil Group A. The required recharge volume is 1" multiplied by the area of impervious surfaces. See Appendix VI for the attached HydroCAD summaries for the recharge volumes provided. The volumes is as follows:

Required Recharge Volume, HSG B = Target Depth * Impervious Area = 1"/12" * 66,254 SF = 5,521 CF

This project is a redevelopment by reducing the overall impervious area by introducing landscaped areas and reducing the amount of roof area. This project is also an improvement on the existing condition due to the installation of stormwater management systems on a site where none exist.

Recharge Volumes (volume under lowest outlet)
Subsurface system 1 (IS1): 477 cf
Subsurface system 2 (IS2): 1,099 cf
Pervious Pavement (drive left 1P,2P,3P): 250cf
Pervious Pavement (drive right 4P): (1304+388+759)=2,451 cf
Permeable Pavers (patio back 5P): 516 cf
Permeable Pavers (patios front 6P): 420 cf
Stone Infiltration trench (7P): 300cf
Total recharge volume = 5,558cf >5,521 cf

The total recharge volume is 5,958 cubic feet. Since the volume provided is greater than the required recharge volume, the standard is met. Please refer to the HydroCAD output for Recharge Volumes (Appendix VI) for more information.

The Massachusetts Stormwater Handbook states that the recharge volume must drain within 72 hours. Observations in test pits observed on-site indicate that the soil that the subsurface systems will be installed upon is sand. Please see the attached "Geotechnical Engineering Report" (Appendix VII) and soil test pit information on the pre and post development drainage plans (Appendix IV). The following "drawdown" calculation assumes a Rawl's Rate of 8.27 inches per hour, corresponding to texture class "sand".

Drawdown Time = Storage Volume / (Rawl's Rate * Bottom Area)

Subsurface system 1 (IS1):
= 477 CF / (8.27 in/hr * 610 SF) = 1.1 Hour
Subsurface system 2 (IS2):
= 1,099 CF / (8.27 in/hr * 1494 SF) = 0.4 Hours
Permeable Pavement (drive right 1P,2P,3P):
= 2,451 CF / (8.27 in/hr * 5,185 SF) = 0.8 Hours
Permeable Pavement (drive left 4P):
= 250 CF / (8.27 in/hr * 4666 SF) = 0.1 Hours
Permeable Pavement (patio back 5P):
= 516 CF / (8.27 in/hr * 1,720 SF) = 0.6 Hours
Permeable pavement (patio front 6P):
= 420 CF / (8.27 in/hr * 400 SF) = 1.5 Hours
Stone Infiltration trench (7P)
= 300 CF / (8.27 in/hr * 500 SF) = 0.9 Hours

Since the drawdown time of all infiltration practices is less than 72 hours, the requirement is met.

Standard 4: Water Quality

The Massachusetts Stormwater Handbook states that systems shall be designed to remove 80% of the average annual post-development construction load of Total Suspended Solids (TSS).
Stormwater runoff from vehicular paved areas will be treated to the required TSS removal via deep sump hooded catch basins, SC=310 treatment rows, and permeable pavers. The treatment train computation is as follows:

Table 2A: Treatment Train Calculation: SC-310

BMP	**TSS Removal Rate**	**Starting TSS Load**	**Amount Removed**	**Remaining Load**
Deep sump catch basin	0.25	1	.25	.75
Total TSS Pretreatment				75%
SC-310	0.80	.75	0.6	0.15
Total TSS Removal				85%
Total Phosphorus removal				68%

Table 2B: Treatment Train Calculation: Permeable Pavers

BMP	**TSS Removal Rate**	**Starting TSS Load**	**Amount Removed**	**Remaining Load**
Grassed Filter Strips	0.1	1	.1	.90
Street Sweeping	0.1	.9	.9	.81
Total TSS Pretreatment				19%
Permeable paver/Infiltration Trench	0.80	.81	0.65	0.16
Total TSS Removal				84%
Total Phosphorus removal				70%

Water Quality Volume Calculations

Standard 4 requires a certain amount of stormwater to be infiltrated to remove sediment and nutrients from stormwater runoff.

WQV = (A)*1in.

