

# Comprehensive Permit Plans

## 2nd Avenue Residences at Needham Crossing

### A Street and Second Avenue, Needham, Massachusetts

100 Nickerson Road  
Marlborough, MA 01752  
Phone: 508-786-2200 Fax: 508-786-2201



www.tetrattech.com

**APPLICANT:**  
2nd AVENUE RESIDENCES  
C/O NORMANDY A STREET RESIDENTIAL, LLC  
99 SUMMER STREET  
BOSTON, MA 02110  
TEL: 617-443-0710

**Tt PROJECT No.:**  
143-103813-15001

**ARCHITECT:**  
ELKUS MANFREDI  
25 DRYDOCK AVENUE  
BOSTON, MA 02210  
TEL: 617-426-1300

**LANDSCAPE ARCHITECT:**  
TERRAINK  
P.O. BOX 281  
ARLINGTON, MA 02476  
TEL: 617-650-7398

**SURVEYOR:**  
NORTH SHORE SURVEY CORPORATION  
14 BROWN STREET  
SALEM, MA 01970  
TEL: 978-774-4800

| ZONING TABULATION  |           |            |                      |
|--|-----------|------------|----------------------|
| NEEDHAM ZONING CLASSIFICATION: NEW ENGLAND BUSINESS CENTER (NEBC)<br>PROPOSED USE: RESIDENTIAL |           |            |                      |
| DIMENSIONAL REQUIREMENTS   |           |            |                      |
| ITEM   | REQUIRED  | PROPOSED   | COMPLIANCE W/ ZONING |
| MINIMUM LOT AREA   | 40,000 SF | 223,345 SF | ✓                    |
| MINIMUM LOT FRONTAGE   | 100'      | 973.28'    | ✓                    |
| MAXIMUM FLOOR AREA RATIO   | 1.00      | 2.13       | WAIVER REQUEST       |
| MINIMUM FRONT YARD   | 15'       | 15.0'      | ✓                    |
| MINIMUM SIDE YARD  | 20'       | 15.0'      | WAIVER REQUEST       |
| MINIMUM REAR YARD  | 20'       | 15'        | WAIVER REQUEST       |
| MAXIMUM LOT COVERAGE   | 65%       | 61.4%      | ✓                    |
| MAXIMUM BUILDING HEIGHT  | 72'       | 70'        | ✓                    |
| MINIMUM OPEN SPACE   | 25%       | 22.8%      | WAIVER REQUEST       |
| MAXIMUM UNINTERRUPTED FACADE LENGTH  | 300'      | 315'       | WAIVER REQUEST       |
| MINIMUM STREET TREES   | 1 PER 40' | 1 PER 40'  | ✓                    |
| MINIMUM FRONT LANDSCAPE BUFFER   | 20'       | 15'        | WAIVER REQUEST       |

| PARKING SUMMARY TABLE                       |       |                                     |                        |
|---|-------|-------------------------------------|------------------------|
| DESCRIPTION                                 | UNITS | REQUIRED                            | PROVIDED               |
| RESIDENTIAL                                 | 390   | 1.5 SPACES PER D.U.<br>= 585 SPACES | 585                    |
| COMPACT SPACES<br>(50% OF 585)              |       | MAX. 293                            | 146<br>(25% OF 585)    |
| HANDICAP SPACES<br>(2% OF 585)              | 12    |                                     | 2 SURFACE<br>10 GARAGE |
| BICYCLE SPACES<br>(1 PER 20 PARKING SPACES) | 30    |                                     | 30                     |

| ZONING BY-LAW OF THE TOWN OF NEEDHAM<br>SECTION 5.1.3: PARKING PLAN AND DESIGN REQUIREMENTS |  |   |                |
|---|--|---|----------------|
| ITEM  | REQUIRED (TOWN OF NEEDHAM)   | PROPOSED  | COMPLIANCE     |
| (a) PARKING LOT ILLUMINATION  | AVERAGE ILLUMINATION OF 1 FC REQUIRED FOR ALL PARKING AREAS  | AVERAGE ILLUMINATION LEVEL OF 1 FC PROVIDED FOR PARKING AREAS   | ✓              |
| (b) LOADING REQUIREMENTS  | PROVIDE OFF-STREET LOADING FACILITIES FOR NEW CONSTRUCTION   | OFF-STREET LOADING FACILITIES PROVIDED AT PROPOSED BUILDING   | ✓              |
| (c) HANDICAPPED PARKING   | PROVIDE HANDICAPPED PARKING IN ACCORDANCE W/ AAB REGULATIONS   | HANDICAPPED PARKING SHOWN IS IN ACCORDANCE W/ AAB REGULATIONS   | ✓              |
| (d) DRIVEWAY OPENINGS   | LOCATION SHALL MINIMIZE CONFLICT W/ TRAFFIC ON STREETS   | OPENING LOCATIONS MINIMIZE CONFLICT W/ TRAFFIC ON STREETS   | ✓              |
| (e) COMPACT CARS  | UP TO 50% OF OFF-STREET PARKING SPACES MAY BE COMPACT (8'X16')   | LESS THAN 50% OF OFF-STREET PARKING SPACES ARE COMPACT  | ✓              |
| (f) PARKING SPACE SIZE  | ALL NON-COMPACT PARKING SPACES SHALL BE 9'X18.5'   | ALL NON-COMPACT PARKING SPACES ARE 9'X18.5'   | ✓              |
| (g) BUMPER OVERHANG   | PARKING SPACE MAY INCLUDE NO MORE THAN 1 FOOT OF AREA AT FRONT OR REAR FOR BUMPER OVERHANG                                 | PARKING SPACE DIMENSIONS MEET REQUIREMENTS. NO EXTRA FOR BUMPER OVERHANG REQUIRED                                     | ✓              |
| (h) PARKING SPACE LAYOUT  | PARKING AREAS SHALL BE DESIGNED SO THAT NO MOVEMENT OF OTHER VEHICLES IS REQUIRED  |   | WAIVER REQUEST |
| (i) WIDTH OF MANEUVERING AISLE  | MINIMUM WIDTH OF MANEUVERING AISLES SHALL CONFORM SECTION 5.1.3(i) OF THE ZONING BY-LAW                                    | MINIMUM WIDTH OF MANEUVERING AISLES CONFORM TO SECTION 5.1.3(i) OF THE ZONING BY-LAW                                  | ✓              |
| (j) PARKING SETBACKS  | MINIMUM 20' FROM ALL FRONT LOT LINES AND 4' FROM ALL SIDE AND REAR LOT LINES; 5' FROM BUILDING LINE                        |   | WAIVER REQUEST |
| (k) LANDSCAPED AREAS  | LANDSCAPED AREAS SHALL CONFORM SECTION 5.1.3(k) OF THE ZONING BY-LAW   |   | WAIVER REQUEST |
| (l) TREES   | ONE TREE SHALL BE PROVIDED FOR EVERY 10 PARKING SPACES   | ONE TREE IS PROVIDED FOR EVERY 10 PARKING SPACES  | ✓              |
| (m) LOCATION  | OFF-STREET PARKING SHALL BE ON EITHER THE SAME LOT AS THE PRINCIPAL USE OR ON A LOT WITHIN 300' & UNDER THE SAME OWNERSHIP | OFF-STREET PARKING IS LOCATED ON THE SAME LOT AS THE PRINCIPAL USE OR ON A LOT WITHIN 300' & UNDER THE SAME OWNERSHIP | ✓              |
| (n) BICYCLE RACKS   | PARKING AREAS OF 40 OR MORE SPACES, BICYCLE RACKS SHALL BE PROVIDED TO ACCOMMODATE 1 BICYCLE PER 20 PARKING SPACES         | BICYCLE RACKS ARE PROVIDED TO ACCOMMODATE 1 BICYCLE PER 20 PARKING SPACES   | ✓              |

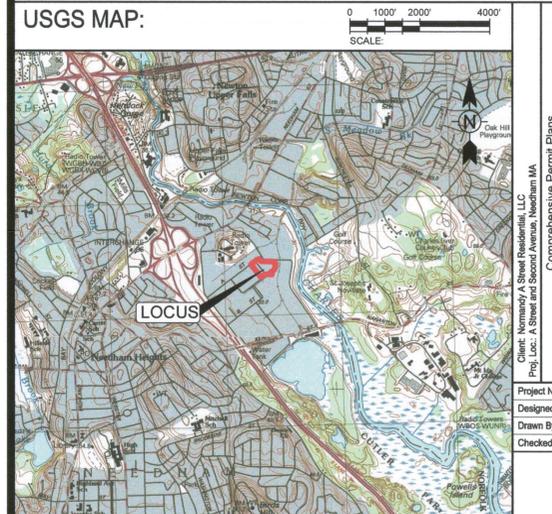
| LEGEND |                    |       |                          |
|--------|--------------------|-------|--------------------------|
| ● DH   | MONUMENT           | ○ TMH | TELEPHONE MANHOLE        |
| ○ CBP  | DRILL HOLE         | ○ GV  | GAS GATE                 |
| ○ FND  | CONCRETE BOUND     | ○ VGC | BOLLARD                  |
| ○ LPT  | FOUND              | ○ CCB | VERTICAL GRANITE CURB    |
| ○ FLG  | LIGHT POLE         | ○ BCC | CAPE COD BERM            |
| ○ ULP  | FLOOD LIGHT        | ○ MW  | BITUMINOUS CONCRETE CURB |
| ○ GWP  | UTILITY POLE       | ○ MW  | MONITORING WELL          |
| ○ GWP  | GUY WIRE/POLE      | ○ MW  | SIGN                     |
| ○ WG   | HYDRANT            | ○ MW  | DRAIN LINE               |
| ○ WG   | WATER VALVE        | ○ MW  | SEWER LINE               |
| ○ WG   | CONTOUR            | ○ MW  | SEWER FORCE MAIN         |
| ○ WG   | SPOT GRADE         | ○ MW  | GAS LINE                 |
| ○ MH   | MANHOLE            | ○ MW  | UNDERGROUND ELECTRIC     |
| ○ CBN  | CATCH BASIN        | ○ MW  | UNDERGROUND TELEPHONE    |
| ○ DCB  | DOUBLE CATCH BASIN | ○ MW  | WATER LINE               |
| ○ DMH  | DRAIN MANHOLE      | ○ MW  | OVERHEAD WIRES           |
| ○ SMH  | SEWER MANHOLE      | ○ MW  |                          |
| ○ EMH  | ELECTRIC MANHOLE   | ○ MW  |                          |



**DRAWING LIST**

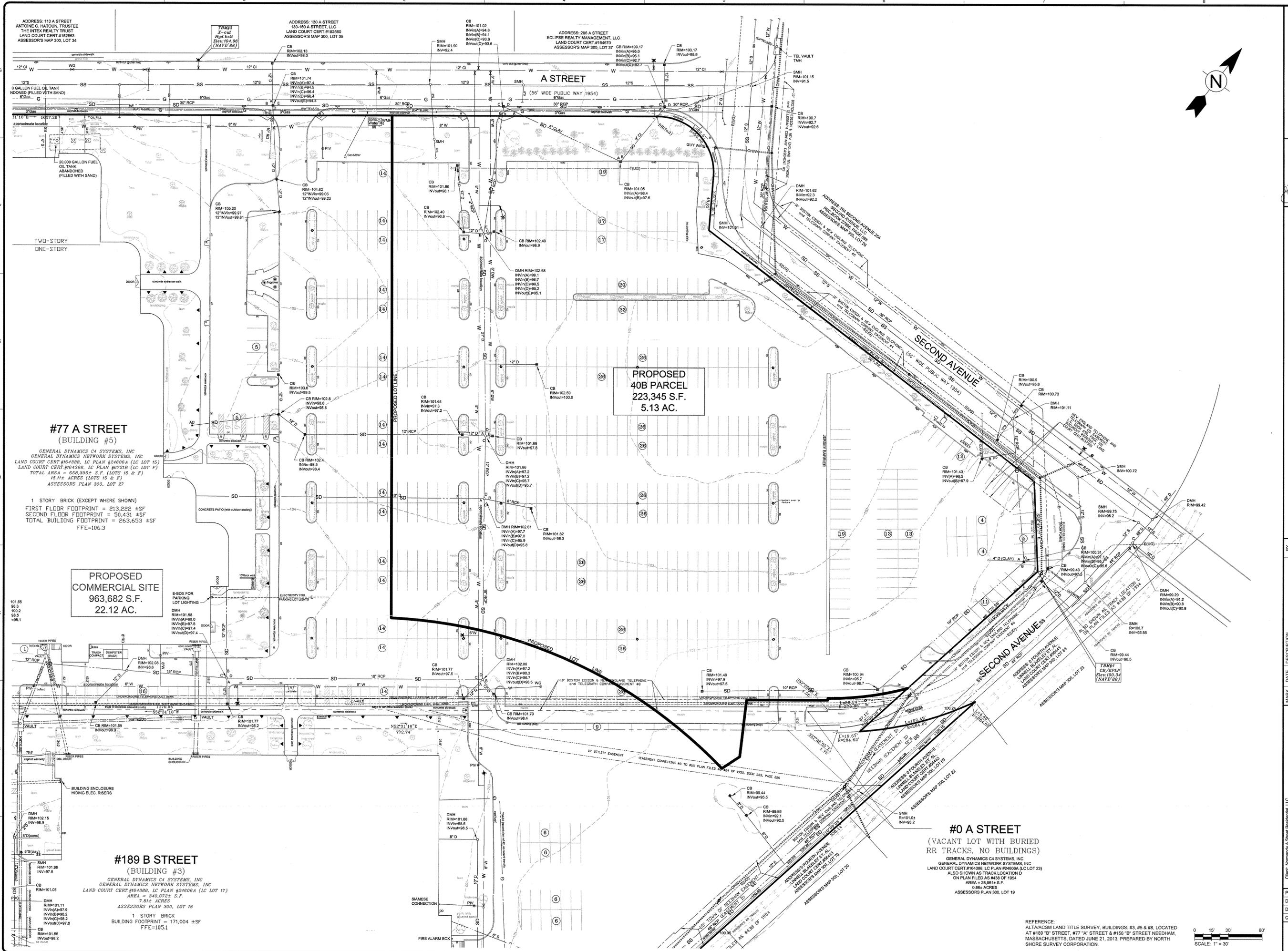
- |                                      |   |
|--------------------------------------|---|
| C-1 COVER SHEET                      | A-101 FLOOR PLAN-LEVEL 1                  |
| C-2 EXISTING CONDITIONS PLAN         | A-102 FLOOR PLAN-LEVEL 2                  |
| C-3 SITE CONTEXT PLAN                | A-103 FLOOR PLAN-LEVEL 3                  |
| C-4 SITE LAYOUT PLAN                 | A-104 FLOOR PLAN-LEVEL 4                  |
| C-5 GRADING AND DRAINAGE PLAN        | A-105 FLOOR PLAN-LEVEL 5                  |
| C-6 UTILITY PLAN                     | A-106 FLOOR PLAN-ROOF                     |
| C-7 LIGHTING PLAN                    | A-200 BUILDING ELEVATIONS                 |
| C-8 DETAIL SHEET                     | A-201 BUILDING ELEVATIONS                 |
| C-9 DETAIL SHEET                     | A-202 BUILDING ELEVATIONS                 |
| C-10 DETAIL SHEET                    | A-300 BUILDING SECTIONS                   |
| C-11 DETAIL SHEET                    | A-310 ENLARGED ELEVATIONS & WALL SECTIONS |
| C-12 STORMTECH RECHARGE AREA DETAILS | A-311 ENLARGED ELEVATIONS & WALL SECTIONS |
| C-13 STORMTECH RECHARGE AREA DETAILS | A-600 ENLARGED UNIT PLANS                 |
| L-1 LANDSCAPE PLANTING               |   |
| L-2 LANDSCAPE DETAILS PLANTING       |   |

**ISSUED:**  
SEPTEMBER 21, 2015 COMPREHENSIVE PERMIT APPLICATION FILING



Client: Normandy A Street Residential, LLC  
 Project: 2nd Avenue Residences at Needham Crossing  
 Project No.: 143-103813-15001  
 Designed By: G.K.D.  
 Drawn By: J.L.P.  
 Checked By:

**C-1**



ADDRESS: 110 A STREET  
ANTOINE G. HATOUN, TRUSTEE  
THE INTEX REALTY TRUST  
LAND COURT CERT #122683  
ASSESSOR'S MAP 300, LOT 34

ADDRESS: 130 A STREET  
130-130 A STREET, LLC  
LAND COURT CERT #122680  
ASSESSOR'S MAP 300, LOT 35

ADDRESS: 206 A STREET  
ECLIPSE REALTY MANAGEMENT, LLC  
LAND COURT CERT #146070  
ASSESSOR'S MAP 300, LOT 37

0 GALLON FUEL OIL TANK  
MOUND (FILLED WITH SAND)  
8' DIA.

TWO-STORY  
ONE-STORY

**#77 A STREET  
(BUILDING #5)**  
GENERAL DYNAMICS C4 SYSTEMS, INC.  
GENERAL DYNAMICS NETWORK SYSTEMS, INC.  
LAND COURT CERT #164388, LC PLAN #24606A (LC LOT 15)  
LAND COURT CERT #164389, LC PLAN #27219 (LC LOT 17)  
TOTAL AREA = 658,895± S.F. (LOTS 15 & 17)  
15.11± ACRES (LOTS 15 & 17)  
ASSESSOR'S PLAN 300, LOT 27

1 STORY BRICK (EXCEPT WHERE SHOWN)  
FIRST FLOOR FOOTPRINT = 213,222 ±SF  
SECOND FLOOR FOOTPRINT = 50,431 ±SF  
TOTAL BUILDING FOOTPRINT = 263,653 ±SF  
FFE=106.3

**PROPOSED  
COMMERCIAL SITE**  
963,682 S.F.  
22.12 AC.

101.65  
98.3  
100.2  
98.5  
99.1

12" RCP  
12" CI  
12" SS

SMH  
RIM=101.86  
INV=97.8

**#189 B STREET  
(BUILDING #3)**  
GENERAL DYNAMICS C4 SYSTEMS, INC.  
GENERAL DYNAMICS NETWORK SYSTEMS, INC.  
LAND COURT CERT #164388, LC PLAN #24606A (LC LOT 17)  
AREA = 340,072± S.F.  
7.81± ACRES  
ASSESSOR'S PLAN 300, LOT 18

