PROPOSED INDUSTRIAL DEVELOPMENT

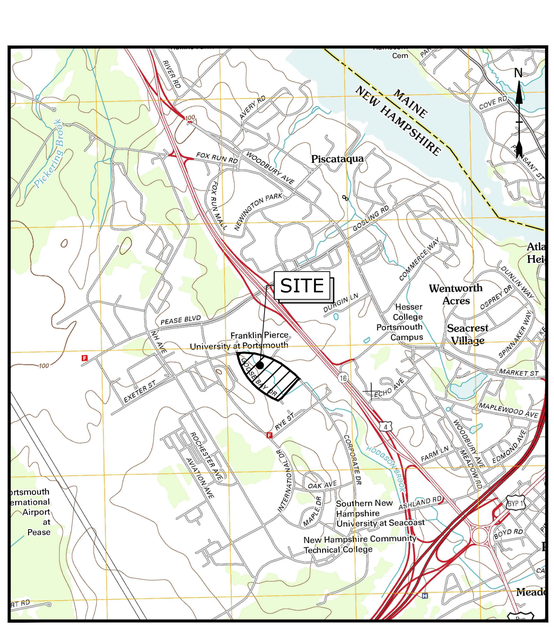
70 & 80 CORPORATE DRIVE

PORTSMOUTH, NEW HAMPSHIRE

PROJECT NO: L-0700-13

MAY 21, 2018

LIST OF DRAWINGS		
SHEET NO.	SHEET TITLE	LAST REVISED
	COVER SHEET	05/21/2018
1 of 4	EXISTING CONDITIONS PLAN	08/03/2016
2 of 4	EXISTING CONDITIONS PLAN	08/03/2016
3 of 4	EXISTING CONDITIONS PLAN	08/03/2016
4 of 4	EXISTING CONDITIONS PLAN	08/03/2016
C-101	DEMOLITION PLAN	05/21/2018
C-102	DEMOLITION PLAN	05/21/2018
C-103	DEMOLITION PLAN	05/21/2018
C-104	OVERALL SITE PLAN	05/21/2018
C-105	SITE PLAN	05/21/2018
C-106	SITE PLAN	05/21/2018
C-107	SITE PLAN	05/21/2018
C-108	GRADING, DRAINAGE & EROSION CONTROL PLAN	05/21/2018
C-109	GRADING, DRAINAGE & EROSION CONTROL PLAN	05/21/2018
C-110	GRADING, DRAINAGE & EROSION CONTROL PLAN	05/21/2018
C-111	UTILITIES PLAN	05/21/2018
C-112	UTILITIES PLAN	05/21/2018
C-113	UTILITIES PLAN	05/21/2018
C-114	LANDSCAPE PLAN	05/21/2018
C-115	LANDSCAPE PLAN	05/21/2018
C-116	LANDSCAPE PLAN	05/21/2018
C-117	PHOTOMETRIC LIGHTING PLAN	05/21/2018
C-118	PHOTOMETRIC LIGHTING PLAN	05/21/2018
C-119	PHOTOMETRIC LIGHTING PLAN	05/21/2018
C-501	EROSION CONTROL NOTES & DETAILS SHEET	05/21/2018
C-502	DETAILS SHEET	05/21/2018
C-503	DETAILS SHEET	05/21/2018
C-504	DETAILS SHEET	05/21/2018
C-505	DETAILS SHEET	05/21/2018
C-506	DETAILS SHEET	05/21/2018
C-507	DETAILS SHEET	05/21/2018
C-508	DETAILS SHEET	05/21/2018
C-701	HODGSON BROOK GRADING, DRAINAGE & EROSION CONTROL PLAN	05/21/2018
C-702	HODGSON BROOK WETLAND PLANTING PLAN	05/21/2018
C-703	HODGSON BROOK DETAILS SHEET	05/21/2018



LOCATION MAP
SCALE: 1" = 2,000'

OWNER:	PEASE DEVELOPMENT AUTHORITY 55 INTERNATIONAL DRIVE PORTSMOUTH, NEW HAMPSHIRE 03801
CLIENT:	LONZA BIOLOGICS 101 INTERNATIONAL DRIVE PORTSMOUTH, NH 03801
CIVIL ENGINEER:	Tighe&Bond Engineers | Environmental Specialists 177 CORPORATE DRIVE PORTSMOUTH, NEW HAMPSHIRE 03801
SURVEYOR:	DOUCET SURVEY, INC. 102 KENT PLACE NEWMARKET, NEW HAMPSHIRE 03857
WETLAND SCIENTIST:	GOVE ENVIRONMENTAL SERVICES, INC. 8 CONTINENTAL DRIVE, UNIT H EXETER, NEW HAMPSHIRE 03833
STREAM DESIGN CONSULTANT:	STREAMWORKS, PLLC MADBURY, NEW HAMPSHIRE 03823

COMPLETE SET 35 SHEETS

Last Save Date: May 21, 2018 2:04 PM By: BCLARK
Plot Date: Monday, May 21, 2018 Plotted By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings_Figures\AutoCAD\Xref\L-0700-13-COVER.dwg Layout Tab: DSGN-CS

DRAINAGE STRUCTURE TABLE

CB #1013
RIM ELEV.=68.4'
(1019) 18" HDPE INV.=64.4'
(A) 18" HDPE INV.=64.4'

CB #1019
RIM ELEV.=68.5'
(A) 18" HDPE INV.=65.1'
(1013) 18" HDPE INV.=64.7'

CB #1088
RIM ELEV.=66.6'
(A) 6" HDPE INV.=62.0'
(1111) 12" RCP INV.=61.6'
(1095) 12" RCP INV.=61.6'

DMH #1095
RIM ELEV.=65.2'
(1088) 12" RCP INV.=60.0'
(1137) 12" RCP INV.=59.7'

CB #1111
RIM ELEV.=66.8'
(1088) 12" RCP INV.=61.9'

CB #1137
RIM ELEV.=60.7'
(1095) 12" RCP INV.=57.3'
(1285) 15" RCP INV.=56.8'
(1141) 15" RCP INV.=56.8'

DMH #1141
RIM ELEV.=61.1'
(1300) 12" RCP INV.=57.2'
(1137) 15" RCP INV.=56.9'
(1147) 15" RCP INV.=56.6'
(A) 15" RCP INV.=56.4'
(B) 18" ASB INV.=56.3'

CB #1147
RIM ELEV.=61.5'
(A) 15" RCP INV.=57.2'
(1141) 15" RCP INV.=57.1'

CB #1183
RIM ELEV.=60.1'
(1212) 15" RCP INV.=55.7'

CB #1212
RIM ELEV.=57.5'
(1183) 15" RCP INV.=54.8'
(1381) 15" RCP INV.=54.6'

CB #1285
RIM ELEV.=60.7'
(1137) 15" RCP INV.=57.0'

CBR #1305
RIM ELEV.=56.7'
(1311) 12" RCP INV.=52.8'
(A) 15" RCP INV.=52.7'
(1324) 15" RCP INV.=52.7'

CB #1311
RIM ELEV.=57.1'
(1381) 15" RCP INV.=53.4'
(1305) 12" RCP INV.=53.0'

CBR #1324
RIM ELEV.=55.7'
(A) 12" RCP INV.=52.3'
(1325) 12" RCP INV.=51.9'
(1305) 15" RCP INV.=51.9'
(B) 22" RCP INV.=51.7'

CB #1325
RIM ELEV.=55.7'
(1399) 15" RCP INV.=51.9'
(1324) 12" RCP INV.=51.8'

DMH #1338
RIM ELEV.=57.7'
(SUMP)=49.9' (LARGE VAULT)

CB #1345
RIM ELEV.=58.1'
(1420) 12" RCP INV.=53.9'

CB #1381
RIM ELEV.=57.2'
(1212) 15" RCP INV.=54.3'
(1311) 15" RCP INV.=54.4'

CB #1399
RIM ELEV.=55.5'
(1325) 15" RCP INV.=52.3'

DMH #1401
RIM ELEV.=58.3'
NOT OPENED – OFF SITE

DMH #1408
RIM ELEV.=56.8'
NOT OPENED -- OFF SITE

CB #1420
RIM ELEV.=58.1'
(1345) 12" RCP INV.=54.4'
(1421) 12" HDPE INV.=54.1'

DMH #1421
RIM ELEV.=57.4'
(1420) 12" RCP INV.=54.3'
SUMP=53.4' (FULL OF SILT)

DMH #1438
RIM ELEV.=50.2'
(A) 12" RCP INV.=44.6'
(1439) 12" RCP INV.=44.6'
(B) UNK. CMP INV.=42.9'
(C) UNK. CMP INV.=42.9'

CBR #1439
RIM ELEV.=47.4'
(1438) 12" RCP INV.=45.2'

CBR #1444
RIM ELEV.=48.3'
12" HDPE INV.=46.4'
(SUMP) INV.=42.8'

CB #1456
RIM ELEV.=58.1'
(1460) 12" RCP INV.=52.5'

DMH #1460
RIM ELEV.=58'
(1461) 12" RCP INV.=51.6'
(1456) 12" RCP INV.=51.5'
(A) 15" RCP INV.=50.7'

CB #1461
RIM ELEV.=57.9'
(1460) 12" RCP INV.=53.2'

CB #1478
RIM ELEV.=54.2'
(1515) 12" RCP INV.=47.2'

CB #1484
RIM ELEV.=49.0'
BROKEN GRATE – NOT OPENED

CB #1504
RIM ELEV.=48.9'
(A) 12" RCP INV.=42.7'
(1484) 12" RCP INV.=42.6'

CB #1515
RIM ELEV.=54.1'
BROKEN GRATE – NOT OPENED

CB #1542
RIM ELEV.=44.4'
(1651) 12" RCP INV.=41.0'

CB #1570
RIM ELEV.=40.7'
(A) 18" RCP INV.=36.2'
(B) 18" RCP INV.=36.2'

CB #1572
RIM ELEV.=42.2'
(1611) 12" RCP INV.=38.2'

CB #1580
RIM ELEV.=41.7'
(1586) 15" RCP INV.=36.8'

CB #1586
RIM ELEV.=41.9'
(1580) 15" RCP INV.=36.4'
(A) 15" RCP INV.=36.6'

CB #1611
RIM ELEV.=42.4'
(1572) 12" RCP INV.=37.8'
(A) 12" RCP INV.=37.5'

CB #1651
RIM ELEV.=44.6'
(1542) 12" RCP INV.=39.5'
(A) 12" RCP INV.=39.5'

CB #1678
RIM ELEV.=39.2'
(TOP OF WATER) INV.=36.5'
(A) 12" RCP INV.=35.4'

CB #1685
RIM ELEV.=39.2'
(TOP OF WATER) INV.=36.6'
(2330) 12" RCP INV.=36.4'

DMH #1695
RIM ELEV.=42.8'
(1732) 10" RCP INV.=36.4'
(A) 48" RCP INV.=35.9'
(B) NOT MEASURED
(RECESSED – LARGE VAULT)

CB #1732
RIM ELEV.=39.1'
(1695) 10" RCP INV.=37.3'

CBR #1733
RIM ELEV.=39.1'
STRUCTURE DAMAGED

DMH #1755
RIM ELEV.=42'
(A) 24" RCP INV.=37.2'
(B) 24" RCP INV.=37.1'

CB #1756
RIM ELEV.=42.5'
(1769) 12" RCP INV.=39.2'

CB #1769
RIM ELEV.=42.5'
(1756) 12" RCP INV.=38.1'
(A) 12" RCP INV.=33.5'

CB #1935
RIM ELEV.=49.7'
NOT OPENED – SILT SOCK

CB #2031
RIM ELEV.=59.0'
NOT OPENED – SILT SOCK

DMH #2142
RIM ELEV.=62.8'
(A) 24" HDPE INV.=58.2'
(B) 24" HDPE INV.=56.8'

CB #2152
RIM ELEV.=64.3'
NOT OPENED – SILT SOCK

DMH #2153
RIM ELEV.=64.5'
(SUMP) INV.=53.9'
FULL OF WATER

CB #2170
RIM ELEV.=65.7'
NOT OPENED – SILT SOCK

CB #2246
RIM ELEV.=65.5'
NOT OPENED – SILT SOCK

CBR #2327
RIM ELEV.=40.2'
(A) 12" RCP INV.=38.3'

CBR #2329
RIM ELEV.=47.4'
(A) 12" RCP INV.=42.0'
SILT=41.9'

DMH #2330
RIM ELEV.=40.4'
(1685) 12" RCP INV.=36.5'
(A) 12" RCP INV.=36.3'
(B) 15" RCP INV.=36.1'

DMH #2336
RIM ELEV.=39.7'
(A) 18" RCP INV.=36.1'
(B) 24" RCP INV.=35.4'

SEWER STRUCTURE TABLE

SMH #1062
RIM ELEV.=69.8'
(A) 6" CLAY INV.=63.9'
(B) 6" CLAY INV.=63.7'
(1067) 8" CLAY INV.=62.6'

SMH #1067
RIM ELEV.=68.6'
(1062) 8" CLAY INV.=60.4'
(2242) 8" UNK. INV.=60.3'

SMH #1078
RIM ELEV.=69.0'
COULD NOT OPEN

SMH #1123
RIM ELEV.=64'
(1295) 8" PVC INV.=55.8'

SMH #1169
RIM ELEV.=65.2'
(1184) 15" STEEL INV.=53.8'
(A) 15" STEEL INV.=53.8'

SMH #1184
RIM ELEV.=60.4'
(1296) 8" CLAY INV.=54.2'
(1217) 15" STEEL INV.=52.7'
(1169) 15" STEEL INV.=52.7'

SMH #1217
RIM ELEV.=57.9'
(1184) 15" STEEL INV.=52.3'
(1400) 15" STEEL INV.=52.2'

SMH #1296
RIM ELEV.=63.7'
(1123) 8" PVC INV.=55.5'
(2326) 8" UNK. INV.=55.0'
(1184) 8" UNK. INV.=55.0'

SMH #1400
RIM ELEV.=55.6'
(1217) 15" ASB INV.=49.3'
(1415) 15" ASB INV.=49.3'

SMH #1415
RIM ELEV.=57.9'
(A) 12" PVC INV.=48.3'
(1400) 18" UNK. INV.=47.9'
(1450) 18" PVC INV.=48.0'

SMH #1450
RIM ELEV.=60.5'
(1415) 18" PVC INV.=47.6'
(1459) 18" PVC INV.=47.5'

SMH #1459
RIM ELEV.=58.8'
(A) 8" PVC INV.=48.4'
(1450) 18" PVC INV.=47.1'
(B) 18" PVC INV.=47.1'

SMH #1551
RIM ELEV.=43.6'
(A) 8" PVC INV.=35.6'
(B) 12" UNK. INV.=34.2'
(C) 12" UNK. INV.=34.1'

SMH #1691
RIM ELEV.=39.9'
(1784) UNK. INV.=34.2'
(1722) UNK. INV.=34.1'

SMH #1722
RIM ELEV.=41.1'
(A) 6" CLAY INV.=33.2'
(1691) UNK. CLAY INV.=33.1'

SMH #1784
RIM ELEV.=41.1'
(1921) 10" UNK. INV.=35.4'
(1691) 10" UNK. INV.=35.5'

SMH #1921
RIM ELEV.=44.8'
(1953) UNK. INV.=37'
(1784) UNK. INV.=36.9'

SMH #1953
RIM ELEV.=50.1'
(A) 6" CLAY INV.=42.4'
(2080) UNK. INV.=42.2'
(1921) UNK. INV.=42.2'

SMH #2080
RIM ELEV.=57.9'
(A) 8" UNK. INV.=50.1'
2187) 8" UNK. INV.=50.1'
(1953) 8" UNK. INV.=49.9'

SMH #2187
RIM ELEV.=63'
(A) 6" PVC INV.=54.9'
(2242) 8" PVC INV.=54.9'
(2080) 8" PVC INV.=54.9'

SMH #2242
RIM ELEV.=65.0'
(1067) 8" CLAY INV.=56.8'
(2187) 8" CLAY INV.=57.0'

SMH #2326
RIM ELEV.=68.1'
(1078) 8" PVC INV.=62.2'
(1296) 8" ASB INV.=62.1'

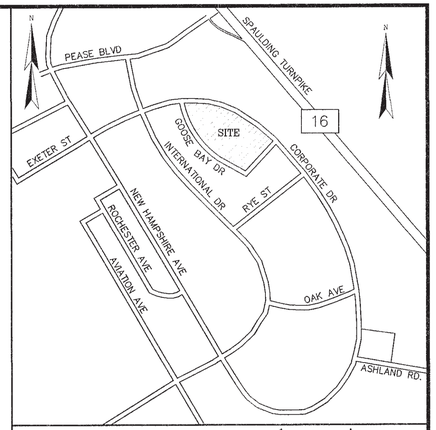
SMH #2328
RIM ELEV.=43.1'
(1551) 12" UNK INV.=32.3'
(A) 18" UNK INV.=32.3'

REFERENCE PLANS:

1. "R.O.W. WORKSHEET, CORPORATE DRIVE PREPARED FOR PEASE DEVELOPMENT AUTHORITY" DATED DEC. 21, 1992 BY RICHARD D. BARTLETT & ASSOCIATES, INC. SHEETS 1 AND 2.
2. "PEASE A.F.B. / PORTSMOUTH, N.H. REPAVE BASE STREETS, PORTSMOUTH AVE, ROCKINGHAM AVE." DATED 7 DEC 82 BY STRATETIC AIR COMMAND CIVIL ENGINEERING. SHEET 4 OF 5
3. "PORTSMOUTH AIR FORCE BASE, PORTSMOUTH, N.H. ROADS AND STORAGE AREA FY-56" DATED DEC 1955 BY WHITMAN & HOWARD ENGINEERS. INDEX PAGE AND SHEETS 2 – 5 OF 11.
4. "PEASE INTERNATIONAL TRADEPORT SUBDIVISION PLAT, INTERNATIONAL DRIVE LOTS BC11–001 & BC11–002, PORTSMOUTH, N.H." DATED FEBRUARY 5, 1993 BY RICHARD D. BARTLETT & ASSOCIATES INC. R.C.R.D. PLAN #D22536.
5. "SUBDIVISION PLAN OF LAND FOR REDHOOK ALE BREWERY, INC. CORPORATE DRIVE, COUNTY OF ROCKINGHAM, PORTSMOUTH, N.H." DATED DECEMBER 10, 1994 BY RICHARD P. MILLETTE AND ASSOCIATES. R.C.R.D. PLAN #D–23978.
6. "ALTA/ACSM LAND TITLE SURVEY FOR RESPORT, LLC, ONE INTERNATIONAL DRIVE, COUNTY OF ROCKINGHAM, PORTSMOUTH, N.H." DATED FEBRUARY 27, 1998 BY MILLETTE, SPRAGUE & COLWELL, INC. R.C.R.D. PLAN #D–26125.
7. "FRANKLIN PIERCE COLLEGE, PEASE INTERNATIONAL TRADEPORT, 73 CORPORATE DRIVE, PORTSMOUTH, NH" DATED JANUARY 15, 1998 BY RONALD R. BURD. R.C.R.D. PLAN #D–26427.
8. "SUBDIVISION PLAN FOR LAND LEASED BY PEASE DEVELOPMENT AUTHORITY & KNOWN AS #119 INTERNATIONAL DRIVE LOCATED AT PEASE INTERNATIONAL TRADEPORT, PORTSMOUTH, N.H." DATED MARCH 1, 2000 BY KNIGHT HILL LAND SURVEYING SERVICES, INC. R.C.R.D. PLAN #D–28059.
9. "SUBDIVISION PLAT PREPARED FOR 80 CORPORATE DRIVE LLC C/O BOULOS PROPERTY MANAGEMENT, LOCATION CORPORATE & GOOSE BAY DRIVES, PEASE INTERNATIONAL TRADEPORT – PORTSMOUTH, NH" DATED APRIL 11, 2000 BY FWS LAND SURVEYING P.L.L.C. R.C.R.D. PLAN #D–28447.
10. "LEASE LINE REVISION PLAN FOR LONZA BIOLOGICS, INC. 101 INTERNATIONAL DRIVE, PORTSMOUTH, NEW HAMPSHIRE" DATED FEB. 5, 2001 BY DOUCET SURVEY, INC. R.C.R.D. PLAN #D–28955.
11. "LEASE LINE REVISION PLAN FOR LONZA BIOLOGICS, INC. 101 INTERNATIONAL DRIVE, PORTSMOUTH, NEW HAMPSHIRE" DATED SEPT. 17, 2001 BY DOUCET SURVEY, INC. R.C.R.D. PLAN #D–29538.
12. "SUBDIVISION PLAN OF LAND OF PEASE DEVELOPMENT AUTHORITY TO BE LEASED TO NORTHEAST REHABILITATION (A PORTION OF TAX MAP 303, LOT 6) 105 & 121 CORPORATE DRIVE, PEASE TRADEPORT, PORTSMOUTH, NEW HAMPSHIRE" DATED NOV. 5, 2008 BY DOUCET SURVEY, INC. R.C.R.D. PLAN #D–35869.
13. "CONDOMINIUM SITE & FLOOR PLAN PREPARED FOR PIONEER NEW HAMPSHIRE, LLC, LAND OF PEASE DEVELOPMENT AUTHORITY, TAX MAP PARCEL 305–3 (108, 110, 112 & 114 CORPORATE DRIVE) PORTSMOUTH, NEW HAMPSHIRE" DATED APRIL 12, 2013 BY FIELDSTONE LAND CONSULTANTS, PLLC. SHEET 1 OF 5. R.C.R.D. PLAN #D–37765.
14. "SUBDIVISION PLAN FOR PEASE DEVELOPMENT AUTHORITY, (TAX MAP 303, LOT 4) 67 CORPORATE DRIVE, PEASE TRADEPORT, PORTSMOUTH NEW HAMPSHIRE" DATED MAY 29, 2009 BY DOUCET SURVEY, INC. (NOT RECORDED)
15. "EXISTING CONDITIONS, BUILDING A, 80 CORPORATE DRIVE AND BUILDING B, 70 CORPORATE DRIVE, PORTSMOUTH, NH" DATED 4/14/2000 AND REVISED 6/05/2000 BY OPECHEE CONSTRUCTION CORPORATION. (NOT RECORDED)

LEGEND

EXISTING LEASE/R.O.W. LINES
O — O CHAIN LINK FENCE
OHW OVERHEAD WIRES
S SEWER LINE
D DRAIN LINE
G GAS LINE
W WATER LINE
E UNDERGROUND ELECTRIC LINE
XS SEWER LINE PER REF. PLAN #15
XD DRAIN LINE PER REF. PLAN #15
XG GAS LINE PER REF. PLAN #15
XW WATER LINE PER REF. PLAN #15
100 MAJOR CONTOUR LINE
98 MINOR CONTOUR LINE
TREE LINE
EDGE OF WETLAND (SEE NOTE #6)
HISS LINE (SEE NOTE #6)
UTILITY POLE
SIGN
GRANITE BOUND FOUND
DRILL HOLE FOUND
IRON PIPE/ROD FOUND
4"X4" GRANITE BOUND TO BE SET
5/8" REBAR W/ ID CAP TO BE SET
BOLLARD
FIRE HYDRANT
WATER GATE VALVE
GAS GATE VALVE
PAD MOUNTED TRANSFORMER
ELECTRIC BOX
TELEPHONE BOX
UTILITY BOX
CABLE BOX
CATCH BASIN
CATCH BASIN
CATCH BASIN
DRAIN MANHOLE
FLARED END SECTION
ELECTRIC MANHOLE
TELEPHONE MANHOLE
SEWER MANHOLE
CLEANOUT
CATCH BASIN PER REF. PLAN #15
DRAIN MANHOLE PER REF. PLAN #15
SEWER MANHOLE PER REF. PLAN #15
HAND HOLE
WETLAND AREA
CONIFEROUS TREE
DECIDUOUS TREE
CONCRETE
RIP RAP
GRAVEL AREA
LEDGE OUTCROP
BND. FND. BOUND FOUND
D.H.F. DRILL HOLE FOUND
EP EDGE OF PAVEMENT
SWL SINGLE WHITE LINE
DYL DOUBLE YELLOW LINE
VGC VERTICAL GRANITE CURB
VGC HISS SOIL TYPE



Location Map (n.t.s.)

NOTES:

1. REFERENCE: TAX MAP 305, LOT 1
PHYSICAL ADDRESS: 70 CORPORATE DRIVE
TAX MAP 305, LOT 2
PHYSICAL ADDRESS: 80 CORPORATE DRIVE
2. TOTAL PARCEL AREA: TAX MAP 305, LOT 1: 443,578 SQ. FT. OR 10.183 AC.
TAX MAP 305, LOT 2: 604,273 SQ. FT. OR 13.872 AC.
TOTAL AREA: 1,047,851 SQ. FT. OR 24.055 AC.
3. OWNER OF RECORD: TAX MAP 305, LOTS 1 & 2
PEASE DEVELOPMENT AUTHORITY
55 INTERNATIONAL DRIVE
PORTSMOUTH, NEW HAMPSHIRE 03801
R.C.R.D. BOOK 4227, PAGE 001
4. ZONE: AIRPORT, BUSINESS & COMMERCIAL (ABC)
5. FIELD SURVEY PERFORMED BY J.M.L, E.J.S., J.P.E., J.F.K., AND N.J.M. DURING NOVEMBER 2015 USING A TRIMBLE R8 SURVEY GRADE GPS UNIT AND A TRIMBLE S6 ROBOTIC TOTAL STATION WITH A TRIMBLE TSC3 DATA COLLECTOR.
6. JURISDICTIONAL WETLANDS DELINEATED BY GOVE ENVIRONMENTAL SERVICES, INC. DURING FALL 2014 IN ACCORDANCE WITH 1987 CORPS OF ENGINEERS WETLANDS DELINEATIONS MANUAL, TECHNICAL REPORT Y–87–1. HISS MAPPING COMPLETED BY GOVE ENVIRONMENTAL SERVICES DURING DECEMBER 2015.
7. FLOOD HAZARD ZONE: "X", PER FIRM MAP #33015C0260E, DATED MAY 17, 2005.
8. HORIZONTAL DATUM BASED ON NH STATE PLANE 2800(NAD83/86) PER REFERENCE PLANS #10, #11, & #12.
9. VERTICAL DATUM IS BASED ON NGVD29 PER REFERENCE PLANS #10, #11, & #12.
10. PROPER FIELD PROCEDURES WERE FOLLOWED IN ORDER TO GENERATE CONTOURS AT 2' INTERVALS. ANY MODIFICATION OF THIS INTERVAL WILL DIMINISH THE INTEGRITY OF THE DATA. AND DOUCET SURVEY, INC. WILL NOT BE RESPONSIBLE FOR ANY SUCH ALTERATION PERFORMED BY THE USER.
11. UNDERGROUND UTILITIES SHOWN HEREON ARE BASED ON OBSERVABLE PHYSICAL EVIDENCE AND PAINT MARKS FOUND ON–SITE. THE SITE WAS NOT MARKED FOR THE PURPOSES OF THIS SURVEY. SOME UTILITIES ARE SHOWN PER REFERENCE PLANS AS NOTED IN THE LEGEND.
12. THE ACCURACY OF MEASURED UTILITY INVERTS AND PIPE SIZES/TYPES IS SUBJECT TO NUMEROUS FIELD CONDITIONS, INCLUDING; THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS, MANHOLE CONFIGURATION, ETC.
13. THE INTENT OF THIS PLAN IS TO SHOW THE LOCATION OF BOUNDARIES IN ACCORDANCE WITH AND IN RELATION TO THE CURRENT LEGAL DESCRIPTION, AND IS NOT AN ATTEMPT TO DEFINE UNWRITTEN RIGHTS, DETERMINE THE EXTENT OF OWNERSHIP, OR DEFINE THE LIMITS OF TITLE.
14. TAX MAP 305, LOTS 1 & 2 ARE EITHER SUBJECT TO OR IN BENEFIT OF, BUT NOT LIMITED TO, THE FOLLOWING EASEMENTS/RIGHTS OF RECORD:
14.A. 50' WIDE ACCESS EASEMENT FOR THE BENEFIT OF LOT 305–2. (SHOWN PER REFERENCE PLAN #9)
14.B. APPROXIMATE LOCATION OF 20' WIDE LICENSE TO THE CITY OF PORTSMOUTH FOR THE PURPOSES OF MAINTAINING A DRAINAGE LINE. (SHOWN PER REFERENCE PLAN #9)
15. FINAL MONUMENTATION MAY BE DIFFERENT THAN THE PROPOSED MONUMENTATION SHOWN HEREON, DUE TO THE FACT THAT SITE CONDITIONS WILL DICTATE THE ACTUAL LOCATION AND TYPE OF MONUMENTS INSTALLED IN THE FIELD. PLEASE REFER TO EITHER THE "MONUMENTATION LOCATION PLAN" TO BE RECORDED OR CONTACT DOUCET SURVEY, INC. FOR CLARIFICATION OF MONUMENTS SET. (A RECORDED PLAN WILL BE PRODUCED AT THE DISCRETION OF DOUCET SURVEY, INC.).

STATE OF NEW HAMPSHIRE — LICENSED LAND SURVEYOR — NO. 964 — JEFFREY A. GOLDINGER — SIGNATURE 12-23-2015

STATE OF NEW HAMPSHIRE — LUKE D. HURLEY — 8/11/16 — No. 232 — CERTIFIED WETLAND SCIENTIST

EXISTING CONDITIONS PLAN
FOR
TIGHE & BOND AND LONZA
LAND OF
PEASE DEVELOPMENT AUTHORITY
(TAX MAP 305, LOTS 1 & 2)
GOOSE BAY DRIVE & CORPORATE DRIVE
PORTSMOUTH, NEW HAMPSHIRE

NO.	DATE	DESCRIPTION	BY
1	8/3/16	GENERAL EDITS AND ADDED WETLANDS BUFFER	J.A.G.