Where:

A = impervious surface drainage area (in square feet)
WQV = water quality volume in watershed inches (1-inch in this case)

Subsurface System 1 (IS1)
WQV = (21,312)(1 inch.) (1ft / 12inches)
WQV = 1,776 CF (1,918 cf infiltrated in the 1.4" storm, 0cf discharge from system)

Subsurface System 2 (IS2)
WQV = (36,278)(1 inch.) (1ft / 12inches)
WQV = 3,023 CF (3,393cf infiltrated in the 1.6" storm, 0cf discharge from system)

Back patio (No impervious area)

Front patio (No impervious area)

Permeable Pavement (drive right 1P,2P,3P):
WQV = (2,150)(1 inch.) (1ft / 12inches)
WQV = 180 CF (2,451 cf of storage below the lowest outlet)

Permeable Pavement (drive left 4P):
WQV = (1020 SF)(1 inch.) (1ft / 12inches)
WQV = 85 CF (250 cf of storage below the lowest outlet)

Stone Infiltration Trench (7P)
WQV = (2,300 SF)(1 inch.) (1ft / 12inches)
WQV = 191 CF (300 cf of storage below the lowest outlet)

All of the systems provide more storage volume than the required calculated water quality volume; therefore, the requirement is met.

Standard 5: Land Uses with Higher Potential Pollutant Loads

This site will not be considered a Land Use with Higher Potential Pollutant Load since it will not have more than 1000 vehicle trips per day and will not have support any industrial use.

Standard 6: Critical Area

The proposed project is not within a critical area.

Standard 7: Redevelopment

The proposed project is a redevelopment. The project aims to develop the existing degraded single story residential buildings into a multi-unit residential building serviced by ADA compliant parking and sidewalks. In doing so, the project will reduce the amount of impervious area, create landscaping/open space, and provide stormwater infiltration systems where none currently exist. This project intends to comply with all the Massachusetts Stormwater Standards to the maximum extent practicable.

Standard 8: Construction Period Pollution Prevention and Erosion & Sedimentation Control

Best management practices (BMP) for erosion and sedimentation control are staked straw wattles, hydro seeding, construction entrance, catch basin sediment sacks, and phased development. Many stormwater BMP technologies (e.g., infiltration technologies) are not designed to handle the high concentrations of sediments typically found in construction runoff and must be protected from construction-related sediment loadings. Construction BMP's must be maintained. In developing the proposed project, certain measures will be implemented to minimize impacts erosion and sedimentation could have on surrounding areas. This section addresses items that involve proper construction techniques, close surveillance of workmanship, and immediate response to emergency situations. The developer must be prepared to provide whatever reasonable measures are necessary to protect the environment during construction and to stabilize all disturbed areas as soon as construction ends. Construction period pollution prevention and erosion and sediment control shall meet the requirements for the 2022 EPA Construction General Permit for all projects requiring coverage under the CGP.

Pre-Construction

1. The contractor shall have a stockpile of materials required to control erosion on-site to be used to supplement or repair erosion control devices. These materials shall include, but are not limited to, wattles and crushed stone.
2. The contractor is responsible for erosion control on site and shall utilize erosion control measures where needed, regardless of whether the measures are specified on the plan or in the order of conditions.

Preliminary Site Work

1. Excavated materials should be stockpiled, separating the topsoil for future use on the site. Erosion control shall be utilized along the down slope side of the piles and side slopes shall not exceed 2:1.
2. If intense rainfall is anticipated, the installation of supplemental straw bale dikes, silt fences, or armored dikes shall be considered.
3. Unsuitable excavated material shall be removed from the site.
4. Construction entrance shall be installed.
5. Existing catchbasins shall be protected with silt sacks.

Ongoing Site Work

1. Erosion control measures shall be regularly inspected and replaced as needed.
2. Dewatering shall be done in a manner so as not to transmit silt, sand or particulate matter to the receiving water or existing drainage system.

Landscaping

1. Landscaping shall occur as soon as possible to provide permanent stabilization of disturbed surfaces.
2. If the season or adverse weather conditions do not allow the establishment of vegetation, temporary mulching with straw, wood chips weighted with snow fence or branches, or other methods shall be provided.
3. A minimum of 4 inches of topsoil shall be placed and its surface smoothed to the specified grades.
4. The use of herbicides is strongly discouraged.
5. Hydro seeding is encouraged for steep slopes. Application rates on slopes greater than 3:1 shall have a minimum seeding rate of 5-lbs/1000 SF. A latex or fiber tackifier shall be used on these slopes at a minimum rate of 50 lbs. of tackifier per 500 gallons of water used.

Standard 9: Operations and Maintenance Plan

The information provided herein is intended to provide the base information for operation and maintenance of the site in perpetuity subject to updates and revisions as required at a future date. As such all future property owners must be notified in writing of this plan and be provided with a copy of this plan, a complete set of the design drawings and/or a completed as-built plan showing all the drainage features as they were constructed, which are considered part of this document. Please see the attached Operations and Maintenance Log (Appendix VII).