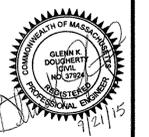
1 STORY BRICK  
BUILDING FOOTPRINT = 171,004 ±SF  
FFE=105.1

SMH  
RIM=101.11  
INV=98.2  
RIM=101.56  
INV=99.2

**PROPOSED  
40B PARCEL**  
223,345 S.F.  
5.13 AC.

**#0 A STREET  
(VACANT LOT WITH BURIED  
RR TRACKS, NO BUILDINGS)**  
GENERAL DYNAMICS C4 SYSTEMS, INC.  
GENERAL DYNAMICS NETWORK SYSTEMS, INC.  
LAND COURT CERT #164388, LC PLAN #24606A (LC LOT 23)  
ALSO SHOWN AS TRACK LOCATION D  
ON PLAN FILED AS MASS OF 1954  
AREA = 26,561± S.F.  
0.66± ACRES  
ASSESSOR'S PLAN 300, LOT 19

REFERENCE:  
ALTA/ACSM LAND TITLE SURVEY, BUILDINGS #3, #5 & #8, LOCATED  
AT #189 "B" STREET, #77 "A" STREET & #156 "B" STREET NEEDHAM,  
MASSACHUSETTS, DATED JUNE 21, 2013. PREPARED BY NORTH  
SHORE SURVEY CORPORATION.



| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9.21.15 | COMPREHENSIVE PERMIT APPLICATION FILING |

Client: Normandy A Street Residential, LLC  
Proj. Loc.: A Street and Second Avenue, Needham MA

Comprehensive Permit Plans  
2nd Avenue Residences at Needham Crossing

**Existing Conditions Plan**

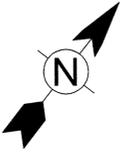
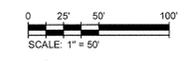
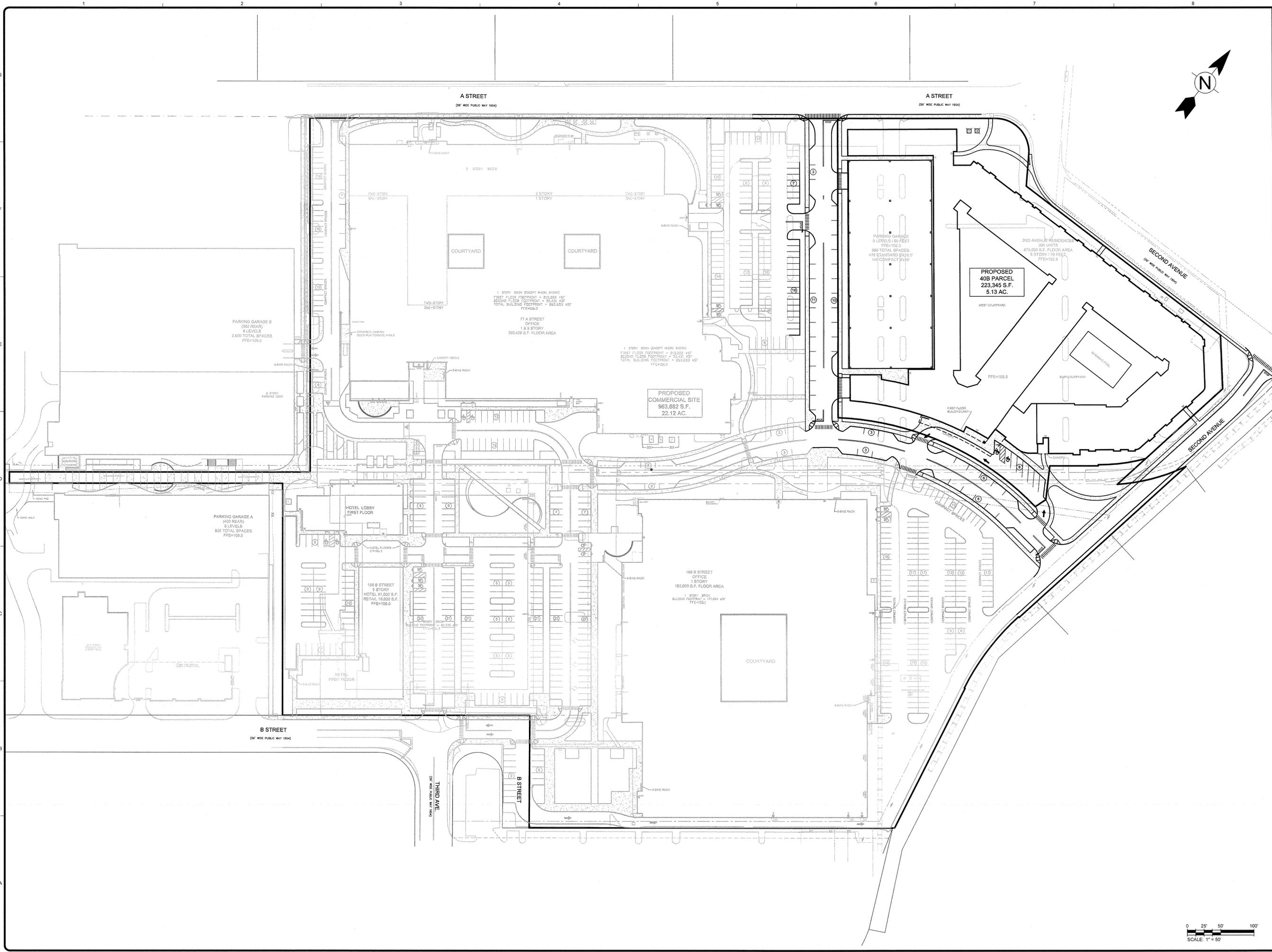
Project No.: 143-103813-15001  
Designed By: G.K.D.  
Drawn By: J.L.P.  
Checked By:

**C-2**

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9/16/2015 4:28:11 PM - P:\103813\143-103813-15001\CAD\SHSHEET\FLEB\C-2 EXISTING CONDITIONS.DWG - PAPPAS, JUD

9/16/2015 4:27:32 PM - P:\1038131-143-103813-15001\CAD\SITEFILES\C-3 SITE CONTEXT PLANDWG - PAPPAS, JUD



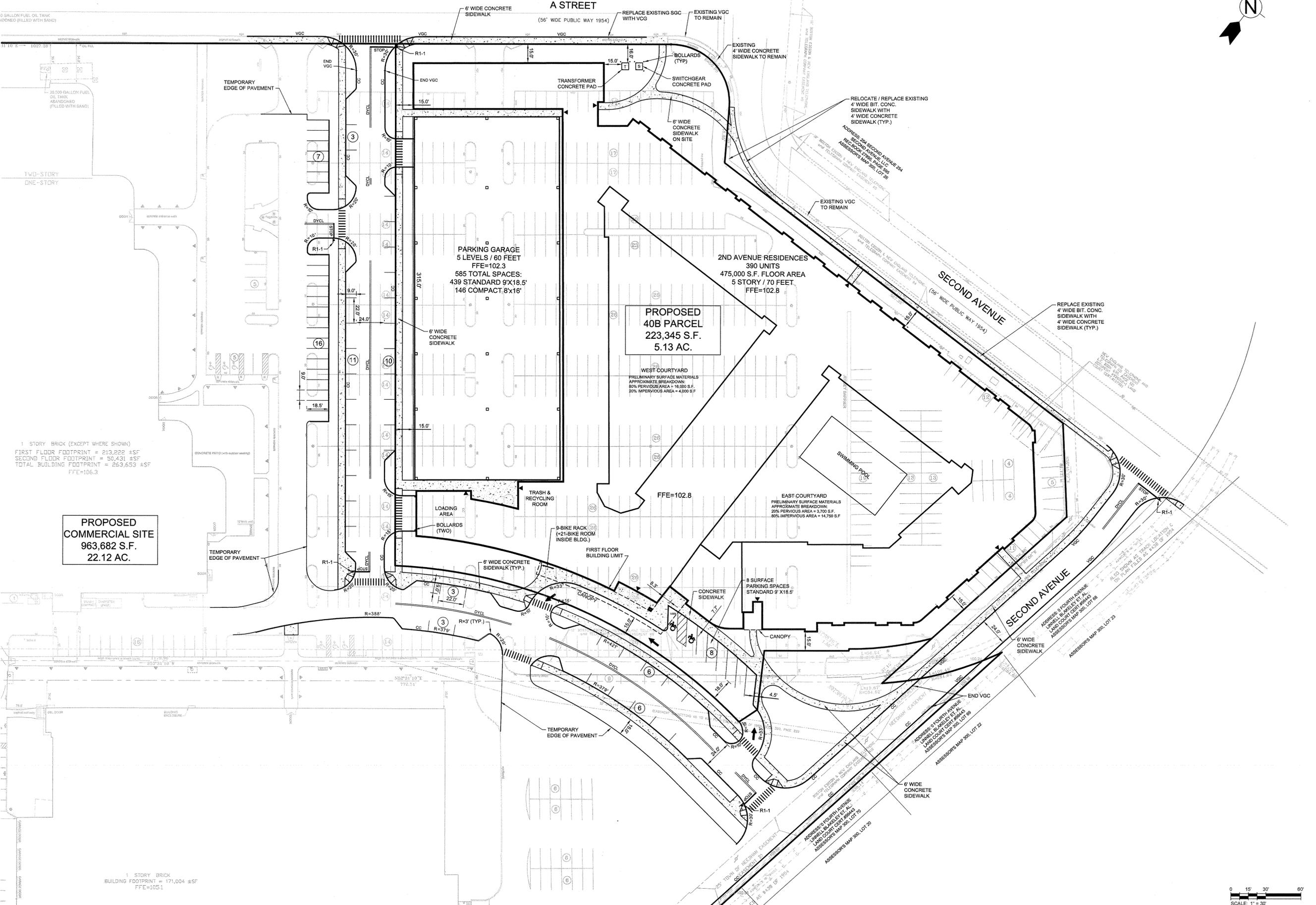
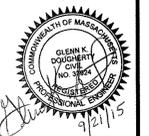
| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

Client: Normandy A Street Residential, LLC  
Proj. Loc.: A Street and Second Avenue, Needham MA  
Project No.: 143-103813-15001  
Designed By: G.K.D.  
Drawn By: J.L.P.  
Checked By:  
Comprehensive Permit Plans  
2nd Avenue Residences at Needham Crossing  
Site Context Plan

ADDRESS: 110 A STREET  
ANTOINE G. HATOUN, TRUSTEE  
THE NTEX REALTY TRUST  
LAND COURT CERT #152863  
ASSESSOR'S MAP 300, LOT 34

ADDRESS: 130 A STREET  
130-150 A STREET, LLC  
LAND COURT CERT #162880  
ASSESSOR'S MAP 300, LOT 35

ADDRESS: 208 A STREET  
ECLIPSE REALTY MANAGEMENT, LLC  
LAND COURT CERT #164670  
ASSESSOR'S MAP 300, LOT 37

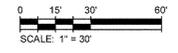


**PROPOSED  
COMMERCIAL SITE  
963,682 S.F.  
22.12 AC.**

**PROPOSED  
40B PARCEL  
223,345 S.F.  
5.13 AC.**

1 STORY BRICK (EXCEPT WHERE SHOWN)  
FIRST FLOOR FOOTPRINT = 213,222 ±SF  
SECOND FLOOR FOOTPRINT = 50,431 ±SF  
TOTAL BUILDING FOOTPRINT = 263,653 ±SF  
FFE=106.3

1 STORY BRICK  
BUILDING FOOTPRINT = 171,004 ±SF  
FFE=105.1

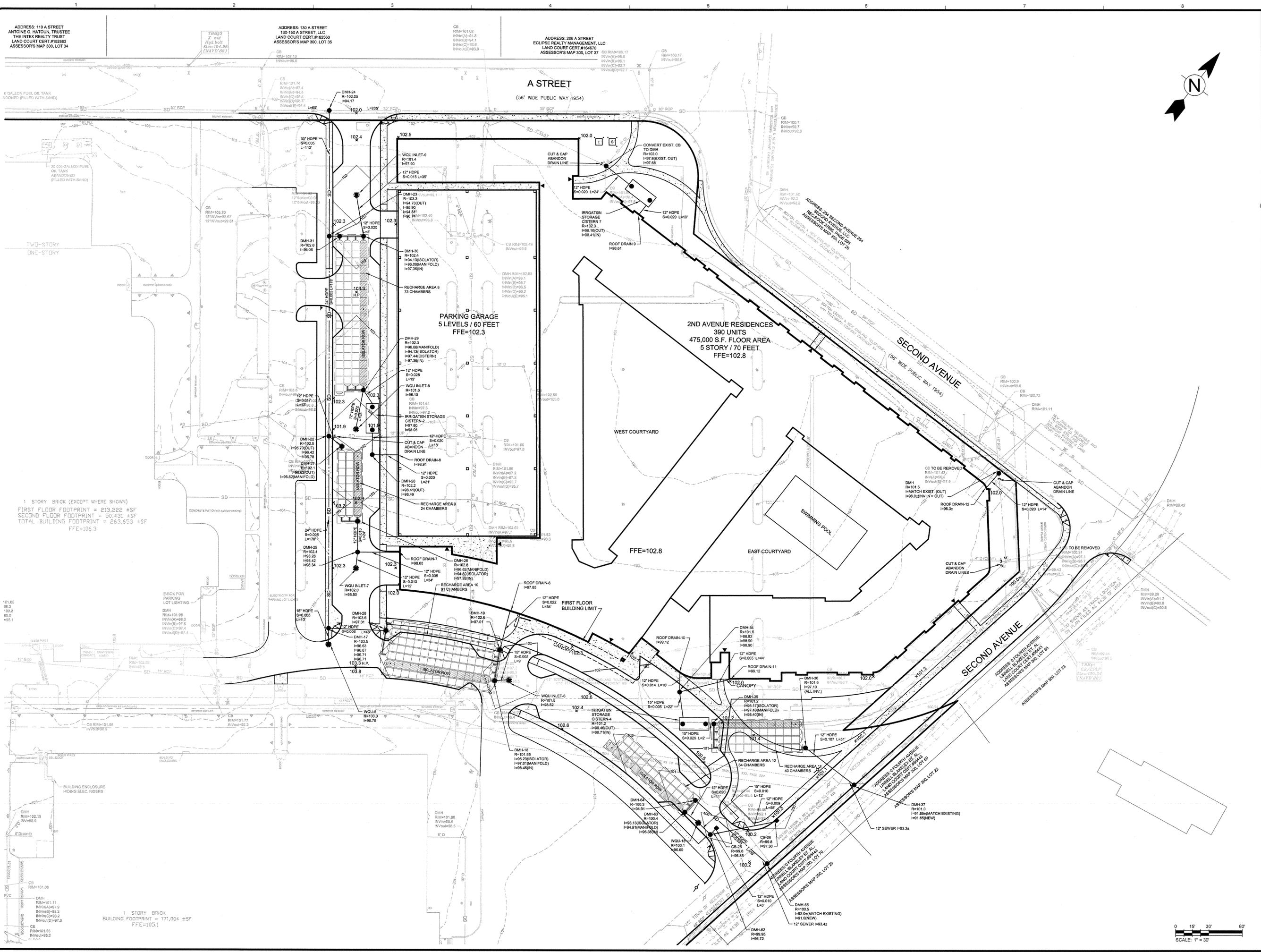


9/16/2016 4:34:19 PM - P:\103813145-103813-15001\CAD\BHEETFILES\C-4 LAYOUT PLAN.DWG - PAPPAS\_JUD

| MARK | DATE    | DESCRIPTION                             | BY |
|------|---------|---|----|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |    |

Client: Normandy A Street Residential, LLC  
Proj. Loc.: A Street and Second Avenue, Northham MA  
Comprehensive Permit Plans  
2nd Avenue Residences at Northham Crossing

Project No.: 143-103813-15001  
Designed By: G.K.D.  
Drawn By: J.L.P.  
Checked By:



ADDRESS: 110 A STREET  
ANTONE G. HATJON, TRUSTEE  
THE INTEX REALTY TRUST  
LAND COURT CERT #152893  
ASSESSOR'S MAP 300, LOT 34

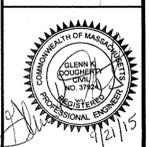
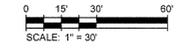
ADDRESS: 130 A STREET  
130-10 A STREET, LLC  
LAND COURT CERT #182560  
ASSESSOR'S MAP 300, LOT 35

ADDRESS: 206 A STREET  
ECLIPSE REALTY MANAGEMENT, LLC  
LAND COURT CERT #166710  
ASSESSOR'S MAP 300, LOT 37

ADDRESS: 25 SECOND AVENUE 254  
SECOND AVENUE RESIDENCES, LLC  
LAND COURT CERT #166710  
ASSESSOR'S MAP 300, LOT 26

1 STORY BRICK (EXCEPT WHERE SHOWN)  
FIRST FLOOR FOOTPRINT = 213,222 ±SF  
SECOND FLOOR FOOTPRINT = 50,431 ±SF  
TOTAL BUILDING FOOTPRINT = 263,653 ±SF  
FFE=106.3

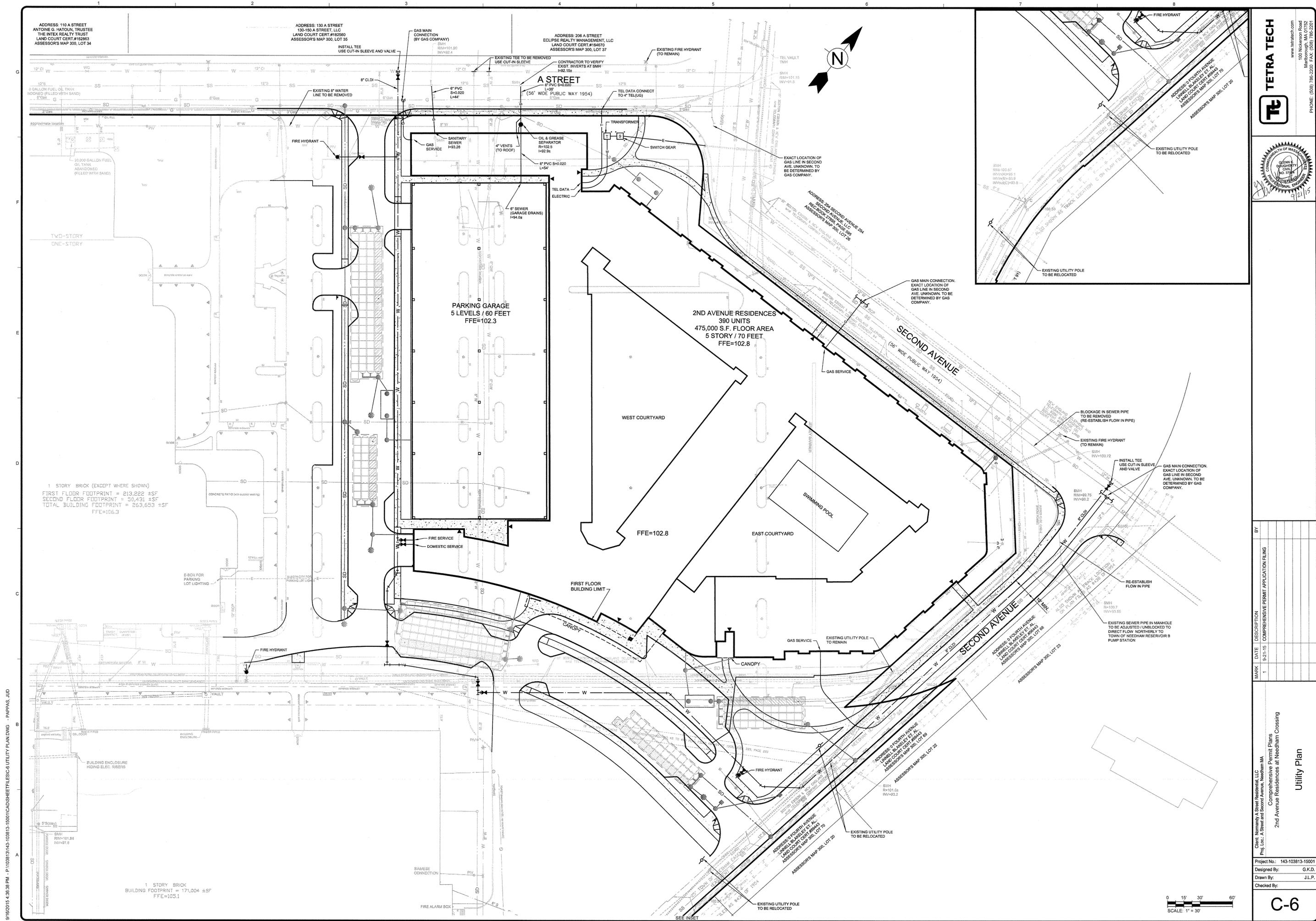
1 STORY BRICK  
BUILDING FOOTPRINT = 171,004 ±SF  
FFE=105.1



| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

Client: Normanby A Street Residences, LLC  
Proj. Loc.: A Street and Second Avenue, Needham MA  
Project Name: 2nd Avenue Residences at Needham Crossing