NOTE:
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GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

DRAWN BY: K.C.W.	DATE: DEC. 23, 2015
CHECKED BY: J.A.G.	DRAWING NO.: 4375A
JOB NO.: 4375	SHEET 1 OF 4

DOUCET SURVEY INC
Serving Your Professional Surveying & Mapping Needs
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10 Storer Street (Riverview Suite) Kennebunk, ME (207) 502–7005
http://www.doucetsurvey.com

FILE NAME: K:\PROJECTS\4375 C3D\DWG\4375A.dwg LAYOUT NAME: ISO 22X34 (1) PLOTTED: Wednesday, August 03, 2016 – 4:01pm

TAX MAP 303, LOT 2-1
OPROCK PORTSMOUTH INTL FEE LLC
C/O OCEAN PROPERTIES LTD
1000 MARKET ST SUITE 300
PORTSMOUTH, NH 03801
R.C.R.D. BOOK 4831, PAGE 2677

TAX MAP 303, LOT 2-2
RESPORT LLC
1000 MARKET ST BLDG 1 STE 300
PORTSMOUTH, NH 03801

TAX MAP 305, LOT 7
PEASE DEVELOPMENT AUTHORITY
55 INTERNATIONAL DRIVE
PORTSMOUTH, NEW HAMPSHIRE 03801

TAX MAP 305, LOT 7-1
UNIVERSITY SYSTEM OF NEW HAMPSHIRE
COLLEGE FOR LIFELONG LEARNING
51 INTERNATIONAL DRIVE
PORTSMOUTH, NH 03801

TAX MAP 305, LOT 7-1
CITY OF PORTSMOUTH
1 JUNKINS AVE
PORTSMOUTH, NH 03801

TAX MAP 305, LOT 6
LONZA BIOLOGICS INC.
101 INTERNATIONAL DRIVE
PORTSMOUTH, NH 03801

TAX MAP 303, LOT 3
RED HOOK BREWERY INC
C/O WIDMER BROTHERS BREWING CO
929 NORTH RUSSELL ST.
PORTLAND, OR 97227

NHSPC(NAD83/2011)

GOOSE BAY RD

CORPORATE DRIVE (100' R.O.W. PER REF. PLAN #1)

GOOSE BAY DRIVE (60' R.O.W. PER REF. PLAN #3)

12" PVC INV.=60.0'

TBM 4375A
"X" CUT BOLT OVER MAIN
ELEV.=69.27'

L=60.50'
R=35.00'
CB=N34°16'57"E
CHORD=53.24'
Δ=99°01'56"

L=60.72'
R=500.00'
CB=N18°42'46"W
CHORD=60.69'
Δ=6°57'30"

N22°13'13"W
200.00'

305-1
443,578 Sq. Ft.
10.18 Acres

L=623.87'
R=1420.00'
CB=N34°46'41"W
CHORD=618.86'
Δ=25°10'21"

L=910.09'
R=1540.26'
CB=S79°16'27"E
CHORD=896.91'
Δ=33°51'16"

25' WETLAND BUFFER (TYP.)
(FOR WETLANDS OVER 10,000 SQ.FT.)

20' LICENSE FOR DRAINAGE
(SEE NOTE #14B)

MATCH LINE SHEET 2
MATCH LINE SHEET 3

411BH
311CH
311BH
511BH

SMH #1169, SMH #1184, SMH #1217, SMH #1123, SMH #1296, SMH #1095, SMH #1078, SMH #2326, SMH #1062, SMH #1400, SMH #1415
CB #1147, CB #1137, CB #1285, CB #1183, CB #1212, CB #1381, CB #1305, CB #1311, CB #1088, CB #1111, CB #1019, CB #1399, CB #1324, CB #1325, CB #1420, CB #1345
DMH #1141, DMH #1401, DMH #1408, DMH #1338, DMH #1421
HH

GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

NO.	DATE	DESCRIPTION	BY
1	8/3/16	GENERAL EDITS AND ADDED WETLANDS BUFFER	J.A.G.

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523BH

HIGH INTENSITY MAP SYMBOL

DRAINAGE CLASS 5
1. EXCESSIVELY DRAINED
2. WELL DRAINED
3. MODERATELY WELL DRAINED
4. SOMEWHAT POORLY DRAINED
5. POORLY DRAINED
6. VERY POORLY DRAINED
7. NOT DETERMINABLE

PARENT MATERIAL 2
1. GLACIOFLUVIAL
2. GLACIAL TILL
3. MARINE OR GLACIOLCUSTRINE VERY FINE SAND AND SILT
4. MARINE OR GLACIOLACUSTRINE LOAMY/SANDY OVER SILT/CLAY
5. MARINE OR GLACIOLACUSTRINE SILT AND CLAY
6. EXCAVATED, REGRADED, OR FILLED
7. ALLUVIAL DEPOSITS
8. ORGANIC MATERIALS FRESH WATER
9. ORGANIC MATERIALS TIDAL MARSH

IDENTIFIER H
H. INDICATES HIGH INTENSITY SOIL MAP
P. INDICATES PRELIMINARY MAP

SLOPE CLASS B
B. 0 TO 8%
C. 8 TO 15%
D. 15 TO 25%
E. MORE THAN 25%

RESTRICTIVE FEATURES 3
1. NONE
2. BOULDERY, WITH MORE THAN 15% OF SURFACE COVERED
3. MINERAL RESTRICTIVE LAYER(S) AREA PRESENT AT LESS THAN 40 IN. DEPTH.
4. BEDROCK 0 IN. TO 20 IN. DEPTH.
5. SUBJECT TO FLOODING
6. DOES NOT MEET FILL STANDARDS.
X. DEPTH TO BEDROCK VARIABLE, COMPLEX OF SOIL TYPES.

HIGH INTENSITY MAP SYMBOL 523BH INDICATES A POORLY DRAINED GLACIAL TILL SOIL WITH A RESTRICTIVE FEATURE, ON A SLOPE OF 0 TO 8%

STATE OF NEW HAMPSHIRE
LUKE D. HUFLEY
8/1/16
No. 232
CERTIFIED WETLAND SCIENTIST

STATE OF NEW HAMPSHIRE
No. 964
JEFFREY A. GOLDKNOPF
SIGNATURE
12/23/2015
LICENSED LAND SURVEYOR

EXISTING CONDITIONS PLAN
FOR
TIGHE & BOND AND LONZA
LAND OF
PEASE DEVELOPMENT AUTHORITY
(TAX MAP 305, LOTS 1 & 2)
GOOSE BAY DRIVE & CORPORATE DRIVE
PORTSMOUTH, NEW HAMPSHIRE

DRAWN BY:	K.C.W.	DATE:	DEC. 23, 2015
CHECKED BY:	J.A.G.	DRAWING NO.:	4375A
JOB NO.:	4375	SHEET	2 OF 4

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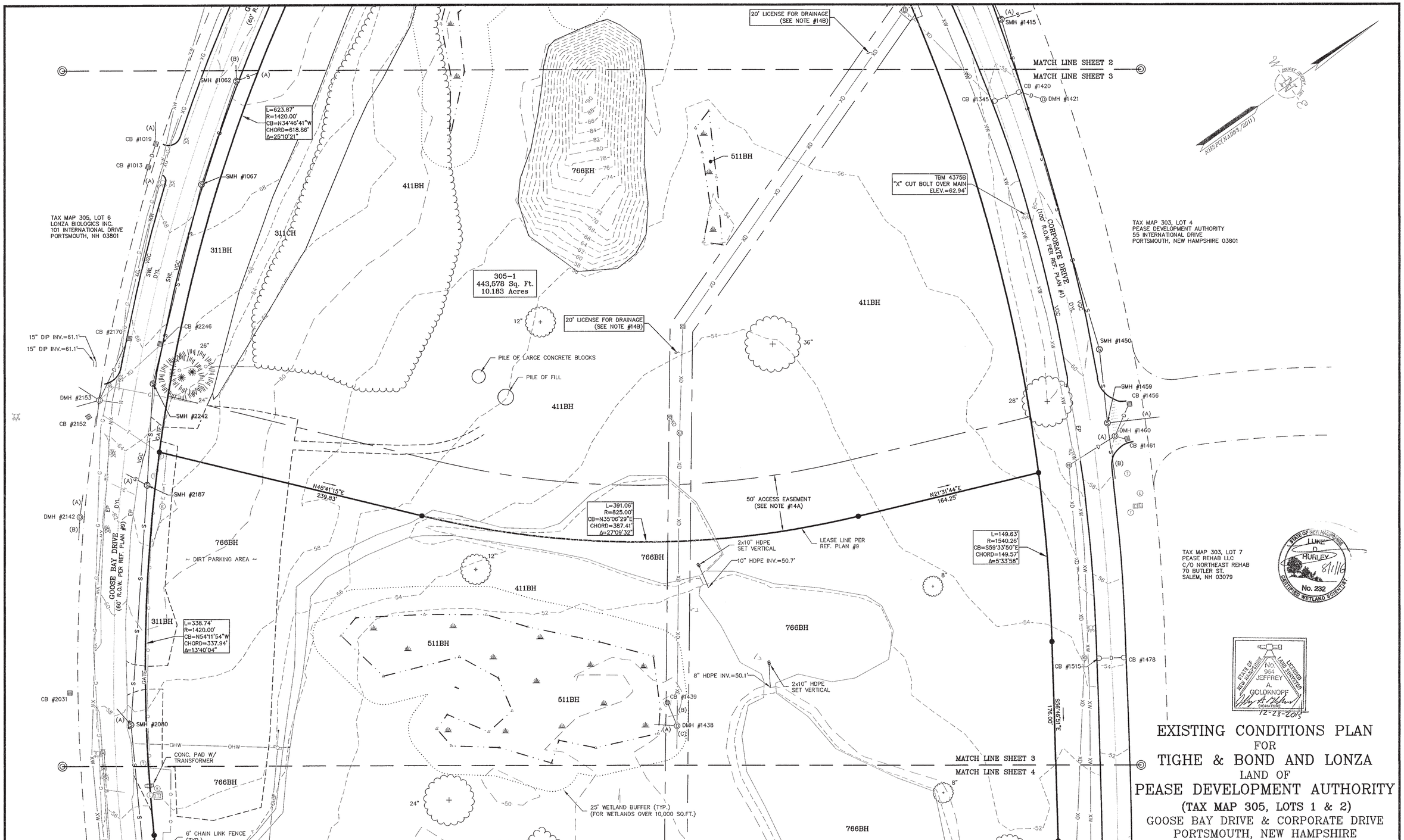
http://www.doucetsurvey.com

FILE NAME: X:\PROJECTS\4375 CSD\DWG\4375A.dwg LAYOUT NAME: ISR 22x34 (2) PLOTTED: Wednesday, August 03, 2016 - 4:02pm



EXISTING CONDITIONS PLAN
FOR
TIGHE & BOND AND LONZA
LAND OF
PEASE DEVELOPMENT AUTHORITY
(TAX MAP 305, LOTS 1 & 2)
GOOSE BAY DRIVE & CORPORATE DRIVE
PORTSMOUTH, NEW HAMPSHIRE

GRAPHIC SCALE

40 0 20 40 80 160

(IN FEET)
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DRAWN BY:	K.C.W.	DATE:	DEC. 23, 2015
CHECKED BY:	J.A.G.	DRAWING NO.:	4375A
JOB NO.:	4375	SHEET	3 OF 4

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FILE NAME: Y:\PROJECTS\4375 C3D\DWG\4375A.dwg LAYOUT NAME: DGI 22X34 (3) PLOTTED: Wednesday, August 03, 2016 - 4:02pm

MATCH LINE SHEET 3

MATCH LINE SHEET 4

766BH

411BH

511BH

311BH

228CH

305-2
604,273 Sq. Ft.
13.872 Acres

25' WETLAND BUFFER (TYP.)
(FOR WETLANDS OVER 10,000 SQ.FT.)

6' CHAIN LINK FENCE (TYP.)

GOOSE BAY DRIVE
(60' R.O.W. PER REF. PLAN #9)

N61°01'36"W
223.15'

252.97'
S38°27'58"W

433.19'
S42°06'02"W

LEDGE OUTCROP

CONC. PAD W/ TRANSFORMER

TRAILER

6" PVC

4" PVC

12T W/ CONDUIT

2x12" HDPE SET VERTICAL

12" HDPE INV.=43.6'

12" HDPE INV.=45.7'

15" RCP INV.=38.1'

20' LICENSE FOR DRAINAGE
(SEE NOTE #14B)

CB #1935
CB #1769
CB #1756
CB #1685
CB #1678
CB #1733
CB #1732
CB #1444
CB #2329
CB #1504
CB #1484
CB #1651
CB #1542
CB #1572
CB #1570
CB #1580
CB #1586

SMH #1953
SMH #1921
SMH #1784
SMH #1691
SMH #1722
SMH #1551
SMH #2328

DMH #2330
DMH #1695
DMH #1755
DMH #2336

L=181.41'
R=1752.84'
CB=N58°03'47"W
CHORD=181.33'
Δ=5°55'47"

L=75.52'
R=50.06'
CB=S81°41'02"W
CHORD=68.56'
Δ=86°26'09"

L=473.28'
R=2450.00'
CB=S51°14'49"E
CHORD=472.54'
Δ=11°04'05"

TBM 4375C
"X" CUT BOLT OVER MAIN
ELEV.=47.97'

TBM 4375D
"X" CUT BOLT OVER MAIN
ELEV.=47.67'

5/8" REBAR FOUND DOWN 1"

5/8" REBAR FOUND FLUSH

5/8" REBAR FOUND W/ "DSI LLS 937" CAP, DOWN 2"

4" X 4" GRANITE BOUND FOUND W/ D.H. UP 8"

6' x 2' CONCRETE BOX CULVERT

30" CMP INV.=35.3'
30" CMP INV.=35.4'
30" CMP INV.=35.2'
15" RCP INV.=35.6'
24" RCP INV.=35.1'
15" RCP INV.=35.5'
0" RCP INV.=35.8'

CORPORATE DRIVE
(100' R.O.W. PER REF. PLAN #1)

TAX MAP 305, LOT 6
LONZA BIOLOGICS INC.
101 INTERNATIONAL DR
PORTSMOUTH, NH
03801

TAX MAP 305, LOT 4
119 INTERNATIONAL DRIVE LLC
CO-OWNER: KEYBANK REAL ESTATE CAPITAL
ATTN: TAX DEPT
11501 OUTLOOK SUITE 300
OVERLAND PARK, KS 66211

TAX MAP 305, LOT 3-1
PIONEER NEW HAMPSHIRE LLC
340 CENTRAL AVE STE 202
DOVER, NH 03820
R.C.R.D. BOOK 3571, PAGE 1559

TAX MAP 305, LOT 3-2
PIONEER NEW HAMPSHIRE LLC
340 CENTRAL AVE STE 202
DOVER, NH 03820
R.C.R.D. BOOK 3571, PAGE 1559

TAX MAP 305, LOT 3-3
PIONEER NEW HAMPSHIRE LLC
340 CENTRAL AVE STE 202
DOVER, NH 03820
R.C.R.D. BOOK 3571, PAGE 1559

TAX MAP 305, LOT 3-4
NEXTERA ENERGY SEABROOK LLC
700 UNIVERSE BOULEVARD PSX/JB
JUNO BEACH, FL 33408
R.C.R.D. BOOK 5454, PAGE 2321

TAX MAP 303, LOT 7
PEASE REHAB LLC
C/O NORTHEAST REHAB
70 BUTLER ST.
SALEM, NH 03079

TAX MAP 303, LOT 8
PEASE DEVELOPMENT AUTHORITY
55 INTERNATIONAL DRIVE
PORTSMOUTH, NEW HAMPSHIRE 03801

NAD83(NAD83/2011)

LUKE D. HUFLEY 8/11/16 No. 232 CERTIFIED WETLAND SCIENTIST

STATE OF NEW HAMPSHIRE No. 964 JEFFREY A. GOLDKNOPF SIGNATURE LICENSED LAND SURVEYOR
12-23-2015

NO.	DATE	DESCRIPTION	BY
1	8/3/16	GENERAL EDITS AND ADDED WETLANDS BUFFER	J.A.G.

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GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

EXISTING CONDITIONS PLAN
FOR
TIGHE & BOND AND LONZA
LAND OF
PEASE DEVELOPMENT AUTHORITY
(TAX MAP 305, LOTS 1 & 2)
GOOSE BAY DRIVE & CORPORATE DRIVE
PORTSMOUTH, NEW HAMPSHIRE

DRAWN BY:	K.C.W.	DATE:	DEC. 23, 2015
CHECKED BY:	J.A.G.	DRAWING NO.:	4375A
JOB NO.:	4375	SHEET	4 OF 4

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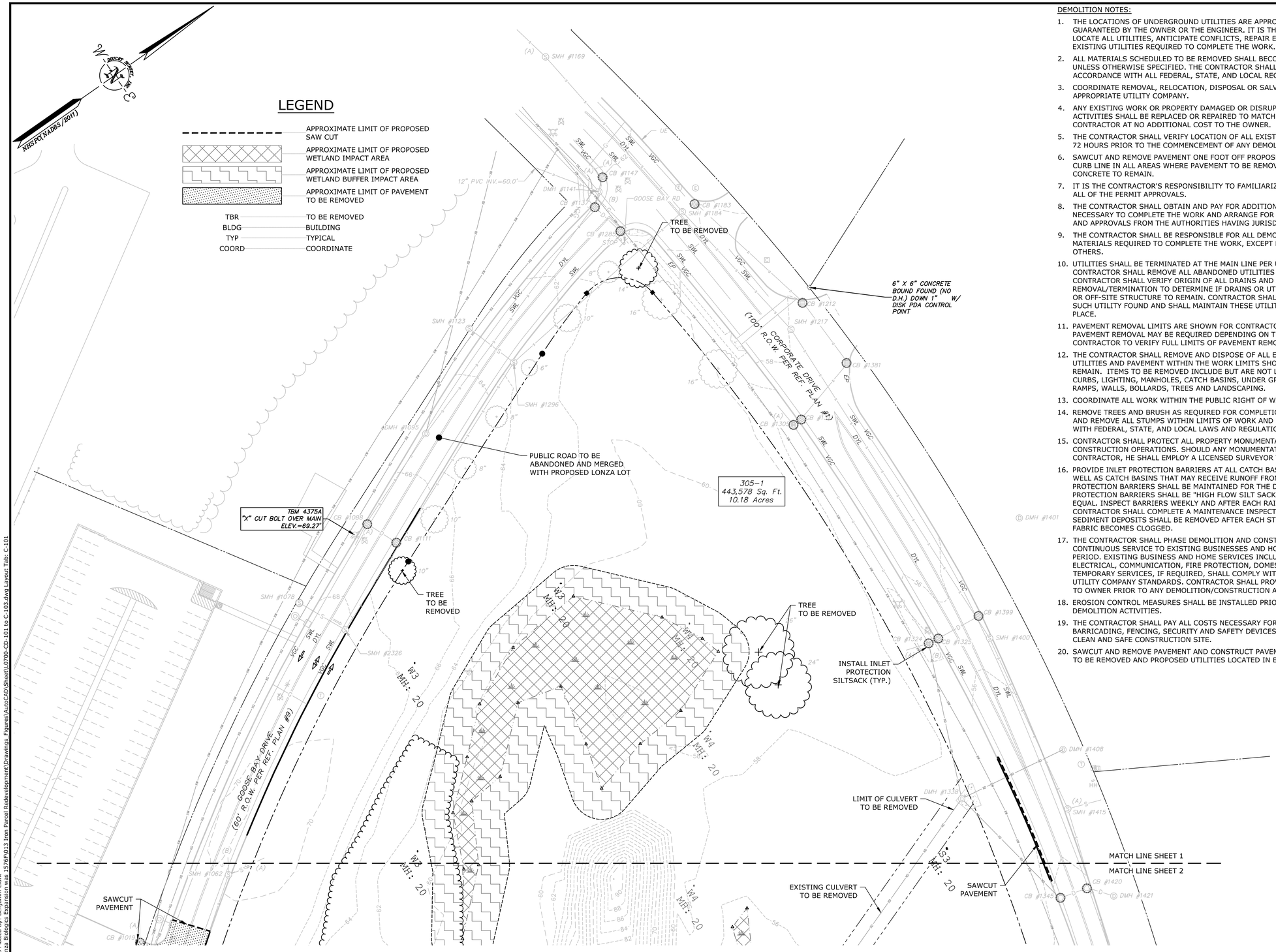
FILE NAME: P:\PROJECTS\4375 GSD\DWG\4375A.dwg LAYOUT NAME: ISI 22X34 (4) PLOTTED: Wednesday, August 03, 2016 - 4:02pm



DEMOLITION NOTES:

1. THE LOCATIONS OF UNDERGROUND UTILITIES ARE APPROXIMATE AND THE LOCATIONS ARE NOT GUARANTEED BY THE OWNER OR THE ENGINEER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES, ANTICIPATE CONFLICTS, REPAIR EXISTING UTILITIES AND RELOCATE EXISTING UTILITIES REQUIRED TO COMPLETE THE WORK.
2. ALL MATERIALS SCHEDULED TO BE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR UNLESS OTHERWISE SPECIFIED. THE CONTRACTOR SHALL DISPOSE OF ALL MATERIALS OFF-SITE IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS, ORDINANCES AND CODES.
3. COORDINATE REMOVAL, RELOCATION, DISPOSAL OR SALVAGE OF UTILITIES WITH THE OWNER AND APPROPRIATE UTILITY COMPANY.
4. ANY EXISTING WORK OR PROPERTY DAMAGED OR DISRUPTED BY CONSTRUCTION/DEMOLITION ACTIVITIES SHALL BE REPLACED OR REPAIRED TO MATCH ORIGINAL EXISTING CONDITIONS BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
5. THE CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING UTILITIES. CALL DIG SAFE AT LEAST 72 HOURS PRIOR TO THE COMMENCEMENT OF ANY DEMOLITION/CONSTRUCTION ACTIVITIES.
6. SAWCUT AND REMOVE PAVEMENT ONE FOOT OFF PROPOSED EDGE OF PAVEMENT OR EXISTING CURB LINE IN ALL AREAS WHERE PAVEMENT TO BE REMOVED ABUTS EXISTING PAVEMENT OR CONCRETE TO REMAIN.
7. IT IS THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE THEMSELVES WITH THE CONDITIONS OF ALL OF THE PERMIT APPROVALS.
8. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ADDITIONAL PERMITS, NOTICES AND FEES NECESSARY TO COMPLETE THE WORK AND ARRANGE FOR AND PAY FOR NECESSARY INSPECTIONS AND APPROVALS FROM THE AUTHORITIES HAVING JURISDICTION.
9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL DEMOLITION AND OFF-SITE DISPOSAL OF MATERIALS REQUIRED TO COMPLETE THE WORK, EXCEPT FOR WORK NOTED TO BE COMPLETED BY OTHERS.
10. UTILITIES SHALL BE TERMINATED AT THE MAIN LINE PER UTILITY COMPANY STANDARDS. THE CONTRACTOR SHALL REMOVE ALL ABANDONED UTILITIES LOCATED WITHIN THE LIMITS OF WORK. CONTRACTOR SHALL VERIFY ORIGIN OF ALL DRAINS AND UTILITIES PRIOR TO REMOVAL/TERMINATION TO DETERMINE IF DRAINS OR UTILITY IS ACTIVE, AND SERVICES ANY ON OR OFF-SITE STRUCTURE TO REMAIN. CONTRACTOR SHALL NOTIFY ENGINEER IMMEDIATELY OF ANY SUCH UTILITY FOUND AND SHALL MAINTAIN THESE UTILITIES UNTIL PERMANENT SOLUTION IS IN PLACE.
11. PAVEMENT REMOVAL LIMITS ARE SHOWN FOR CONTRACTOR'S CONVENIENCE. ADDITIONAL PAVEMENT REMOVAL MAY BE REQUIRED DEPENDING ON THE CONTRACTOR'S OPERATION. CONTRACTOR TO VERIFY FULL LIMITS OF PAVEMENT REMOVAL PRIOR TO BID.
12. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING STRUCTURES, CONCRETE PADS, UTILITIES AND PAVEMENT WITHIN THE WORK LIMITS SHOWN UNLESS SPECIFICALLY IDENTIFIED TO REMAIN. ITEMS TO BE REMOVED INCLUDE BUT ARE NOT LIMITED TO: CONCRETE, PAVEMENT, CURBS, LIGHTING, MANHOLES, CATCH BASINS, UNDER GROUND PIPING, POLES, SIGNS, FENCES, RAMPS, WALLS, BOLLARDS, TREES AND LANDSCAPING.
13. COORDINATE ALL WORK WITHIN THE PUBLIC RIGHT OF WAYS WITH THE CITY OF PORTSMOUTH.
14. REMOVE TREES AND BRUSH AS REQUIRED FOR COMPLETION OF WORK. CONTRACTOR SHALL GRUB AND REMOVE ALL STUMPS WITHIN LIMITS OF WORK AND DISPOSE OF OFF SITE IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL LAWS AND REGULATIONS.
15. CONTRACTOR SHALL PROTECT ALL PROPERTY MONUMENTATION THROUGHOUT DEMOLITION AND CONSTRUCTION OPERATIONS. SHOULD ANY MONUMENTATION BE DISTURBED BY BY THE CONTRACTOR, HE SHALL EMPLOY A LICENSED SURVEYOR TO REPLACE IT.
16. PROVIDE INLET PROTECTION BARRIERS AT ALL CATCH BASINS WITHIN CONSTRUCTION LIMITS AS WELL AS CATCH BASINS THAT MAY RECEIVE RUNOFF FROM CONSTRUCTION ACTIVITIES. INLET PROTECTION BARRIERS SHALL BE MAINTAINED FOR THE DURATION OF THE PROJECT. INLET PROTECTION BARRIERS SHALL BE "HIGH FLOW SILT SACK" BY ACF ENVIRONMENTAL OR APPROVED EQUAL. INSPECT BARRIERS WEEKLY AND AFTER EACH RAIN OF 0.25 INCHES OR GREATER. CONTRACTOR SHALL COMPLETE A MAINTENANCE INSPECTION REPORT AFTER EACH INSPECTION. SEDIMENT DEPOSITS SHALL BE REMOVED AFTER EACH STORM EVENT OR MORE OFTEN IF THE FABRIC BECOMES CLOGGED.
17. THE CONTRACTOR SHALL PHASE DEMOLITION AND CONSTRUCTION AS REQUIRED TO PROVIDE CONTINUOUS SERVICE TO EXISTING BUSINESSES AND HOMES THROUGHOUT THE CONSTRUCTION PERIOD. EXISTING BUSINESS AND HOME SERVICES INCLUDE, BUT ARE NOT LIMITED TO ELECTRICAL, COMMUNICATION, FIRE PROTECTION, DOMESTIC WATER AND SEWER SERVICES. TEMPORARY SERVICES, IF REQUIRED, SHALL COMPLY WITH ALL FEDERAL, STATE, LOCAL AND UTILITY COMPANY STANDARDS. CONTRACTOR SHALL PROVIDE DETAILED CONSTRUCTION SCHEDULE TO OWNER PRIOR TO ANY DEMOLITION/CONSTRUCTION ACTIVITIES.
18. EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE START OF ANY CLEARING OR DEMOLITION ACTIVITIES.
19. THE CONTRACTOR SHALL PAY ALL COSTS NECESSARY FOR TEMPORARY PARTITIONING, BARRICADING, FENCING, SECURITY AND SAFETY DEVICES REQUIRED FOR THE MAINTENANCE OF A CLEAN AND SAFE CONSTRUCTION SITE.
20. SAWCUT AND REMOVE PAVEMENT AND CONSTRUCT PAVEMENT TRENCH PATCH FOR ALL UTILITIES TO BE REMOVED AND PROPOSED UTILITIES LOCATED IN EXISTING PAVEMENT AREAS TO REMAIN.

Tighe&Bond
Engineers | Environmental Specialists

STATE OF NEW HAMPSHIRE – PATRICK M. GRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER – 5-21-18

STATE OF NEW HAMPSHIRE – BRADLEE MEZQUITA No. 09590 LICENSED PROFESSIONAL ENGINEER – 5-21-18

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-101 to C-103.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

DEMOLITION PLAN

SCALE: AS SHOWN

C-101

Last Save Date: May 18, 2018 9:48 AM By: BCLARK
Plot Date: May 21, 2018 - 2:08pm By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CD-101 to C-103.dwg Layout Tab: C-101

SAWCUT PAVEMENT

INSTALL INLET PROTECTION SILTSACK (TYP.)

TBR

SAWCUT PAVEMENT

TREE TO BE REMOVED

TREES TO BE REMOVED

PILE OF LARGE CONCRETE BLOCKS

PILE OF FILL

LIMIT OF CULVERT TO BE REMOVED

EXISTING CULVERT TO BE REMOVED

SAWCUT PAVEMENT

MATCH LINE SHEET 1

MATCH LINE SHEET 2

TBM 4375B
"X" CUT BOLT OVER MAIN
ELEV.=62.94'

(100' R.O.W. PER REF. PLAN #1) CORPORATE DRIVE

TREE TO BE REMOVED

EXISTING CULVERT TO BE REMOVED

EXISTING TREE TO REMAIN, PROTECT DURING CONSTRUCTION

5/8" REBAR FOUND W/ "BURD ENGINEERING" CAP, FLUSH

5/8" REBAR FOUND W/ "BURD ENGINEERING" CAP, DOWN 1"

5/8" REBAR FOUND W/ "BURD ENGINEERING" CAP, DOWN 1"

(66' R.O.W. PER REF. PLAN #2) GOOSE BAY DRIVE

~ DIRT PARKING AREA ~
TBR

LEASE LINE PER REF. PLAN #9

2x10" HDPE VERTICAL
10" HDPE INV.=50.7'
TBR

TREE TO BE REMOVED

8" HDPE INV.=50.1'
TBR

2x10" HDPE VERTICAL
TBR

TBR

UTILITY POLE AND OVERHEAD WIRE TO BE REMOVED

CONC. PAD W/ TRANSFORMER

MATCH LINE SHEET 2

MATCH LINE SHEET 3

TREE TO BE REMOVED

TREE TO BE REMOVED

TREE TO BE REMOVED

6' CHAIN LINK FENCE (TYP.)