Stormwater management system owner:	Needham Housing Authority
The party responsible for operation and maintenance:	Needham Housing Authority

Preliminary Stormwater Operation and Maintenance Budget

Quarterly Inspection and Maintenance x $2,500 per visit = $10,000 annually

Illicit Discharge - Practices to Minimize Storm Water Contamination

- All waste materials will be collected and stored in a securely lidded metal dumpster.
- All trash and debris from the site will be deposited in the dumpster. The dumpster will be emptied on a regular schedule prior to being over full.
- All personnel will be instructed regarding the correct procedure for waste disposal.
- Good housekeeping and spill control practices will be followed to minimize storm water contamination from petroleum products, paints, and cleaning products.
- All site vehicles will be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage.
- Spill kits will be provided with any activity that could provide contamination.
- All paint containers and curing compounds will be tightly sealed and stored when not required for use. Excess paint will not be discharged to the storm sewers but will be properly disposed of according to the manufacturer's instructions.
- All spills will be cleaned up immediately upon discovery. Spills large enough to reach the storm sewers will be reported to the Massachusetts Department of Environmental Protection Northeast Regional Office at 1-888-304-1133.

Subsurface Infiltration System

The infiltration BMP (subsurface SC-310 chamber system) shall be inspected after every major storm for the first few months to ensure it is stabilized and functioning properly. If necessary, corrective action shall be taken until the system functions properly. Inspectors should note how long water remains standing in the inspection port after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging. Thereafter, inspect the infiltration BMP at least twice per year.

Pervious Pavement

The infiltration BMP shall be inspected after every major storm for the first few months to ensure it is stabilized and functioning properly. If necessary, corrective action shall be taken until the system functions properly. Inspectors should note how long water remains standing in the inspection port after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging. Thereafter, inspect the infiltration BMP at least twice per year. Sanding is not allowed over pervious pavement. Vacuum sweep the surface monthly.

Deep Sump Hooded Catch Basins

Inspect deep sump catch basins four times per year including the end of the foliage and snow removal seasons. Sediments must also be removed four times per year or when the depth of deposits is greater than or equal to one half the depth of the sump. Vacuum trucks are to be used to remove trapped sediment and supernatant.
Although catch basin debris often contains concentrations of oil and hazardous materials such as petroleum hydrocarbons and metals, MassDEP classifies them as solid waste. Any contaminated materials must be evaluated in accordance with the Hazardous Waste Regulations, 310 CMR 30.00, and handled as hazardous waste. MassDEP regulations prohibit landfills from accepting materials that contain free draining liquids.

Roof Drain Leaders

Routine roof inspections shall be performed two times per year. The roof shall be kept clean and free of debris, and the roof drainage systems shall be kept clear. Gutters and downspouts shall be cleaned at least twice per year, or more frequently as necessary.

Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of stormwater management practices. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings.

Initial Post-Construction Inspection

During the initial period of vegetation establishment pruning and weeding are required twice in first year by contractor or owner. Any dead vegetation/plantings found after the first year will be replaced. Proper mulching is mandatory and regular watering may be required initially to ensure proper establishment of new vegetation.

Long-Term Maintenance

The planted areas shall be inspected on a semi-annual basis and any litter removed. Weeds and invasive plant species shall be removed by hand. Maintain planted areas adjacent to pavement to prevent soil washout. Immediately clean any soil deposits on pavement. Leaf litter and other detritus shall be removed twice per year. If needed to maintain aesthetic appearance, perennial plantings may be trimmed at the end of the growing season.

Trees and shrubs shall be inspected twice per year to evaluate health and attended to as necessary. Seeded ground cover or grass areas shall not receive mulching. Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming. Plant alternative mixtures of grass species in the event of unsuccessful establishment. The grass vegetation should not be cut to a height less than four inches.

Pesticide/Herbicide Usage

No pesticides are to be used unless a single spot treatment is required for a specific control application.

Structural Best Management Practice	Action	Date Completed	Completed By	Comments
Infiltration Systems - Inspect twice per year. Clean as required	Inspect/repair/ clean			
Roof Drain Leaders – Inspect/clean twice per year.	Inspect/Clean			
Pervious Pavement. Inspect twice per year. Vacuum sweep monthly. Clean pipes as required	Inspect/maintain			
Deep Sump Catch Basins/Outlet Control structures– Inspect/clean four times per year. Clean when sump is 50% full.	Inspect/Clean			
Vegetated Areas Maintenance – Inspect twice per year. Maintain as required.	Inspect			
	Inspect			

Standard 10: Prohibition of Illicit Discharges

No illicit discharges currently exist and no future illicit discharges will be allowed including wastewater discharges and discharges of stormwater contaminated by contact with process wastes, raw materials, toxic pollutants, hazardous substances, soil, or grease.

HANCOCK
ASSOCIATES
Surveyors | Engineers | Scientists

Boston, Brockton, Chelmsford, Danvers, Marlborough, Newburyport and Palmer, MA | Concord, NH
978-777-3050 / 880-998-3050 | HancockAssociates.com