Project No.: 143-103813-15001  
Designed By: G.K.D.  
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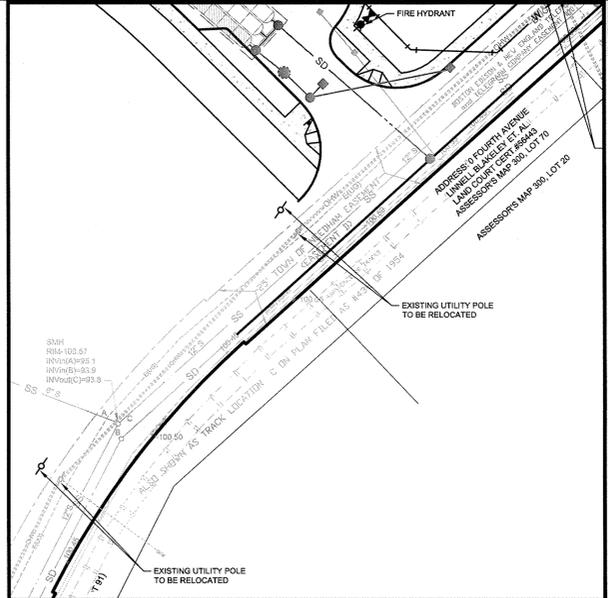


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ADDRESS: 110 A STREET  
ANTONIO G. HATJUN, TRUSTEE  
THE INTEX REALTY TRUST  
LAND COURT CERT #182863  
ASSESSOR'S MAP 300, LOT 34

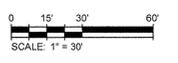
ADDRESS: 130 A STREET  
130-A A STREET, LLC  
LAND COURT CERT #182560  
ASSESSOR'S MAP 300, LOT 35

ADDRESS: 206 A STREET  
ECLIPSE REALTY MANAGEMENT, LLC  
LAND COURT CERT #184670  
ASSESSOR'S MAP 300, LOT 37



1 STORY BRICK (EXCEPT WHERE SHOWN)  
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TOTAL BUILDING FOOTPRINT = 263,653 ±SF  
FFE=106.3

1 STORY BRICK  
BUILDING FOOTPRINT = 171,004 ±SF  
FFE=105.1



**TETRA TECH**  
www.tetrattech.com  
100 Nickerson Road  
Needham, MA 01752  
PHONE: (603) 766-2200 FAX: (603) 766-2201



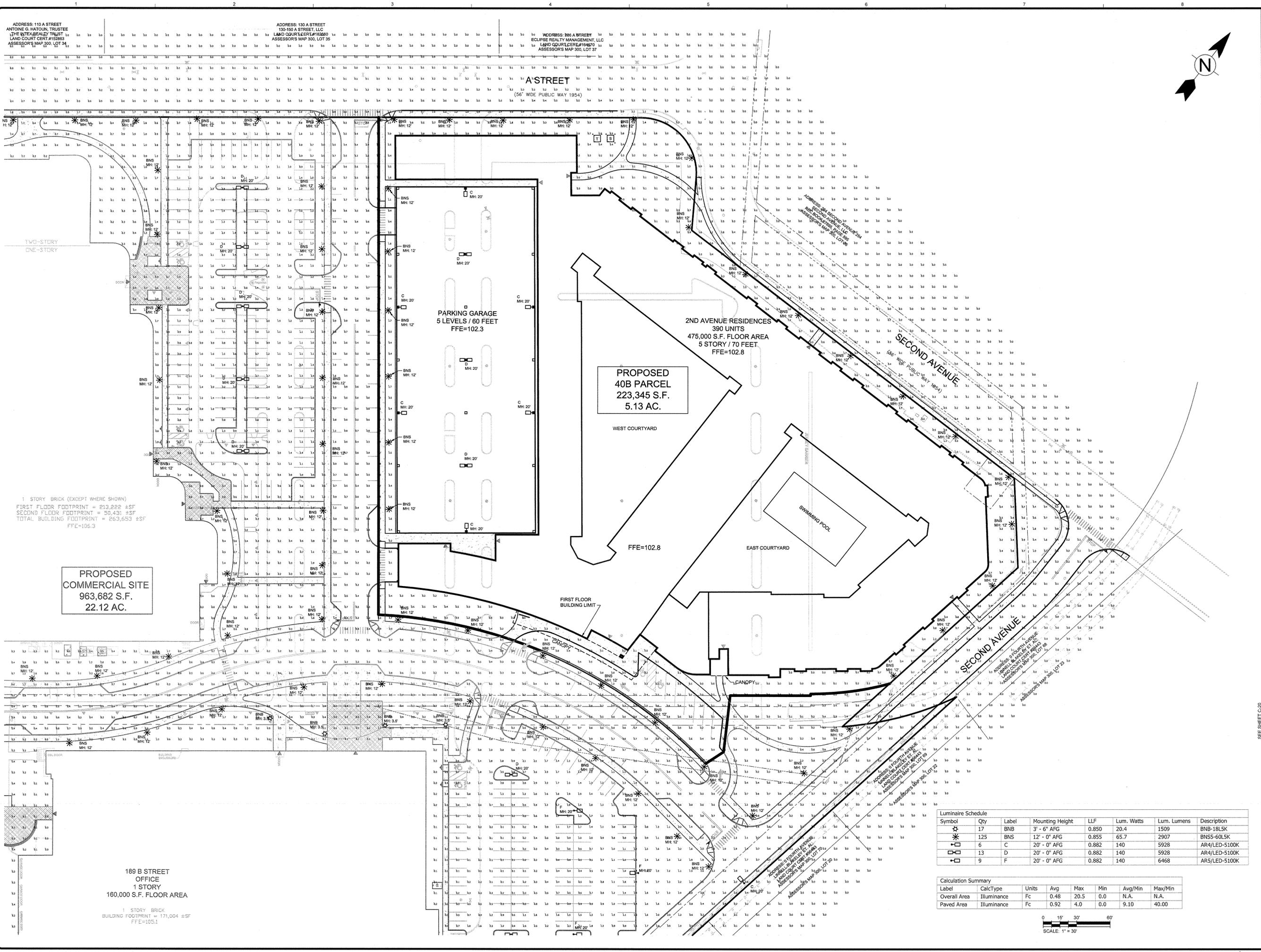
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|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

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Proj. Loc.: A Street and Second Avenue, Needham MA  
Project Name: 2nd Avenue Residences at Needham Crossing

Project No.: 143-103813-15001  
Designed By: G.K.D.  
Drawn By: J.L.P.  
Checked By:

**C-6**

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ADDRESS: 110 A STREET  
ANTONIO G. HATOUN, TRUSTEE  
THE NITEX/BEALTY TRUST  
LAND COURT CERT #15588  
ASSESSOR'S MAP 300, LOT 34

ADDRESS: 130 A STREET  
130-150 A STREET, LLC  
LAND COURT CERT #162690  
ASSESSOR'S MAP 300, LOT 35

ADDRESS: 200 A STREET  
ECLIPSE REALTY MANAGEMENT, LLC  
LAND COURT CERT #164670  
ASSESSOR'S MAP 300, LOT 37

A STREET  
(56' WIDE PUBLIC WAY 1954)

ADDRESS: 200 SECOND AVENUE  
2ND AVENUE RESIDENCES  
ASSESSOR'S MAP 300, LOT 28

ADDRESS: 189 B STREET  
189 B STREET OFFICE  
LAND COURT CERT #15588  
ASSESSOR'S MAP 300, LOT 23

PROPOSED  
COMMERCIAL SITE  
963,682 S.F.  
22.12 AC.

PARKING GARAGE  
5 LEVELS / 60 FEET  
FFE=102.3

PROPOSED  
40B PARCEL  
223,345 S.F.  
5.13 AC.

2ND AVENUE RESIDENCES  
390 UNITS  
475,000 S.F. FLOOR AREA  
5 STORY / 70 FEET  
FFE=102.8

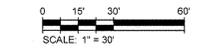
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FIRST FLOOR FOOTPRINT = 213,222 ±SF  
SECOND FLOOR FOOTPRINT = 50,431 ±SF  
TOTAL BUILDING FOOTPRINT = 263,653 ±SF  
FFE=106.3

189 B STREET  
OFFICE  
1 STORY  
160,000 S.F. FLOOR AREA

1 STORY BRICK  
BUILDING FOOTPRINT = 171,004 ±SF  
FFE=105.1

| Symbol | Qty | Label | Mounting Height | LLF   | Lum. Watts | Lum. Lumens | Description   |
|--------|-----|-------|-----------------|-------|------------|-------------|---------------|
| ✱      | 17  | BNS   | 3' - 6" AFG     | 0.850 | 20.4       | 1509        | BNS-18LSK     |
| ✱      | 125 | BNS   | 12' - 0" AFG    | 0.855 | 65.7       | 2907        | BNS5-60LSK    |
| □      | 6   | C     | 20' - 0" AFG    | 0.882 | 140        | 5928        | AR4/LED-5100K |
| □      | 13  | D     | 20' - 0" AFG    | 0.882 | 140        | 5928        | AR4/LED-5100K |
| □      | 9   | F     | 20' - 0" AFG    | 0.882 | 140        | 6468        | AR5/LED-5100K |

| Label        | CalcType    | Units | Avg  | Max  | Min | Avg/Min | Max/Min |
|--------------|-------------|-------|------|------|-----|---------|---------|
| Overall Area | Illuminance | Fc    | 0.48 | 20.5 | 0.0 | N.A.    | N.A.    |
| Paved Area   | Illuminance | Fc    | 0.92 | 4.0  | 0.0 | 9.10    | 40.00   |



**TETRA TECH**  
www.tetra.com  
100 Nickerson Road  
Malden, MA 02148  
PHONE: (617) 786-2200 FAX: (617) 786-2201

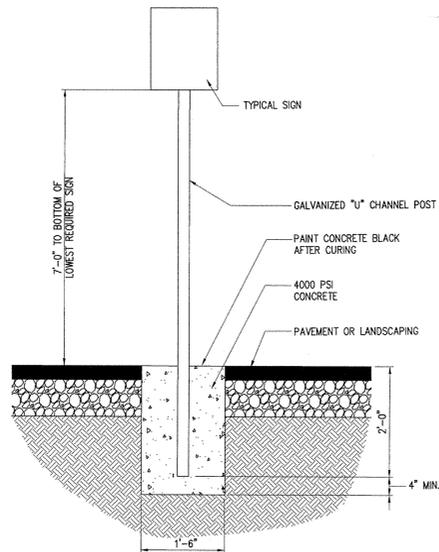


| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

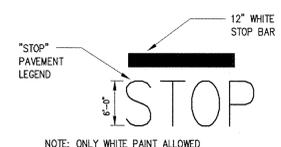
Client: Normandy A Street Residential, LLC  
Proj. Loc.: A Street and Second Avenue, Needham MA  
Project: Comprehensive Permit Plans  
2nd Avenue Residences at Needham Crossing  
Site Lighting Plan  
Project No.: 143-103813-15001  
Designed By: G.K.D.  
Drawn By: J.L.P.  
Checked By:  
Copyright: Tetra Tech  
Bar Measures 1 inch

**C-7**

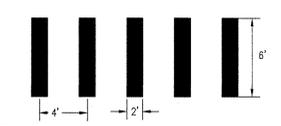
9/16/2015 4:37:30 PM - P:\103813\143-103813-15001\CAD\SITE\FILESC-7 SITE LIGHTING PLANDWG - PAPPAS, JUD



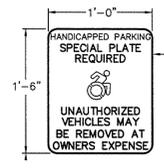
**SIGN POST DETAIL**  
NOT TO SCALE



**STOP BAR AND LEGEND DETAIL**  
NOT TO SCALE

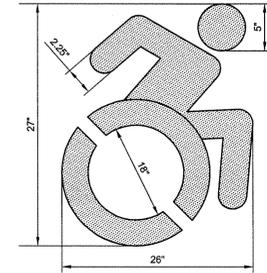


**CROSSWALK STRIPING DETAIL**  
NOT TO SCALE

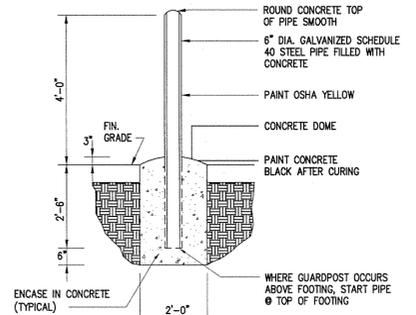


**HANDICAP PARKING SIGN**  
NOT TO SCALE

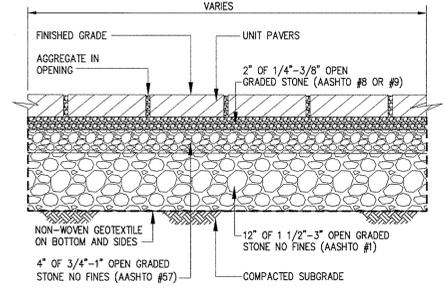
SIGN PANEL SHALL BE FABRICATED FROM ALUMINUM SHEETING ASTM 3209, ALLOY 6061-T6, 0.080" THICK. SIGN SHALL HAVE TYPE D PERMANENTLY APPLIED LEGEND WITH "E" SILK SCREEN PROCESSED LEGEND SUPERIMPOSED THEREON. SIGN TO HAVE WHITE LETTERING AGAINST A BLUE BACKGROUND AND SHALL BEAR THE WORDS "HANDICAPPED PARKING SPECIAL PLATE REQUIRED"



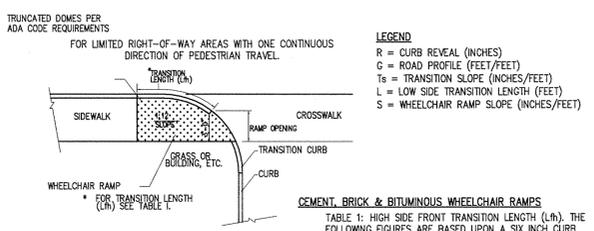
**HANDICAP PARKING PAVEMENT MARKING**  
NOT TO SCALE



**ROLLARD DETAIL**  
NOT TO SCALE

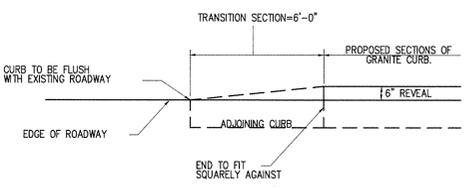


**PERMEABLE PAVERS DETAIL**  
NOT TO SCALE

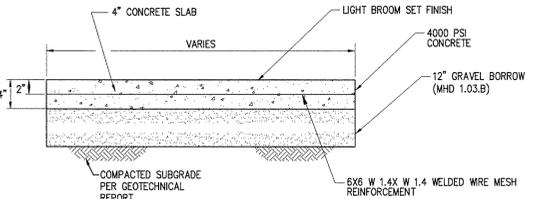


NOTES:  
1. WHERE THE ROAD PROFILE EXCEEDS 5%, THE TRANSITION LENGTH SHALL BE FIFTEEN FT. (15.0')  
\* EQUATION:  $L_n (FT) = R/Ts = 120$   
2. THE FIGURES IN THE TABLE WERE ROUNDED UP TO THE NEAREST HALF FOOT.