SEE SHEET C-101 FOR LEGEND AND DEMOLITION NOTES

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Tighe&Bond
Engineers | Environmental Specialists

PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE
5-21-18

BRADLEE MEZCKTA No. 09590 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE
5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

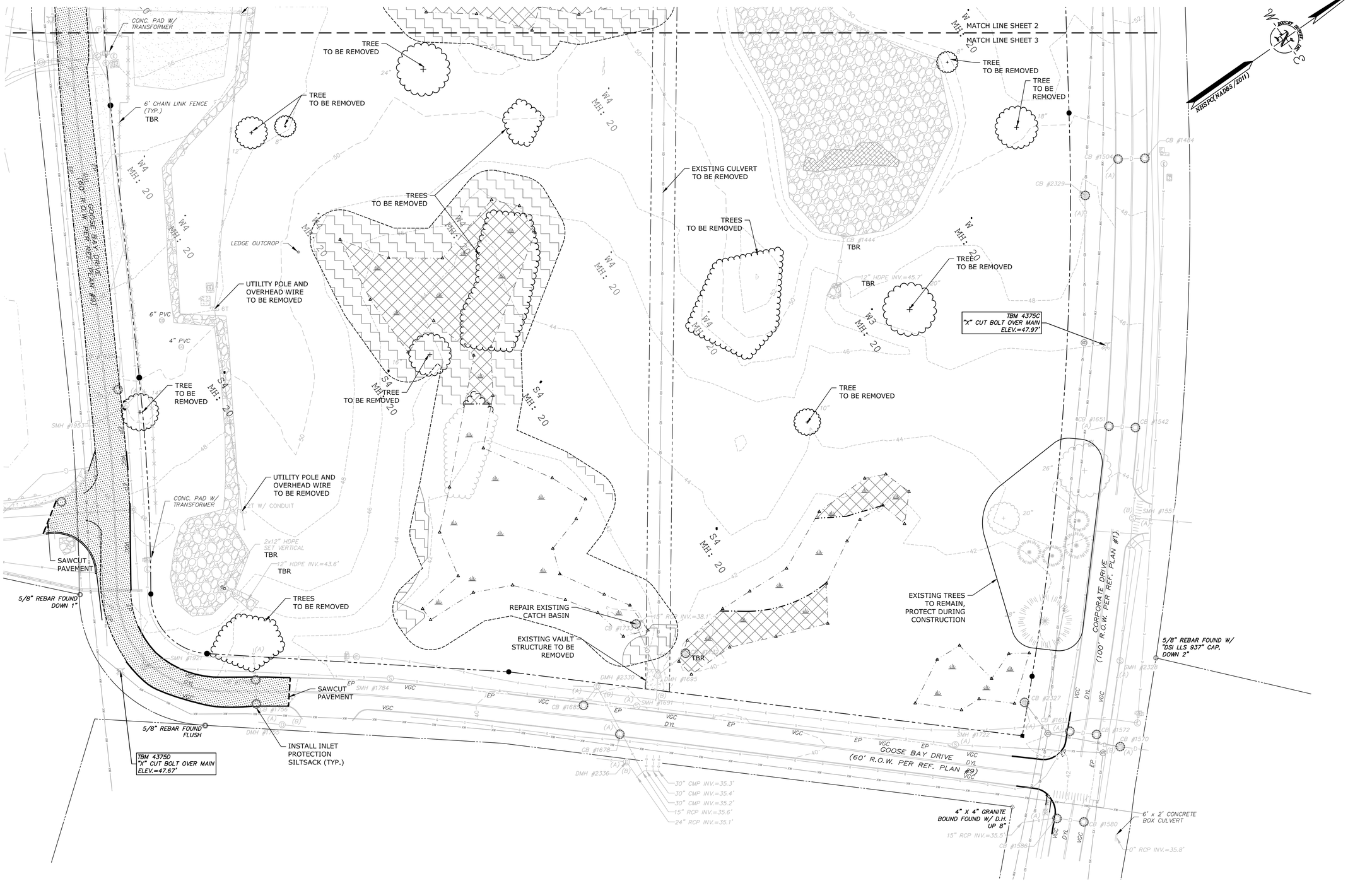
PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-101 to C-103.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

DEMOLITION PLAN

SCALE: AS SHOWN

C-102

Last Save Date: May 18, 2018 9:48 AM By: BCLARK
Plot Date: May 21, 2018 7:18 AM By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings_Figures\AutoCAD\Sheet\L0700-CD-101 to C-103.dwg Layout Tab: C-102



SEE SHEET C-101 FOR LEGEND AND DEMOLITION NOTES

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STATE OF NEW HAMPSHIRE PATRICK M. CRIMMINS No. 12378 LICENSED PROFESSIONAL ENGINEER 5-21-18

STATE OF NEW HAMPSHIRE BRADLEE MEZQUITA No. 09830 LICENSED PROFESSIONAL ENGINEER 5-21-18

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-101 to C-103.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

DEMOLITION PLAN

SCALE: AS SHOWN

C-103

Last Save Date: May 18, 2018 9:48 AM By: BCLARK
Plot Date: Monday, May 21, 2018 Plotted By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings_Figures\AutoCAD\Sheet\L0700-CD-101 to C-103.dwg Layout Tab: C-103

SITE DATA

LOCATION: TAX MAP 305, LOTS 1 & 2 — 70 & 80 CORPORATE DRIVE — PORTSMOUTH, NH
TAX MAP 305, LOT 6 — 101 INTERNATIONAL DRIVE — PORTSMOUTH, NH

ZONING DISTRICT: AIRPORT, BUSINESS & COMMERCIAL (ABC)

DIMENSIONAL REQUIREMENTS:

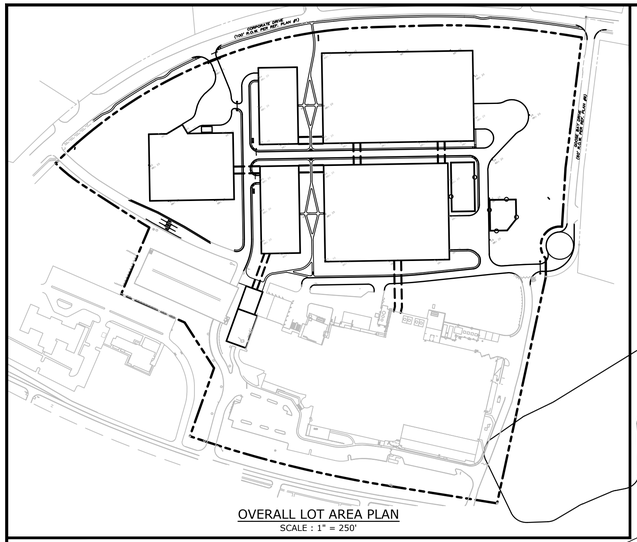
	REQUIRED	PROVIDED
MINIMUM LOT AREA:	5 AC	43.4± AC
MINIMUM STREET FRONTAGE:	200 FT	1,038 FT
MINIMUM FRONT YARD SETBACK:	70 FT	70 FT
SIDE SETBACK	30 FT	30 FT
REAR SETBACK	50 FT	51 FT
MINIMUM OPEN SPACE	25 %	41.7± %

MAXIMUM STRUCTURE HEIGHT SHALL NOT EXCEED FAA CRITERIA.

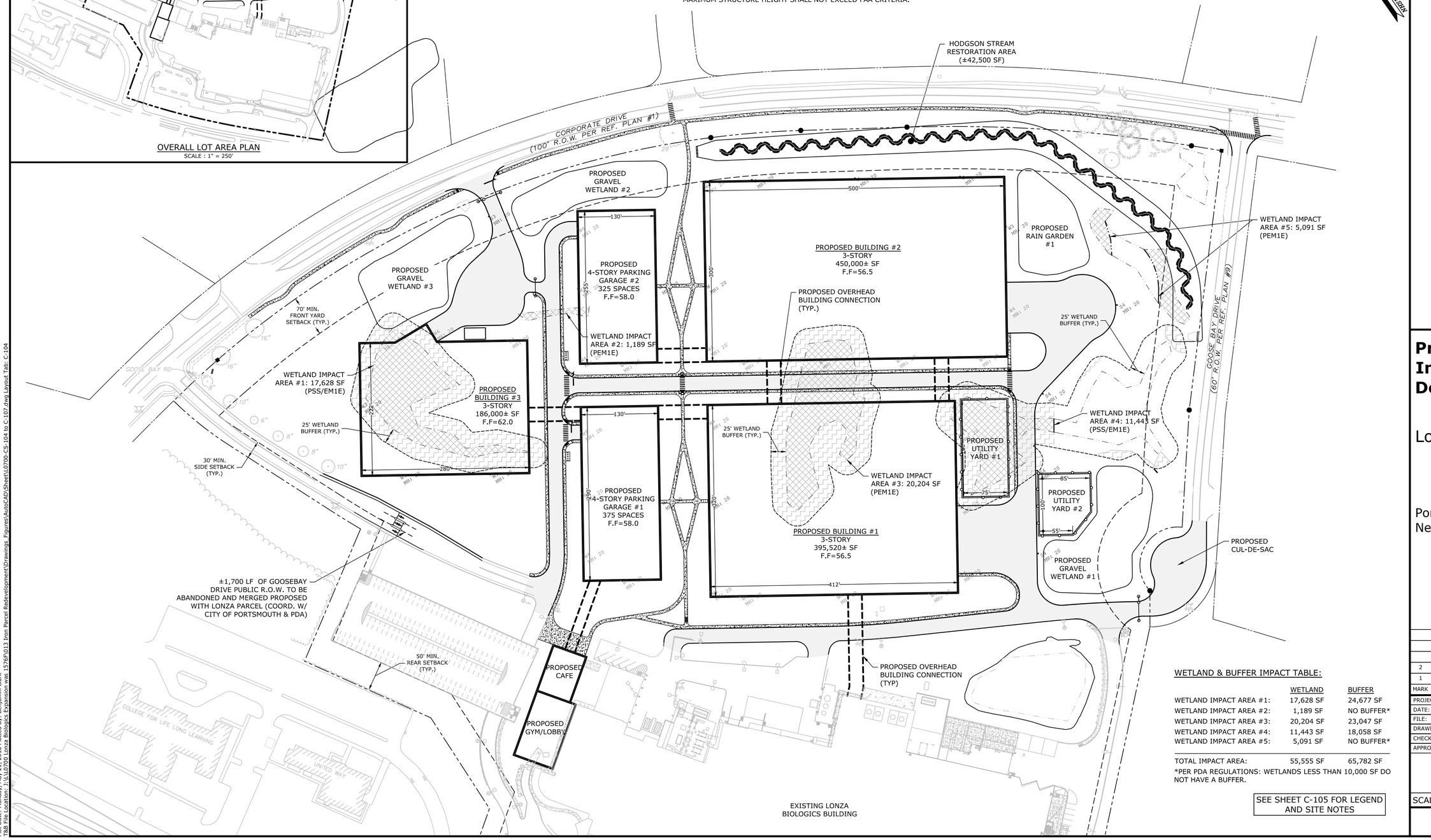
PARKING REQUIREMENTS:

REQUIRED PARKING
2 SPACES PER 3 EMPLOYEES ON LARGEST SHIFT
740 EXISTING EMPLOYEES — 493 SPACES
1000 ANTICIPATED EMPLOYEES — 667 SPACES
TOTAL REQUIRED: — 1160 SPACES

PARKING PROVIDED
EXISTING SPACES: — 521 SPACES
PROPOSED PARKING GARAGE #1: — 325 SPACES
PROPOSED PARKING GARAGE #2: — 375 SPACES
TOTAL: — 1221 SPACES



OVERALL LOT AREA PLAN
SCALE : 1" = 250'



WETLAND & BUFFER IMPACT TABLE:

	WETLAND	BUFFER
WETLAND IMPACT AREA #1:	17,628 SF	24,677 SF
WETLAND IMPACT AREA #2:	1,189 SF	NO BUFFER*
WETLAND IMPACT AREA #3:	20,204 SF	23,047 SF
WETLAND IMPACT AREA #4:	11,443 SF	18,058 SF
WETLAND IMPACT AREA #5:	5,091 SF	NO BUFFER*
TOTAL IMPACT AREA:	55,555 SF	65,782 SF

*PER PDA REGULATIONS: WETLANDS LESS THAN 10,000 SF DO NOT HAVE A BUFFER.

SEE SHEET C-105 FOR LEGEND AND SITE NOTES

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PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER — STATE OF NEW HAMPSHIRE — 5-21-18

BRADLEE MEZICKTA No. 09930 LICENSED PROFESSIONAL ENGINEER — STATE OF NEW HAMPSHIRE — 5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

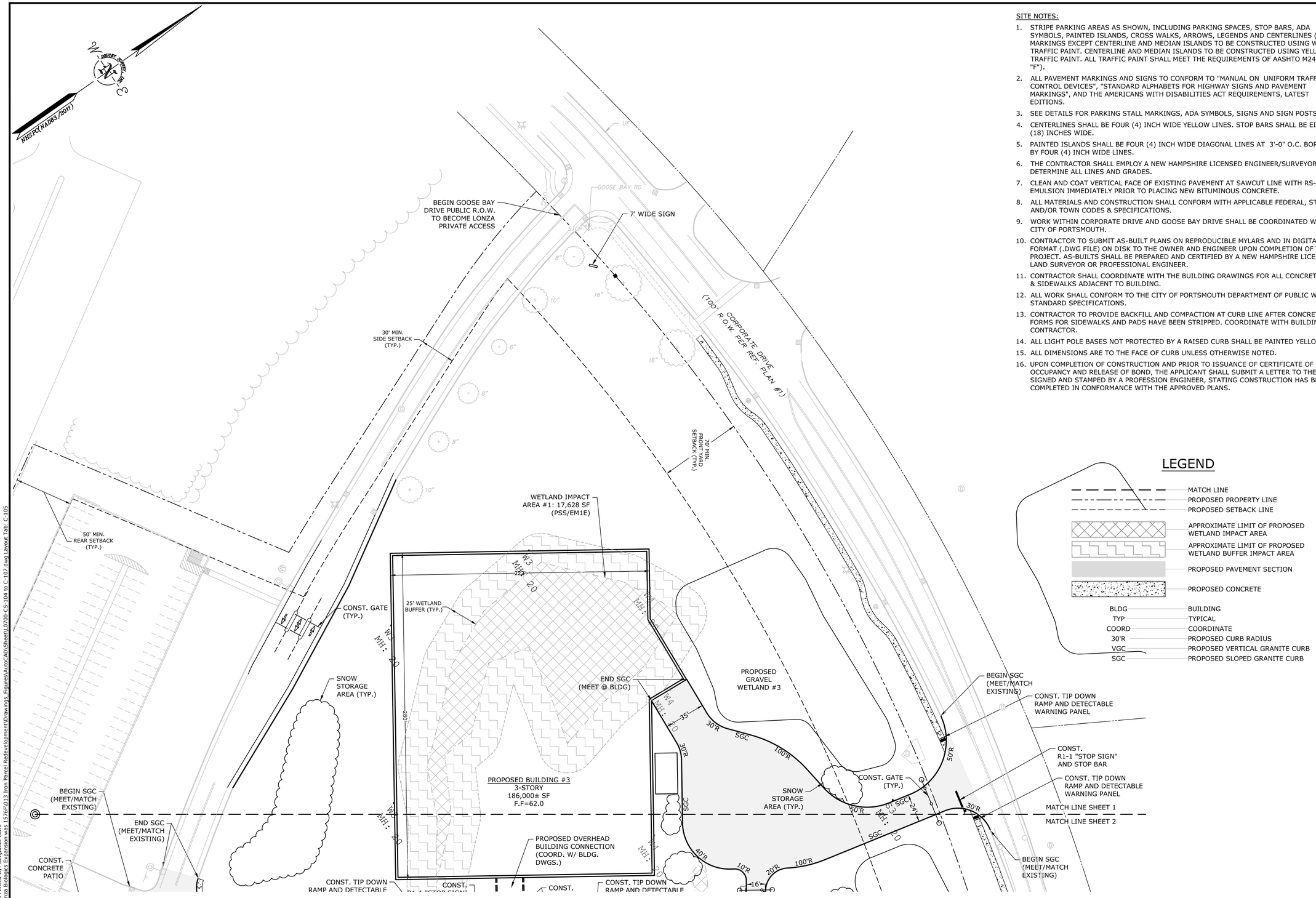
PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CS-104 to C-107.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

OVERALL SITE PLAN

SCALE: AS SHOWN

C-104

Last Save Date: May 18, 2018 10:22 AM By: BCLARK
Plot Date: May 21, 2018 10:22 AM By: Brandon Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion wat 1576F\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CS-104 to C-107.dwg Layout Tab: C-104



SITE NOTES:

1. STRIPE PARKING AREAS AS SHOWN, INCLUDING PARKING SPACES, STOP BARS, ADA SYMBOLS, PAINTED ISLANDS, CROSS WALKS, ARROWS, LEGENDS AND CENTERLINES (ALL MARKINGS EXCEPT CENTERLINE AND MEDIAN ISLANDS TO BE CONSTRUCTED USING WHITE TRAFFIC PAINT. CENTERLINE AND MEDIAN ISLANDS TO BE CONSTRUCTED USING YELLOW TRAFFIC PAINT. ALL TRAFFIC PAINT SHALL MEET THE REQUIREMENTS OF AASHTO M248 TYPE "F").
2. ALL PAVEMENT MARKINGS AND SIGNS TO CONFORM TO "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES", "STANDARD ALPHABETS FOR HIGHWAY SIGNS AND PAVEMENT MARKINGS", AND THE AMERICANS WITH DISABILITIES ACT REQUIREMENTS, LATEST EDITIONS.
3. SEE DETAILS FOR PARKING STALL MARKINGS, ADA SYMBOLS, SIGNS AND SIGN POSTS.
4. CENTERLINES SHALL BE FOUR (4) INCH WIDE YELLOW LINES. STOP BARS SHALL BE EIGHTEEN (18) INCHES WIDE.
5. PAINTED ISLANDS SHALL BE FOUR (4) INCH WIDE DIAGONAL LINES AT 3'-0" O.C. BORDERED BY FOUR (4) INCH WIDE LINES.
6. THE CONTRACTOR SHALL EMPLOY A NEW HAMPSHIRE LICENSED ENGINEER/SURVEYOR TO DETERMINE ALL LINES AND GRADES.
7. CLEAN AND COAT VERTICAL FACE OF EXISTING PAVEMENT AT SAWCUT LINE WITH RS-1 EMULSION IMMEDIATELY PRIOR TO PLACING NEW BITUMINOUS CONCRETE.
8. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM WITH APPLICABLE FEDERAL, STATE AND/OR TOWN CODES & SPECIFICATIONS.
9. WORK WITHIN CORPORATE DRIVE AND GOOSE BAY DRIVE SHALL BE COORDINATED WITH CITY OF PORTSMOUTH.
10. CONTRACTOR TO SUBMIT AS-BUILT PLANS ON REPRODUCIBLE MYLARS AND IN DIGITAL FORMAT (.DWG FILE) ON DISK TO THE OWNER AND ENGINEER UPON COMPLETION OF THE PROJECT. AS-BUILTS SHALL BE PREPARED AND CERTIFIED BY A NEW HAMPSHIRE LICENSED LAND SURVEYOR OR PROFESSIONAL ENGINEER.
11. CONTRACTOR SHALL COORDINATE WITH THE BUILDING DRAWINGS FOR ALL CONCRETE PADS & SIDEWALKS ADJACENT TO BUILDING.
12. ALL WORK SHALL CONFORM TO THE CITY OF PORTSMOUTH DEPARTMENT OF PUBLIC WORKS, STANDARD SPECIFICATIONS.
13. CONTRACTOR TO PROVIDE BACKFILL AND COMPACTION AT CURB LINE AFTER CONCRETE FORMS FOR SIDEWALKS AND PADS HAVE BEEN STRIPPED. COORDINATE WITH BUILDING CONTRACTOR.
14. ALL LIGHT POLE BASES NOT PROTECTED BY A RAISED CURB SHALL BE PAINTED YELLOW.
15. ALL DIMENSIONS ARE TO THE FACE OF CURB UNLESS OTHERWISE NOTED.
16. UPON COMPLETION OF CONSTRUCTION AND PRIOR TO ISSUANCE OF CERTIFICATE OF OCCUPANCY AND RELEASE OF BOND, THE APPLICANT SHALL SUBMIT A LETTER TO THE PDA, SIGNED AND STAMPED BY A PROFESSION ENGINEER, STATING CONSTRUCTION HAS BEEN COMPLETED IN CONFORMANCE WITH THE APPROVED PLANS.

LEGEND

- MATCH LINE
- PROPOSED PROPERTY LINE
- PROPOSED SETBACK LINE
- APPROXIMATE LIMIT OF PROPOSED WETLAND IMPACT AREA
- APPROXIMATE LIMIT OF PROPOSED WETLAND BUFFER IMPACT AREA
- PROPOSED PAVEMENT SECTION
- PROPOSED CONCRETE

BLDG	BUILDING
TYP	TYPICAL
COORD	COORDINATE
30'R	PROPOSED CURB RADIUS
VGC	PROPOSED VERTICAL GRANITE CURB
SGC	PROPOSED SLOPED GRANITE CURB

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Tighe&Bond
Engineers | Environmental Specialists

STATE OF NEW HAMPSHIRE – PATRICK M. GRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER – 5-21-18

STATE OF NEW HAMPSHIRE – BRADLEE MEZICKTA No. 09590 LICENSED PROFESSIONAL ENGINEER – 5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CS-104 to C-107.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

SITE PLAN

SCALE: AS SHOWN

C-105

Last Save Date: May 18, 2018 10:22 AM By: BCLARK
Plot Date: May 18, 2018 10:22 AM By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CS-104 to C-107.dwg Layout Tab: C-105

BEGIN SGC (MEET/MATCH EXISTING)
END SGC (MEET/MATCH EXISTING)
CONST. CONCRETE PATIO
PROPOSED CAFE
BEGIN VGC (MEET/MATCH EXISTING)
PROPOSED OVERHEAD BUILDING CONNECTION (COORD. W/ BLDG. DWGS.)
PROPOSED BUILDING #3
3-STORY
186,000± SF
F.F=62.0
PROPOSED OVERHEAD BUILDING CONNECTION (COORD. W/ BLDG. DWGS.)
CONST. TIP DOWN RAMP AND DETECTABLE WARNING PANEL
CONST. R1-1 "STOP SIGN" AND STOP BAR
CONST. CROSSWALK
CONST. TIP DOWN RAMP AND DETECTABLE WARNING PANEL
CONST. BIKE RACK
END VGC (MEET @ BLDG)
CONST. TIP DOWN RAMP AND DETECTABLE WARNING PANEL
PROPOSED 4-STORY PARKING GARAGE #1
375 SPACES
F.F=58.0
CONST. BIKE RACK
WETLAND IMPACT AREA #2: 1,189 SF (PEM1E)
END SGC (MEET @ BLDG)
CONST. R1-1 "STOP SIGN" AND STOP BAR
END VGC (MEET @ BLDG)
PROPOSED 4-STORY PARKING GARAGE #2
325 SPACES
F.F=58.0
PROPOSED GRAVEL WETLAND #2
PROPOSED OVERHEAD BUILDING CONNECTION (COORD. W/ BLDG. DWGS.)
CONST. CONCRETE STAIRS
PROPOSED 5' WIDE CONCRETE SIDEWALK
CONST. CROSSWALK
PROPOSED 5' WIDE CONCRETE SIDEWALK
70' MIN. FRONT YARD SETBACK (TYP.)
CONST. CROSSWALK
PROPOSED OVERHEAD BUILDING CONNECTION (COORD. W/ BLDG. DWGS.)
CONST. TIP DOWN RAMP AND DETECTABLE WARNING PANEL
SNOW STORAGE AREA (TYP.)
PROPOSED BUILDING #1
3-STORY
395,520± SF
F.F=56.5
25' WETLAND BUFFER (TYP.)
PROPOSED OVERHEAD BUILDING CONNECTION (COORD. W/ BLDG. DWGS.)
PROPOSED BUILDING #2
3-STORY
450,000± SF
F.F=56.5
PROPOSED OVERHEAD BUILDING CONNECTION (COORD. W/ BLDG. DWGS.)
WETLAND IMPACT AREA #3: 20,204 SF (PEM1E)
HODGSON STREAM RESTORATION AREA (±42,500 SF)
SNOW STORAGE AREA (TYP.)
CONST. GATE (TYP.)
CONST. R1-1 "STOP SIGN" AND STOP BAR
CONST. TIP DOWN RAMP AND DETECTABLE WARNING PANEL
MATCH LINE SHEET 1
MATCH LINE SHEET 2
BEGIN SGC (MEET/MATCH EXISTING)
CONST. GATE (TYP.)
WBSFC(NAD83/2011)
CORPORATE DRIVE (100' R.O.W. PER REF. PLAN #1)
MATCH LINE SHEET 2
MATCH LINE SHEET 3
SEE SHEET C-105 FOR LEGEND AND SITE NOTES

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Tighe&Bond
Engineers | Environmental Specialists

STATE OF NEW HAMPSHIRE – PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER – 5-21-18

STATE OF NEW HAMPSHIRE – BRADLEE MEZICHTA No. 09830 LICENSED PROFESSIONAL ENGINEER – 5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
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PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CS-104 to C-107.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

SITE PLAN

SCALE: AS SHOWN

C-106

Last Save Date: May 18, 2018 10:22 AM By: BCLARK
Plot Date: Monday, May 21, 2018 Plotted By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CS-104 to C-107.dwg Layout Tab: C-106

AREA #3: 20,204 SF
(PEM1E)

MATCH LINE SHEET 2

MATCH LINE SHEET 3

PROPOSED BUILDING #1
3-STORY
395,520± SF
F.F=56.5

PROPOSED BUILDING #2
3-STORY
450,000± SF
F.F=56.5

PROPOSED OVERHEAD BUILDING CONNECTION (COORD. W/ BLDG. DWGS.)

END SGC
(MEET @ BLDG)

END VGC
(MEET @ BLDG)

WETLAND IMPACT
AREA #4: 11,443 SF
(PSS/EM1E)

PROPOSED
UTILITY YARD #1

CONST. TIP DOWN
RAMP AND DETECTABLE
WARNING PANEL

BEGIN SGC
(MEET @ BLDG)

END SGC
(MEET/MATCH
EXISTING)

SNOW
STORAGE
AREA (TYP.)

CONST.
CHAINLINK
FENCE

END SGC
BEGIN VGC W/
CURB
TRANSITION

CONST.
CROSSWALK

PROPOSED
RAIN GARDEN
#1

PROPOSED
UTILITY YARD #2

CONST.
CHAINLINK
FENCE

PROPOSED
GRAVEL
WETLAND #1

BEGIN VGC
(MEET/MATCH
EXISTING)

CONST. GATE
(TYP.)

30' MIN.
SIDE SETBACK
(TYP.)

25' WETLAND
BUFFER (TYP.)

WETLAND IMPACT
AREA #5: 5,091 SF
(PEM1E)

70' MIN.
FRONT YARD
SETBACK (TYP.)