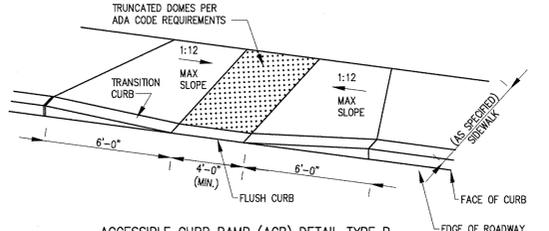
| PROFILE GRADE | % G | TRANSITION LENGTH $L_n$ (FT) |
|---------------|-----|------------------------------|
| 0             | 0   | 6.0                          |
| 1             | .05 | 7.0                          |
| 2             | .10 | 8.0                          |
| 3             | .15 | 9.5                          |
| 4             | .20 | 11.5                         |
| 5             | .25 | 15.0                         |



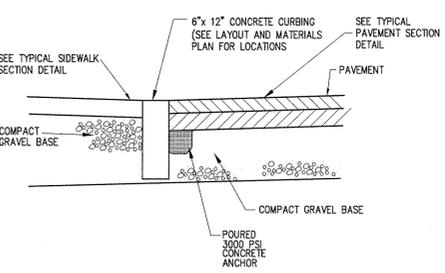
**TRANSITION CURB DETAIL**  
NOT TO SCALE



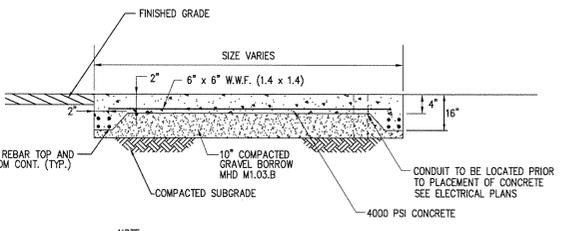
**CONCRETE SIDEWALK/WALKWAY DETAIL**  
NOT TO SCALE



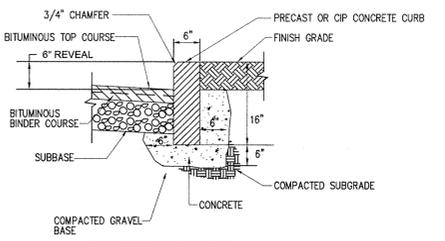
**ACCESSIBLE CURB RAMP (ACR) DETAIL-TYPE A**  
NOT TO SCALE



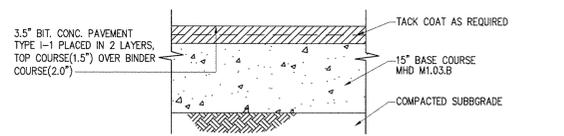
**FLUSH CONCRETE CURB**  
NOT TO SCALE



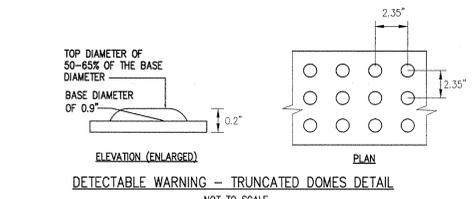
**TRANSFORMER PAD DETAIL**  
NOT TO SCALE



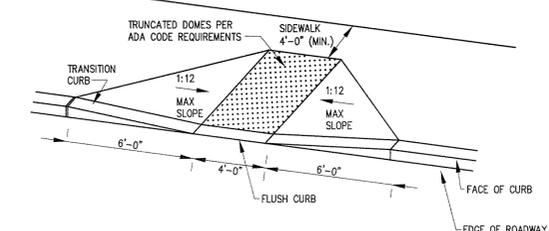
**CONCRETE CURB DETAIL**  
NOT TO SCALE



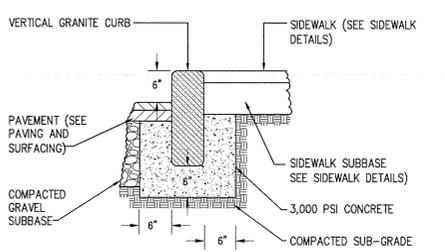
**TYPICAL PAVEMENT SECTION DETAIL**  
NOT TO SCALE



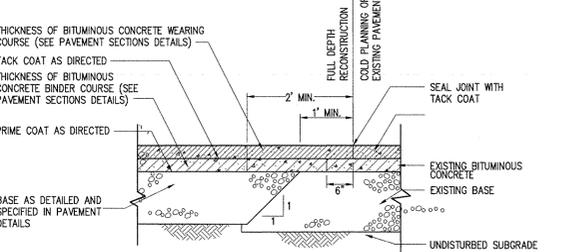
**DETECTABLE WARNING - TRUNCATED DOMES DETAIL**  
NOT TO SCALE



**ACCESSIBLE CURB RAMP (ACR) DETAIL-TYPE B**  
NOT TO SCALE



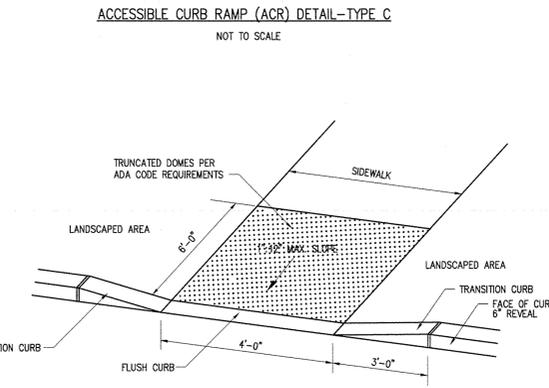
**VERTICAL GRANITE CURB DETAIL**  
NOT TO SCALE



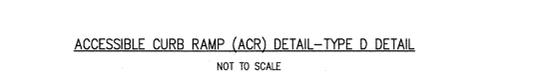
**PAVEMENT MATCHING DETAIL**  
NOT TO SCALE

- ACCESSIBLE CURB RAMP (ACR) ROUTE NOTES**
1. THE MAXIMUM ALLOWABLE ROUTE (SIDEWALK) AND CURB RAMP CROSS SLOPES SHALL BE 2.0% MAX.
  2. THE MAXIMUM ALLOWABLE SLOPE OF ACCESSIBLE ROUTE CURB RAMPS SHALL NOT EXCEED 1:12
  3. 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.)
  4. BASE OF RAMP SHALL BE GRADED TO PREVENT PONDING.
  5. SEE TYPICAL SIDEWALK SECTION FOR RAMP CONSTRUCTION.
  6. ALL SLOPING SURFACES AT WHEEL CHAIR RAMPS FOR SIDEWALKS SHALL HAVE DETECTABLE WARNING-TRUNCATED DOMES AND COLOR CONCRETE
  7. DETECTABLE WARNINGS SHALL CONSIST OF RAISED TRUNCATED DOMES WITH A DIAMETER OF NOMINAL 0.9 IN (23 MM), A HEIGHT OF NOMINAL 0.2 IN (5 MM) AND A CENTER-TO-CENTER SPACING OF NOMINAL 2.35 IN (60 MM) AND SHALL CONTRAST VISUALLY WITH ADJOINING SURFACES, EITHER LIGHT-ON-DARK, OR DARK-ON-LIGHT. THE MATERIAL USED TO PROVIDE CONTRAST SHOULD CONTRAST BY AT LEAST 70% CONTRAST IN PERCENT IS DETERMINED BY:  $CONTRAST = ((B1 - B2)/B1) \times 100$  WHERE B1 = LIGHT REFLECTANCE VALUE (LRV) OF THE LIGHTER AREA AND B2 = LIGHT REFLECTANCE VALUE (LRV) OF THE DARKER AREA. B1 SHALL NEVER EQUAL 100 AND B2 SHALL ALWAYS BE GREATER THAN 0.
  8. ALL PROPOSED WHEELCHAIR RAMPS SHALL HAVE A PEDESTRAIN WARNING SURFACE MEETING THE REQUIREMENTS OF THE ADA GUIDELINES. (SEE SPECIFICATIONS). ALL WHEELCHAIR RAMPS SHALL BE CONSTRUCTED WITH COLOR TINTED CONCRETE MEETING THE ADA GUIDELINES FOR CONTRASTING COLOR. FINAL COLOR TO BE DETERMINED BY THE ARCHITECT. ALL CONCRETE SHALL BE 4000 PSI PER ASTM C-260 AND THE PROJECT SPECIFICATIONS.
  9. AT NO TIME IS ANY PART OF THE WHEELCHAIR RAMP TO BE LOCATED OUTSIDE OF THE CROSSWALK AND IT IS TO BE CENTERED WHENEVER POSSIBLE.
  10. THE ENTRANCE OF THE WHEELCHAIR RAMP SHALL BE WITHIN 1/2' WITH THE ROADWAY.

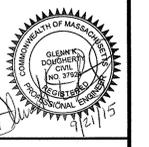
**ACCESSIBLE CURB RAMP (ACR) ROUTE NOTES**  
NOT TO SCALE



**ACCESSIBLE CURB RAMP (ACR) DETAIL-TYPE C**  
NOT TO SCALE



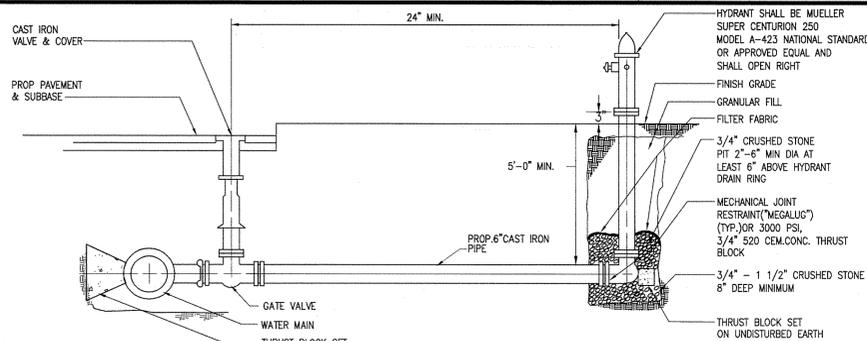
**ACCESSIBLE CURB RAMP (ACR) DETAIL-TYPE D**  
NOT TO SCALE



| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

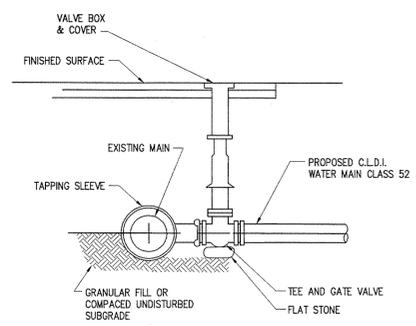
Client: Normandy A Street Residential, LLC  
Proj. Loc.: A Street and Second Avenue, Needham MA  
Project: Comprehensive Permit Plans  
2nd Avenue Residences at Needham Crossing

Project No.: 143-103813-15001  
Designed By: G.K.D.  
Drawn By: J.L.P.  
Checked By:



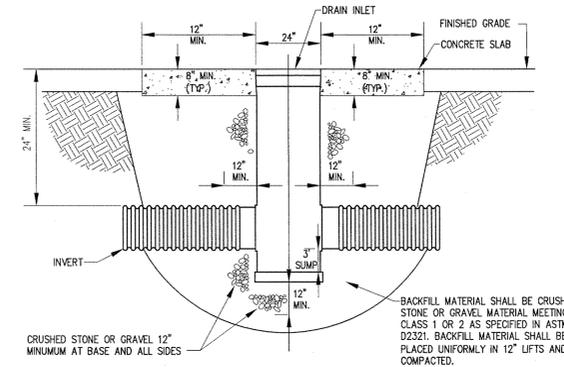
- NOTES:**
1. CONNECT TO MAIN TO BE MADE USING MEGALUG THE ROD TYPE RESTRAINT JOINT CONNECTION.
  2. HYDRANT CONNECTIONS, AND VALVES TO MEET TOWN OF NEEDHAM STANDARD.

**HYDRANT CONNECTION DETAIL**  
(TOWN OF NEEDHAM STANDARD)  
NOT TO SCALE

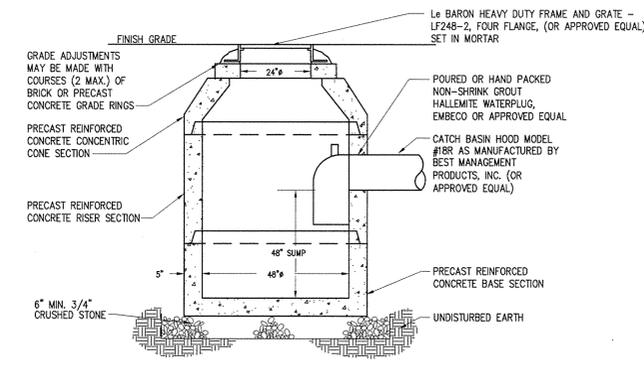


**NOTE:** COORDINATE CONNECTION AND INSTALLATION WITH TOWN OF NEEDHAM WATER DEPARTMENT. TAPPING SLEEVE AND GATE VALVE SHALL BE PER TOWN SPECIFICATIONS.

**TYPICAL WATER MAIN CONNECTION DETAIL**  
NOT TO SCALE



**24\"/>**



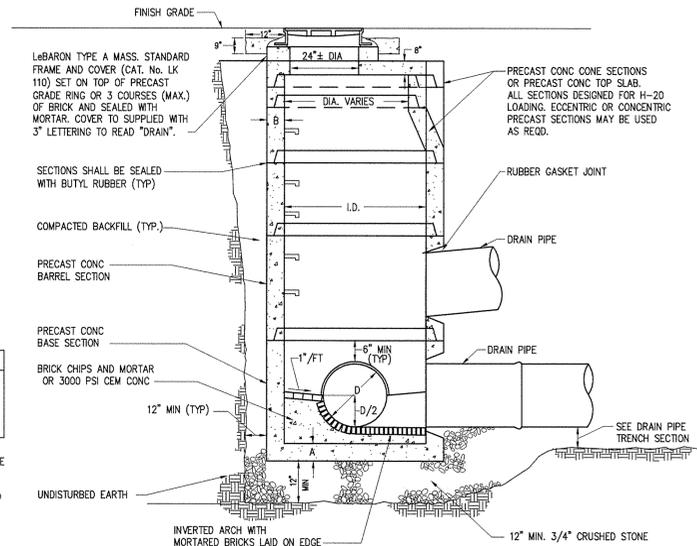
**PRECAST CONCRETE CATCH BASIN DETAIL (SITE)**  
NOT TO SCALE

| OCS    | A  | B      | C      | D      | E      |
|--------|----|--------|--------|--------|--------|
| OCS-45 | 6" | 108.00 | 105.00 | 105.00 | 105.00 |
| OCS-59 | 8" | 109.40 | 106.40 | 106.40 | 106.40 |

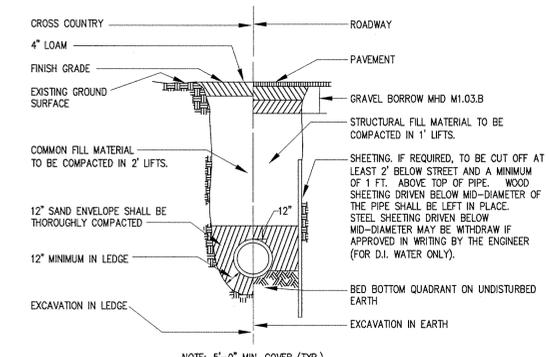
  

| I.D. (MIN) | A  | B  | D (MAX) |
|------------|----|----|---------|
| 4'-0"      | 6" | 5" | 12'-18" |
| 5'-0"      | 8" | 6" | 18'-24" |
| 6'-0"      | 8" | 6" | 24'-30" |

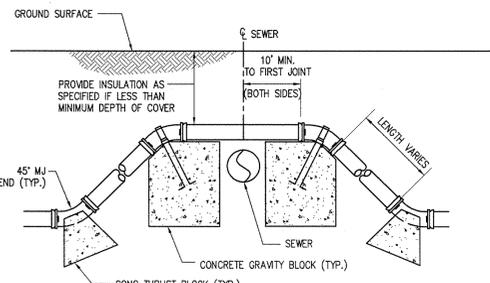
- NOTES:**
1. MANHOLE SHALL BE PRECAST CEMENT CONCRETE MANUFACTURED IN ACCORDANCE WITH ASTM C-478 DESIGNED FOR H-20 LOADING.
  2. SEE GENERAL PLANS FOR PIPE SIZES, LINES AND GRADES.



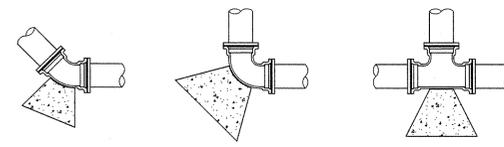
**PRECAST CONCRETE DRAIN MANHOLE DETAIL**  
NOT TO SCALE



**DUCTILE IRON PIPE WATER MAIN TRENCH DETAIL**  
NOT TO SCALE



**WATER MAIN SEWER CROSSING DETAIL**  
NOT TO SCALE



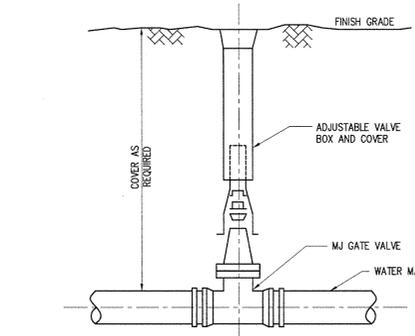
**NOTE:** ALL MAIN LINE VALVES - (OPEN RIGHT, NON RISING STEM) SIZES 3" TO 12" - (GATE VALVES) SIZES GREATER THAN 12" - (BUTTERFLY VALVES) MUELLER - KENNEDY - DARLING EPOXY COATED MUELLER RESILIENT SEAT EPOXY COATED, AWWA APPROVED

| PIPE SIZE | MINIMUM SURFACE AREA (S.F.) OF CONCRETE AGAINST UNDISTURBED EARTH |          |      |      |     |
|-----------|---|----------|------|------|-----|
|           | 11 1/4 d  | 22 1/2 d | 45 d | 90 d | TEE |
| 6"        | 0.7   | 1.0      | 2.0  | 3.0  | 2.5 |
| 8"        | 1.0   | 1.5      | 3.0  | 3.5  | 3.0 |
| 10"       | 2.0   | 2.5      | 5.0  | 7.0  | 6.0 |
| 12"       | 3.0   | 3.5      | 7.0  | 10.0 | 9.0 |

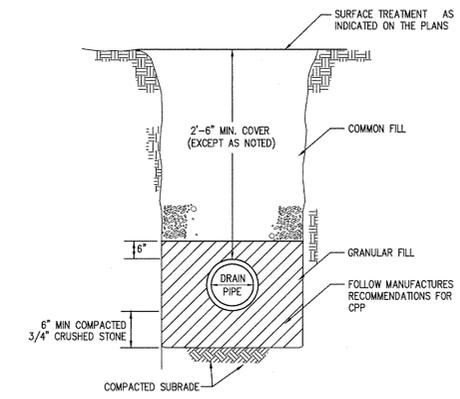
**NOTE:** PIPE FITTINGS SHALL BE AS MANUFACTURED BY U.S. PIPE SPEC. U501, U503, U505, U507, U509 OR APPROVED EQUAL.

**CONCRETE SHALL BE 3000 PSI PORTLAND TYPE II CEMENT CONCRETE MEETING MDPW SPEC M4.02.00 #1 985 AND SHALL BE PLACED SO AS TO NOT INTERFERE WITH THE JOINTS OF THE FITTING**

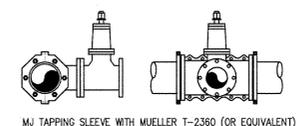
**THRUST BLOCK DETAIL**  
(TOWN OF NEEDHAM STANDARD)  
NOT TO SCALE



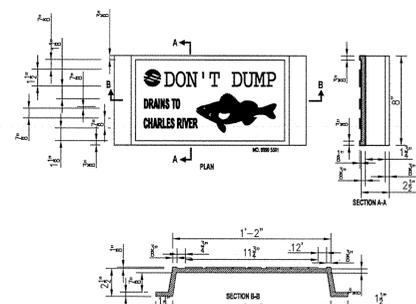
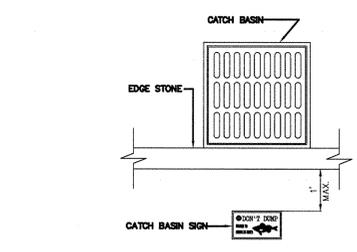
**BURIED GATE VALVE DETAIL**  
NOT TO SCALE



**DRAIN PIPE TRENCH SECTION DETAIL**  
NOT TO SCALE



**WATER MAIN UTILITY CROSSING DETAIL**  
NOT TO SCALE



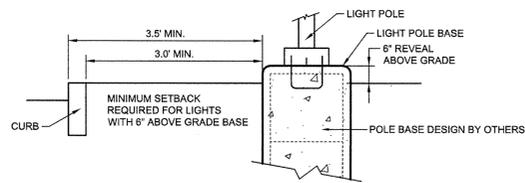
**CATCH BASIN PLAQUE**  
NOT TO SCALE



| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

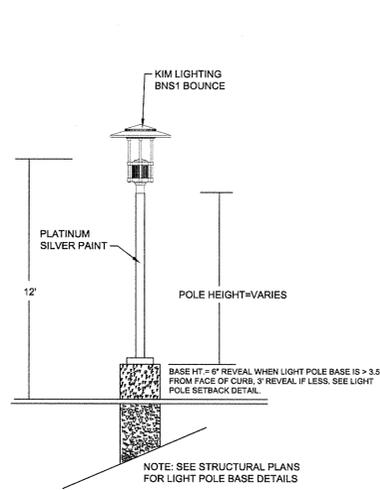
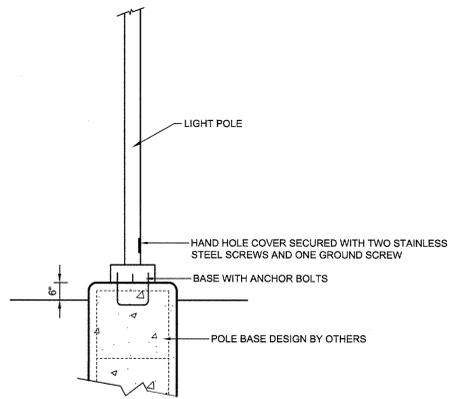
Client: Normandy A Street Residential, LLC  
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Comprehensive Permit Plans  
2nd Avenue Residences at Needham Crossing

Project No.: 143-103813-15001  
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Drawn By: J.L.P.  
Checked By:

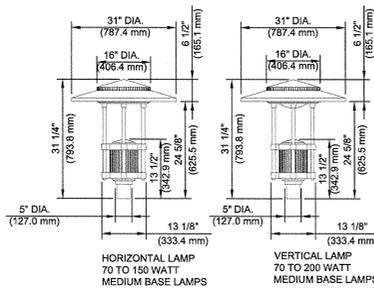
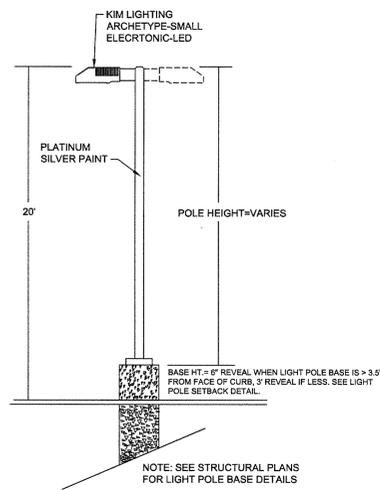


TYPICAL LIGHT POLE BASE HEIGHT ABOVE FINISH GRADE IS 6' UNLESS OTHERWISE SHOWN ON PLAN

**LIGHT POLE SETBACK**  
NOT TO SCALE

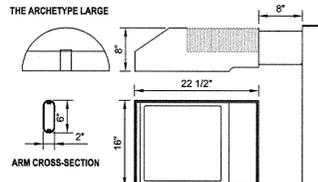


**LIGHT POLE DETAIL**  
NOT TO SCALE



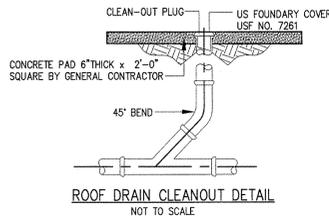
NOTES:  
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.  
2. DO NOT SCALE DRAWINGS.  
3. CONTRACTORS NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT [www.CADdetails.com/info](http://www.CADdetails.com/info) REFERENCE NUMBER 433-108.

**BNS1 BOUNCE**  
NOT TO SCALE

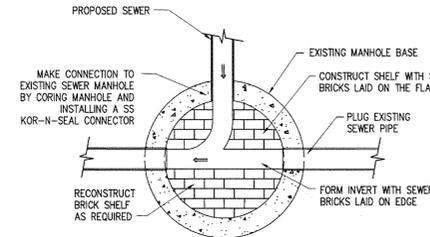


NOTES:  
1. INSTALLATION TO BE COMPLETED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.  
2. DO NOT SCALE DRAWINGS.  
3. CONTRACTORS NOTE: FOR PRODUCT AND COMPANY INFORMATION VISIT [www.CADdetails.com/info](http://www.CADdetails.com/info) REFERENCE NUMBER 433-104.

**AR THE ARCHETYPE**  
NOT TO SCALE

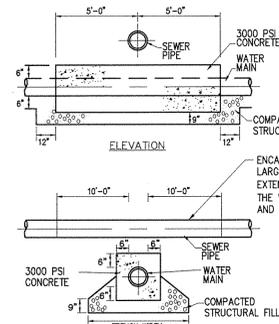


**ROOF DRAIN CLEANOUT DETAIL**  
NOT TO SCALE

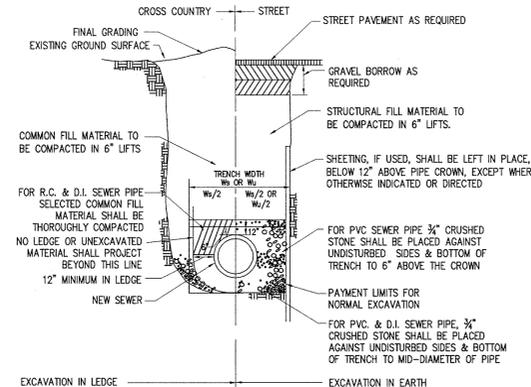


NOTE:  
CONTRACTOR TO VERIFY STRUCTURAL INTEGRITY OF THE EXISTING SEWER MANHOLE. THE CONTRACTOR SHALL CARRY A LUMP SUM ALTERNATE FOR RECONSTRUCTION OF THE MANHOLE IF CONDITIONS DICTATE.

**SEWER CONNECTION DETAIL**  
NOT TO SCALE

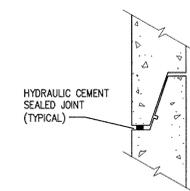


**SECTION**  
**CONCRETE SLEEVE DETAIL**  
NOT TO SCALE

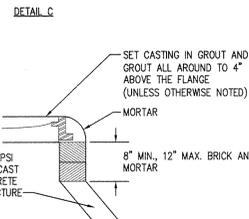


NOTE:  
ALL NON-STRUCTURAL FILL TO BE COMPACTED TO 95% OF MAXIMUM DENSITY AS PER ASTM D1557

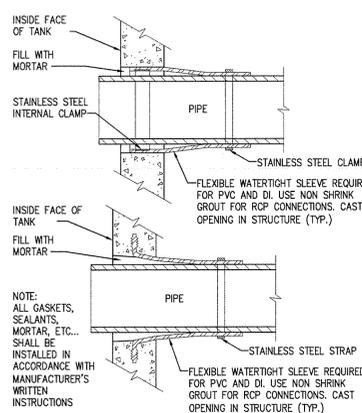
**SEWER TRENCH SECTION DETAIL**  
NOT TO SCALE



NOTE:  
ALL GASKETS AND SEALANTS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS.

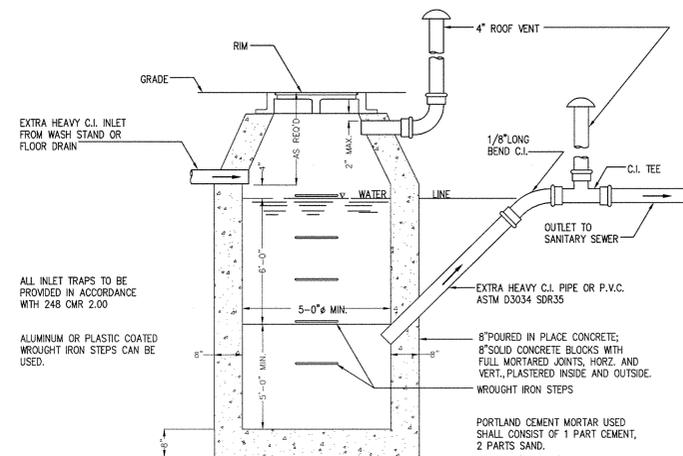


**DETAIL C**



NOTE:  
ALL GASKETS, SEALANTS, MORTARS, ETC., SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S WRITTEN INSTRUCTIONS

**DETAIL A**



ALL INLET TRAPS TO BE PROVIDED IN ACCORDANCE WITH 248 CMR 2.00

ALUMINUM OR PLASTIC COATED WROUGHT IRON STEPS CAN BE USED.

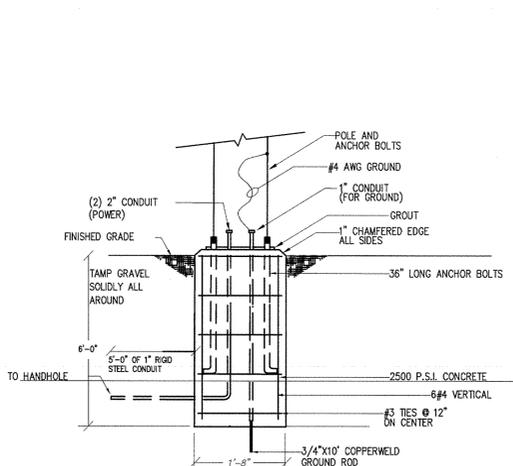
**GENERAL CONSTRUCTION NOTES:**

- BASIN TO BE LOCATED OUTSIDE OF BUILDING WHERE POSSIBLE, COVER TO HAVE A CENTER HOLE.
- A TIGHT COVER MUST BE USED IF BASIN IS LOCATED INSIDE OF BUILDING.
- OPENING SHALL BE NOT LESS THAN 24" DIA.
- THE CATCH BASIN SHALL BE SO LOCATED AND CONSTRUCTED THAT SURFACE WATER SHALL BE EXCLUDED.
- INLET PIPE SHALL BE AT LEAST FOUR INCHES ABOVE NORMAL WATER LINE.
- WHERE SUBJECT TO FROST OR CRUSHING CONDITIONS, OUTLET SHALL BE AT LEAST THREE FEET BELOW THE SURFACE.
- THE NEW CATCH BASIN MUST BE FILLED WITH CLEAN WATER BEFORE USING, AND AFTER BEING EMPTIED FOR PERIODIC CLEANING.
- ALL OIL AND GASOLINE MUST BE REMOVED BEFORE CLEANING OUT THE BASIN, AND MUST NOT BE DISCHARGED INTO THE SEWER THROUGH OTHER FIXTURES.
- SPECIFICATIONS FOR COVERING SPECIAL CASES OR CONDITIONS, SHALL BE APPROVED BY THE LOCAL AUTHORITIES, AND THE AUTHORITIES OF THE M.W.R.A.
- WROUGHT IRON STEPS SHALL BE SPACED ABOUT 18" APART.
- BOTH VENTS SHALL BE EXTENDED INDEPENDENTLY 18" ABOVE THE ROOF, OR AS APPROVED BY THE LOCAL AUTHORITIES, AND THE AUTHORITIES OF THE M.W.R.A. (OUTLET PIPE TO BE 45 DEGREE ANGLE)

NOTE:  
1. FOR INLETS LARGER THAN 10" THE DESIGN AND DIMENSIONS WILL BE DETERMINED FOR EACH PARTICULAR CASE

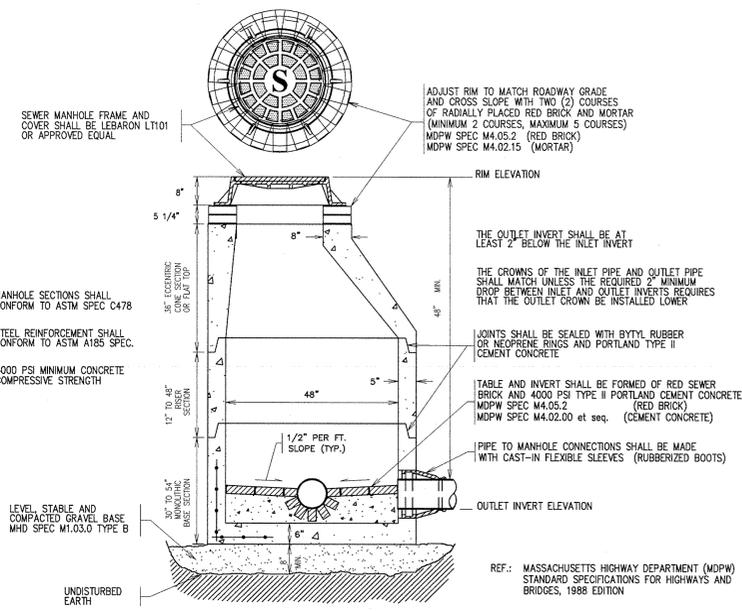
2. PRE-CAST SEPARATORS ARE TO HAVE ALL SPECIFIED HOLES EITHER CORE-BORED OR CAST IN PLACE.

**STANDARD OIL AND GREASE SEPARATOR DETAIL**  
(M.W.R.A. STANDARD DETAIL)  
NOT TO SCALE



NOTES:  
1. IT SHALL BE THE E.C. RESPONSIBILITY TO VERIFY SOIL CONDITIONS TO ESTABLISH REQUIRED DEPTH BELOW GRADE AND WITHSTAND BASE VELOCITY WINDS FOR AREAS TO BE INSTALLED.  
2. RIGID STEEL CONDUIT SHALL BE INSTALLED BY THE E.C. BENEATH ALL PAVED AREAS AND EXTENDED OUT FROM EACH POLE BASE 5'-0" AS INDICATED.  
3. POLE BASE FURNISHED & INSTALLED BY GC, CONDUIT, WIRING & GROUNDING BY EC, REFER TO LANDSCAPING DWGS FOR DETAILS.

**LIGHT BASE DETAIL**  
NOT TO SCALE



REF: MASSACHUSETTS HIGHWAY DEPARTMENT (MDPW) STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, 1988 EDITION

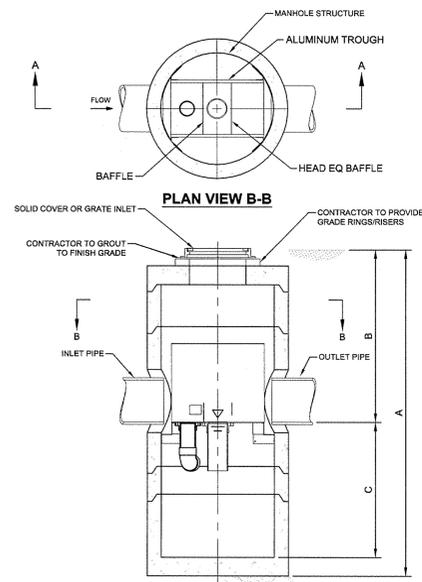
**STANDARD SEWER MANHOLE DETAIL**  
(TOWN OF NEEDHAM STANDARD)  
NOT TO SCALE



| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

Client: Normandy A Street Residential, LLC  
Proj. Loc.: A Street and Second Avenue, Needham MA  
Comprehensive Permit Plans  
2nd Avenue Residences at Needham Crossing

Project No.: 143-103813-15001  
Designed By: G.K.D.  
Drawn By: J.L.P.  
Checked By:  
Copyright: Tetra Tech

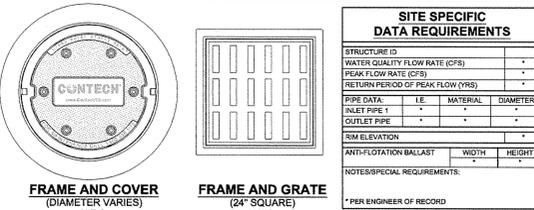


SECTION A-A

VortSentry  
THE HIGHEST QUALITY WATER QUALITY UNIT AVAILABLE  
 CONTECH CONSTRUCTION PRODUCTS

**VORTSENTRY HS DESIGN NOTES**  
 VSHS RATED TREATMENT CAPACITY IS SHOWN IN THE TABLE BELOW, OR PER LOCAL REGULATIONS. MAXIMUM HYDRAULIC INTERNAL BYPASS CAPACITY VARIES. CONTACT YOUR CONTECH REPRESENTATIVE FOR ADDITIONAL INFORMATION.  
 THE STANDARD SOLID COVER CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW.

| CONFIGURATION OPTION DESCRIPTION  |                       |      |                           |       |  |      |                                      |      |                                     |      |  |      |                            |      |
|-----------------------------------|-----------------------|------|---------------------------|-------|--|------|--------------------------------------|------|-------------------------------------|------|--|------|----------------------------|------|
| GRATE INLET (NO INLET PIPE)       |                       |      |                           |       |  |      |                                      |      |                                     |      |  |      |                            |      |
| GRATE INLET WITH INLET PIPE       |                       |      |                           |       |  |      |                                      |      |                                     |      |  |      |                            |      |
| VORTSENTRY HS GENERAL INFORMATION |                       |      |                           |       |  |      |                                      |      |                                     |      |  |      |                            |      |
| Model                             | Manhole Diameter (ID) |      | Total Treatment Flow Rate |       | Typical Total Distance Rim to Outside Bottom |      | Typical Total Distance Rim to Invert |      | Typical Depth Below Invert (inside) |      | Approximate Minimum Distance Rim to Invert |      | Maximum Pipe Diameter (ID) |      |
|                                   | FT                    | mm   | CFS                       | L/S   | FT   | m    | FT                                   | m    | FT                                  | mm   | FT   | m    | IN                         | mm   |
| HS36                              | 3                     | 900  | 0.55                      | 15.6  | 10.16  | 3.10 | 4.08                                 | 1.24 | 5.58                                | 1702 | 3.00                                       | 0.91 | 18                         | 450  |
| HS48                              | 4                     | 1200 | 1.20                      | 34.0  | 13.25  | 4.04 | 6.00                                 | 1.83 | 6.75                                | 2007 | 4.00                                       | 1.22 | 24                         | 600  |
| HS60                              | 5                     | 1500 | 2.20                      | 62.3  | 15.13  | 4.61 | 6.50                                 | 1.96 | 7.96                                | 2426 | 4.82                                       | 1.47 | 30                         | 750  |
| HS72                              | 6                     | 1800 | 3.70                      | 104.6 | 16.56  | 5.05 | 6.75                                 | 2.06 | 9.15                                | 2788 | 5.59                                       | 1.70 | 36                         | 900  |
| HS84                              | 7                     | 2100 | 5.60                      | 158.6 | 18.85  | 5.75 | 7.75                                 | 2.36 | 10.35                               | 3156 | 5.00                                       | 1.52 | 42                         | 1050 |
| HS96                              | 8                     | 2400 | 8.10                      | 229.4 | 20.87  | 6.36 | 8.50                                 | 2.59 | 11.54                               | 3518 | 6.91                                       | 2.11 | 48                         | 1200 |



**SITE SPECIFIC DATA REQUIREMENTS**

|                                  |                      |
|----------------------------------|----------------------|
| STRUCTURE ID                     |                      |
| WATER QUALITY FLOW RATE (CFS)    | *                    |
| PEAK FLOW RATE (CFS)             | *                    |
| RETURN PERIOD OF PEAK FLOW (YRS) | *                    |
| PIPE DATA                        | IE MATERIAL DIAMETER |
| INLET PIPE 1                     | * * *                |
| OUTLET PIPE                      | * * *                |
| RIM ELEVATION                    | *                    |
| ANTI-FLOTATION BALLAST           | WIDTH HEIGHT         |
| NOTES/SPECIAL REQUIREMENTS:      | *                    |
| * PER ENGINEER OF RECORD         |                      |

**GENERAL NOTES**

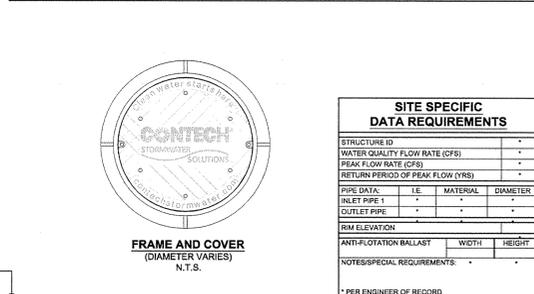
- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. [www.contech.com](http://www.contech.com)
- VORTSENTRY HS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M308 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.