HODGSON STREAM
RESTORATION AREA
(±42,500 SF)

END GOOSE BAY
DRIVE PUBLIC R.O.W.
TO BECOME LONZA
PRIVATE ACCESS

END VGC
(MEET/MATCH
EXISTING)

END VGC
(MEET/MATCH
EXISTING)

GOOSE BAY DRIVE
(60' R.O.W. PER REF. PLAN #9)

CORPORATE DRIVE
(100' R.O.W. PER REF. PLAN #1)

CONST.
CROSSWALK

WHSFC(NAD83/2011)

SEE SHEET C-105 FOR LEGEND
AND SITE NOTES

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Tighe&Bond
Engineers | Environmental Specialists

STATE OF NEW HAMPSHIRE
PATRICK M. GRIMMINS
No. 16278
LICENSED
PROFESSIONAL ENGINEER
5-21-18

STATE OF NEW HAMPSHIRE
BRADLEE MEZICKTA
No. 09590
LICENSED
PROFESSIONAL ENGINEER
5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

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2	5/21/2018	TAC SUBMISSION
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PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CS-104 to C-107.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

SITE PLAN

SCALE: AS SHOWN

C-107

Last Save Date: May 18, 2018 10:32 AM By: BCLARK
Path: S:\Work Projects\L-0700 2018 Revised Re-Submission\Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CS-104 to C-107.dwg Layout Tab: C-107

DRAINAGE STRUCTURE TABLE

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RIM=46.61
INV.IN=43.00

FES101
RIM=-2.94
INV.IN=43.00

FES200
RIM=2.92
INV.IN=50.00

FES201
RIM=0.66
INV.IN=50.00

FES300
RIM=52.22
INV.IN=50.50

FES400
RIM=46.43
INV.IN=45.00

FES401
RIM=-2.94
INV.IN=45.00

HW100
RIM=43.47
INV.IN=41.20

HW300
RIM=-2.75
INV.IN=47.00

PCB100
RIM=54.00
INV.OUT=47.20

PCB101
RIM=54.00
INV.IN=47.10
INV.IN=47.10
INV.OUT=47.00

PCB102
RIM=51.20
INV.OUT=45.30

PCB103
RIM=51.20
INV.IN=45.15
INV.IN=45.15
INV.OUT=45.05

PCB104
RIM=50.30
INV.OUT=44.95

PCB105
RIM=49.50
INV.IN=43.95
INV.OUT=43.85

PCB106
RIM=49.40
INV.IN=44.50
INV.OUT=44.40

PCB107
RIM=53.60
INV.OUT=46.66

PCB108
RIM=53.60
INV.IN=46.55
INV.OUT=46.45

PCB109
RIM=49.30
INV.OUT=43.36

PCB110
RIM=49.30
INV.IN=43.25
INV.OUT=43.15

PCB200
RIM=59.81
INV.IN=49.80
INV.IN=49.80
INV.OUT=49.70

PCB201
RIM=57.00
INV.OUT=49.90

PCB202
RIM=61.62
INV.IN=50.60
INV.OUT=50.50

PCB204
RIM=56.00
INV.OUT=50.80

PCB205
RIM=56.00
INV.OUT=51.00

PCB206
RIM=55.75
INV.OUT=51.70

PCB207
RIM=55.75
INV.IN=51.55
INV.OUT=51.45

PCB302
RIM=56.00
INV.OUT=51.85

PCB303
RIM=55.85
INV.IN=51.70
INV.OUT=51.60

PCB304
RIM=55.25
INV.OUT=51.40

PCB400
RIM=50.60
INV.OUT=45.60

PDMH100
RIM=51.79
INV.IN=48.70
INV.IN=48.70
INV.OUT=48.60

PDMH101
RIM=52.32
INV.IN=46.30
INV.IN=46.30
INV.OUT=46.20

PDMH102
RIM=54.10
INV.IN=46.10
INV.OUT=46.00

PDMH103
RIM=50.70
INV.IN=44.75
INV.IN=44.75
INV.OUT=44.65

PDMH104
RIM=51.00
INV.IN=44.00
INV.IN=43.20
INV.OUT=43.10

PDMH201
RIM=72.20
INV.IN=50.60
INV.OUT=50.50

PDMH301
RIM=58.17
INV.IN=51.60
INV.OUT=51.50

PDMH302
RIM=56.95
INV.IN=51.30
INV.IN=51.30
INV.OUT=51.20

PDMH303
RIM=62.51
INV.IN=50.90
INV.IN=50.90
INV.OUT=50.80

PDMH304
RIM=57.00
INV.IN=49.45
INV.OUT=49.35

PDMH305
RIM=57.50
INV.IN=48.45
INV.OUT=48.35

PDMH306
RIM=57.30
INV.IN=47.55
INV.IN=47.55
INV.OUT=47.45

PDMH400
RIM=51.50
INV.IN=45.25
INV.OUT=45.15

PDMH401
RIM=55.00
INV.IN=50.80
INV.OUT=50.70

PDMH402
RIM=53.50
INV.IN=49.50
INV.OUT=49.40

PDMH403
RIM=50.50
INV.IN=46.70
INV.OUT=45.55

POS100
RIM=46.17
INV.OUT=41.35

POS200
RIM=55.50
INV.OUT=49.35

POS300
RIM=55.50
INV.OUT=49.85

PYD100
RIM=55.00
INV.OUT=50.15

PYD101
RIM=55.00
INV.IN=49.65
INV.OUT=49.55

PYD102
RIM=55.00
INV.IN=49.15
INV.OUT=49.05

PYD103
RIM=59.00
INV.OUT=56.00

PYD104
RIM=55.00
INV.IN=48.00
INV.OUT=47.90

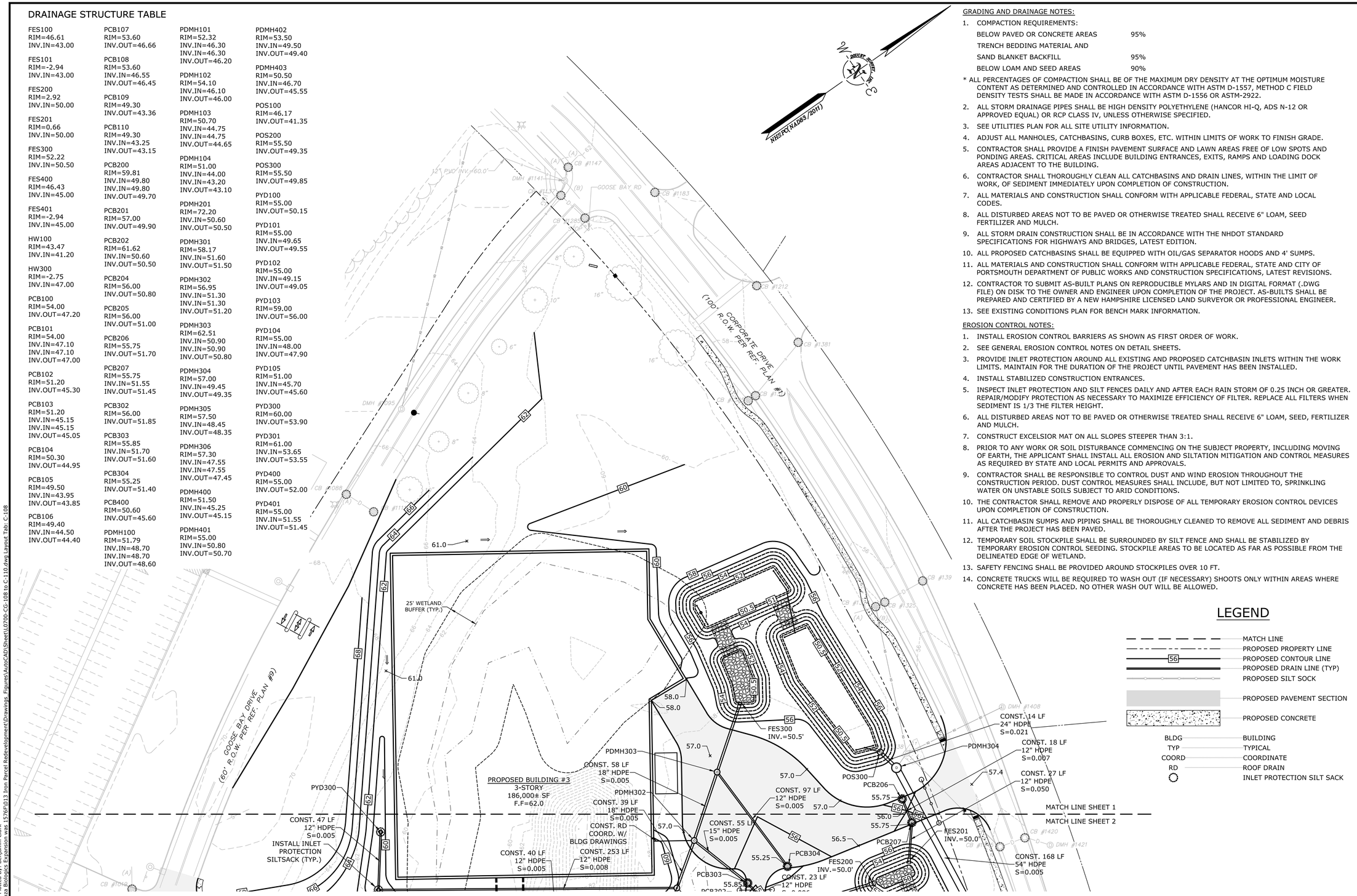
PYD105
RIM=51.00
INV.IN=45.70
INV.OUT=45.60

PYD300
RIM=60.00
INV.OUT=53.90

PYD301
RIM=61.00
INV.IN=53.65
INV.OUT=53.55

PYD400
RIM=55.00
INV.OUT=52.00

PYD401
RIM=55.00
INV.IN=51.55
INV.OUT=51.45



GRADING AND DRAINAGE NOTES:

1. COMPACTION REQUIREMENTS:

BELOW PAVED OR CONCRETE AREAS	95%
TRENCH BEDDING MATERIAL AND SAND BLANKET BACKFILL	95%
BELOW LOAM AND SEED AREAS	90%

* ALL PERCENTAGES OF COMPACTION SHALL BE OF THE MAXIMUM DRY DENSITY AT THE OPTIMUM MOISTURE CONTENT AS DETERMINED AND CONTROLLED IN ACCORDANCE WITH ASTM D-1557, METHOD C FIELD DENSITY TESTS SHALL BE MADE IN ACCORDANCE WITH ASTM D-1556 OR ASTM-2922.

2. ALL STORM DRAINAGE PIPES SHALL BE HIGH DENSITY POLYETHYLENE (HANCOR HI-Q, ADS N-12 OR APPROVED EQUAL) OR RCP CLASS IV, UNLESS OTHERWISE SPECIFIED.
3. SEE UTILITIES PLAN FOR ALL SITE UTILITY INFORMATION.
4. ADJUST ALL MANHOLES, CATCHBASINS, CURB BOXES, ETC. WITHIN LIMITS OF WORK TO FINISH GRADE.
5. CONTRACTOR SHALL PROVIDE A FINISH PAVEMENT SURFACE AND LAWN AREAS FREE OF LOW SPOTS AND PONDING AREAS. CRITICAL AREAS INCLUDE BUILDING ENTRANCES, EXITS, RAMPS AND LOADING DOCK AREAS ADJACENT TO THE BUILDING.
6. CONTRACTOR SHALL THOROUGHLY CLEAN ALL CATCHBASINS AND DRAIN LINES, WITHIN THE LIMIT OF WORK, OF SEDIMENT IMMEDIATELY UPON COMPLETION OF CONSTRUCTION.
7. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM WITH APPLICABLE FEDERAL, STATE AND LOCAL CODES.
8. ALL DISTURBED AREAS NOT TO BE PAVED OR OTHERWISE TREATED SHALL RECEIVE 6" LOAM, SEED FERTILIZER AND MULCH.
9. ALL STORM DRAIN CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE NHDOT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, LATEST EDITION.
10. ALL PROPOSED CATCHBASINS SHALL BE EQUIPPED WITH OIL/GAS SEPARATOR HOODS AND 4' SUMPS.
11. ALL MATERIALS AND CONSTRUCTION SHALL CONFORM WITH APPLICABLE FEDERAL, STATE AND CITY OF PORTSMOUTH DEPARTMENT OF PUBLIC WORKS AND CONSTRUCTION SPECIFICATIONS, LATEST REVISIONS.
12. CONTRACTOR TO SUBMIT AS-BUILT PLANS ON REPRODUCIBLE MYLARS AND IN DIGITAL FORMAT (.DWG FILE) ON DISK TO THE OWNER AND ENGINEER UPON COMPLETION OF THE PROJECT. AS-BUILTS SHALL BE PREPARED AND CERTIFIED BY A NEW HAMPSHIRE LICENSED LAND SURVEYOR OR PROFESSIONAL ENGINEER.
13. SEE EXISTING CONDITIONS PLAN FOR BENCH MARK INFORMATION.

EROSION CONTROL NOTES:

1. INSTALL EROSION CONTROL BARRIERS AS SHOWN AS FIRST ORDER OF WORK.
2. SEE GENERAL EROSION CONTROL NOTES ON DETAIL SHEETS.
3. PROVIDE INLET PROTECTION AROUND ALL EXISTING AND PROPOSED CATCHBASIN INLETS WITHIN THE WORK LIMITS. MAINTAIN FOR THE DURATION OF THE PROJECT UNTIL PAVEMENT HAS BEEN INSTALLED.
4. INSTALL STABILIZED CONSTRUCTION ENTRANCES.
5. INSPECT INLET PROTECTION AND SILT FENCES DAILY AND AFTER EACH RAIN STORM OF 0.25 INCH OR GREATER. REPAIR/MODIFY PROTECTION AS NECESSARY TO MAXIMIZE EFFICIENCY OF FILTER. REPLACE ALL FILTERS WHEN SEDIMENT IS 1/3 THE FILTER HEIGHT.
6. ALL DISTURBED AREAS NOT TO BE PAVED OR OTHERWISE TREATED SHALL RECEIVE 6" LOAM, SEED, FERTILIZER AND MULCH.
7. CONSTRUCT EXCELSIOR MAT ON ALL SLOPES STEEPER THAN 3:1.
8. PRIOR TO ANY WORK OR SOIL DISTURBANCE COMMENCING ON THE SUBJECT PROPERTY, INCLUDING MOVING OF EARTH, THE APPLICANT SHALL INSTALL ALL EROSION AND SILTATION MITIGATION AND CONTROL MEASURES AS REQUIRED BY STATE AND LOCAL PERMITS AND APPROVALS.
9. CONTRACTOR SHALL BE RESPONSIBLE TO CONTROL DUST AND WIND EROSION THROUGHOUT THE CONSTRUCTION PERIOD. DUST CONTROL MEASURES SHALL INCLUDE, BUT NOT LIMITED TO, SPRINKLING WATER ON UNSTABLE SOILS SUBJECT TO ARID CONDITIONS.
10. THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF ALL TEMPORARY EROSION CONTROL DEVICES UPON COMPLETION OF CONSTRUCTION.
11. ALL CATCHBASIN SUMPS AND PIPING SHALL BE THOROUGHLY CLEANED TO REMOVE ALL SEDIMENT AND DEBRIS AFTER THE PROJECT HAS BEEN PAVED.
12. TEMPORARY SOIL STOCKPILE SHALL BE SURROUNDED BY SILT FENCE AND SHALL BE STABILIZED BY TEMPORARY EROSION CONTROL SEEDING. STOCKPILE AREAS TO BE LOCATED AS FAR AS POSSIBLE FROM THE DELINEATED EDGE OF WETLAND.
13. SAFETY FENCING SHALL BE PROVIDED AROUND STOCKPILES OVER 10 FT.
14. CONCRETE TRUCKS WILL BE REQUIRED TO WASH OUT (IF NECESSARY) SHOOTS ONLY WITHIN AREAS WHERE CONCRETE HAS BEEN PLACED. NO OTHER WASH OUT WILL BE ALLOWED.

LEGEND

- MATCH LINE
- PROPOSED PROPERTY LINE
- PROPOSED CONTOUR LINE
- PROPOSED DRAIN LINE (TYP)
- PROPOSED SILT SOCK
- PROPOSED PAVEMENT SECTION
- PROPOSED CONCRETE

BLDG	BUILDING
TYP	TYPICAL
COORD	COORDINATE
RD	ROOF DRAIN
	INLET PROTECTION SILT SACK

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Tighe&Bond
Engineers | Environmental Specialists

PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER
STATE OF NEW HAMPSHIRE
5-21-18

BRADLEE MEZQUITA No. 09590 LICENSED PROFESSIONAL ENGINEER
STATE OF NEW HAMPSHIRE
5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
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APPROVED:	BLM

GRADING, DRAINAGE & EROSION CONTROL PLAN

SCALE: AS SHOWN

C-108

Last Save Date: May 21, 2018 12:21 PM By: BCLARK
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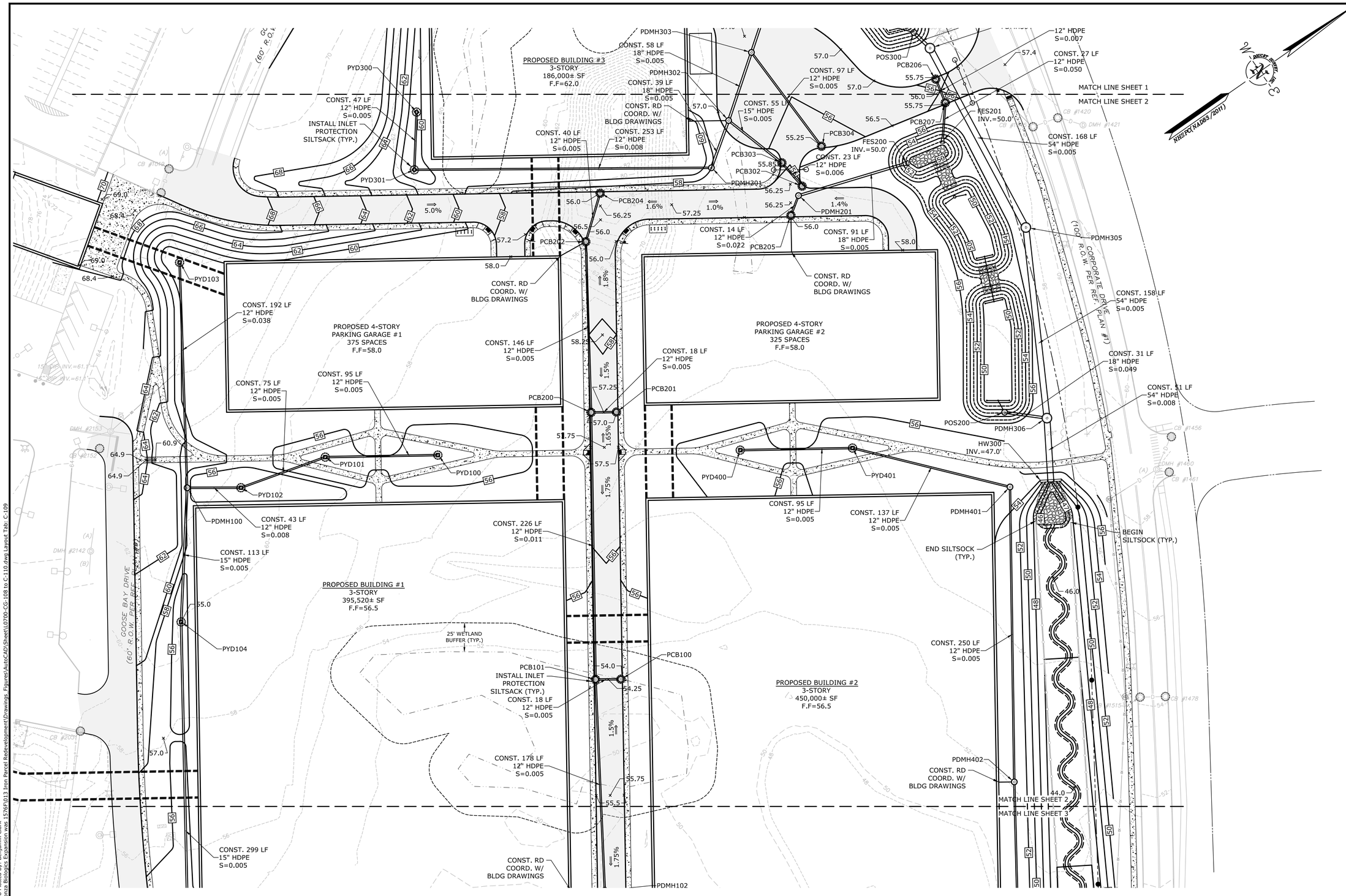

SEE SHEET C-108 FOR LEGEND GRADING, DRAINAGE & EROSION CONTROL NOTES, & DRAINAGE STRUCTURE TABLE

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STATE OF NEW HAMPSHIRE PATRICK M. CRIMMINS No. 12378 LICENSED PROFESSIONAL ENGINEER 5-21-18

STATE OF NEW HAMPSHIRE BRADLEE MEZQUITA No. 09830 LICENSED PROFESSIONAL ENGINEER 5-21-18

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Portsmouth, New Hampshire

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SCALE: AS SHOWN

C-109

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BLDG DRAWINGS

MATCH LINE SHEET 2

MATCH LINE SHEET 3

PROPOSED BUILDING #1
3-STORY
395,520± SF
F.F=56.5

PROPOSED BUILDING #2
3-STORY
450,000± SF
F.F=56.5

CONST. 299 LF
15" HDPE
S=0.005

CONST. RD
COORD. W/
BLDG DRAWINGS

CONST. 25 LF
12" HDPE
S=0.005

CONST. 18 LF
12" HDPE
S=0.005

PDMH101

CONST. RD
COORD. W/
BLDG DRAWINGS

CONST. 94 LF
15" HDPE
S=0.005

CONST. 158 LF
12" HDPE
S=0.005

PDMH102

PCB107

PCB108

(60' PROPOSE BAY DRIVE PER REF. PLAN #9)

INSTALL INLET
PROTECTION
SILTSACK (TYP.)

PYD105

CONST. 46 LF
18" HDPE
S=0.022

CONST. 108 LF
18" HDPE
S=0.006

CONST. 147 LF
18" HDPE
S=0.005

CONST. 56 LF
15" HDPE
S=0.005

PCB103

CONST. 23 LF
12" HDPE
S=0.006

PCB102

CONST. RIPRAP
APRON W1=4.0' W2=17.0'
L=13' D50=6" D=14"

CONST. 6" HDPE
PERFORATED
UNDERDRAIN (TYP.)

PDMH403

CONST. 15 LF
12" HDPE
S=0.033

FES401
INV.=45.0'

CONST. 273 LF
12" HDPE
S=0.010

CONST. RIPRAP
APRON W1=4.0' W2=41.0'
L=37' D50=21" D=48"

CONST. 60 LF
6" HDPE UNDERDRAIN
S=0.005

6" UNDERDRAIN
INV.=42.2'

CONST. 5 LF
18" HDPE
S=0.043

BEGIN
SILTSOCK (TYP.)

PCB106

PCB105

PCB104

PDMH103

CONST. 25 LF
15" HDPE
S=0.006

PDMH400

FES400
INV.=45.0'

CONST. 56 LF
12" HDPE
S=0.006

PCB400

CONST. RIPRAP
APRON W1=2.0' W2=20.0'
L=19' D50=10" D=22"

CONST. RIPRAP
SPILLWAY
ELEV.=49.25',
L=10'

CONST. 18 LF
12" HDPE
S=0.005

PDMH104

PCB109

PCB110

CONST. 29 LF
12" HDPE
S=0.005

FES100
INV.=43.0'

FES101
INV.=43.0'

CONST. 39 LF
12" HDPE
S=0.005

CONST. RIPRAP SPILLWAY
ELEV.=46.50', L=20'

CONST. 29 LF
24" HDPE
S=0.005

POS100

HW100
INV.=41.4'

CONST. RIPRAP
APRON W1=6.0' W2=30.0'
L=24' D50=6" D=14"

BEGIN
SILTSOCK (TYP.)

25' WETLAND
BUFFER (TYP.)

END SILTSOCK
(TYP.)

END SILTSOCK
(TYP.)

REMOVE VAULT STRUCTURE AND CONSTRUCT
HEADWALL FOR PROPOSED HODGSON BROOK
RELOCATION OUTLET
3 - 42"x29" ARCH CMP
INV. OUT = 35.6' (V.I.F.)

30" CMP INV.=35.7'
30" CMP INV.=35.4'
30" CMP INV.=35.2'
15" RCP INV.=35.6'
24" RCP INV.=35.1'

15" RCP INV.=35.5'

0" RCP INV.=35.8'

CORPORATE DRIVE
(100' R.O.W. PER REF. PLAN #1)

GOOSE BAY DRIVE
(60' R.O.W. PER REF. PLAN #9)

WBSFC(NAD83/2011)

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

SEE SHEET C-108 FOR LEGEND GRADING, DRAINAGE & EROSION CONTROL NOTES, & DRAINAGE STRUCTURE TABLE

Tighe&Bond
Engineers | Environmental Specialists

STATE OF NEW HAMPSHIRE
PATRICK M. CRIMMINS
No. 16278
LICENSED
PROFESSIONAL ENGINEER
5-21-18

STATE OF NEW HAMPSHIRE
BRADLEE MEZICHTA
No. 09590
LICENSED
PROFESSIONAL ENGINEER
5-21-18

Proposed Industrial Development

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Portsmouth,
New Hampshire

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GRADING, DRAINAGE & EROSION CONTROL PLAN

SCALE: AS SHOWN

C-110

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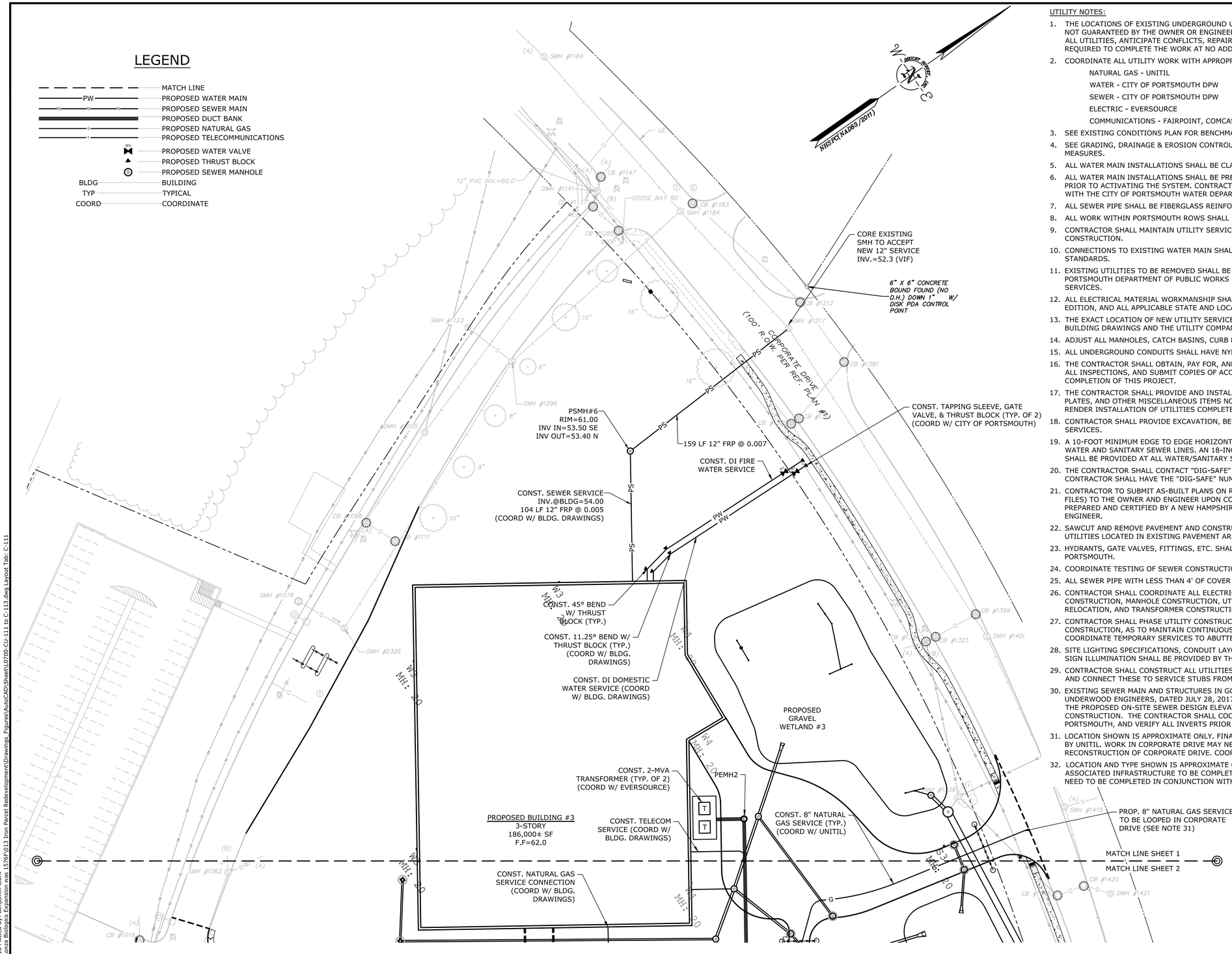
LEGEND

- MATCH LINE
- PW — PROPOSED WATER MAIN
- PROPOSED SEWER MAIN
- PROPOSED DUCT BANK
- PROPOSED NATURAL GAS
- PROPOSED TELECOMMUNICATIONS
- PROPOSED WATER VALVE
- PROPOSED THRUST BLOCK
- PROPOSED SEWER MANHOLE
- BLDG — BUILDING
- TYP — TYPICAL
- COORD — COORDINATE



UTILITY NOTES:

1. THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE APPROXIMATE AND THE LOCATIONS ARE NOT GUARANTEED BY THE OWNER OR ENGINEER. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE ALL UTILITIES, ANTICIPATE CONFLICTS, REPAIR EXISTING UTILITIES, AND RELOCATE EXISTING UTILITIES REQUIRED TO COMPLETE THE WORK AT NO ADDITIONAL COST TO THE OWNER.
2. COORDINATE ALL UTILITY WORK WITH APPROPRIATE UTILITY COMPANY.
   - NATURAL GAS - UNITIL
   - WATER - CITY OF PORTSMOUTH DPW
   - SEWER - CITY OF PORTSMOUTH DPW
   - ELECTRIC - EVERSOURCE
   - COMMUNICATIONS - FAIRPOINT, COMCAST, FIRSTLIGHT
3. SEE EXISTING CONDITIONS PLAN FOR BENCHMARK INFORMATION.
4. SEE GRADING, DRAINAGE & EROSION CONTROL PLAN FOR PROPOSED GRADING AND EROSION CONTROL MEASURES.
5. ALL WATER MAIN INSTALLATIONS SHALL BE CLASS 52, CEMENT LINED DUCTILE IRON PIPE.
6. ALL WATER MAIN INSTALLATIONS SHALL BE PRESSURE TESTED AND CHLORINATED AFTER CONSTRUCTION PRIOR TO ACTIVATING THE SYSTEM. CONTRACTOR SHALL COORDINATE CHLORINATION AND TESTING WITH THE CITY OF PORTSMOUTH WATER DEPARTMENT.
7. ALL SEWER PIPE SHALL BE FIBERGLASS REINFORCED PLASTIC UNLESS OTHERWISE STATED.
8. ALL WORK WITHIN PORTSMOUTH ROWS SHALL BE COORDINATED WITH CITY OF PORTSMOUTH.
9. CONTRACTOR SHALL MAINTAIN UTILITY SERVICES TO ABUTTING PROPERTIES THROUGHOUT CONSTRUCTION.
10. CONNECTIONS TO EXISTING WATER MAIN SHALL BE CONSTRUCTED TO CITY OF PORTSMOUTH STANDARDS.
11. EXISTING UTILITIES TO BE REMOVED SHALL BE CAPPED AT THE MAIN AND MEET THE CITY OF PORTSMOUTH DEPARTMENT OF PUBLIC WORKS STANDARDS FOR CAPPING OF WATER AND SEWER SERVICES.
12. ALL ELECTRICAL MATERIAL WORKMANSHIP SHALL CONFORM TO THE NATIONAL ELECTRIC CODE, LATEST EDITION, AND ALL APPLICABLE STATE AND LOCAL CODES.
13. THE EXACT LOCATION OF NEW UTILITY SERVICES AND CONNECTIONS SHALL BE COORDINATED WITH THE BUILDING DRAWINGS AND THE UTILITY COMPANIES.
14. ADJUST ALL MANHOLES, CATCH BASINS, CURB BOXES, ETC. WITHIN LIMITS OF WORK TO FINISH GRADE.
15. ALL UNDERGROUND CONDUITS SHALL HAVE NYLON PULL ROPES TO FACILITATE PULLING CABLES.
16. THE CONTRACTOR SHALL OBTAIN, PAY FOR, AND COMPLY WITH ALL REQUIRED PERMITS, ARRANGE FOR ALL INSPECTIONS, AND SUBMIT COPIES OF ACCEPTANCE CERTIFICATES TO THE OWNER PRIOR TO THE COMPLETION OF THIS PROJECT.
17. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL MANHOLES, BOXES, FITTINGS, CONNECTORS, COVER PLATES, AND OTHER MISCELLANEOUS ITEMS NOT NECESSARILY DETAILED ON THESE DRAWINGS TO RENDER INSTALLATION OF UTILITIES COMPLETE AND OPERATIONAL.
18. CONTRACTOR SHALL PROVIDE EXCAVATION, BEDDING, BACKFILL AND COMPACTION FOR NATURAL GAS SERVICES.
19. A 10-FOOT MINIMUM EDGE TO EDGE HORIZONTAL SEPARATION SHALL BE PROVIDED BETWEEN ALL WATER AND SANITARY SEWER LINES. AN 18-INCH MINIMUM OUTSIDE TO OUTSIDE VERTICAL SEPARATION SHALL BE PROVIDED AT ALL WATER/SANITARY SEWER CROSSINGS.
20. THE CONTRACTOR SHALL CONTACT "DIG-SAFE" 72 HOURS PRIOR TO COMMENCING CONSTRUCTION. THE CONTRACTOR SHALL HAVE THE "DIG-SAFE" NUMBER ON SITE AT ALL TIMES.
21. CONTRACTOR TO SUBMIT AS-BUILT PLANS ON REPRODUCIBLE MYLARS AND IN DIGITAL FORMAT (.DWG FILES) TO THE OWNER AND ENGINEER UPON COMPLETION OF THE PROJECT. AS-BUILTS SHALL BE PREPARED AND CERTIFIED BY A NEW HAMPSHIRE LICENSED LAND SURVEYOR OR PROFESSIONAL ENGINEER.
22. SAWCUT AND REMOVE PAVEMENT AND CONSTRUCT PAVEMENT TRENCH PATCH FOR ALL PROPOSED UTILITIES LOCATED IN EXISTING PAVEMENT AREAS TO REMAIN.
23. HYDRANTS, GATE VALVES, FITTINGS, ETC. SHALL MEET THE REQUIREMENTS OF THE CITY OF PORTSMOUTH.
24. COORDINATE TESTING OF SEWER CONSTRUCTION WITH THE CITY OF PORTSMOUTH.
25. ALL SEWER PIPE WITH LESS THAN 4' OF COVER SHALL BE INSULATED.
26. CONTRACTOR SHALL COORDINATE ALL ELECTRIC WORK INCLUDING BUT NOT LIMITED TO: CONDUIT CONSTRUCTION, MANHOLE CONSTRUCTION, UTILITY POLE CONSTRUCTION, OVERHEAD WIRE RELOCATION, AND TRANSFORMER CONSTRUCTION WITH POWER COMPANY.
27. CONTRACTOR SHALL PHASE UTILITY CONSTRUCTION, PARTICULARLY WATER MAIN AND GAS MAIN CONSTRUCTION, AS TO MAINTAIN CONTINUOUS SERVICE TO ABUTTING PROPERTIES. CONTRACTOR SHALL COORDINATE TEMPORARY SERVICES TO ABUTTERS WITH THE UTILITY COMPANY AND AFFECTED ABUTTER.
28. SITE LIGHTING SPECIFICATIONS, CONDUIT LAYOUT AND CIRCUITRY FOR PROPOSED SITE LIGHTING AND SIGN ILLUMINATION SHALL BE PROVIDED BY THE PROJECT ELECTRICAL ENGINEER.
29. CONTRACTOR SHALL CONSTRUCT ALL UTILITIES AND DRAINS TO WITHIN 10' OF THE FOUNDATION WALLS AND CONNECT THESE TO SERVICE STUBS FROM THE BUILDING.
30. EXISTING SEWER MAIN AND STRUCTURES IN GOOSE BAY DRIVE ARE BASED ON A PROPOSED DESIGN BY UNDERWOOD ENGINEERS, DATED JULY 28, 2017, AND IS SLATED FOR CONSTRUCTION IN SPRING 2018. THE PROPOSED ON-SITE SEWER DESIGN ELEVATIONS BASED ON THE UNDERWOOD PLAN DURING CONSTRUCTION. THE CONTRACTOR SHALL COORDINATE SEWER CONSTRUCTION WITH THE CITY OF PORTSMOUTH, AND VERIFY ALL INVERTS PRIOR TO CONSTRUCTION.
31. LOCATION SHOWN IS APPROXIMATE ONLY. FINAL DESIGN OF NATURAL GAS SERVICE TO BE COMPLETED BY UNITIL. WORK IN CORPORATE DRIVE MAY NEED TO BE COMPLETED IN CONJUNCTION WITH FUTURE RECONSTRUCTION OF CORPORATE DRIVE. COORDINATE WITH CITY OF PORTSMOUTH AND UNITIL.
32. LOCATION AND TYPE SHOWN IS APPROXIMATE ONLY. FINAL DESIGN OF ELECTRIC SERVICE AND ASSOCIATED INFRASTRUCTURE TO BE COMPLETED BY EVERSOURCE. WORK IN CORPORATE DRIVE MAY NEED TO BE COMPLETED IN CONJUNCTION WITH FUTURE RECONSTRUCTION OF CORPORATE DRIVE.

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STATE OF NEW HAMPSHIRE — PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER — 5-21-18

STATE OF NEW HAMPSHIRE — BRADLEE MEZQUITA No. 09590 LICENSED PROFESSIONAL ENGINEER — 5-21-18

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

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Portsmouth,
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UTILITIES PLAN

SCALE: AS SHOWN

C-111

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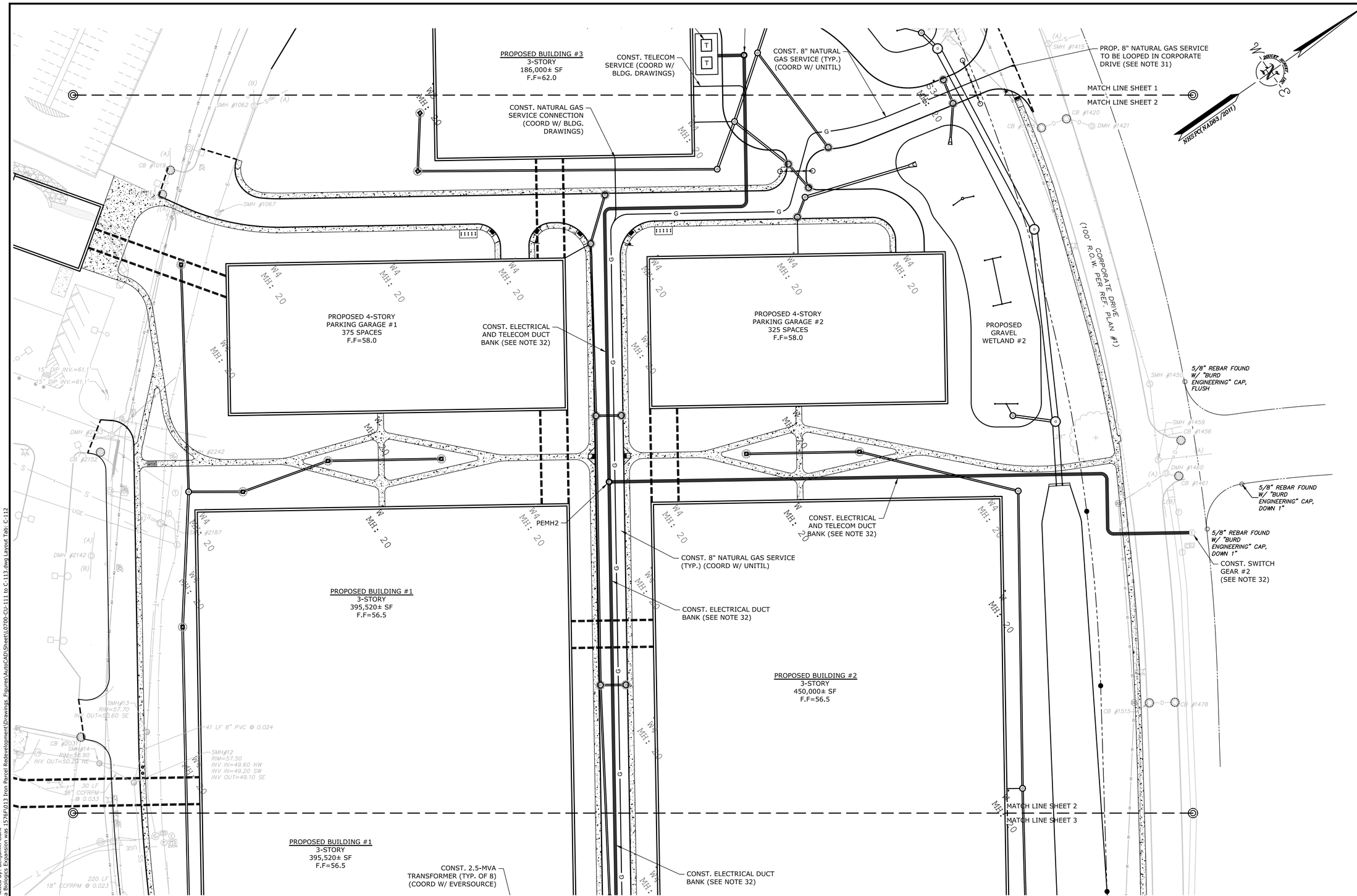

SEE SHEET C-111 FOR UTILITY NOTES AND LEGEND

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UTILITIES PLAN

SCALE: AS SHOWN

C-112

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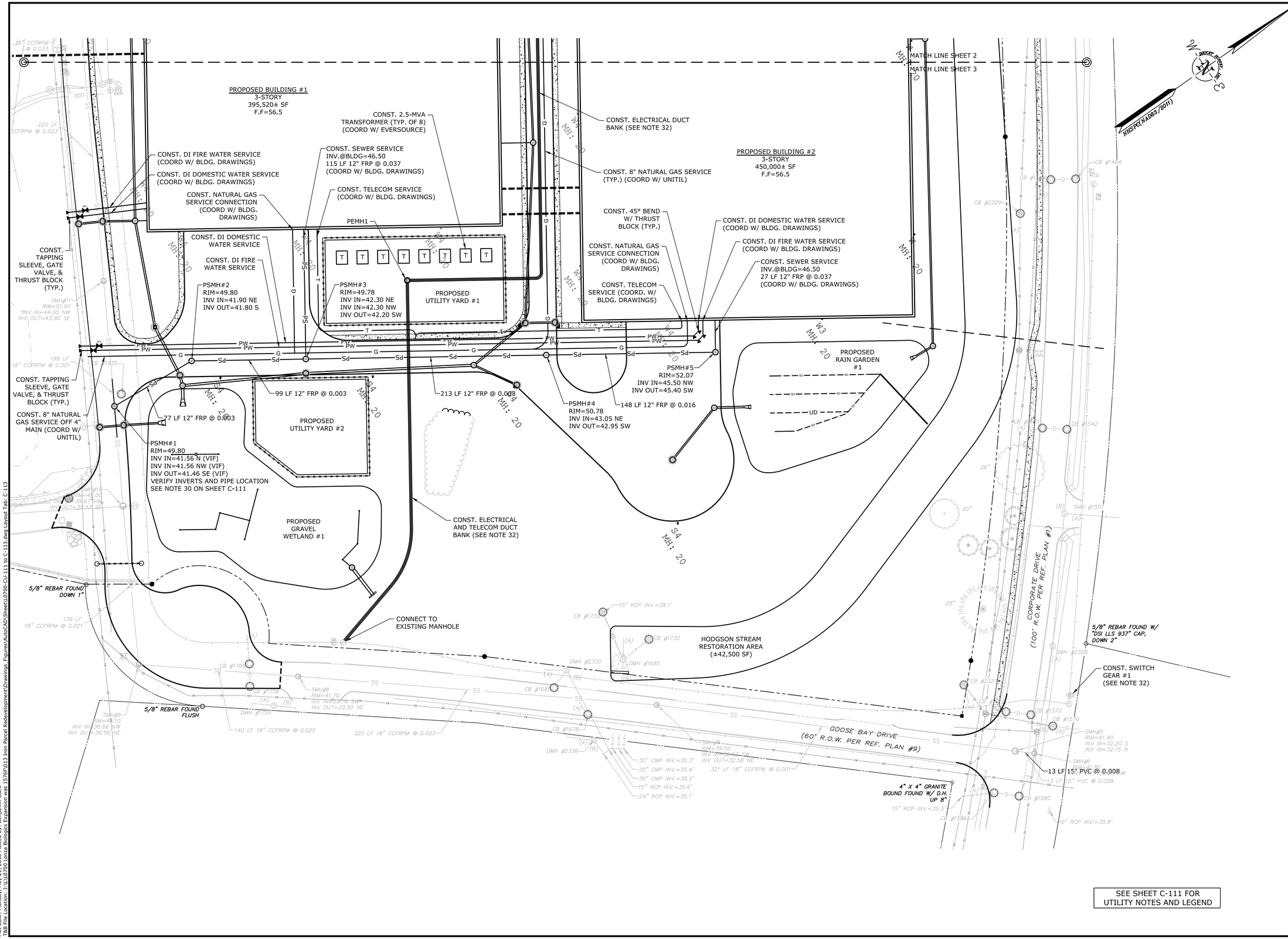

SEE SHEET C-111 FOR UTILITY NOTES AND LEGEND

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UTILITIES PLAN

SCALE: AS SHOWN

C-113

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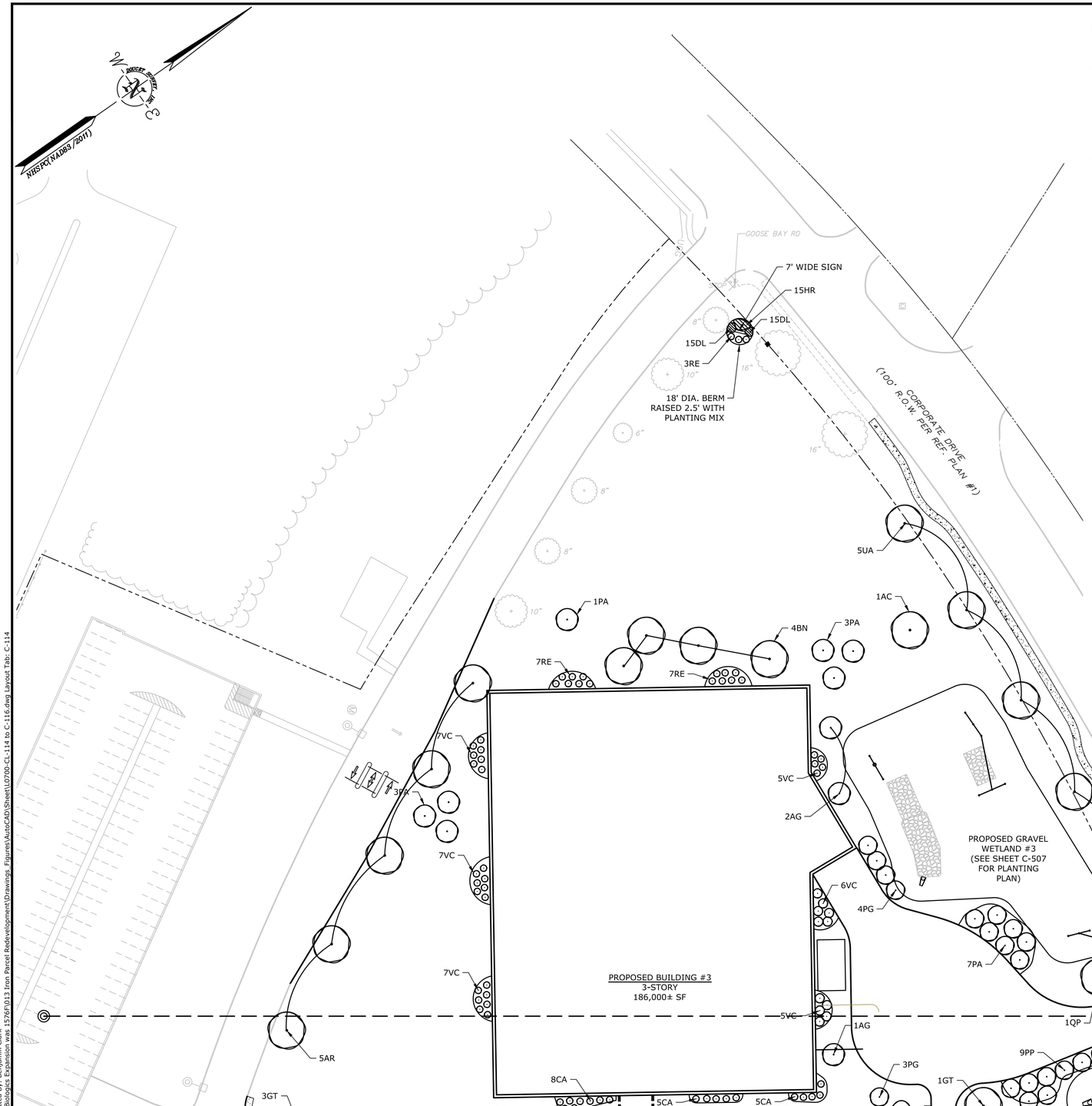

SEE SHEET C-116 FOR PLANT SCHEDULE

LANDSCAPE NOTES:

1. THE CONTRACTOR SHALL FURNISH AND PLANT ALL PLANTS IN QUANTITIES AS SHOWN ON THIS PLAN. NO SUBSTITUTIONS WILL BE PERMITTED UNLESS APPROVED BY OWNER. ALL PLANTS SHALL BE NURSERY GROWN.
2. ALL PLANTS SHALL BE NURSERY GROWN AND PLANTS AND WORKMANSHIP SHALL CONFORM TO THE AMERICAN ASSOCIATION OF NURSERYMEN STANDARDS, INCLUDING BUT NOT LIMITED TO SIZE, HEALTH, SHAPE, ETC., AND SHALL BE SUBJECT TO THE APPROVAL OF THE LANDSCAPE ARCHITECT PRIOR TO ARRIVAL ON-SITE AND AFTER PLANTING.
3. PLANT STOCK SHALL BE GROWN WITHIN THE HARDINESS ZONES 4 THRU 7 ESTABLISHED BY THE PLANT HARDINESS ZONE MAP, MISCELLANEOUS PUBLICATIONS NO. 814, AGRICULTURAL RESEARCH SERVICE, UNITED STATES DEPARTMENT AGRICULTURE, LATEST REVISION.
4. PLANT MATERIAL SHALL BARE THE SAME RELATIONSHIP TO FINISHED GRADE AS TO THE ORIGINAL PLANTING GRADE PRIOR TO DIGGING.
5. THE NUMBER OF EACH INDIVIDUAL PLANT TYPE AND SIZE PROVIDED IN THE PLANT LIST OR ON THE PLAN IS FOR THE CONTRACTOR'S CONVENIENCE ONLY. IF A DISCREPANCY EXISTS BETWEEN THE NUMBER OF PLANTS ON THE LABEL AND THE NUMBER OF SYMBOLS SHOWN ON THE DRAWINGS, THE GREATER NUMBER SHALL APPLY.
6. NO SUBSTITUTION OF PLANT MATERIALS WILL BE ALLOWED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE OWNER'S REPRESENTATIVE.
7. THE CONTRACTOR SHALL LOCATE, VERIFY AND MARK ALL EXISTING AND NEWLY INSTALLED UNDERGROUND UTILITIES PRIOR TO ANY LAWN WORK OR PLANTING. ANY CONFLICTS WHICH MIGHT OCCUR BETWEEN PLANTING AND UTILITIES SHALL IMMEDIATELY BE REPORTED TO THE OWNER SO THAT ALTERNATE PLANTING LOCATIONS CAN BE DETERMINED.
8. ALL DISTURBED AREAS NOT TO BE PAVED OR OTHERWISE TREATED, SHALL RECEIVE SIX (6) INCHES OF LOAM AND SEED. NO FILL SHALL BE PLACED IN ANY WETLAND AREA.
9. THREE (3) INCH BARK MULCH IS TO BE USED AROUND THE TREE AND SHRUB PLANTING AS SPECIFIED IN THE DETAILS. WHERE BARK MULCH IS TO BE USED IN A CURBED ISLAND THE BARK MULCH SHALL MEET THE TOP INSIDE EDGE OF THE CURB. ALL OTHER AREAS SHALL RECEIVE SIX (6) INCHES OF LOAM AND SEED.
10. LANDSCAPING SHALL BE LOCATED WITHIN 150 FT OF EXTERIOR HOSE ATTACHMENT OR SHALL BE PROVIDED WITH AN IRRIGATION SYSTEM..
11. SEE PLANTING DETAILS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
12. TREE STAKES SHALL REMAIN IN PLACE FOR NO LESS THAN 6 MONTHS AND NO MORE THAN 1 YEAR.
13. PLANTING SHALL BE COMPLETED FROM APRIL 15TH THROUGH OCTOBER 1ST. NO PLANTING DURING JULY AND AUGUST UNLESS SPECIAL PROVISIONS ARE MADE FOR DROUGHT.
14. PARKING AREA PLANTED ISLANDS TO HAVE MINIMUM OF 1'-0" TOPSOIL PLACED TO WITHIN 3 INCHES OF THE TOP OF CURB ELEVATION. REMOVE ALL CONSTRUCTION DEBRIS BEFORE PLACING TOPSOIL.
15. TREES SHALL BE PRUNED IN ACCORDANCE WITH THE LATEST EDITION OF ANSI A300 'TREES, SHRUBS AND OTHER WOOD PLANT MAINTENANCE STANDARD PRACTICES.
16. ALL PLANTS SHALL BE WATERED THOROUGHLY TWICE DURING THE FIRST 24 HOUR PERIOD AFTER PLANTING. ALL PLANTS SHALL BE WATERED WEEKLY, OR MORE OFTEN, IF NECESSARY DURING THE FIRST GROWING SEASON.
17. EXISTING TREES AND SHRUBS SHOWN ON THE PLAN ARE TO REMAIN UNDISTURBED. ALL EXISTING TREES AND SHRUBS SHOWN TO REMAIN ARE TO BE PROTECTED WITH A 4-FOOT SNOW FENCE PLACED AT THE DRIP LINE OF THE BRANCHES OR AT 8 FEET MINIMUM FROM THE TREE TRUNK. ANY EXISTING TREE OR SHRUB SHOWN TO REMAIN, WHICH IS REMOVED DURING CONSTRUCTION, SHALL BE REPLACED BY A TREE OF COMPARABLE SIZE AND SPECIES TREE OR SHRUB.
18. THE CONTRACTOR SHALL GUARANTEE ALL PLANTINGS TO BE IN GOOD HEALTHY, FLOURISHING AND ACCEPTABLE CONDITION FOR A PERIOD OF (1) YEAR BEGINNING AT THE DATE OF ACCEPTANCE OF SUBSTANTIAL COMPLETION. ALL GRASSES, TREES AND SHRUBS THAT, IN THE OPINION OF THE LANDSCAPE ARCHITECT, SHOW LESS THAN 80% HEALTHY GROWTH AT THE END OF ONE YEAR PERIOD SHALL BE REPLACED BY THE CONTRACTOR.
19. UPON EXPIRATION OF THE CONTRACTOR'S ONE YEAR GUARANTEE PERIOD, THE OWNER SHALL BE RESPONSIBLE FOR LANDSCAPE MAINTENANCE INCLUDING WATERING DURING PERIODS OF DROUGHT
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING ALL PLANTING AND LAWNS AGAINST DAMAGE FROM ONGOING CONSTRUCTION. THIS PROTECTION SHALL BEGIN AT THE TIME THE PLANT IS INSTALLED AND CONTINUE UNTIL THE FORMAL ACCEPTANCE OF ALL THE PLANTINGS.
21. PRE-PURCHASE PLANT MATERIAL AND ARRANGE FOR DELIVERY TO MEET PROJECT SCHEDULE AS REQUIRED IT MAY BE NECESSARY TO PRE-DIG CERTAIN SPECIES WELL IN ADVANCE OF ACTUAL PLANTING DATES.

Tighe&Bond
Engineers | Environmental Specialists

STATE OF NEW HAMPSHIRE
PATRICK M. CRIMMINS
No. 16278
LICENSED
PROFESSIONAL ENGINEER
5-21-18

STATE OF NEW HAMPSHIRE
BRADLEE MEZICKTA
No. 09590
LICENSED
PROFESSIONAL ENGINEER
5-21-18

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CL-114 to C-116.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

LANDSCAPE PLAN

SCALE: AS SHOWN

C-114

Last Save Date: May 18, 2018 1:37 PM By: BCLARK
Plot Date: May 21, 2018 8:39 AM By: Benjamin Clark
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PROPOSED BUILDING #3
3-STORY
186,000± SF

PROPOSED 4-STORY
PARKING GARAGE #1
375 SPACES

PROPOSED 4-STORY
PARKING GARAGE #2
325 SPACES

PROPOSED BUILDING #1
3-STORY
395,520± SF

PROPOSED BUILDING #2
3-STORY
450,000± SF

PROPOSED BUILDING #1
3-STORY

PROPOSED GRAVEL WETLAND #2
(SEE SHEET C-506 FOR PLANTING PLAN)

HODGSON STREAM RESTORATION AREA
(SEE SHEET C-707 FOR PLANTING PLAN)

CORPORATE DRIVE
(100' R.O.W. PER REF. PLAN #1)

MATCH LINE SHEET 1

MATCH LINE SHEET 2

MATCH LINE SHEET 2

MATCH LINE SHEET 3

NHSPCS(NAD83/2011)

SEE SHEET C-114 FOR LANDSCAPING NOTES

SEE SHEET C-116 FOR PLANT SCHEDULE

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Last Save Date: May 18, 2018 1:27 PM By: BCLARK
Plot Date: Monday, May 21, 2018 8:37 AM By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\0113 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CL-114 to C-116.dwg Layout Tab: C-115

Tighe&Bond
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PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER - STATE OF NEW HAMPSHIRE

BRADLEE MEZQUITA No. 09830 LICENSED PROFESSIONAL ENGINEER - STATE OF NEW HAMPSHIRE

Proposed Industrial Development

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Portsmouth,
New Hampshire

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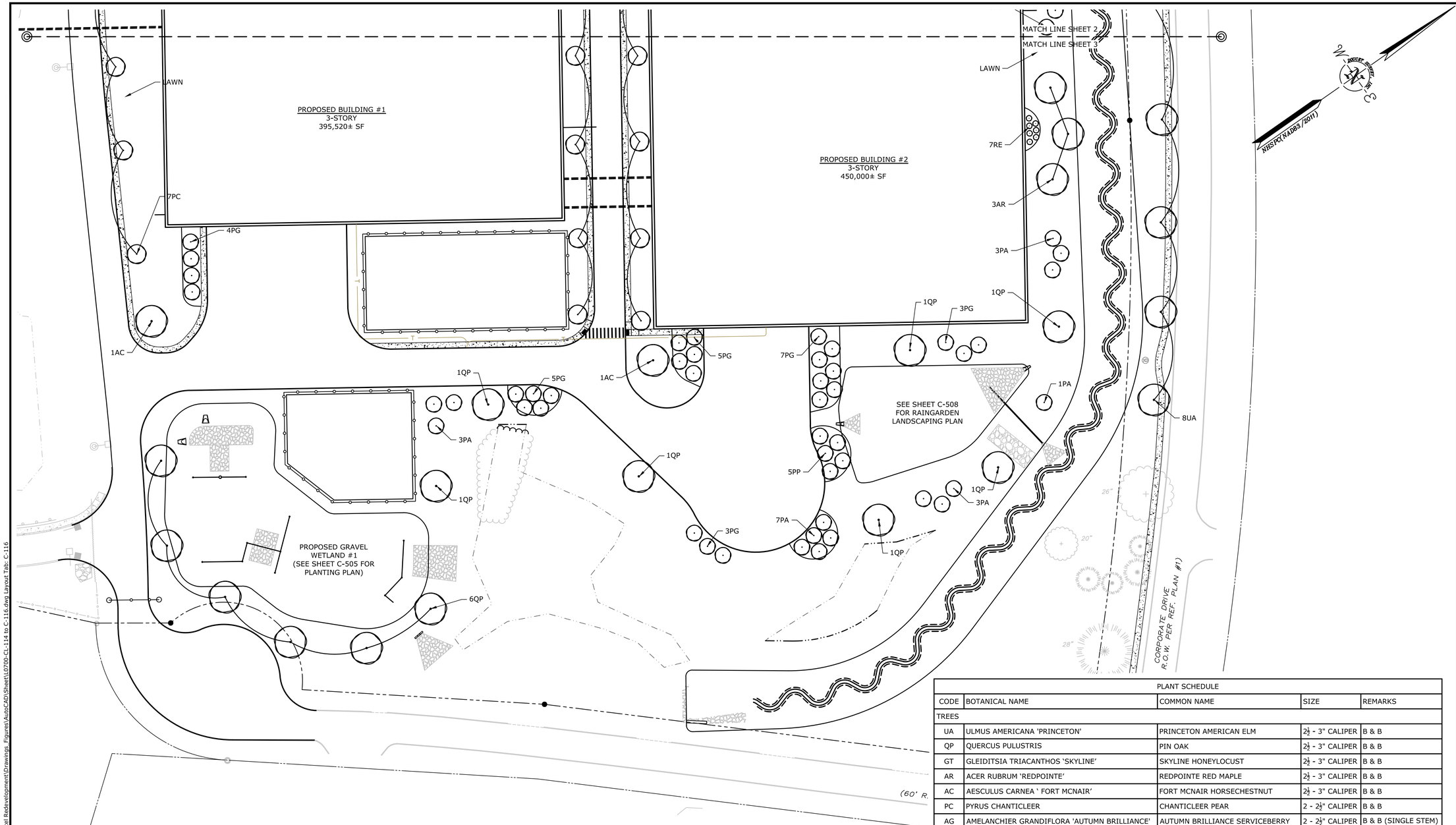
APPROVED:	BLM