**INSTALLATION NOTES**

- ANY SUB-BASE, BACKFILL, DEPTH AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE VORTSENTRY HS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH VORTSENTRY HS WATER QUALITY UNIT (WQU)  
 NOT TO SCALE

**CDS2015-4-C DESIGN NOTES**  
 CDS2015-4-C RATED TREATMENT CAPACITY IS 1.4 CFS, OR PER LOCAL REGULATIONS.  
 THE STANDARD CDS2015-4-C CONFIGURATION IS SHOWN. ALTERNATE CONFIGURATIONS ARE AVAILABLE AND ARE LISTED BELOW. SOME CONFIGURATIONS MAY BE COMBINED TO SUIT SITE REQUIREMENTS.



**SITE SPECIFIC DATA REQUIREMENTS**

|                                  |                      |
|----------------------------------|----------------------|
| STRUCTURE ID                     |                      |
| WATER QUALITY FLOW RATE (CFS)    | *                    |
| PEAK FLOW RATE (CFS)             | *                    |
| RETURN PERIOD OF PEAK FLOW (YRS) | *                    |
| PIPE DATA                        | IE MATERIAL DIAMETER |
| INLET PIPE 1                     | * * *                |
| OUTLET PIPE                      | * * *                |
| RIM ELEVATION                    | *                    |
| ANTI-FLOTATION BALLAST           | WIDTH HEIGHT         |
| NOTES/SPECIAL REQUIREMENTS:      | *                    |
| * PER ENGINEER OF RECORD         |                      |

**GENERAL NOTES**

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- DIMENSIONS MARKED WITH ( ) ARE REFERENCE DIMENSIONS. ACTUAL DIMENSIONS MAY VARY.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHTS, PLEASE CONTACT YOUR CONTECH CONSTRUCTION PRODUCTS REPRESENTATIVE. [www.contech.com](http://www.contech.com)
- CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING.
- STRUCTURE SHALL MEET AASHTO HS20 AND CASTINGS SHALL MEET AASHTO M308 LOAD RATING, ASSUMING GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION.
- PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.

**INSTALLATION NOTES**

- ANY SUB-BASE, BACKFILL, DEPTH AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO ADD JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS, AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT PIPES. MATCH PIPE INVERTS WITH ELEVATIONS SHOWN.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

CONTECH CDS2015-4-C WATER QUALITY UNIT (WQU)  
 NOT TO SCALE



| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

Client: Normandy A Street Residential, LLC  
 Proj. Loc.: A Street and Second Avenue, Needham MA  
 Comprehensive Permit Plans  
 2nd Avenue Residences at Needham Crossing

Project No.: 143-103813-15001  
 Designed By: G.K.D.  
 Drawn By: J.L.P.  
 Checked By:

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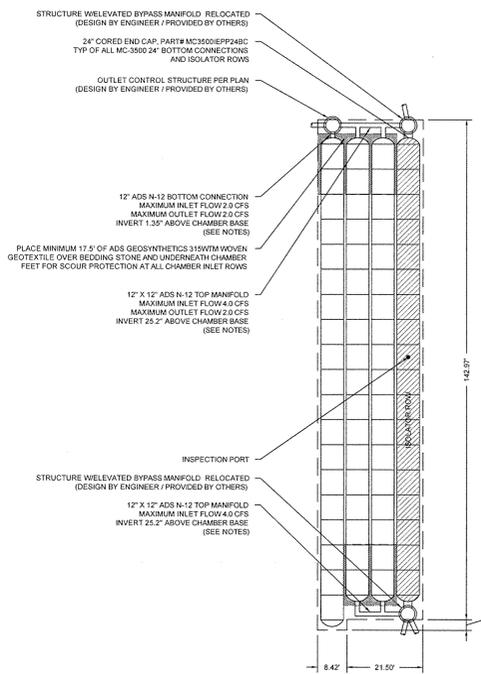
9/6/2015 4:35:53 PM - P:\103813\145-103813-1500\CAD\DWG\DETAIL SHEETS\STORMTECH RECHARGE AREAS 408.DWG - PAPPAS, JUD

**PROPOSED LAYOUT: RECHARGE AREA 8**

(7) STORMTECH MC-3500 CHAMBERS  
(8) STORMTECH MC-3500 END CAPS  
INSTALLED WITH 12" COVER STONE, 12" BASE STONE, 35% STONE VOID  
INSTALLED SYSTEM VOLUME: 12,448 CF (PERIMETER STONE INCLUDED, TO TOP OF CHAMBER)  
AREA OF SYSTEM: 4,303 FT<sup>2</sup>  
PERIMETER OF SYSTEM: 393 FT

**PROPOSED ELEVATIONS: RECHARGE AREA 8**

|   |        |
|---|--------|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT UNPAVED):        | 105.71 |
| MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):           | 100.21 |
| MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):             | 99.71  |
| MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):      | 99.71  |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 99.71  |
| TOP OF STONE:   | 99.71  |
| TOP OF CHAMBER:   | 97.71  |
| 12" TOP MANFOLD INVERT:                                   | 96.05  |
| 24" ISOLATOR ROW INVERT:                                  | 94.13  |
| 12" BOTTOM MANFOLD INVERT:                                | 94.07  |
| BOTTOM OF CHAMBER:  | 93.96  |
| BOTTOM OF STONE:  | 92.99  |



STRUCTURE W/ELEVATED BYPASS MANFOLD RELOCATED (DESIGN BY ENGINEER / PROVIDED BY OTHERS)  
 24" CORED END CAP, PART# MC3500EPP24BC  
 TYP OF ALL MC-3500 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS  
 OUTLET CONTROL STRUCTURE PER PLAN (DESIGN BY ENGINEER / PROVIDED BY OTHERS)

12" ADS N-12 BOTTOM CONNECTION  
 MAXIMUM INLET FLOW 2.0 CFS  
 MAXIMUM OUTLET FLOW 2.0 CFS  
 INVERT 1.35' ABOVE CHAMBER BASE (SEE NOTES)  
 PLACE MINIMUM 17.5' OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS  
 12" X 12" ADS N-12 TOP MANFOLD  
 MAXIMUM INLET FLOW 4.0 CFS  
 MAXIMUM OUTLET FLOW 2.0 CFS  
 INVERT 25.2' ABOVE CHAMBER BASE (SEE NOTES)

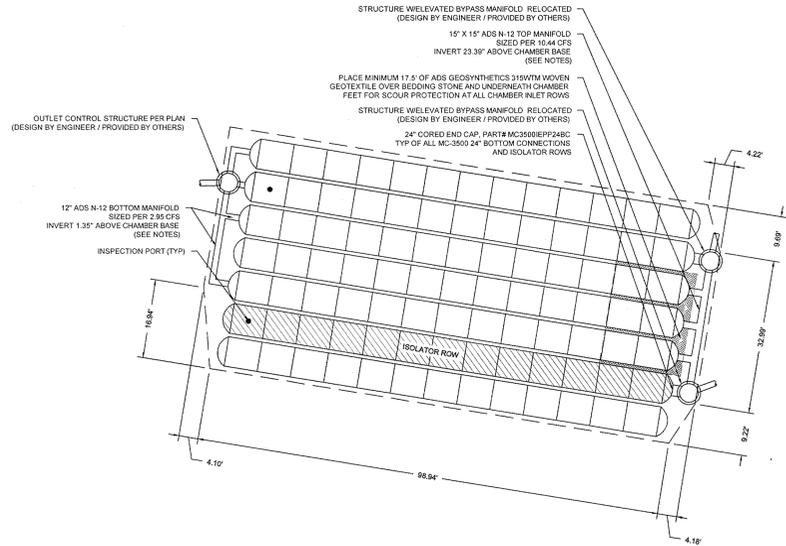
INSPECTION PORT  
 STRUCTURE W/ELEVATED BYPASS MANFOLD RELOCATED (DESIGN BY ENGINEER / PROVIDED BY OTHERS)  
 12" X 12" ADS N-12 TOP MANFOLD  
 MAXIMUM INLET FLOW 4.0 CFS  
 INVERT 25.2' ABOVE CHAMBER BASE (SEE NOTES)

**PROPOSED LAYOUT: RECHARGE AREA 10**

(9) STORMTECH MC-3500 CHAMBERS  
(14) STORMTECH MC-3500 END CAPS  
INSTALLED WITH 12" COVER STONE, 12" BASE STONE, 35% STONE VOID  
INSTALLED SYSTEM VOLUME: 15,766 CF (PERIMETER STONE INCLUDED, TO TOP OF CHAMBER)  
AREA OF SYSTEM: 5,490 FT<sup>2</sup>  
PERIMETER OF SYSTEM: 308 FT

**PROPOSED ELEVATIONS: RECHARGE AREA 10**

|   |        |
|---|--------|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT UNPAVED):        | 108.81 |
| MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):           | 101.31 |
| MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):             | 100.81 |
| MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):      | 100.81 |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 100.81 |
| TOP OF STONE:   | 99.81  |
| TOP OF CHAMBER:   | 98.81  |
| 15" TOP MANFOLD INVERT:                                   | 97.81  |
| 24" ISOLATOR ROW INVERT:                                  | 95.23  |
| 12" BOTTOM MANFOLD INVERT:                                | 95.17  |
| BOTTOM OF CHAMBER:  | 95.06  |
| BOTTOM OF STONE:  | 94.06  |



OUTLET CONTROL STRUCTURE PER PLAN (DESIGN BY ENGINEER / PROVIDED BY OTHERS)  
 12" ADS N-12 BOTTOM MANFOLD  
 SIZED PER 2.00 CFS  
 INVERT 1.35' ABOVE CHAMBER BASE (SEE NOTES)  
 INSPECTION PORT (TYP)

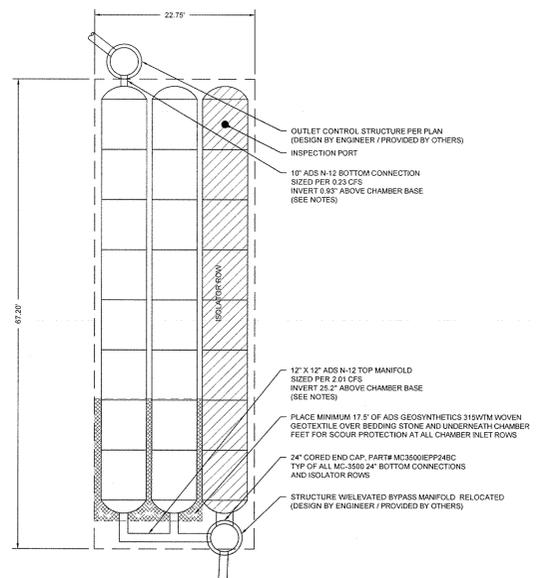
STRUCTURE W/ELEVATED BYPASS MANFOLD RELOCATED (DESIGN BY ENGINEER / PROVIDED BY OTHERS)  
 15" X 15" ADS N-12 TOP MANFOLD  
 SIZED PER 10.44 CFS  
 INVERT 23.35' ABOVE CHAMBER BASE (SEE NOTES)  
 PLACE MINIMUM 17.5' OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS  
 STRUCTURE W/ELEVATED BYPASS MANFOLD RELOCATED (DESIGN BY ENGINEER / PROVIDED BY OTHERS)  
 24" CORED END CAP, PART# MC3500EPP24BC  
 TYP OF ALL MC-3500 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS

**PROPOSED LAYOUT: RECHARGE AREA 9**

(24) STORMTECH MC-3500 CHAMBERS  
(6) STORMTECH MC-3500 END CAPS  
INSTALLED WITH 12" COVER STONE, 12" BASE STONE, 35% STONE VOID  
INSTALLED SYSTEM VOLUME: 4,313 CF (PERIMETER STONE INCLUDED, TO TOP OF CHAMBER)  
AREA OF SYSTEM: 1,528 FT<sup>2</sup>  
PERIMETER OF SYSTEM: 179 FT

**PROPOSED ELEVATIONS: RECHARGE AREA 9**

|   |        |
|---|--------|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT UNPAVED):        | 108.27 |
| MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):           | 100.77 |
| MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):             | 100.27 |
| MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):      | 100.27 |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 100.27 |
| TOP OF STONE:   | 99.27  |
| TOP OF CHAMBER:   | 98.27  |
| 12" TOP MANFOLD INVERT:                                   | 96.62  |
| 24" ISOLATOR ROW INVERT:                                  | 94.69  |
| 12" BOTTOM CONNECTION INVERT:                             | 94.60  |
| BOTTOM OF CHAMBER:  | 94.52  |
| BOTTOM OF STONE:  | 93.52  |



OUTLET CONTROL STRUCTURE PER PLAN (DESIGN BY ENGINEER / PROVIDED BY OTHERS)  
 INSPECTION PORT  
 10" ADS N-12 BOTTOM CONNECTION  
 SIZED PER 0.50 CFS  
 INVERT 0.93' ABOVE CHAMBER BASE (SEE NOTES)

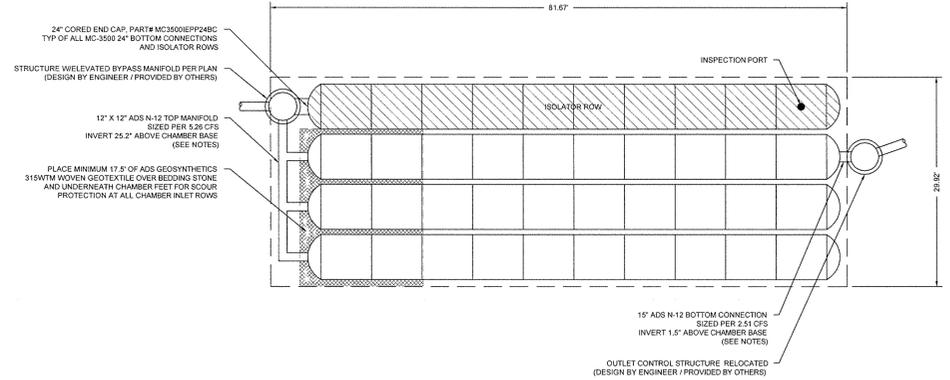
12" X 12" ADS N-12 TOP MANFOLD  
 SIZED PER 2.01 CFS  
 INVERT 21.2' ABOVE CHAMBER BASE (SEE NOTES)  
 PLACE MINIMUM 17.5' OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS  
 24" CORED END CAP, PART# MC3500EPP24BC  
 TYP OF ALL MC-3500 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS  
 STRUCTURE W/ELEVATED BYPASS MANFOLD RELOCATED (DESIGN BY ENGINEER / PROVIDED BY OTHERS)

**PROPOSED LAYOUT: RECHARGE AREA 11**

(40) STORMTECH MC-3500 CHAMBERS  
(8) STORMTECH MC-3500 END CAPS  
INSTALLED WITH 12" COVER STONE, 12" BASE STONE, 35% STONE VOID  
INSTALLED SYSTEM VOLUME: 8,977 CF (PERIMETER STONE INCLUDED, TO TOP OF CHAMBER)  
AREA OF SYSTEM: 2,443 FT<sup>2</sup>  
PERIMETER OF SYSTEM: 223 FT

**PROPOSED ELEVATIONS: RECHARGE AREA 11**

|   |        |
|---|--------|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT UNPAVED):        | 108.75 |
| MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):           | 101.25 |
| MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):             | 100.75 |
| MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):      | 100.75 |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 100.75 |
| TOP OF STONE:   | 99.75  |
| TOP OF CHAMBER:   | 98.75  |
| 12" TOP MANFOLD INVERT:                                   | 97.10  |
| 24" ISOLATOR ROW INVERT:                                  | 95.17  |
| 15" BOTTOM CONNECTION INVERT:                             | 95.13  |
| BOTTOM OF CHAMBER:  | 95.00  |
| BOTTOM OF STONE:  | 94.00  |



12" X 12" ADS N-12 TOP MANFOLD  
 SIZED PER 5.26 CFS  
 INVERT 25.2' ABOVE CHAMBER BASE (SEE NOTES)  
 PLACE MINIMUM 17.5' OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS  
 15" ADS N-12 BOTTOM CONNECTION  
 SIZED PER 0.51 CFS  
 INVERT 1.5' ABOVE CHAMBER BASE (SEE NOTES)  
 OUTLET CONTROL STRUCTURE RELOCATED (DESIGN BY ENGINEER / PROVIDED BY OTHERS)