LANDSCAPE PLAN

SCALE: AS SHOWN

C-115



SEE SHEET C-114 FOR
LANDSCAPING NOTES

PLANT SCHEDULE				
CODE	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
TREES				
UA	ULMUS AMERICANA 'PRINCETON'	PRINCETON AMERICAN ELM	2½ - 3" CALIPER	B & B
QP	QUERCUS PULUSTRIS	PIN OAK	2½ - 3" CALIPER	B & B
GT	GLEIDITSIA TRIACANTHOS 'SKYLINE'	SKYLINE HONEYLOCUST	2½ - 3" CALIPER	B & B
AR	ACER RUBRUM 'REDPOINTE'	REDPOINTE RED MAPLE	2½ - 3" CALIPER	B & B
AC	AESCULUS CARNEA ' FORT MCNAIR'	FORT MCNAIR HORSECHESTNUT	2½ - 3" CALIPER	B & B
PC	PYRUS CHANTICLEER	CHANTICLEER PEAR	2 - 2½" CALIPER	B & B
AG	AMELANCHIER GRANDIFLORA 'AUTUMN BRILLIANCE'	AUTUMN BRILLIANCE SERVICEBERRY	2 - 2½" CALIPER	B & B (SINGLE STEM)
BN	BETULA NIGRA 'HERITAGE'	HERITAGE RIVER BIRCH	12 - 14' HT.	B & B (MULTISTEM)
PG	PICEA GLAUCA	WHITE SPRUCE	8 - 10' HT.	B & B
PP	PICEA PUNGENS	COLORADO SPRUCE	8 - 10' HT.	B & B
PA	PICEA ABIES	NORWAY SPRUCE	8 - 10' HT.	B & B
SHRUBS				
VC	VIBURNUM CASSINOIDES	WITHEROD VIBURNUM	2½ - 3' HT.	B & B
RE	RHODODENDRON 'ENGLISH ROSEUM'	ENGLISH ROSEUM RHODODENDRON	2½ - 3' HT.	B & B
CA	CLETHERA ALNIFOLIA	SUMMERSWEET CLETHERA	7 GALLON	CONTAINER
HQ	HYDRANGEA QUERCIFOLIA 'SNOW QUEEN'	SNOW QUEEN OAKLEAF HYDRANGEA	2½ - 3' HT.	B & B
GROUNDCOVERS & PERENNIALS				
DL	HEMEROCALLIS 'STELLA DORO'	STELLA DORO DAYLILY	2 GALLON	CONTAINER
HR	HOSTA 'ROYAL STANDARD'	ROYAL STANDARD HOSTA	2 GALLON	CONTAINER
AS	ASTILBE 'VISIONS IN PINK'	VISIONS IN PINK ASTILBE	2 GALLON	CONTAINER
CAL	CALAMAGROSTIS 'KARL FOERSTER'	KARL FOERSTER FEATHER REED GRASS	3 GALLON	CONTAINER

Tighe&Bond
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PATRICK M. CRIMMINS
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PROFESSIONAL ENGINEER
5-5-2018

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

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LANDSCAPE PLAN

SCALE: AS SHOWN

C-116

Last Save Date: May 18, 2018 1:37 PM By: BCLARK
Plot Date: Monday, May 21, 2018 Plotted By: Benjamin Clark
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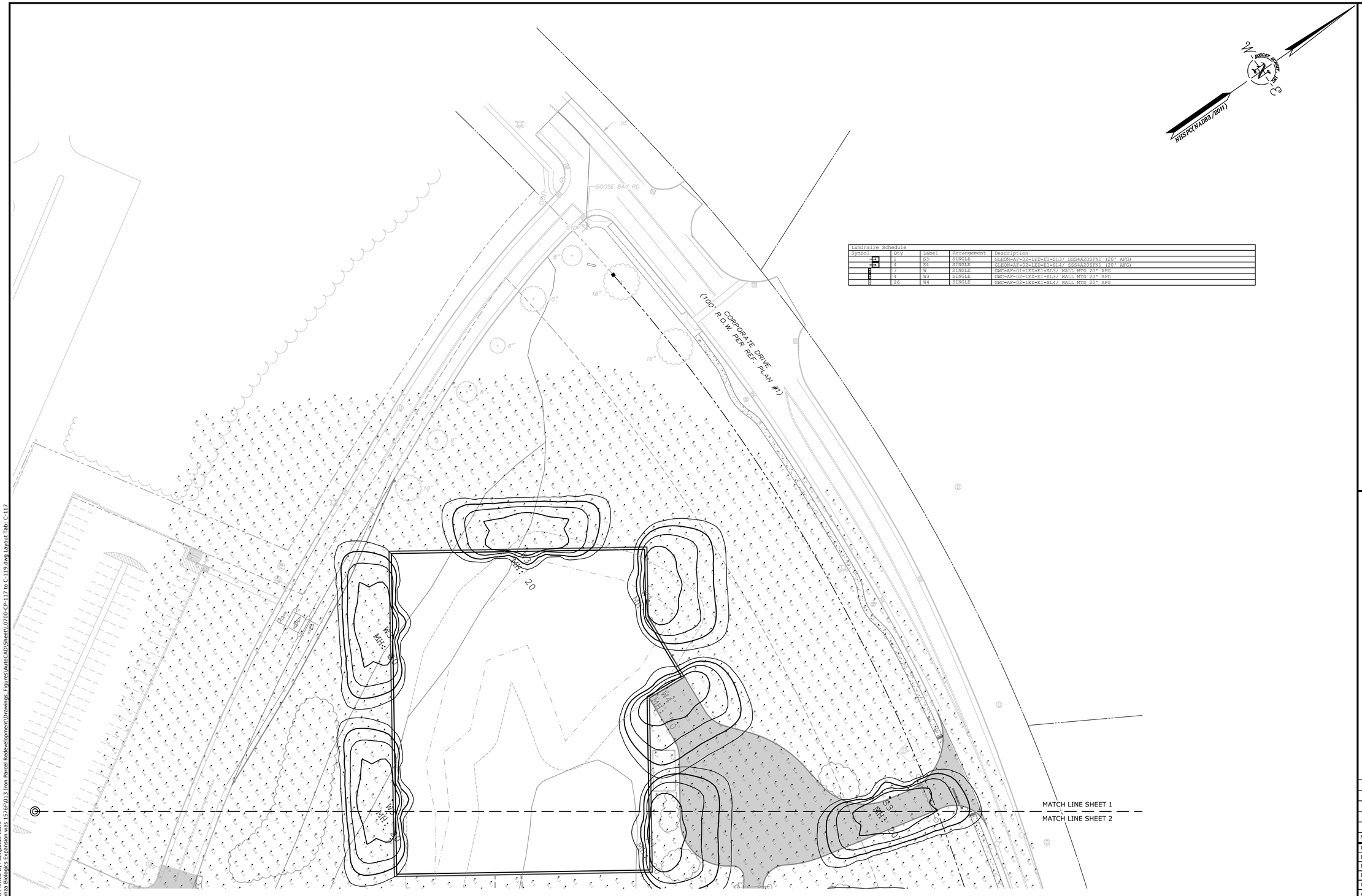

Luminaire Schedule				
Symbol	Qty	Label	Arrangement	Description
	1	S3	SINGLE	GLEON-AF-02-LED-E1-SL3/ SSS4A20SFN1 (20' AFG)
	4	S4	SINGLE	GLEON-AF-02-LED-E1-SL4/ SSS4A20SFN1 (20' AFG)
	7	W	SINGLE	GWC-AF-01-LED-E1-SL3/ WALL MTD 20' AFG
	4	W3	SINGLE	GWC-AF-02-LED-E1-SL3/ WALL MTD 20' AFG
	26	W4	SINGLE	GWC-AF-02-LED-E1-SL4/ WALL MTD 20' AFG

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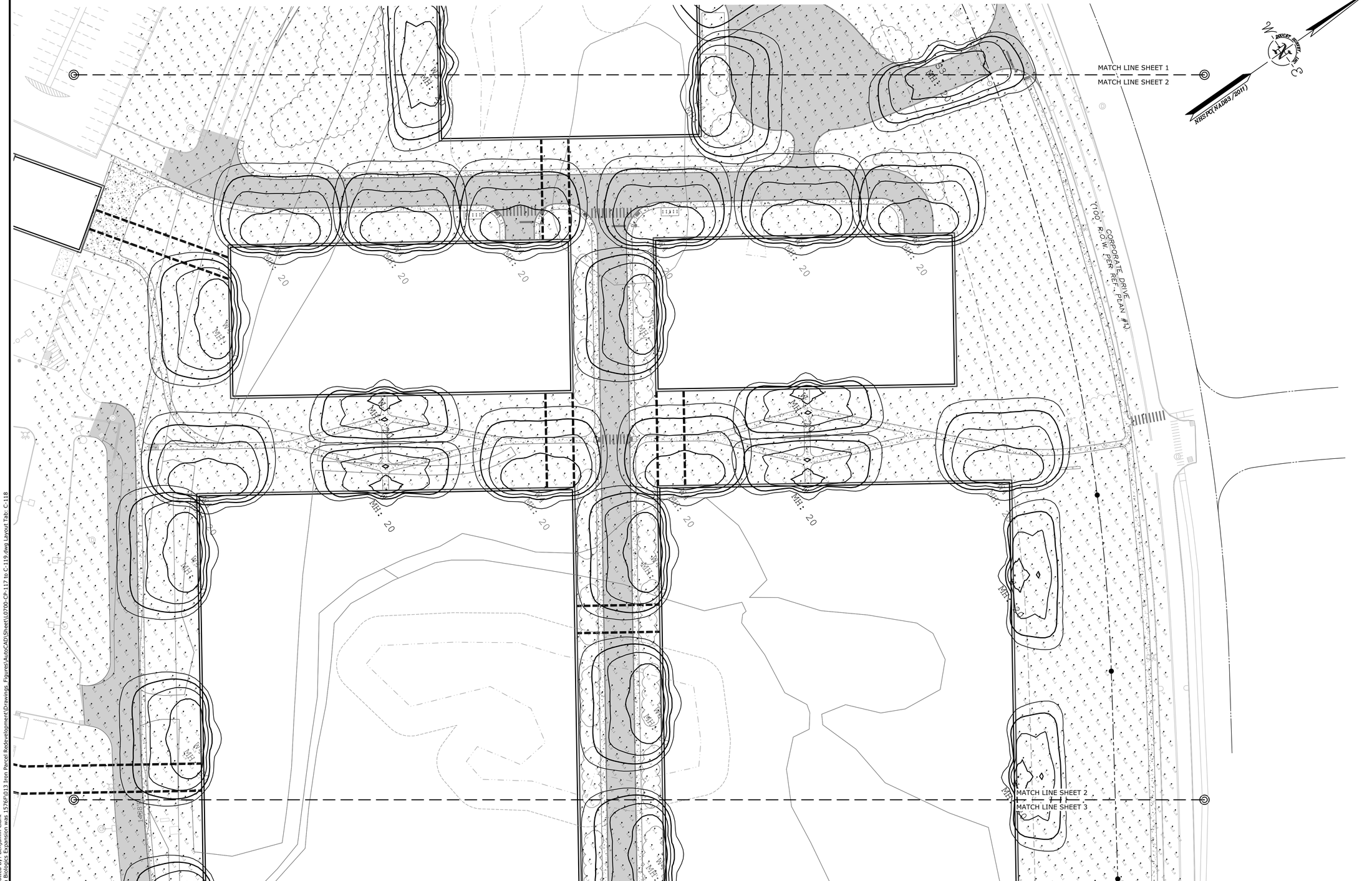
CHECKED:	PMC
APPROVED:	BLM

PHOTOMETRIC LIGHTING PLAN

SCALE: AS SHOWN

C-117

Last Save Date: May 21, 2018 11:22 AM By: BCLARK
Plot Date: Monday, May 21, 2018 Plot By: Brandon Clark
T&B File Location: J:\LL\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings_Figures\AutoCAD\Sheet\L0700-CP-117 to C-119.dwg Layout Tab: C-117



Luminaire Schedule				
Symbol	Qty	Label	Arrangement	Description
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Lonza Biologics

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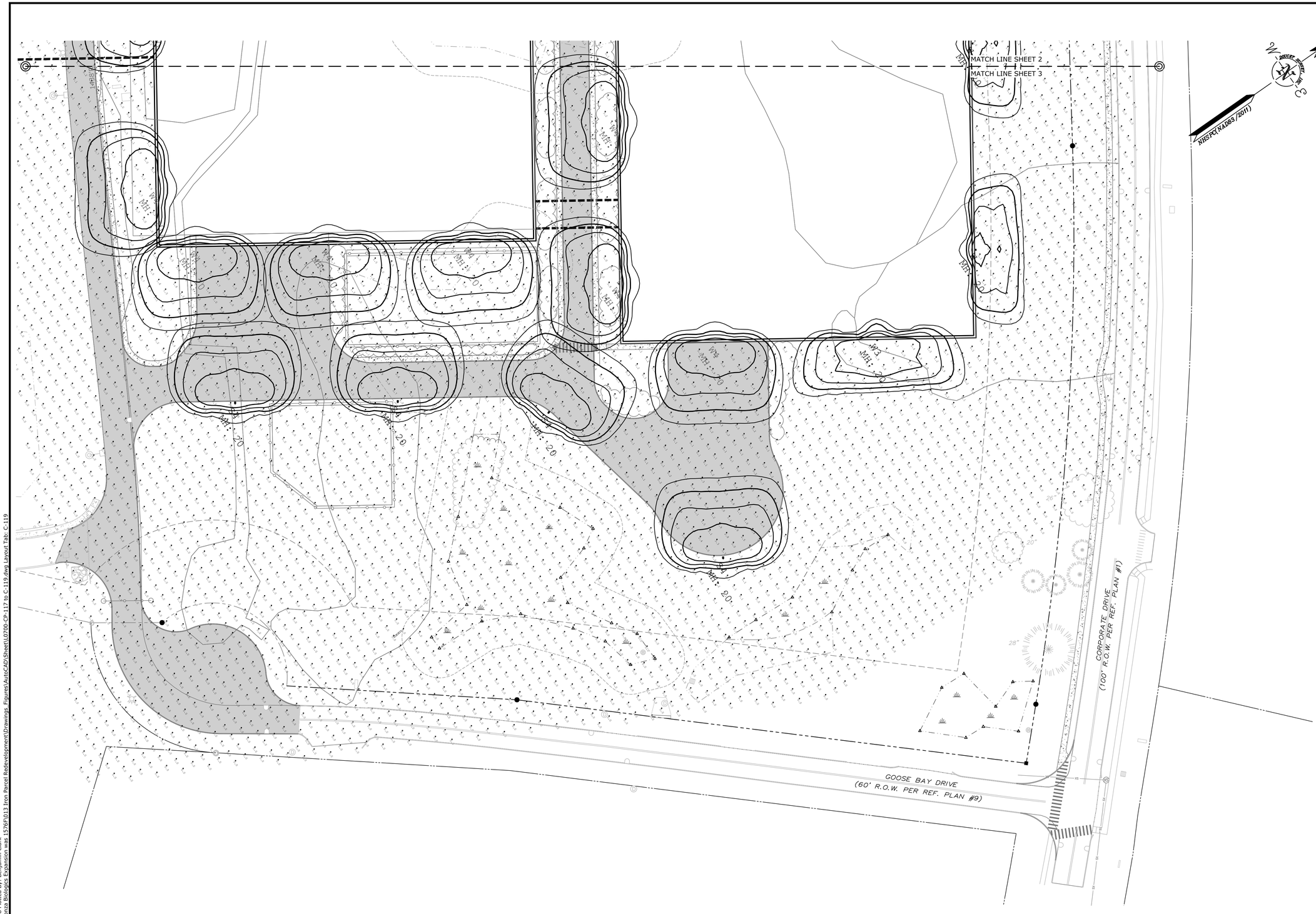
CHECKED:	PMC
APPROVED:	BLM

PHOTOMETRIC LIGHTING PLAN

SCALE: AS SHOWN

C-118

Last Save Date: May 21, 2018 11:32 AM By: BCLARK
Plot Date: May 21, 2018 11:33 AM By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CP-117 to C-119.dwg Layout Tab: C-118



Luminaire Schedule				
Symbol	Qty	Label	Arrangement	Description
	3	B3	SINGLE	GLEON-AF-02-LED-E1-SL3/ SSS4A20SFN1 (20' AFG)
	4	B4	SINGLE	GLEON-AF-02-LED-E1-SL4/ SSS4A20SFN1 (20' AFG)
	7	W	SINGLE	GWC-AF-01-LED-E1-SL3/ WALL MTD 20' AFG
	4	W3	SINGLE	GWC-AF-02-LED-E1-SL3/ WALL MTD 20' AFG
	26	W4	SINGLE	GWC-AF-02-LED-E1-SL4/ WALL MTD 20' AFG

Tighe&Bond
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5-21-18

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5-21-18

SCALE IN FEET
0 40' 80'
GRAPHIC SCALE

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
DATE:	04/03/2018
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PHOTOMETRIC LIGHTING PLAN

SCALE: AS SHOWN

C-119

Last Save Date: May 21, 2018 11:32 AM By: BCLARK
Plot Date: May 21, 2018 11:32 AM By: Benjamin Clark
T&B File Location: J:\LL\0700 Lonza Biologics Expansion was 1576R\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CP-117 to C-119.dwg Layout Tab: C-119

PROJECT NAME AND LOCATION
LONZA BIOLOGICS 43°-04'-59.0"N
70 & 80 CORPORATE DRIVE 70°-48'-09.7"W
PORTSMOUTH, NH 03801

DESCRIPTION
THE PROJECT CONSISTS OF THE EXPANSION OF LONZA BIOLOGICS, WHICH INCLUDES THE CONSTRUCTION OF 3 PROPOSED BUILDINGS, 2 PARKING GARAGES AND ASSOCIATED SITE IMPROVEMENTS

DISTURBED AREA
THE TOTAL AREA TO BE DISTURBED IS APPROXIMATELY 23 ACRES.

SOIL CHARACTERISTICS
BASED ON THE HIGH INTENSITY SOIL SURVEY PREPARED BY GOVE ENVIRONMENTAL SERVICES, INC. IN DECEMBER 2015, THE SITE SOILS VARY FROM WELL DRAINED TO VERY POORLY DRAINED AND PRIMARILY CONSIST OF SOMEWHAT POORLY DRAINED SOILS.

NAME OF RECEIVING WATERS
THE STORM WATER RUNOFF WILL ULTIMATELY DISCHARGE INTO HODGSON BROOK

SEQUENCE OF MAJOR ACTIVITIES
1. CUT AND CLEAR TREES.
2. CONSTRUCT TEMPORARY AND PERMANENT SEDIMENT, EROSION AND DETENTION CONTROL FACILITIES. EROSION, SEDIMENT AND DETENTION MEASURES SHALL BE INSTALLED PRIOR TO ANY EARTH MOVING OPERATIONS THAT WILL INFLUENCE STORMWATER RUNOFF SUCH AS:
   - NEW CONSTRUCTION
   - DEVELOPMENT OF BORROW PIT AREAS
   - DISPOSAL OF SEDIMENT SPOIL, STUMP AND OTHER SOLID WASTE
   - STREAM CHANNEL MODIFICATIONS
   - CONTROL OF DUST
   - CONSTRUCTION OF ACCESS ROAD
   - NEARNESS OF CONSTRUCTION SITE TO RECEIVING WATERS
   - CONSTRUCTION DURING LATE WINTER AND EARLY SPRING
3. ALL PERMANENT DITCHES, SWALES, DETENTION, RETENTION AND SEDIMENTATION BASINS TO BE STABILIZED USING THE VEGETATIVE AND NON-STRUCTURAL BMPS PRIOR TO DIRECTING RUNOFF TO THEM.
4. CLEAR AND DISPOSE OF DEBRIS.
5. CONSTRUCT TEMPORARY CULVERTS AND DIVERSION CHANNELS AS REQUIRED.
6. GRADE AND GRAVEL ROADWAYS AND PARKING AREAS - ALL ROADS AND PARKING AREA SHALL BE STABILIZED IMMEDIATELY AFTER THEIR CONSTRUCTION.
7. BEGIN PERMANENT AND TEMPORARY SEEDING AND MULCHING. ALL CUT AND FILL SLOPES HALL BE SEEDED AND MULCHED IMMEDIATELY AFTER THEIR CONSTRUCTION.
8. DAILY, OR AS REQUIRED, CONSTRUCT TEMPORARY BERMS, DRAINS, DITCHES, SILT FENCES, SEDIMENT TRAPS, ETC., MULCH AND SEED AS REQUIRED.
9. FINISH PAVING ALL ROADWAYS AND PARKING LOTS.
10. INSPECT AND MAINTAIN ALL EROSION AND SEDIMENT CONTROL MEASURES.
11. COMPLETE PERMANENT SEEDING AND LANDSCAPING.
12. REMOVE TRAPPED SEDIMENTS FROM COLLECTOR DEVICES AS APPROPRIATE AND THEN REMOVE TEMPORARY EROSION CONTROL MEASURES.

NOTE: THE CONSTRUCTION SEQUENCE MUST LIMIT THE DURATION AND AREA OF DISTURBANCE.

EROSION CONTROL NOTES
1. ALL EROSION CONTROL MEASURES AND PRACTICES SHALL CONFORM TO THE "NEW HAMPSHIRE STORMWATER MANUAL VOLUME 3: EROSION AND SEDIMENT CONTROLS DURING CONSTRUCTION" PREPARED BY THE NHDES.
2. PRIOR TO ANY WORK OR SOIL DISTURBANCE, CONTRACTOR SHALL SUBMIT SHOP DRAWINGS FOR EROSION CONTROL MEASURES AS REQUIRED IN THE PROJECT MANUAL.
3. CONTRACTOR SHALL INSTALL TEMPORARY EROSION CONTROL BARRIERS, INCLUDING, SILT FENCES, SILT SACKS AND SILT SOCKS, AS SHOWN IN THESE DRAWINGS AS THE FIRST ORDER OF WORK.
4. SILT SACK INLET PROTECTION SHALL BE INSTALLED IN ALL EXISTING AND PROPOSED CATCH BASIN INLETS WITHIN THE WORK LIMITS AND BE MAINTAINED FOR THE DURATION OF THE PROJECT.
5. PERIMETER CONTROLS INCLUDING SILT FENCES, AND/OR SILT SOCKS SHALL MAINTAINED FOR THE DURATION OF THE PROJECT UNTIL NON-PAVED AREAS HAVE BEEN STABILIZED.
6. THE CONTRACTOR SHALL REMOVE AND PROPERLY DISPOSE OF ALL TEMPORARY EROSION CONTROL DEVICES UPON COMPLETION OF CONSTRUCTION.
7. ALL DISTURBED AREAS NOT OTHERWISE BEING TREATED SHALL RECEIVE 6" LOAM, SEED, AND FERTILIZER.
8. INSPECT ALL INLET PROTECTION AND PERIMETER CONTROLS WEEKLY AND AFTER EACH RAIN STORM OF 0.25 INCH OR GREATER. REPAIR/MODIFY PROTECTION AS NECESSARY TO MAXIMIZE EFFICIENCY OF FILTER. REPLACE ALL FILTERS WHEN SEDIMENT IS 1/3 THE FILTER HEIGHT.
9. CONSTRUCT EROSION CONTROL BLANKETS ON ALL SLOPES STEEPER THAN 3:1.

STABILIZATION
1. AN AREA SHALL BE CONSIDERED STABLE WHEN ONE OF THE FOLLOWING HAS OCCURRED:
   A. BASE COURSE GRAVELS HAVE BEEN INSTALLED IN AREAS TO BE PAVED.
   B. A MINIMUM OF 85% VEGETATED GROWTH HAS BEEN ESTABLISHED.
   C. A MINIMUM OF 3" OF NON-EROSIVE MATERIAL SUCH AS STONE OR RIPRAP HAS BEEN INSTALLED
   D. EROSION CONTROL BLANKETS HAVE BEEN PROPERLY INSTALLED.
2. WINTER STABILIZATION PRACTICES:
   A. ALL PROPOSED POST-DEVELOPMENT VEGETATED AREAS WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATED GROWTH BY NOVEMBER 15TH, OR WHICH ARE DISTURBED AFTER NOVEMBER 15TH, SHALL BE STABILIZED BY SEEDING AND INSTALLING EROSION CONTROL BLANKETS ON SLOPES GREATER THAN 4:1, AND SEEDING AND PLACING 3 TO 4 TONS OF MULCH PER ACRE, SECURED WITH ANCHOR NETTING, ELSEWHERE.
   B. ALL DITCHES OR SWALES WHICH DO NOT EXHIBIT A MINIMUM OF 85% VEGETATIVE GROWTH BY OCTOBER 15TH, OR WHICH ARE DISTURBED AFTER OCTOBER 15TH, SHALL BE STABILIZED WITH STONE OR EROSION CONTROL BLANKETS APPROPRIATE FOR THE DESIGN FLOW CONDITION.
   C. AFTER NOVEMBER 15TH, INCOMPLETE ROAD SURFACES SHALL BE PROTECTED WITH A MINIMUM OF 3-INCHES OF CRUSHED GRAVEL PER NHDOT ITEM 304.3, OR IF CONSTRUCTION IS TO CONTINUE THROUGH THE WINTER SEASON BE CLEARED OF ANY ACCUMULATED SNOW AFTER EACH STORM EVENT.
3. STABILIZATION SHALL BE INITIATED ON ALL LOAM STOCKPILES, AND DISTURBED AREAS, WHERE CONSTRUCTION ACTIVITY SHALL NOT OCCUR FOR MORE THAN TWENTY-ONE (21) CALENDAR DAYS BY THE FOURTEENTH (14TH) DAY AFTER CONSTRUCTION ACTIVITY HAS PERMANENTLY OR TEMPORARILY CEASED IN THAT AREA. STABILIZATION MEASURES TO BE USED INCLUDE:
   A. TEMPORARY SEEDING
   B. MULCHING
4. WHEN CONSTRUCTION ACTIVITY PERMANENTLY OR TEMPORARILY CEASES WITHIN 100 FEET OF NEARBY SURFACE WATERS OR DELINEATED WETLANDS, THE AREA SHALL BE STABILIZED WITHIN SEVEN (7) DAYS OR PRIOR TO A RAIN EVENT. ONCE CONSTRUCTION ACTIVITY CEASES PERMANENTLY IN AN THESE AREAS, SILT FENCES AND HAY BALE BARRIERS AND ANY EARTH/DIKES SHALL BE REMOVED ONCE PERMANENT MEASURES ARE ESTABLISHED.
5. DURING CONSTRUCTION, RUNOFF WILL BE DIVERTED AROUND THE SITE WITH EARTH DIKES, PIPING OR STABILIZED CHANNELS WHERE POSSIBLE. SHEET RUNOFF FROM THE SITE WILL BE FILTERED THROUGH HAY BALE BARRIERS AND SILT FENCES OR SILT SOCKS. ALL STORM DRAIN BASIN INLETS SHALL BE PROVIDED WITH FLARED END SECTIONS AND TRASH RACKS. THE SITE SHALL BE STABILIZED FOR THE WINTER BY NOVEMBER 15.

DUST CONTROL:
1. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTROL DUST THROUGHOUT THE CONSTRUCTION PERIOD.
2. DUST CONTROL METHODS SHALL INCLUDE, BUT BE NOT LIMITED TO SPRINKLING WATER ON EXPOSED AREAS, COVERING LOADED DUMP TRUCKS LEAVING THE SITE, AND TEMPORARY MULCHING.
3. DUST CONTROL MEASURES SHALL BE UTILIZED SO AS TO PREVENT THE MIGRATION OF DUST FROM THE SITE TO ABUTTING AREAS INCLUDING.

STOCKPILES
1. LOCATE STOCKPILES A MINIMUM OF 50 FEET AWAY FROM CATCH BASINS, SWALES, AND CULVERTS.
2. ALL STOCKPILES SHOULD BE SURROUNDED WITH TEMPORARY EROSION CONTROL MEASURES PRIOR TO THE ONSET OF PRECIPITATION.
3. PERIMETER BARRIERS SHOULD BE MAINTAINED AT ALL TIMES, AND ADJUSTED AS NEEDED TO ACCOMMODATE THE DELIVERY AND REMOVAL OF MATERIALS FROM THE STOCKPILE. THE INTEGRITY OF THE BARRIER SHOULD BE INSPECTED AT THE END OF EACH WORKING DAY.
4. PROTECT ALL STOCKPILES FROM STORMWATER RUN-OFF USING TEMPORARY EROSION CONTROL MEASURES SUCH AS BERMS, SILT SOCK, OR OTHER APPROVED PRACTICE TO PREVENT MIGRATION OF MATERIAL BEYOND THE IMMEDIATE CONFINES OF THE STOCKPILES.

OFF SITE VEHICLE TRACKING
THE CONTRACTOR SHALL CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE(S) PRIOR TO ANY EXCAVATION ACTIVITIES.

VEGETATION
1. TEMPORARY GRASS COVER
   A. SEEDBED PREPARATION:
      APPLY FERTILIZER AT THE RATE OF 600 POUNDS PER ACRE OF 10-10-10. APPLY LIMESTONE (EQUIVALENT TO 50 PERCENT CALCIUM PLUS MAGNESIUM OXIDE) AT A RATE OF THREE (3) TONS PER ACRE.
   B. SEEDING
      1. UTILIZE ANNUAL RYE GRASS AT A RATE OF 40 LBS/ACRE.
      2. WHERE THE SOIL HAS BEEN COMPACTED BY CONSTRUCTION OPERATIONS, LOOSEN SOIL TO A DEPTH OF TWO (2) INCHES BEFORE APPLYING FERTILIZER, LIME AND SEED.
      3. APPLY SEED UNIFORMLY BY HAND, CYCLONE SEEDER, OR HYDROSEEDER (SLURRY INCLUDING SEED AND FERTILIZER). HYDROSEEDINGS, WHICH INCLUDE MULCH,MAY BE LEFT ON SOIL SURFACE. SEEDING RATES MUST BE INCREASED 10% WHEN HYDROSEEDING.
   C. MAINTENANCE
      TEMPORARY SEEDING SHALL BE PERIODICALLY INSPECTED. AT A MINIMUM, 95% OF THE SOIL SURFACE SHOULD BE COVERED BY VEGETATION. IF ANY EVIDENCE OF EROSION OR SEDIMENTATION IS APPARENT, REPAIRS SHALL BE MADE AND OTHER TEMPORARY MEASURES USED IN THE INTERIM (MULCH, FILTER BARRIERS, CHECK DAMS, ETC.).

2. VEGETATIVE PRACTICE
   A. FOR PERMANENT MEASURES AND PLANTINGS.
      1. LIMESTONE SHALL BE THOROUGHLY INCORPORATED INTO THE LOAM LAYER AT A RATE OF THREE (3) TONS PER ACRE IN ORDER TO PROVIDE A PH VALUE OF 5.5 TO 6.5.
      2. FERTILIZER SHALL BE SPREAD ON THE TOP LAYER OF LOAM AND WORKED INTO THE SURFACE. FERTILIZER APPLICATION RATE SHALL BE 800 POUNDS PER ACRE OF 10-20-20 FERTILIZER.
      3. SOIL CONDITIONERS AND FERTILIZER SHALL BE APPLIED AT THE RECOMMENDED RATES AND SHALL BE THOROUGHLY WORKED INTO THE LOAM. LOAM SHALL BE RAKED UNTIL THE SURFACE IS FINELY PULVERIZED, SMOOTH AND EVEN, AND THEN COMPACTED TO AN EVEN SURFACE CONFORMING TO THE REQUIRED LINES AND GRADES WITH APPROVED ROLLERS WEIGHING BETWEEN 4-1/2 POUNDS AND 5-1/2 POUNDS PER INCH OF WIDTH.
      4. SEED SHALL BE SOWN AT THE RATE SHOWN BELOW. SOWING SHALL BE DONE ON A CALM, DRY DAY, PREFERABLY BY MACHINE, BUT IF BY HAND, ONLY BY EXPERIENCED WORKMEN. IMMEDIATELY BEFORE SEEDING, THE SOIL SHALL BE LIGHTLY RAKED. ONE HALF THE SEED SHALL BE SOWN IN ONE DIRECTION AND THE OTHER HALF AT RIGHT ANGLES TO THE ORIGINAL DIRECTION. IT SHALL BE LIGHTLY RAKED INTO THE SOIL TO A DEPTH NOT OVER 1/4 INCH AND ROLLED WITH A HAND ROLLER WEIGHING NOT OVER 100 POUNDS PER LINEAR FOOT OF WIDTH.
      5. HAY MULCH SHALL BE APPLIED IMMEDIATELY AFTER SEEDING AS INDICATED ABOVE.
      6. THE SURFACE SHALL BE WATERED AND KEPT MOIST WITH A FINE SPRAY AS REQUIRED, WITHOUT WASHING AWAY THE SOIL, UNTIL THE GRASS IS WELL ESTABLISHED. ANY AREAS WHICH ARE NOT SATISFACTORILY COVERED WITH GRASS SHALL BE RESEEDED, AND ALL NOXIOUS WEEDS REMOVED.
      7. THE CONTRACTOR SHALL PROTECT AND MAINTAIN THE SEEDED AREAS UNTIL ACCEPTED.
      8. A GRASS SEED MIXTURE CONTAINING THE FOLLOWING SEED REQUIREMENTS SHALL BE APPLIED AT THE INDICATED RATE:

SEEDING RATE	
CREEPING RED FESCUE	20 LBS/ACRE
TALL FESCUE	20 LBS/ACRE
REDTOP	2 LBS/ACRE

      IN NO CASE SHALL THE WEED CONTENT EXCEED ONE (1) PERCENT BY WEIGHT. ALL SEED SHALL COMPLY WITH STATE AND FEDERAL SEED LAWS. SEEDING SHALL BE DONE NO LATER THAN SEPTEMBER 15. IN NO CASE SHALL SEEDING TAKE PLACE OVER SNOW.

3. DORMANT SEEDING (SEPTEMBER 15 TO FIRST SNOWFALL)
   FOLLOW PERMANENT MEASURES SLOPE, LIME, FERTILIZER AND GRADING REQUIREMENTS. APPLY SEED MIXTURE AT TWICE THE INDICATED RATE. APPLY MULCH AS INDICATED FOR PERMANENT MEASURES.

CONCRETE WASHOUT AREA
1. THE FOLLOWING ARE THE ONLY NON-STORMWATER DISCHARGES ALLOWED. ALL OTHER NON-STORMWATER DISCHARGES ARE PROHIBITED ON SITE.
   A. THE CONCRETE DELIVERY TRUCKS SHALL, WHENEVER POSSIBLE, USE WASHOUT FACILITIES AT THEIR OWN PLANT OR DISPATCH FACILITY.
   B. IF IT IS NECESSARY, SITE CONTRACTOR SHALL DESIGNATE SPECIFIC WASHOUT AREAS AND DESIGN FACILITIES TO HANDLE ANTICIPATED WASHOUT WATER.
   C. CONTRACTOR SHALL LOCATE WASHOUT AREAS AT LEAST 150 FEET AWAY FROM STORM DRAINS, SWALES AND SURFACE WATERS OR DELINEATED WETLANDS.
   D. INSPECT WASHOUT FACILITIES DAILY TO DETECT LEAKS OR TEARS AND TO IDENTIFY WHEN MATERIALS NEED TO BE REMOVED.

ALLOWABLE NON-STORMWATER DISCHARGES
1. DISCHARGES FROM FIRE-FIGHTING ACTIVITIES
2. FIRE HYDRANT FLUSHINGS
3. WATERS USED TO WASH VEHICLES WHERE DETERGENTS ARE NOT USED
4. WATER USED TO CONTROL DUST
5. POTABLE WATER INC. UNCONTAMINATED WATER LINE FLUSHINGS
6. ROUTINE EXTERNAL BUILDING WASH DOWN -NO DETERGENTS
7. PAVEMENT WASH WATERS -NO SPILLS OR DETERGENTS
8. UNCONTAMINATED AIR CONDITIONING/COMPRESSOR CONDENSATE
9. UNCONTAMINATED GROUND WATER OR SPRING WATER
10. FOUNDATION OR FOOTING DRAINS -NOT CONTAMINATED
11. UNCONTAMINATED EXCAVATION DEWATERING
12. LANDSCAPE IRRIGATION

WASTE DISPOSAL
1. WASTE MATERIALS
   A. ALL WASTE MATERIALS SHALL BE COLLECTED AND STORED IN SECURELY LIDDED RECEPTACLES. ALL TRASH AND CONSTRUCTION DEBRIS FROM THE SITE SHALL BE DEPOSITED IN A DUMPSTER.
   B. NO CONSTRUCTION WASTE MATERIALS SHALL BE BURIED ON SITE.
   C. ALL PERSONNEL SHALL BE INSTRUCTED REGARDING THE CORRECT PROCEDURE FOR WASTE DISPOSAL BY THE SUPERINTENDENT.
2. HAZARDOUS WASTE
   A. ALL HAZARDOUS WASTE MATERIALS SHALL BE DISPOSED OF IN THE MANNER SPECIFIED BY LOCAL OR STATE REGULATION OR BY THE MANUFACTURER.
   B. SITE PERSONNEL SHALL BE INSTRUCTED IN THESE PRACTICES BY THE SUPERINTENDENT.
3. SANITARY WASTE
   A. ALL SANITARY WASTE SHALL BE COLLECTED FROM THE PORTABLE UNITS A MINIMUM OF ONCE PER WEEK BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

SPILL PREVENTION
1. CONTRACTOR SHALL BE FAMILIAR WITH SPILL PREVENTION MEASURES REQUIRED BY LOCAL, STATE AND FEDERAL AGENCIES. AT A MINIMUM, CONTRACTOR SHALL FOLLOW THE BEST MANAGEMENT SPILL PREVENTION PRACTICES OUTLINED BELOW.
2. THE FOLLOWING ARE THE MATERIAL MANAGEMENT PRACTICES THAT SHALL BE USED TO REDUCE THE RISK OF SPILLS OR OTHER ACCIDENTAL EXPOSURE OF MATERIALS AND SUBSTANCES DURING CONSTRUCTION TO STORMWATER RUNOFF:
   A. GOOD HOUSEKEEPING:
      THE FOLLOWING GOOD HOUSEKEEPING PRACTICES SHALL BE FOLLOWED ON SITE DURING THE CONSTRUCTION PROJECT:
      1. ONLY SUFFICIENT AMOUNTS OF PRODUCTS TO DO THE JOB SHALL BE STORED ON SITE.
      2. ALL MATERIALS STORED ON SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER IN THEIR PROPER (ORIGINAL IF POSSIBLE) CONTAINERS AND, IF POSSIBLE, UNDER A ROOF OR OTHER ENCLOSURE.
      3. MANUFACTURER'S RECOMMENDATIONS FOR PROPER USE AND DISPOSAL SHALL BE FOLLOWED.
      4. THE SITE SUPERINTENDENT SHALL INSPECT DAILY TO ENSURE PROPER USE AND DISPOSAL OF MATERIALS.
      5. SUBSTANCES SHALL NOT BE MIXED WITH ONE ANOTHER UNLESS RECOMMENDED BY THE MANUFACTURER.
      6. WHENEVER POSSIBLE ALL OF A PRODUCT SHALL BE USED UP BEFORE DISPOSING OF THE CONTAINER.
   B. HAZARDOUS PRODUCTS:
      THE FOLLOWING PRACTICES SHALL BE USED TO REDUCE THE RISKS ASSOCIATED WITH HAZARDOUS MATERIALS:
      1. PRODUCTS SHALL BE KEPT IN THEIR ORIGINAL CONTAINERS UNLESS THEY ARE NOT RESEALABLE.
      2. ORIGINAL LABELS AND MATERIAL SAFETY DATA SHALL BE RETAINED FOR IMPORTANT PRODUCT INFORMATION.
      3. SURPLUS PRODUCT THAT MUST BE DISPOSED OF SHALL BE DISCARDED ACCORDING TO THE MANUFACTURER'S RECOMMENDED METHODS OF DISPOSAL.
   C. PRODUCT SPECIFICATION PRACTICES
      THE FOLLOWING PRODUCT SPECIFIC PRACTICES SHALL BE FOLLOWED ON SITE:
      1. PETROLEUM PRODUCTS:
         a. ALL ON SITE VEHICLES SHALL BE MONITORED FOR LEAKS AND RECEIVE REGULAR PREVENTIVE MAINTENANCE TO REDUCE LEAKAGE.
         b. PETROLEUM PRODUCTS SHALL BE STORED IN TIGHTLY SEALED CONTAINERS WHICH ARE CLEARLY LABELED. ANY ASPHALT BASED SUBSTANCES USED ON SITE SHALL BE APPLIED ACCORDING TO THE MANUFACTURER'S RECOMMENDATIONS.
      2. FERTILIZERS:
         a. FERTILIZERS USED SHALL BE APPLIED ONLY IN THE MINIMUM AMOUNTS DIRECTED BY THE SPECIFICATIONS.
         b. ONCE APPLIED FERTILIZER SHALL BE WORKED INTO THE SOIL TO LIMIT EXPOSURE TO STORMWATER.
         c. STORAGE SHALL BE IN A COVERED SHED OR ENCLOSED TRAILERS. THE CONTENTS OF ANY PARTIALLY USED BAGS OF FERTILIZER SHALL BE TRANSFERRED TO A SEALABLE PLASTIC BIN TO AVOID SPILLS.
      3. PAINTS:
         a. ALL CONTAINERS SHALL BE TIGHTLY SEALED AND STORED WHEN NOT REQUIRED FOR USE.
         b. EXCESS PAINT SHALL NOT BE DISCHARGED TO THE STORM SEWER SYSTEM.
         c. EXCESS PAINT SHALL BE DISPOSED OF PROPERLY ACCORDING TO MANUFACTURER'S INSTRUCTIONS OR STATE AND LOCAL REGULATIONS.
   D. SPILL CONTROL PRACTICES
      IN ADDITION TO GOOD HOUSEKEEPING AND MATERIAL MANAGEMENT PRACTICES DISCUSSED IN THE PREVIOUS SECTION, THE FOLLOWING PRACTICES SHALL BE FOLLOWED FOR SPILL PREVENTION AND CLEANUP:
      1. MANUFACTURER'S RECOMMENDED METHODS FOR SPILL CLEANUP SHALL BE CLEARLY POSTED AND SITE PERSONNEL SHALL BE MADE AWARE OF THE PROCEDURES AND THE LOCATION OF THE INFORMATION AND CLEANUP SUPPLIES.
      2. MATERIALS AND EQUIPMENT NECESSARY FOR SPILL CLEANUP SHALL BE KEPT IN THE MATERIAL STORAGE AREA ON SITE. EQUIPMENT AND MATERIALS SHALL INCLUDE BUT NOT BE LIMITED TO BROOMS, DUSTPANS, MOPS, RAGS, GLOVES, GOGGLES, KITTY LITTER, SAND, SAWDUST AND PLASTIC OR METAL TRASH CONTAINERS SPECIFICALLY FOR THIS PURPOSE.
      3. ALL SPILLS SHALL BE CLEANED UP IMMEDIATELY AFTER DISCOVERY.
      4. THE SPILL AREA SHALL BE KEPT WELL VENTILATED AND PERSONNEL SHALL WEAR APPROPRIATE PROTECTIVE CLOTHING TO PREVENT INJURY FROM CONTACT WITH A HAZARDOUS SUBSTANCE.
      5. SPILLS OF TOXIC OR HAZARDOUS MATERIAL SHALL BE REPORTED TO THE APPROPRIATE LOCAL, STATE OR FEDERAL AGENCIES AS REQUIRED.
      6. THE SITE SUPERINTENDENT RESPONSIBLE FOR DAY-TO-DAY SITE OPERATIONS SHALL BE THE SPILL PREVENTION AND CLEANUP COORDINATOR.
   E. VEHICLE FUELING AND MAINTENANCE PRACTICE:
      1. CONTRACTOR SHALL MAKE AN EFFORT TO PERFORM EQUIPTMENT/VEHICAL FUELING AND MAINTENANCE AT AN OFF-SITE FACILITY.
      2. CONTRACTOR SHALL PROVIDE AN ON-SITE FUELING AND MAINTENANCE AREA THAT IS CLEAN AND DRY.
      3. IF POSSIBLE THE CONTRACTOR SHALL KEEP AREA COVERED.
      4. CONTRACTOR SHALL KEEP A SPILL KIT AT THE FUELING AND MAINTENANCE AREA.
      5. CONTRACTOR SHALL VEHICLES SHALL BE INSPECTED REGULARLY FOR LEAKS AND DAMAGE.
      6. CONTRACTOR SHALL USE DRIP PANS, DRIP CLOTHS, OR ABSORBENT PADS WHEN REPLACING SPENT FLUID.

EROSION CONTROL OBSERVATIONS AND MAINTENANCE PRACTICES
THIS PROJECT EXCEEDS ONE (1) ACRE OF DISTURBANCE AND THUS REQUIRES A SWPPP. THE SWPPP SHALL BE PREPARED BY THE ENGINEER (CONTRACTOR). THE CONTRACTOR SHALL BE FAMILIAR WITH THE SWPPP AND KEEP AN UPDATED COPY OF THE SWPPP ONSITE AT ALL TIMES.

THE FOLLOWING REPRESENTS THE GENERAL OBSERVATION AND REPORTING PRACTICES THAT SHALL BE FOLLOWED AS PART OF THIS PROJECT.
1. OBSERVATIONS OF THE PROJECT FOR COMPLIANCE WITH THE SWPPP SHALL BE MADE BY THE ENGINEER (CONTRACTOR) AT LEAST ONCE A WEEK OR WITHIN 24 HOURS OF A STORM 0.25 INCHES OR GREATER.
2. AN OBSERVATION REPORT SHALL BE MADE AFTER EACH OBSERVATION AND DISTRIBUTED TO THE ENGINEER, THE OWNER, AND THE CONTRACTOR.
3. A REPRESENTATIVE OF THE SITE CONTRACTOR, SHALL BE RESPONSIBLE FOR MAINTENANCE AND REPAIR ACTIVITIES.
4. IF A REPAIR IS NECESSARY, IT SHALL BE INITIATED WITHIN 24 HOURS OF REPORT.

BLASTING NOTES
1. IF MORE THAN 5000 CUBIC YARDS ARE TO BE BLASTED A BLASTING PLAN SHALL BE PROVIDED. BLASTING PLAN SHALL INCLUDE:
   A. LOCATION AND IDENTIFICATION OF DRINKING WATER WELLS LOCATED WITHIN 2000 FEET OF THE PROPOSED BLASTING ACTIVITIES.
   B. A GROUNDWATER QUALITY SAMPLING PROGRAM, APPROVED BY NHDES PRIOR TO INITIATING BLASTING, TO MONITOR FOR NITRATE AND NITRITE EITHER IN THE DRINKING WATER SUPPLY WELLS OR IN OTHER WELLS THAT ARE REPRESENTATIVE OF THE DRINKING WATER SUPPLY WELLS IN THE AREA.
      1. THE GROUNDWATER SAMPLING PROGRAM MUST BE IMPLEMENTED ONCE APPROVED BY NHDES.

2. THE FOLLOWING BEST MANAGEMENT PROCEDURES FOR BLASTING SHALL BE COMPLIED WITH:
   A. LOADING PRACTICES.
      THE FOLLOWING BLASTHOLE LOADING PRACTICES TO MINIMIZE ENVIRONMENTAL EFFECTS SHALL BE FOLLOWED:
      1. DRILLING LOGS SHALL BE MAINTAINED BY THE DRILLER AND COMMUNICATED DIRECTLY TO THE BLASTER. THE LOGS SHALL INDICATE DEPTHS AND LENGTHS OF VOIDS, CAVITIES, AND FAULT ZONES OR OTHER WEAK ZONES ENCOUNTERED AS WELL AS GROUNDWATER CONDITIONS.
      2. EXPLOSIVE PRODUCTS SHALL BE MANAGED ON-SITE SO THAT THEY ARE EITHER USED IN THE BOREHOLE, RETURNED TO THE DELIVERY VEHICLE, OR PLACED IN SECURE CONTAINERS FOR OFF-SITE DISPOSAL.
      3. SPILLAGE AROUND THE BOREHOLE SHALL EITHER BE PLACED IN THE BOREHOLE OR CLEANED UP AND RETURNED TO AN APPROPRIATE VEHICLE FOR HANDLING OR PLACEMENT IN SECURED CONTAINERS FOR OFF-SITE DISPOSAL.
      4. LOADED EXPLOSIVES SHALL BE DETONATED AS SOON AS POSSIBLE AND SHALL NOT BE LEFT IN THE BLASTHOLES OVERNIGHT, UNLESS WEATHER OR OTHER SAFETY CONCERNS REASONABLY DICTATE THAT DETONATION SHOULD BE POSTPONED.
      5. LOADING EQUIPMENT SHALL BE CLEANED IN AN AREA WHERE WASTEWATER CAN BE PROPERLY CONTAINED AND HANDLED IN A MANNER THAT PREVENTS RELEASE OF CONTAMINANTS TO THE ENVIRONMENT.
      6. EXPLOSIVES SHALL BE LOADED TO MAINTAIN GOOD CONTINUITY IN THE COLUMN LOAD TO PROMOTE COMPLETE DETONATION. INDUSTRY ACCEPTED LOADING PRACTICES FOR PRIMING, STEMMING, DECKING AND COLUMN RISE NEED TO BE ATTENDED TO.
   B. EXPLOSIVE SELECTION
      THE FOLLOWING BMPS SHALL BE FOLLOWED TO REDUCE THE POTENTIAL FOR GROUNDWATER CONTAMINATION WHEN EXPLOSIVES ARE USED:
      1. EXPLOSIVE PRODUCTS SHALL BE SELECTED THAT ARE APPROPRIATE FOR SITE CONDITIONS AND SAFE BLAST EXECUTION.
      2. EXPLOSIVE PRODUCTS SHALL BE SELECTED THAT HAVE THE APPROPRIATE WATER RESISTANCE FOR THE SITE CONDITIONS PRESENT TO MINIMIZE THE POTENTIAL FOR HAZARDOUS EFFECT OF THE PRODUCT UPON GROUNDWATER.
   C. PREVENTION OF MISFIRES. APPROPRIATE PRACTICES SHALL BE DEVELOPED AND IMPLEMENTED TO PREVENT MISFIRES.
   D. MUCK PILE MANAGEMENT
      MUCK PILES (THE BLASTED PIECES OF ROCK) AND ROCK PILES SHALL BE MANAGED IN A MANNER TO REDUCE THE POTENTIAL FOR CONTAMINATION BY IMPLEMENTING THE FOLLOWING MEASURES:
      1. REMOVE THE MUCK PILE FROM THE BLAST AREA AS SOON AS REASONABLY POSSIBLE.
      2. MANAGE THE INTERACTION OF BLASTED ROCK PILES AND STORMWATER TO PREVENT CONTAMINATION OF WATER SUPPLY WELLS OR SURFACE WATER.
   E. SPILL PREVENTION MEASURES AND SPILL MITIGATION
      SPILL PREVENTION AND SPILL MITIGATION MEASURES SHALL BE IMPLEMENTED TO PREVENT THE RELEASE OF FUEL AND OTHER RELATED SUBSTANCES TO THE ENVIRONMENT. THE MEASURES SHALL INCLUDE AT A MINIMUM:
      1. THE FUEL STORAGE REQUIREMENTS SHALL INCLUDE:
         a. STORAGE OF REGULATED SUBSTANCES ON AN IMPERVIOUS SURFACE;
         b. SECURE STORAGE AREAS AGAINST UNAUTHORIZED ENTRY;
         c. LABEL REGULATED CONTAINERS CLEARLY AND VISIBLY;
         d. INSPECT STORAGE AREAS WEEKLY;
         e. COVER REGULATED CONTAINERS IN OUTSIDE STORAGE AREAS;
         f. WHEREVER POSSIBLE, KEEP REGULATED CONTAINERS THAT ARE STORED OUTSIDE MORE THAN 50 FEET FROM SURFACE WATER AND STORM DRAINS, 75 FEET FROM PRIVATE WELLS, AND 400 FEET FROM PUBLIC WELLS; AND
         g. SECONDARY CONTAINMENT IS REQUIRED FOR CONTAINERS CONTAINING REGULATED SUBSTANCES STORED OUTSIDE, EXCEPT FOR ON PREMISE USE HEATING FUEL TANKS, OR ABOVEGROUND OR UNDERGROUND STORAGE TANKS OTHERWISE REGULATED.
      2. THE FUEL HANDLING REQUIREMENTS SHALL INCLUDE:
         a EXCEPT WHEN IN USE, KEEP CONTAINERS CONTAINING REGULATED SUBSTANCES CLOSED AND SEALED;
         b. PLACE DRIP PANS UNDER SPIGOTS, VALVES, AND PUMPS;
         c. HAVE SPILL CONTROL AND CONTAINMENT EQUIPMENT READILY AVAILABLE IN ALL WORK AREAS;
         d. USE FUNNELS AND DRIP PANS WHEN TRANSFERRING REGULATED SUBSTANCES; AND
         e. PERFORM TRANSFERS OF REGULATED SUBSTANCES OVER AN IMPERVIOUS SURFACE.
      3. THE TRAINING OF ON-SITE EMPLOYEES AND THE ON-SITE POSTING OF RELEASE RESPONSE INFORMATION DESCRIBING WHAT TO DO IN THE EVENT OF A SPILL OF REGULATED SUBSTANCES.
      4. FUELING AND MAINTENANCE OF EXCAVATION, EARTHMOVING AND OTHER CONSTRUCTION RELATED EQUIPMENT SHALL COMPLY WITH THE REGULATIONS OF THE NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES THESE REQUIREMENTS ARE SUMMARIZED IN WD-DWGB-22-6 BEST MANAGEMENT PRACTICES FOR FUELING AND MAINTENANCE OF EXCAVATION AND EARTHMOVING EQUIPMENT" OR ITS SUCCESSOR DOCUMENT. (SEE HTTP://DES.NH.GOV/ORGANIZATION/COMMISSIONER/PIP/FACTSHEETS/DWGB/DOCUMENTS/DWGB-22-6.PDF)

Tighe&Bond
Engineers | Environmental Specialists

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Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

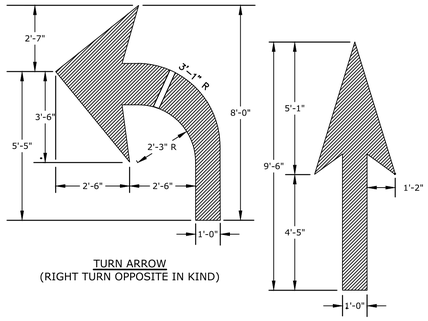
PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-501 to C-508.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

EROSION CONTROL NOTES

SCALE: AS SHOWN

C-501

Last Save Date: May 21, 2018 2:25 PM By: BCLARK
Plot Date: May 21, 2018 2:26 PM By: Benjamin Clark
T&B File Location: J:\L\L0700



TURN ARROW
(RIGHT TURN OPPOSITE IN KIND)

THROUGH (STRAIGHT) ARROW

PAVEMENT MARKING NOTES:

1. ALL WORDS AND SYMBOLS SHALL BE RETROREFLECTIVE WHITE AND SHALL CONFORM TO THE LATEST VERSION OF THE MUTCD.
2. COMBINATION ARROWS MAY BE COMPRISED OF 2 SINGLE ARROWS (e.g. TURN AND THROUGH ARROWS). HOWEVER, THE SHAFTS OF THE ARROWS SHALL COINCIDE AS SHOWN.
3. PREFORMED SYMBOLS SHALL BE PRE-CUT BY THE MANUFACTURER.
4. WRONG-WAY ARROWS SHALL NOT BE SUBSTITUTED FOR THROUGH ARROWS.
7. ALL SYMBOLS SHALL BE CONSTRUCTED USING FAST DRYING TRAFFIC PAINT MEETING THE REQUIREMENTS OF AASHTO M248-TYPE F. PAINT SHALL BE APPLIED AS SPECIFIED BY THE MANUFACTURER.

PAVEMENT MARKINGS
NO SCALE

CONTROL LANE GENERAL NOTES:

1. THIS DRAWING IS NOT TO BE USED FOR ELECTRICAL CIRCUITRY, REFER TO ELECTRICAL DRAWINGS.
2. ———————— DENOTES CONDUIT AND WIRE FOR POWER OR PULL WIRE FOR CONTROLS BY ELECTRICAL CONTRACTOR.
3. ———————— DENOTES CONDUIT AND WIRE BY ELECTRICAL CONTRACTOR.
4. C.O. (CONDUIT ONLY) DENOTES CONDUIT AND PULL WIRE.
5. STUB-UP CONDUIT 8" ABOVE TOP OF CONCRETE ISLAND PLUS 3'-0" OF WIRE FOR PARKING EQUIPMENT SUPPLIER.
6. ELECTRICAL CONTRACTOR SHALL VERIFY WITH PARKING EQUIPMENT SUPPLIER AS TO THE ACTUAL POWER REQUIREMENTS TO EACH LOCATION BEFORE START OF WORK.
7. ELECTRICAL CONTRACTOR SHALL VERIFY WITH INTERCOM SYSTEM SUPPLIER AS TO THE ACTUAL CONDUIT SIZE REQUIRED BEFORE START OF WORK.
8. CONCRETE CURBS SHALL BE 6" HIGH UNO.
9. FOR ADDITIONAL PARKING EQUIPMENT REQUIREMENTS, REFER TO SPECS.
10. COORDINATE WITH ELECTRICAL DRAWINGS.

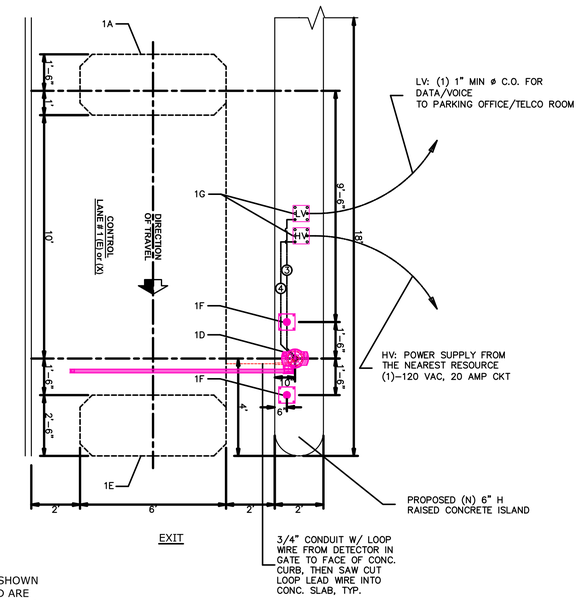
PARKING CONTROL EQUIPMENT LIST:

CONTROL LANE # 1 (E) or (X)

- 1A – ARMING LOOP DETECTOR ASSEMBLY
- 1B – ENTRY/EXIT COLUMN UNLIMITED (See Detail)
- 1C – TWO-WAY INTERCOM UNIT
- 1D – BARRIER GATE (See Detail)
- 1E – CLOSING LOOP DETECTOR ASSEMBLY
- 1F – PROTECTION POST
- 1G – INGROUND JUNCTION BOXES (8"x8"x4") FOR POWER & DATA

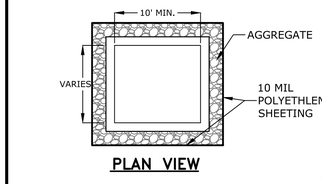
LEGEND

- ① 1" ø C.O., ARCNET CABLE (DATA)
- ② 22/4 CAT3, PVC (VOICE)
- ③ 3/4" ø C.O., 22/8 CABLE O.S., PVC (DATA)
- ④ ONE (1) 115VAC, 20AMP CIRCUIT (POWER)

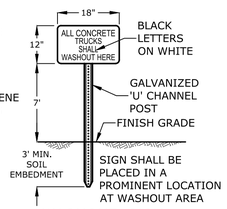


NOTE:
1. THE LANES, ISLANDS, AND GATE CONTROL LOCATIONS SHOWN ON THE PLAN ARE FOR GRAPHICAL PURPOSES ONLY, AND ARE INTENDED TO GENERALLY CONVEY THE INTENT OF THE ACCESS CONTROL THAT IS DESIRED.
2. FINAL BARRIER GATE DESIGN AND PREFERRED VENDOR TO BE COORDINATED WITH LONZA PRIOR TO CONSTRUCTION.