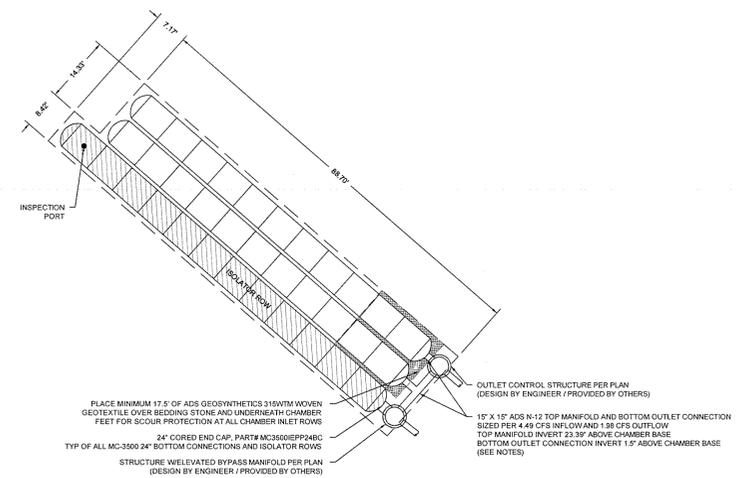
STRUCTURE W/ELEVATED BYPASS MANFOLD PER PLAN (DESIGN BY ENGINEER / PROVIDED BY OTHERS)  
 24" CORED END CAP, PART# MC3500EPP24BC  
 TYP OF ALL MC-3500 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS

**PROPOSED LAYOUT: RECHARGE AREA 12**

(34) STORMTECH MC-3500 CHAMBERS  
(6) STORMTECH MC-3500 END CAPS  
INSTALLED WITH 12" COVER STONE, 12" BASE STONE, 35% STONE VOID  
INSTALLED SYSTEM VOLUME: 4,842 CF (PERIMETER STONE INCLUDED, TO TOP OF CHAMBER)  
AREA OF SYSTEM: 2,076 FT<sup>2</sup>  
PERIMETER OF SYSTEM: 237 FT

**PROPOSED ELEVATIONS: RECHARGE AREA 12**

|   |        |
|---|--------|
| MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT UNPAVED):        | 104.71 |
| MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):           | 99.21  |
| MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):             | 98.71  |
| MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):      | 98.71  |
| MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT): | 98.71  |
| TOP OF STONE:   | 97.71  |
| TOP OF CHAMBER:   | 96.71  |
| 15" TOP MANFOLD INVERT:                                   | 94.94  |
| 24" ISOLATOR ROW INVERT:                                  | 93.13  |
| 15" BOTTOM CONNECTION INVERT:                             | 93.09  |
| BOTTOM OF CHAMBER:  | 92.99  |
| BOTTOM OF STONE:  | 91.99  |



INSPECTION PORT  
 PLACE MINIMUM 17.5' OF ADS GEOSYNTHETICS 315WTM WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS  
 15" X 15" ADS N-12 TOP MANFOLD AND BOTTOM OUTLET CONNECTION  
 SIZED PER 4.49 CFS INFLOW AND 1.98 CFS OUTFLOW  
 TOP MANFOLD INVERT 33.35' ABOVE CHAMBER BASE  
 BOTTOM OUTLET CONNECTION INVERT 1.5' ABOVE CHAMBER BASE (SEE NOTES)  
 STRUCTURE W/ELEVATED BYPASS MANFOLD PER PLAN (DESIGN BY ENGINEER / PROVIDED BY OTHERS)

STRUCTURE W/ELEVATED BYPASS MANFOLD PER PLAN (DESIGN BY ENGINEER / PROVIDED BY OTHERS)  
 24" CORED END CAP, PART# MC3500EPP24BC  
 TYP OF ALL MC-3500 24" BOTTOM CONNECTIONS AND ISOLATOR ROWS



| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

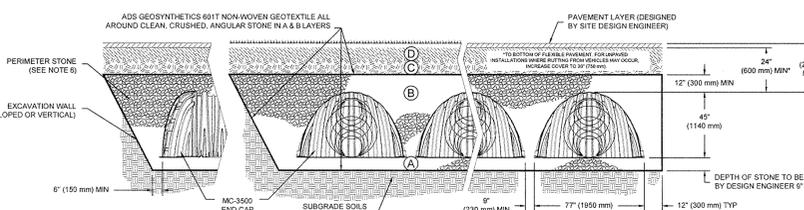
Client: Normandy A Street Residential, LLC  
 Proj. Loc.: A Street and Second Avenue, Needham MA  
 Comprehensive Permit Plans  
 2nd Avenue Residence at Needham Crossing  
 Stormtech Recharge Area Details

Project No: 143-103813-15001  
 Designed By: G.K.D.  
 Drawn By: J.L.P.  
 Checked By:

ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

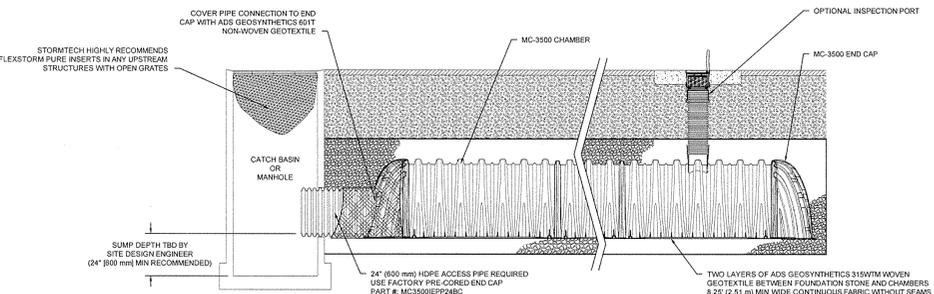
| MATERIAL LOCATION | DESCRIPTION  | AASHTO MATERIAL CLASSIFICATIONS  | COMPACTION / DENSITY REQUIREMENT  |
|-------------------|--|--|---|
| D                 | FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBGRADE MAY BE PART OF THE 'D' LAYER. | 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 (E) LAYER TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBGRADE MAY BE A PART OF THE 'C' LAYER.   | AASHTO M145<br>A-1, A-2, A-3<br>OR<br>AASHTO M31<br>3, 3.57, 4, 4.07, 5.56, 5.7, 6, 6.7, 6.8, 7, 7.6, 8.0, 9, 10 | BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 98% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 90% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. |
| B                 | EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE (A) LAYERS TO THE 'C' LAYER ABOVE.  | CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4" (20-50 mm)                                 | PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. **   |
| A                 | FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.  | CLEAN, CRUSHED, ANGULAR STONE, NOMINAL SIZE DISTRIBUTION BETWEEN 3/4" (20-50 mm)                                 | PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. **   |

PLEASE NOTE:  
 1. THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M4) STONE."  
 2. STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR. EQUIPMENT FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.



NOTES:

- MC-3500 CHAMBERS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F2418 "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- "ACCEPTABLE FILL MATERIALS" TABLE ABOVE PROVIDES MATERIAL LOCATIONS, DESCRIPTIONS, GRADATIONS, AND COMPACTION REQUIREMENTS FOR FOUNDATION, EMBEDMENT, AND FILL MATERIALS.
- THE "SITE DESIGN ENGINEER" REFERS TO THE ENGINEER RESPONSIBLE FOR THE DESIGN AND LAYOUT OF THE STORMTECH CHAMBERS FOR THIS PROJECT.
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- ONCE LAYER 'C' IS PLACED, ANY SOLID MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBGRADE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



INSPECTION & MAINTENANCE

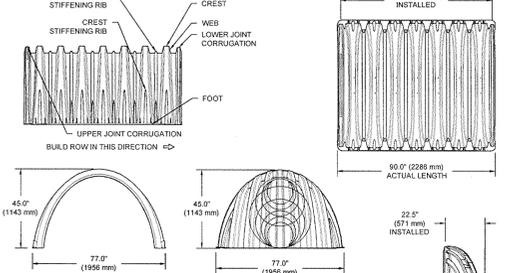
- STEP 1) INSPECT ISOLATOR ROW FOR SEDIMENT
- INSPECTION PORTS (IF PRESENT)
  - REMOVE/OPEN LID ON NYLOPLAST RAISE DRAM
  - REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
  - USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
  - LOWER A CAMERA INTO ISOLATOR ROW FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
  - IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2; IF NOT, PROCEED TO STEP 3.
- B) ALL ISOLATOR ROWS
- REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW
    - USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW THROUGH OUTLET PIPE
    - MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
    - FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
    - IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2; IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW USING THE JETVAC PROCESS
- A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45° (1.1 m) OR MORE IS PREFERRED
  - APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
  - VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS. RECORD OBSERVATIONS AND ACTIONS
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM

NOTES

- INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
- CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.

NOTES:  
 1. INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION VALLEY  
 2. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED.

MC-3500 TECHNICAL SPECIFICATION



NOMINAL CHAMBER SPECIFICATIONS

| SIZE (W X H X INSTALLED LENGTH)                     | WEIGHT                     |
|---|----------------------------|
| 77.0" X 45.0" X 86.0" (1956 mm X 1143 mm X 2184 mm) | 109.9 CUBIC FEET (3.11 m³) |
| MINIMUM INSTALLED STORAGE*                          | 178.9 CUBIC FEET (5.06 m³) |
|   | 135.0 lbs. (61.2 kg)       |

NOMINAL END CAP SPECIFICATIONS

| SIZE (W X H X INSTALLED LENGTH)                    | WEIGHT                    |
|--|---------------------------|
| 77.0" X 45.0" X 22.5" (1956 mm X 1143 mm X 571 mm) | 14.9 CUBIC FEET (0.42 m³) |
| END CAP STORAGE                                    | 46.0 CUBIC FEET (1.30 m³) |
| MINIMUM INSTALLED STORAGE*                         | 50.0 lbs. (22.7 kg)       |

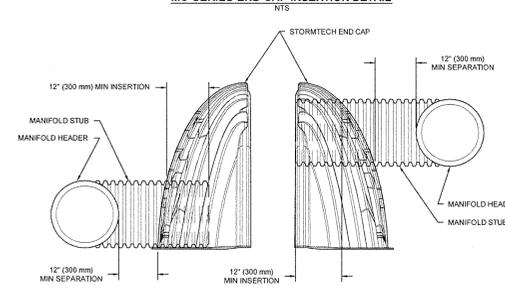
\*ASSUMES 12" (305 mm) STONE ABOVE, 6" (150 mm) STONE FOUNDATION AND BETWEEN CHAMBERS, 12" (305 mm) STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
 STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

| PART #       | STUB         | B               | C             |
|--------------|--------------|-----------------|---------------|
| MC3500EPP08T | 6" (150 mm)  | 33.21" (844 mm) | 0.60" (17 mm) |
| MC3500EPP08B | —            | —               | —             |
| MC3500EPP08T | 8" (200 mm)  | 31.16" (791 mm) | 0.81" (21 mm) |
| MC3500EPP08B | —            | —               | —             |
| MC3500EPP10T | 10" (250 mm) | 29.04" (738 mm) | 0.85" (24 mm) |
| MC3500EPP10B | —            | —               | —             |
| MC3500EPP12T | 12" (300 mm) | 26.38" (670 mm) | 1.35" (34 mm) |
| MC3500EPP12B | —            | —               | —             |
| MC3500EPP15T | 15" (375 mm) | 23.39" (594 mm) | 1.50" (38 mm) |
| MC3500EPP15B | —            | —               | —             |
| MC3500EPP18T | 18" (450 mm) | 20.03" (509 mm) | 1.77" (45 mm) |
| MC3500EPP18B | —            | —               | —             |
| MC3500EPP24T | 24" (600 mm) | 14.48" (368 mm) | 2.00" (52 mm) |
| MC3500EPP24B | —            | —               | —             |
| MC3500EPP30B | 30" (750 mm) | —               | —             |

NOTE: ALL DIMENSIONS ARE NOMINAL  
 CUSTOM PRECURED INVERTS ARE AVAILABLE UPON REQUEST. INVERTED MANIFOLDS INCLUDE 12" (305 mm) MIN SIZE ON SIZE AND 15" (381 mm) TO 20" (508 mm) ECCENTRIC MANIFOLDS. CUSTOM INVERT LOCATIONS ON THE MC-3500 END CAP CUT IN THE FIELD ARE NOT RECOMMENDED FOR PIPE SIZES GREATER THAN 10" (250 mm). THE INVERT LOCATION IN COLUMN 'B' ARE THE HIGHEST POSSIBLE FOR THE PIPE SIZE.

MC-SERIES END CAP INSERTION DETAIL



NOTE: MANIFOLD STUB MUST BE LAD HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

STORMWATER CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-3500 OR APPROVED EQUAL.
- CHAMBERS SHALL BE MADE FROM VIRGIN, IMPACT MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORT PANELS THAT WOULD IMPIDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- CHAMBERS SHALL BE DESIGNED AND ALLOWABLE LOADS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. THE CHAMBER MANUFACTURER SHALL SUBMIT THE FOLLOWING UPON REQUEST TO THE SITE DESIGN ENGINEER FOR APPROVAL, BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE:
  - A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.35 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD. THE MINIMUM REQUIRED BY ASTM F2787 AND BY AASHTO FOR THERMOPLASTIC PIPE.
  - A STRUCTURAL EVALUATION SEALED BY A REGISTERED PROFESSIONAL ENGINEER THAT DEMONSTRATES THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET. THE 50 YEAR GRIFF MODULUS DATA SPECIFIED IN ASTM F2418 MUST BE USED AS PART OF THE AASHTO STRUCTURAL EVALUATION TO VERIFY LONG-TERM PERFORMANCE.
  - STRUCTURAL CROSS SECTION DETAIL ON WHICH THE STRUCTURAL EVALUATION IS BASED.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

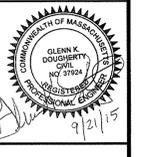
- STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500MC-4500 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONEHOOTER LOCATED OVER THE CHAMBER BED
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOSE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELLED AND COMPACTED PRIOR TO PLACING STONE.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4" (20-50 mm) MEETING THE AASHTO M43 DESIGNATION OF #3 OR #4.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- ADS RECOMMENDS THE USE OF 'FLEXSTORM CATCH IT' INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500MC-4500 CONSTRUCTION GUIDE".
  - THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
    - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
    - NO RUBBER TIRE LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500MC-4500 CONSTRUCTION GUIDE".
    - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500MC-4500 CONSTRUCTION GUIDE".
  - FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.
- USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.
- CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

NOTES

- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH SHEET #7 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THE SITE DESIGN ENGINEER MUST REVIEW THE PROXIMITY OF THE CHAMBERS TO THE BUILDING STRUCTURE. NO FOUNDATION LOADS SHALL BE TRANSMITTED TO THE CHAMBERS. THE SITE DESIGN ENGINEER MUST CONSIDER EFFECTS OF POSSIBLE SATURATED SOILS ON BEARING CAPACITY OF SOILS AND SEEPAGE INTO BASEMENTS.



| MARK | DATE    | DESCRIPTION                             |
|------|---------|---|
| 1    | 9-21-15 | COMPREHENSIVE PERMIT APPLICATION FILING |

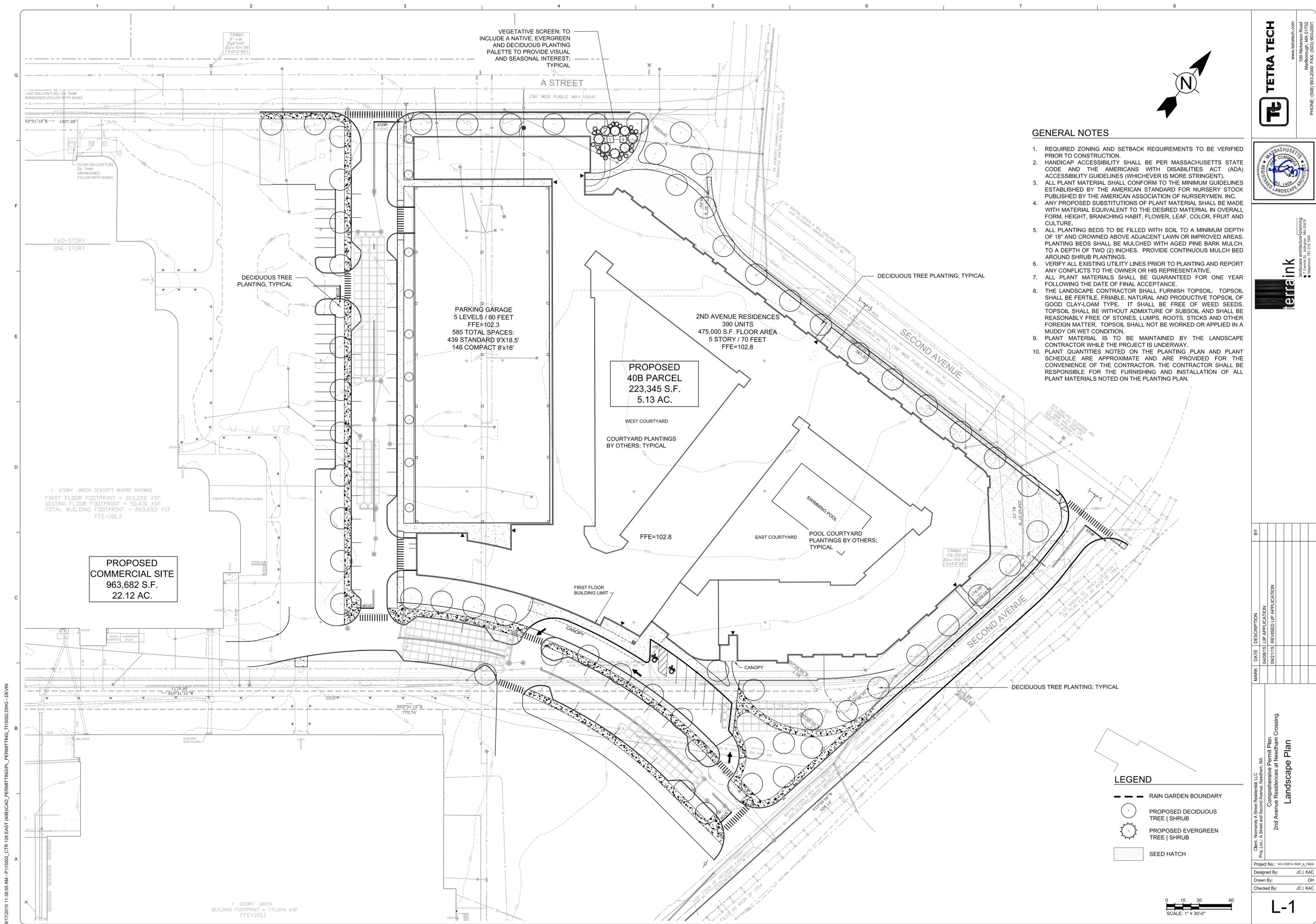
| BY | DATE | DESCRIPTION |
|----|------|-------------|
|    |      |             |

Client: Normandy A Street Residential, LLC  
 Proj. Loc.: A Street and Second Avenue, Needham MA  
 Comprehensive Permit Plans  
 2nd Avenue Residence at Needham Crossing

Stormtech Recharge Area Details

Project No.: 143-103813-15001  
 Designed By: G.K.D.  
 Drawn By: J.L.P.  
 Checked By:

C-13  
 Copyright: Tetra Tech  
 Bar Measures 1 inch



**GENERAL NOTES**

1. REQUIRED ZONING AND SETBACK REQUIREMENTS TO BE VERIFIED PRIOR TO CONSTRUCTION.
2. HANDICAP ACCESSIBILITY SHALL BE PER MASSACHUSETTS STATE CODE AND THE AMERICANS WITH DISABILITIES ACT (ADA) ACCESSIBILITY GUIDELINES (WHICHEVER IS MORE STRINGENT).
3. ALL PLANT MATERIAL SHALL CONFORM TO THE MINIMUM GUIDELINES ESTABLISHED BY THE AMERICAN STANDARD FOR NURSERY STOCK PUBLISHED BY THE AMERICAN ASSOCIATION OF NURSERYMEN, INC.
4. ANY PROPOSED SUBSTITUTIONS OF PLANT MATERIAL SHALL BE MADE WITH MATERIAL EQUIVALENT TO THE DESIRED MATERIAL IN OVERALL FORM, HEIGHT, BRANCHING HABIT, FLOWER, LEAF, COLOR, FRUIT AND CULTURE.
5. ALL PLANTING BEDS TO BE FILLED WITH SOIL TO A MINIMUM DEPTH OF 18" AND CROWNED ABOVE ADJACENT LAWN OR IMPROVED AREAS. PLANTING BEDS SHALL BE MULCHED WITH AGED PINE BARK MULCH, TO A DEPTH OF TWO (2) INCHES. PROVIDE CONTINUOUS MULCH BED AROUND SHRUB PLANTINGS.
6. VERIFY ALL EXISTING UTILITY LINES PRIOR TO PLANTING AND REPORT ANY CONFLICTS TO THE OWNER OR HIS REPRESENTATIVE.
7. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING THE DATE OF FINAL ACCEPTANCE.
8. THE LANDSCAPE CONTRACTOR SHALL FURNISH TOPSOIL. TOPSOIL SHALL BE FERTILE, FRIABLE, NATURAL AND PRODUCTIVE TOPSOIL OF GOOD CLAY-LOAM TYPE. IT SHALL BE FREE OF WEED SEEDS, TOPSOIL SHALL BE WITHOUT ADMXTURE OF SUBSOIL AND SHALL BE REASONABLY FREE OF STONES, LUMPS, ROOTS, STICKS AND OTHER FOREIGN MATTER. TOPSOIL SHALL NOT BE WORKED OR APPLIED IN A MUDDY OR WET CONDITION.
9. PLANT MATERIAL IS TO BE MAINTAINED BY THE LANDSCAPE CONTRACTOR WHILE THE PROJECT IS UNDERWAY.
10. PLANT QUANTITIES NOTED ON THE PLANTING PLAN AND PLANT SCHEDULE ARE APPROXIMATE AND ARE PROVIDED FOR THE CONVENIENCE OF THE CONTRACTOR. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE FURNISHING AND INSTALLATION OF ALL PLANT MATERIALS NOTED ON THE PLANTING PLAN.

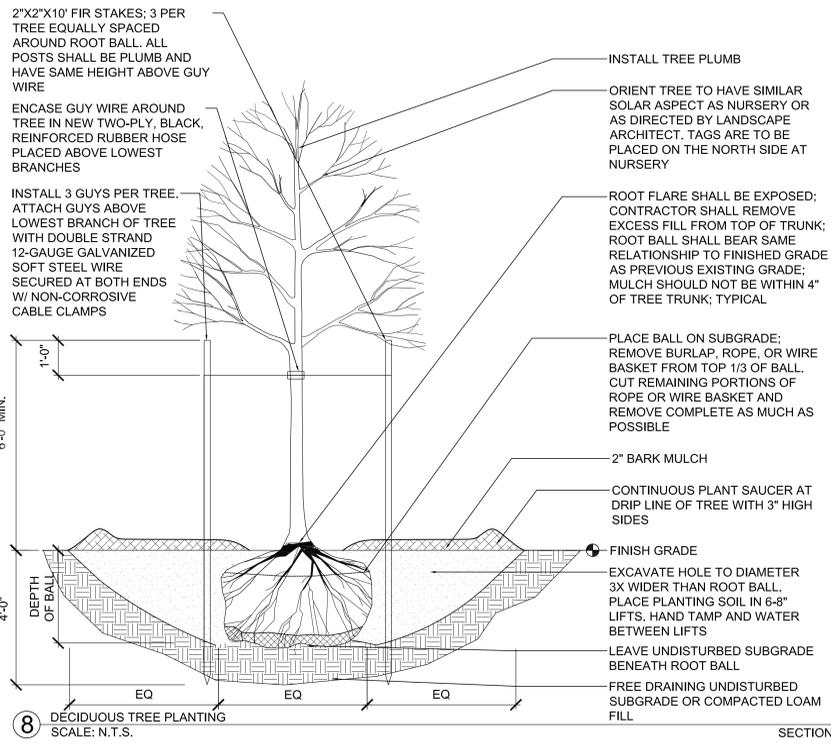
**LEGEND**

- RAIN GARDEN BOUNDARY
- PROPOSED DECIDUOUS TREE | SHRUB
- ⊗ PROPOSED EVERGREEN TREE | SHRUB
- ▨ SEED HATCH

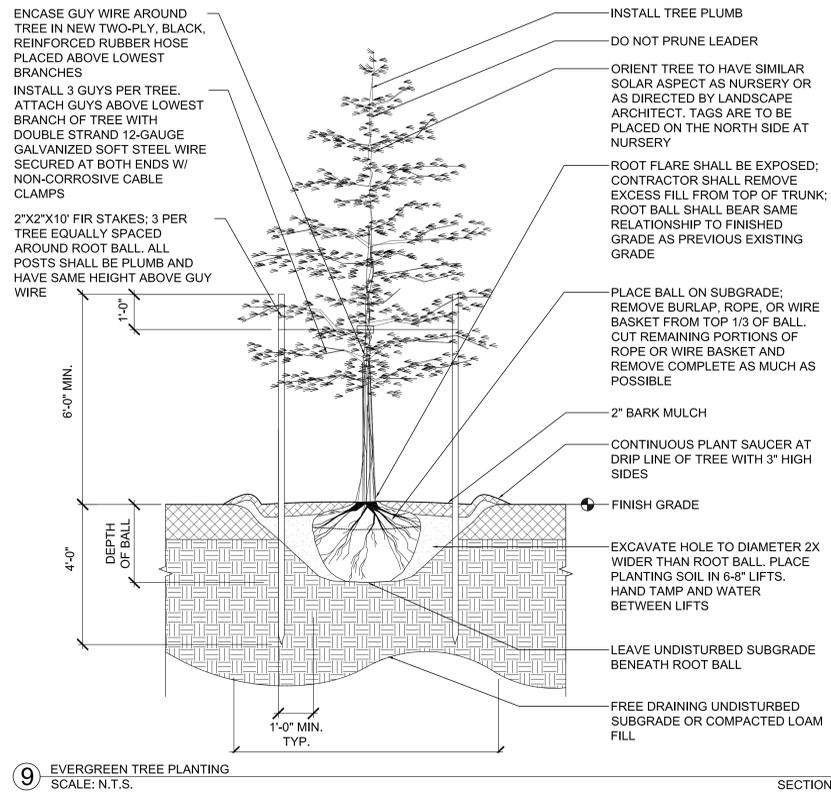


| MARK | DATE     | DESCRIPTION             | BY |
|------|----------|-------------------------|----|
|      | 04/08/15 | LIP APPLICATION         |    |
|      | 09/21/15 | REVISED LIP APPLICATION |    |

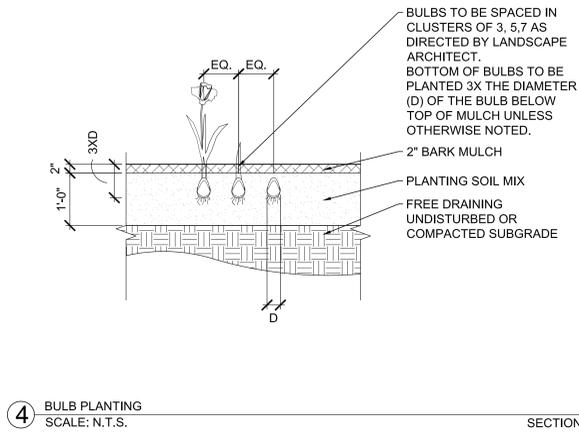
Client: Normandy A Street Residential, LLC  
 Proj. Loc.: A Street and Second Avenue, Needham, MA  
 Project No.: 143-103813-15001\_4\_15002  
 Designed By: JC | KAC  
 Drawn By: DH  
 Checked By: JC | KAC  
**2nd Avenue Residences at Needham Crossing**  
**Landscape Plan**  
 Copyright: Tetra Tech



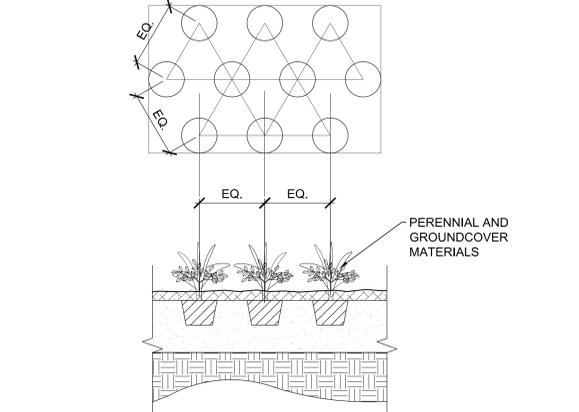
8 DECIDUOUS TREE PLANTING  
SCALE: N.T.S. SECTION



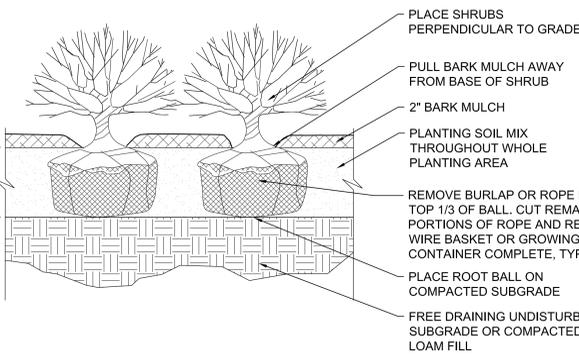
9 EVERGREEN TREE PLANTING  
SCALE: N.T.S. SECTION



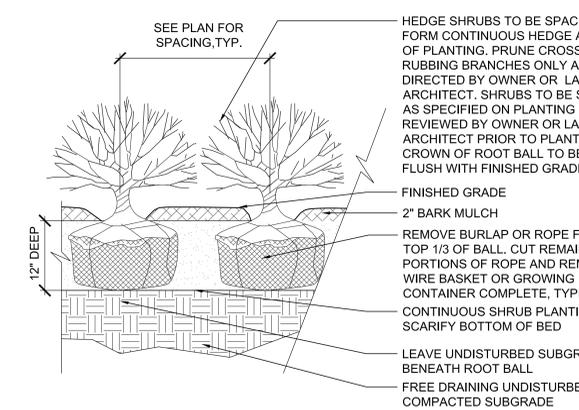
4 BULB PLANTING  
SCALE: N.T.S. SECTION



5 HERBACEOUS MATERIALS SPACING CHART  
SCALE: N.T.S. PLAN | SECTION



6 SHRUB PLANTING  
SCALE: N.T.S. SECTION



7 HEDGE PLANTING  
SCALE: N.T.S. SECTION

PLANT SCHEDULE - SHEET L-1

TREES

| KEY | BOTANICAL NAME             | COMMON NAME              | SIZE         | ROOT          | NOTES        |
|-----|----------------------------|--------------------------|--------------|---------------|--------------|
| AC  | AMELANCHIER CANADENSIS     | SHADBLOW SERVICEBERRY    | 10'-12' HT.  | BALL & BURLAP | 40' O.C. (N) |
| AR  | ACER RUBRUM 'RED SUNSET'   | RED SUNSET RED MAPLE     | 3"-3.5" CAL. | B&B           | 40' O.C. (N) |
| CK  | CORNUS KOUSA - MULTI STEM  | MULTI STEM KOUSA DOGWOOD | 8'-10' HT.   | B&B           | 10' O.C.     |
| LS  | LIQUIDAMBAR STRACIFLUA     | AMERICAN SWEETGUM        | 3"-3.5" CAL. | B&B           | 25' O.C. (N) |
| PG  | PICEA GLAUCA               | WHITE SPRUCE             | 10'-12' HT.  | B&B           | 12' O.C. (N) |
| QR  | QUERCUS RUBRA              | RED OAK                  | 3"-3.5" CAL. | B&B           | 25' O.C. (N) |
| TN  | THUJA OCCIDENTALIS 'NIGRA' | DARK AMERICAN ARBORVITAE | 10'-12' HT.  | B&B           | 10' O.C. (N) |

EVERGREEN SHRUBS

|    |                                     |                            |             |               |             |
|----|-------------------------------------|----------------------------|-------------|---------------|-------------|
| BS | BUXUS SEMPERVIRENS 'NEWPORT BLUE'   | NEWPORT BLUE BOXWOOD       | 18"-24" SP. | BALL & BURLAP | 3' O.C.     |
| IG | ILEX GLABRA 'COMPACTA'              | COMPACT INKBERRY           | 24"-30" HT. | #7 CONT.      | 4' O.C. (N) |
| JH | JUNIPERUS HORIZONTALIS 'BAR HARBOR' | BAR HARBOR JUNIPER         | 18"-24" SP. | #3 CONT.      | 3' O.C. (N) |
| RP | RHODODENDRON 'PJM'                  | PJM RHODODENDRON           | 24"-30" HT. | #7 CONT.      | 4' O.C.     |
| RY | RHODODENDRON 'YAKU-PRINCESS'        | YAKU PRINCESS RHODODENDRON | 18"-24" HT. | #5 CONT.      | 3' O.C.     |

DECIDUOUS SHRUBS

|    |                                    |                             |             |          |             |
|----|------------------------------------|-----------------------------|-------------|----------|-------------|
| CA | CLETHRA ALINIFOLIA 'HUMMINGBIRD'   | HUMMINGBIRD SUMMERSWEET     | 15"-18" HT. | #3 CONT. | 4' O.C. (N) |
| CF | CALYCANTHUS FLORIDUS               | COMMON SWEETSHRUB           | 24"-30" HT. | #7 CONT. | 5' O.C. (N) |
| FG | FOTHERGILLA GARDENII               | DWARF FOTHERGILLA           | 15"-18" HT. | #3 CONT. | 3' O.C. (N) |
| RA | RHUS AROMATICA 'GRO-LOW'           | GRO-LOW FRAGRANT SUMAC      | 15"-18" HT. | #3 CONT. | 3' O.C. (N) |
| SJ | SPIRAEA JAPONICA 'LITTLE PRINCESS' | LITTLE PRINCESS JAP. SPIREA | 15"-18" HT. | #3 CONT. | 2' O.C.     |
| SB | SPIRAEA BUMALDA 'ANTHONY WATERER'  | ANTHONY WATERER SPIREA      | 18"-24" HT. | #3 CONT. | 4' O.C.     |
| VD | VIBURNUM DENTATUM 'CHRISTOM'       | BLUE MUFFIN VIBURNUM        | 3'-4' HT.   | #7 CONT. | 5' O.C. (N) |
| VT | VIBURNUM TRILOBUM                  | CRANBERRY VIBURNUM          | 3'-4' HT.   | #7 CONT. | 5' O.C. (N) |

PERENNIALS

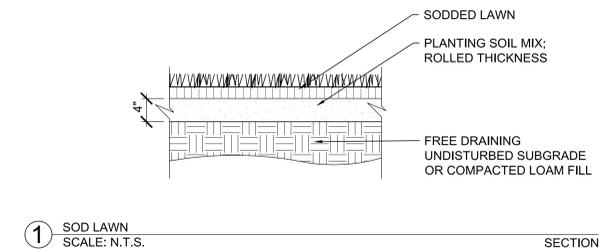
|    |                                     |                           |    |          |              |
|----|-------------------------------------|---------------------------|----|----------|--------------|
| HS | HEMEROCALLIS X 'STELLA D'ORO'       | STELLA D'ORO DAYLILLY     | NA | #2 CONT. | 18" O.C.     |
| PA | PENNISETUM ALOPECUR. 'HAMELN'       | DWARF FOUNTAIN GRASS      | NA | #2 CONT. | 24" O.C.     |
| SA | SEDUM X 'AUTUMN JOY'                | AUTUMN JOY STONECROP      | NA | #2 CONT. | 24" O.C.     |
| RF | RUDEBECKIA FULGIDA VAR. 'GOLDSTURM' | GOLDSTURM BLACKEYED SUSAN | NA | #2 CONT. | 24" O.C. (N) |

TURF

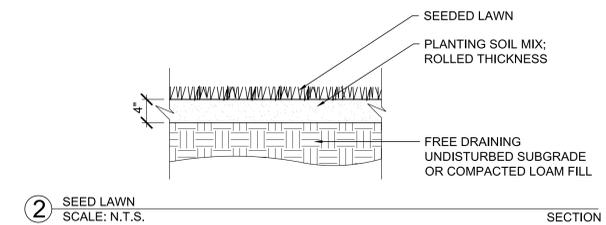
|    |   |   |
|----|---|---|
| SF | LOWGROW FESCUE SEED MIX                       | SUMMIT SEED; MANTENO, IL; 815.468.7333    |
| SF | NEW ENGLAND EROSION CONTROL   RESTORATION MIX | NE WETLAND PLANTS, INC., MA; 413.548.8000 |

O.C. = ON-CENTER SPACING  
(N) = NATIVE SPECIES

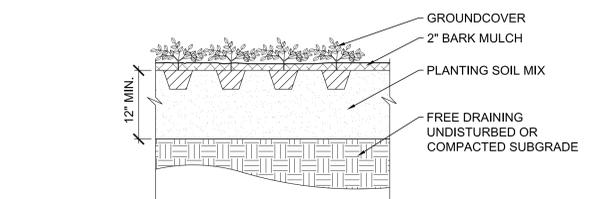
NOTE: ALL PLANT QUANTITIES TO BE DETERMINED AS PART OF THE PERMITTING PLAN SET AND WILL BE FURTHER REFINED IN THE CONSTRUCTION DOCUMENTS



1 SOD LAWN  
SCALE: N.T.S. SECTION



2 SEED LAWN  
SCALE: N.T.S. SECTION



3 PERENNIAL PLANTING  
SCALE: N.T.S. SECTION