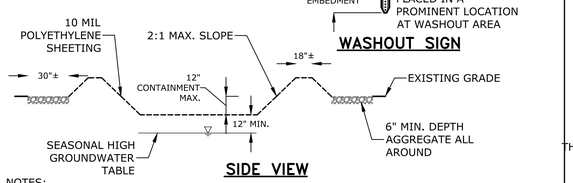
TYPICAL BARRIER GATE DETAILS
NO SCALE



PLAN VIEW



WASHOUT SIGN



SIDE VIEW

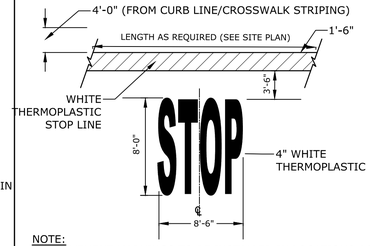
NOTES:
1. CONTAINMENT SHALL BE STRUCTURALLY SOUND AND LEAK FREE AND CONTAIN ALL LIQUID WASTES.
2. CONTAINMENT DEVICES MUST BE OF SUFFICIENT QUANTITY OR VOLUME TO COMPLETELY CONTAIN THE LIQUID WASTES GENERATED.
3. WASHOUT SHALL BE CLEANED OR NEW FACILITIES CONSTRUCTED AND READY TO USE ONCE WASHOUT IS 75% FULL.
4. WASHOUT AREA(S) SHALL BE INSTALLED IN A LOCATION EASILY ACCESSIBLE BY CONCRETE TRUCKS.
5. ONE OR MORE AREAS MAY BE INSTALLED ON THE CONSTRUCTION SITE AND MAY BE RELOCATED AS CONSTRUCTION PROGRESSES.
6. AT LEAST WEEKLY, REMOVE ACCUMULATION OF SAND AND AGGREGATE AND DISPOSE OF PROPERLY.

CONCRETE WASHOUT AREA
NO SCALE



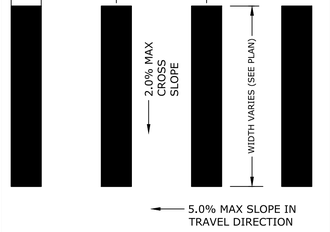
NOTE:
1. PAVEMENT MARKINGS TO BE INSTALLED IN LOCATIONS AS SHOWN ON SITE PLAN.
2. STRIPING SHALL BE CONSTRUCTED USING WHITE THERMO PLASTIC, REFLECTERIZED PAVEMENT MARKING MATERIAL MEETING THE REQUIREMENTS OF ASTM D 4505.

ONLY LEGEND
NO SCALE



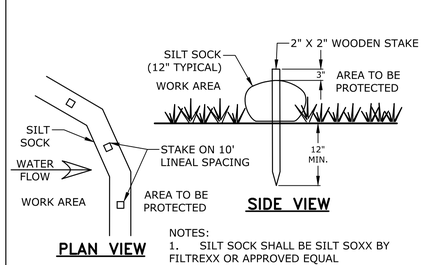
NOTE:
1. PAVEMENT MARKINGS TO BE INSTALLED IN LOCATIONS AS SHOWN ON SITE PLAN.
2. STRIPING SHALL BE CONSTRUCTED USING WHITE THERMO PLASTIC, REFLECTERIZED PAVEMENT MARKING MATERIAL MEETING THE REQUIREMENTS OF ASTM D 4505

STOP BAR AND LEGEND
NO SCALE



NOTE:
STRIPING SHALL BE CONSTRUCTED USING WHITE THERMO PLASTIC, REFLECTERIZED PAVEMENT MARKING MATERIAL MEETING THE REQUIREMENTS OF ASTM D 4505

CROSSWALK STRIPING
NO SCALE

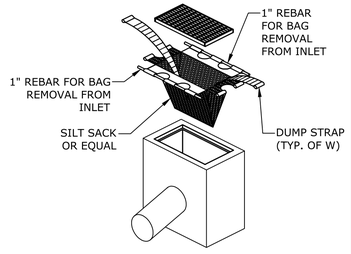


PLAN VIEW

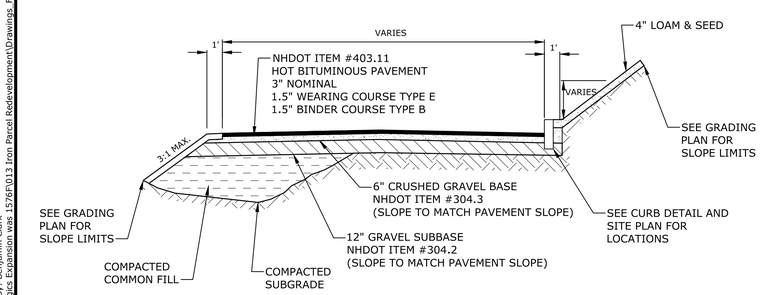
SIDE VIEW

NOTES:
1. SILT SOCK SHALL BE SILT SOXX BY FILTREXX OR APPROVED EQUAL
2. INSTALL SILT SOCK IN ACCORDANCE WITH...

SILT SOCK
NO SCALE

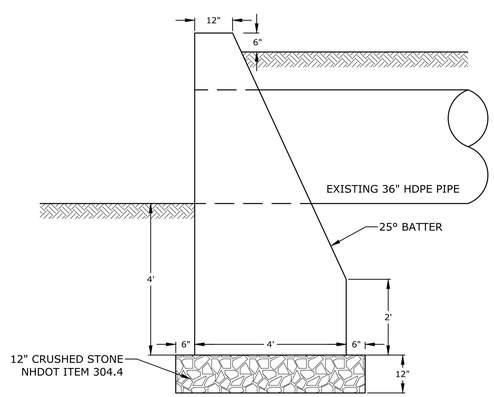


SILT SACK
NO SCALE



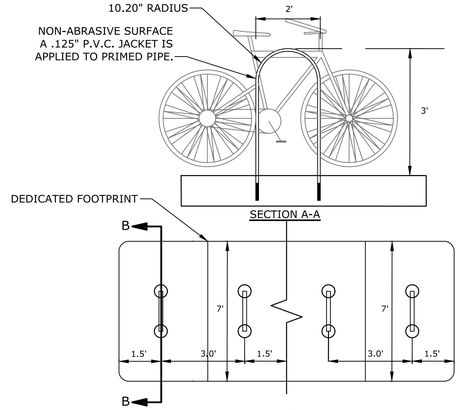
NOTE:
1. FINAL PAVEMENT DESIGN TO BE BASED ON GEOTECH REPORT.
2. SEE GRADING, DRAINAGE AND EROSION CONTROL PLAN FOR PAVEMENT SLOPE AND CROSS-SLOPE.
3. A TACK COAT SHALL BE PLACED ON TOP OF BINDER COURSE PAVEMENT PRIOR TO PLACING WEARING COURSE.
4. CONTRACTOR SHALL HAVE THE OPTION OF RECLAIMING THE EXISTING PAVEMENT AND REMOVING THE MATERIAL, THEN REUSING THE RECLAIMED MATERIAL AS A PAVEMENT SUBBASE.

STANDARD DUTY PAVEMENT SECTION
NO SCALE



NOTE:
1. CONTRACTOR SHALL SUBMIT REBAR CAGE LAYOUT FOR APPROVAL PRIOR TO CONSTRUCTION.

CONCRETE HEADWALL
NO SCALE



PLAN

BIKE RACK
NO SCALE

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Engineers | Environmental Specialists

PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE 5-21-18

BRADLEE MEZICKTA No. 09590 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE 5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

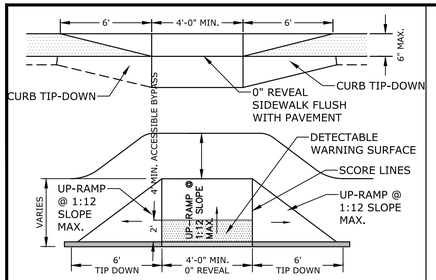
PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-501 to C-508.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEETS

SCALE: AS SHOWN

C-502

Last Save Date: May 21, 2018 2:23 PM By: RCLARK
Plot Date: Monday, May 21, 2018 2:23 PM By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576\N\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CD-501 to C-508.dwg Layout Tab: C-502

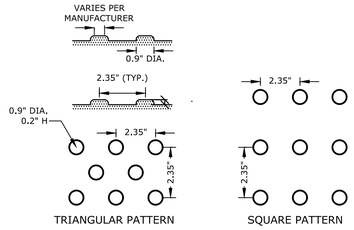


PLAN

NOTES:
1. RAMPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE AMERICANS WITH DISABILITIES ACT AND LOCAL AND STATE REQUIREMENTS
2. PROVIDE 6" COMPACTED CRUSHED GRAVEL BASE BENEATH RAMPS
3. DETECTABLE WARNING STRIP SHALL BE ADA SOLUTIONS, INC. CAST IN PLACE RAMP. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

CONCRETE WHEELCHAIR ACCESSIBLE RAMP

NO SCALE

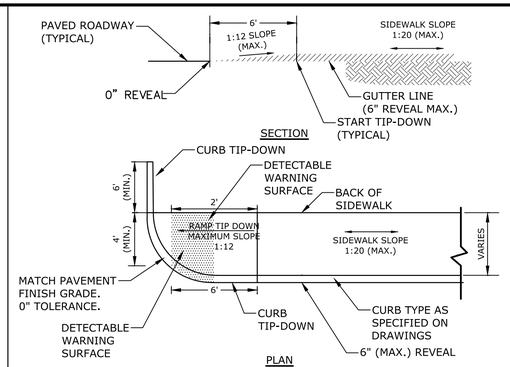


(EITHER PATTERN IS ACCEPTABLE)

NOTE:
CURB RAMPS MUST HAVE A DETECTABLE WARNING FEATURE EXTENDING THE FULL WIDTH AND DEPTH OF THE RAMP, A HEIGHT OF NOMINAL 0.2 INCHES, THE DETECTABLE SURFACE MUST CONSIST OF RAISED TRUNCATED DOMES WITH A DIAMETER OF NOMINAL 0.9 INCHES AND A CENTER TO CENTER SPACING OF NOMINAL 2.35 INCHES. THE TEXTURE OF THE DETECTABLE WARNING FEATURE MUST CONTRAST VISUALLY WITH THE SURROUNDING SURFACES (EITHER LIGHT-ON-DARK OR DARK-ON-LIGHT).

DETECTABLE WARNING SURFACE

NO SCALE



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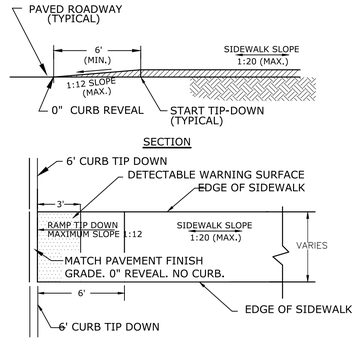
CORNER TIP DOWN RAMP

NOT TO SCALE



NOTES:
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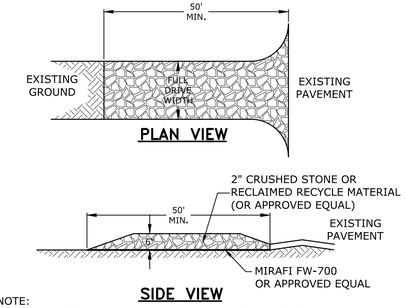
2. PROVIDE 6" COMPACTED CRUSHED GRAVEL BASE BENEATH RAMPS.
3. DETECTABLE WARNING STRIP SHALL BE ADA SOLUTIONS, INC. CAST IN PLACE RAMP. INSTALL PER MANUFACTURER'S RECOMMENDATIONS.

SIDEWALK TIP-DOWN RAMP

NO SCALE

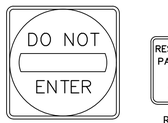


SIDE VIEW

NOTE:
THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAY. WHEN WASHING IS REQUIRED, IT SHALL BE DONE AN AREA STABILIZED WITH AGGREGATE WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE. ALL SEDIMENT SHALL BE PREVENTED FROM ENTERING STORM DRAINS, DITCHES, OR WATERWAYS.

STABILIZED CONSTRUCTION ENTRANCE

NO SCALE



R5-1
30"X30"
WHITE ON RED



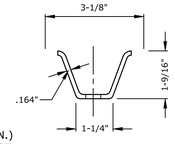
R7-8
12"X18"
BLUE AND
GREEN ON
WHITE



R7-8A
6"X12"
BLUE AND
GREEN ON
WHITE



R1-1
30"X30"
WHITE ON RED

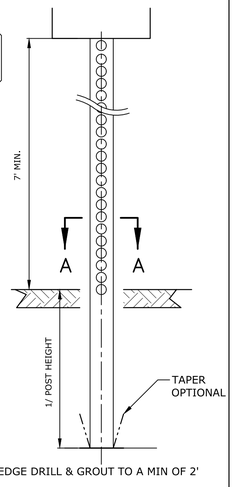


SECTION A–A

LENGTH: AS REQUIRED
WEIGHT PER LINEAR FOOT: 2.50 LBS (MIN.)
HOLES: 3/8" DIAMETER, 1" C-C FULL LENGTH
STEEL: SHALL CONFORM TO ASTM A-499 (GRADE 60) OR ASSTM A-576 (GRADE 1070 - 1080)

FINISH: SHALL BE PAINTED WITH TWO COATS OF AN APPROVED MEDIUM GREEN BAKED ON OR DRIED, PAINT OF WEATHER RESISTANT QUALITY. ALL FABRICATION SHALL BE COMPLETE BEFORE PAINTING.

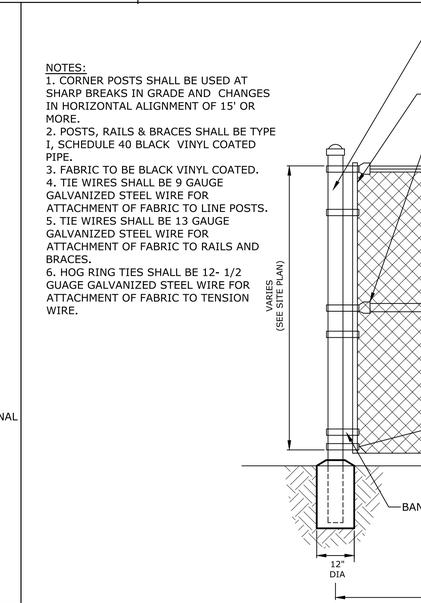
NOTE:
ALL SIGNS TO BE INSTALLED AS INDICATED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.



* IN LEDGE DRILL & GROUT TO A MIN OF 2'

SIGN LEGEND & SIGN POST

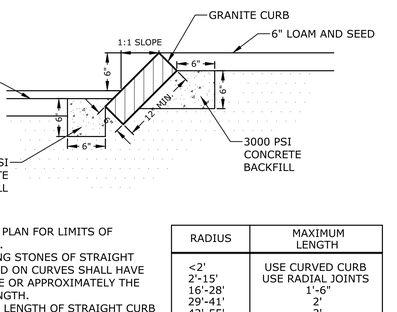
NO SCALE



NOTES:
1. CORNER POSTS SHALL BE USED AT SHARP BREAKS IN GRADE AND CHANGES IN HORIZONTAL ALIGNMENT OF 15' OR MORE.
2. POSTS, RAILS & BRACES SHALL BE TYPE 1, SCHEDULE 40 BLACK VINYL COATED PIPE.
3. FABRIC TO BE BLACK VINYL COATED.
4. TIE WIRES SHALL BE 9 GAUGE GALVANIZED STEEL WIRE FOR ATTACHMENT OF FABRIC TO LINE POSTS.
5. TIE WIRES SHALL BE 13 GAUGE GALVANIZED STEEL WIRE FOR ATTACHMENT OF FABRIC TO RAILS AND BRACES.
6. HOG RING TIES SHALL BE 12- 1/2 GUAGE GALVANIZED STEEL WIRE FOR ATTACHMENT OF FABRIC TO TENSION WIRE.

CHAIN LINK FENCE

NO SCALE



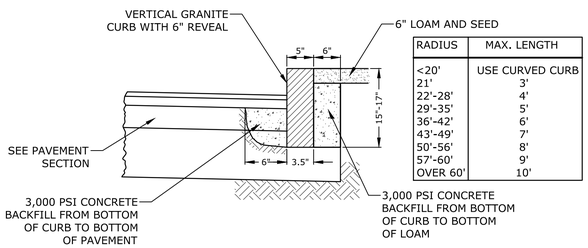
NOTES:

1. SEE SITE PLAN FOR LIMITS OF CURBING.
2. ADJOINING STONES OF STRAIGHT CURB LAID ON CURVES SHALL HAVE THE SAME OR APPROXIMATELY THE SAME LENGTH.
3. MINIMUM LENGTH OF STRAIGHT CURB STONES = 18 INCHES.
4. MAXIMUM LENGTH OF STRAIGHT CURB STONES = 8 FEET.
5. MAXIMUM LENGTH OF STRAIGHT CURB STONES LAID ON CURVES - SEE CHART.
6. JOINTS BETWEEN STONES SHALL BE MORTARED.

RADIUS	MAXIMUM LENGTH
<2'	USE CURVED CURB
2'-15'	USE RADIAL JOINTS
16'-28'	1'-6"
29'-41'	2'
42'-55'	3'
56'-68'	4'
69'-82'	5'
83'-96'	6'
97'-110'	7'
OVER 110'	8'

SLOPED GRANITE CURB

NO SCALE

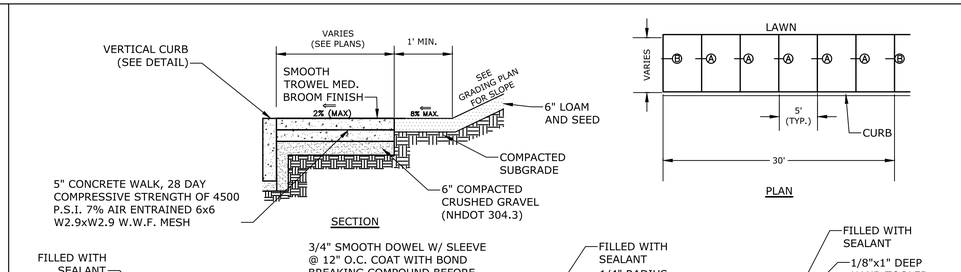


RADIUS	MAX. LENGTH
<20'	USE CURVED CURB
21'	3'
22'-28'	4'
29'-35'	5'
36'-42'	6'
43'-49'	7'
50'-56'	8'
57'-60'	9'
OVER 60'	10'

NOTES:
1. SEE SITE PLAN FOR LIMITS OF CURBING.
2. ADJOINING STONES SHALL HAVE THE SAME OR APPROXIMATELY THE SAME LENGTH.
3. MINIMUM LENGTH OF CURB STONES = 3'
4. MAXIMUM LENGTH OF CURB STONES = 10'
5. MAXIMUM LENGTH OF STRAIGHT CURB STONES LAID ON CURVES (SEE CHART).
6. ALL RADII 20 FEET AND SMALLER SHALL BE CONSTRUCTED USING CURVED SECTIONS.
7. JOINTS BETWEEN STONES SHALL BE MORTARED.

VERTICAL GRANITE CURB

NO SCALE



CONCRETE SIDEWALK WITH GRANITE CURB

NO SCALE

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5-21-18

BRADLEE MEZQUITA No. 09930 LICENSED PROFESSIONAL ENGINEER - STATE OF NEW HAMPSHIRE
5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

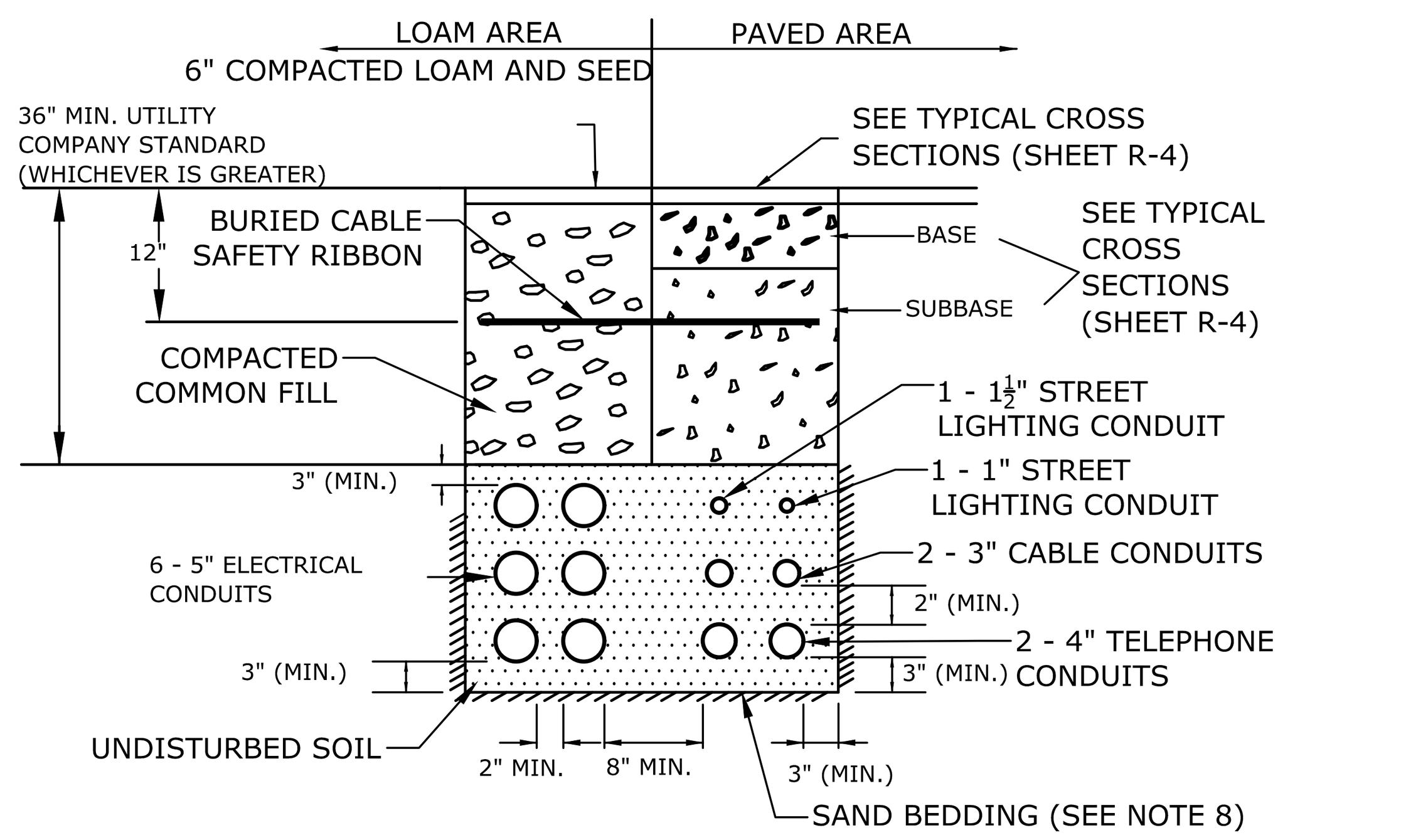
PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-501 to C-508.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEET

SCALE: AS SHOWN

C-503

Last Save Date: May 21, 2018 2:25 PM By: BCLARK
Plot Date: May 21, 2018 2:25 PM By: Brandon Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CD-501 to C-508.dwg Layout Tab: C-503

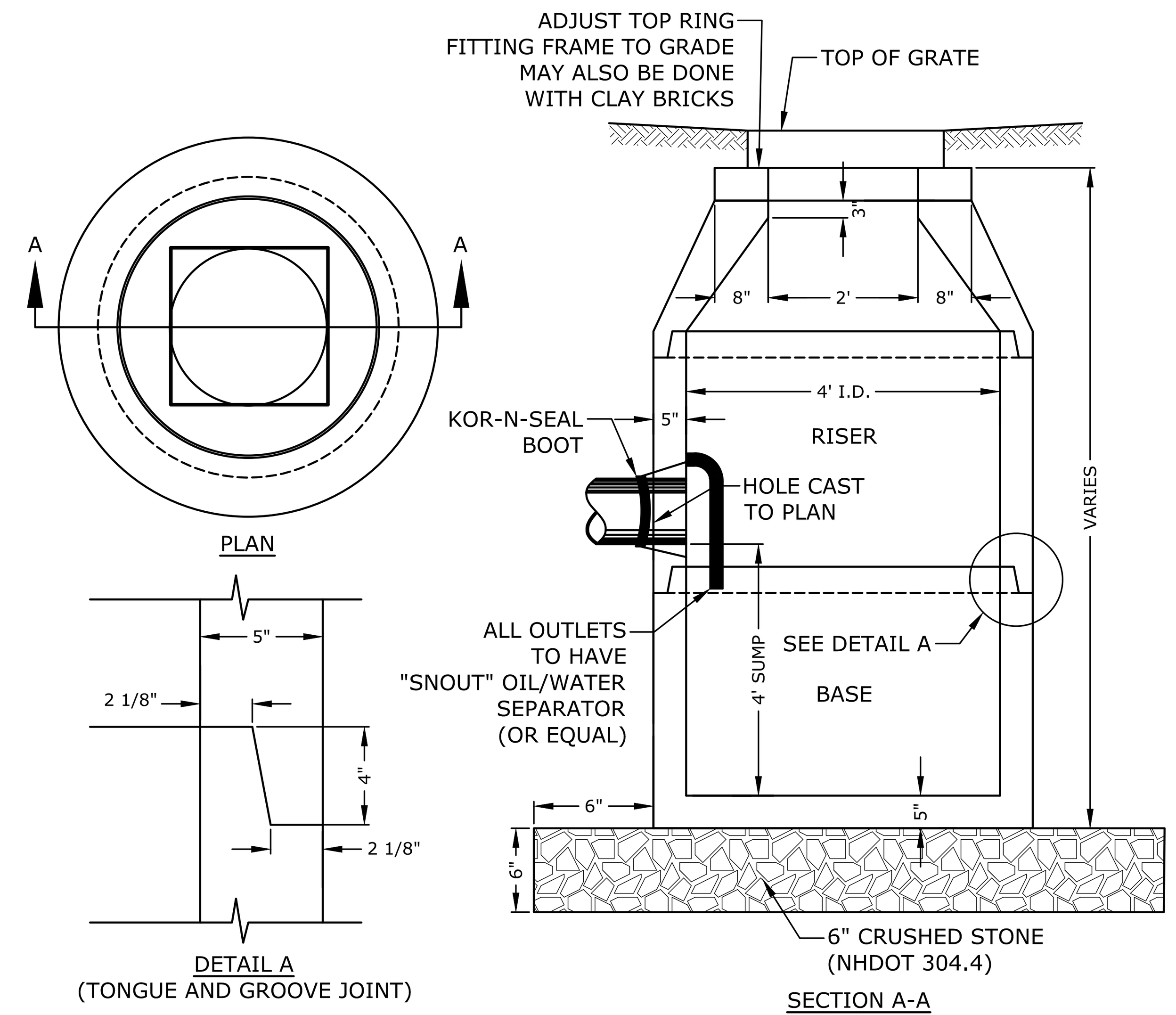


NOTE:

1. NUMBER, MATERIAL, AND SIZE OF UTILITY CONDUITS TO BE DETERMINED BY LOCAL UTILITY OR AS SHOWN ON ELECTRICAL DRAWINGS. CONTRACTOR TO PROVIDE ONE SPARE CONDUIT FOR EACH UTILITY TO BUILDING.
2. DIMENSIONS SHOWN REPRESENT OWNERS MINIMUM REQUIREMENTS. ACTUAL DIMENSIONS MAY BE GREATER BASED ON UTILITY COMPANY STANDARDS, BUT SHALL NOT BE LESS THAN THOSE SHOWN.
3. NO CONDUIT RUN SHALL EXCEED 360 DEGREES IN TOTAL BENDS.
4. A SUITABLE PULLING STRING, CAPABLE OF 200 POUNDS OF PULL, MUST BE INSTALLED IN THE CONDUIT BEFORE UTILITY COMPANY IS NOTIFIED TO INSTALL CABLE. THE STRING SHOULD BE BLOWN INTO THE CONDUIT AFTER THE RUN IS ASSEMBLED TO AVOID BONDING THE STRING TO THE CONDUIT.
5. UTILITY COMPANY MUST BE GIVEN THE OPPORTUNITY TO INSPECT THE CONDUIT PRIOR TO BACKFILL. THE CONTRACTOR IS RESPONSIBLE FOR ALL REPAIRS SHOULD THE UTILITY COMPANY BE UNABLE TO INSTALL ITS CABLE IN A SUITABLE MANNER.
6. ALL CONDUIT INSTALLATIONS MUST CONFORM TO THE CURRENT EDITION OF THE NATIONAL ELECTRIC SAFETY CODE, STATE AND LOCAL CODES AND ORDINANCES, AND, WHERE APPLICABLE, THE NATIONAL ELECTRIC CODE.
7. ALL 90° SWEEPS WILL BE MADE USING RIGID GALVANIZED STEEL. SWEEPS WITH A 36 TO 48 INCH RADIUS.
8. SAND BEDDING TO BE REPLACED WITH CONCRETE ENCASEMENT WHERE COVER IS LESS THAN 3 FEET, WHEN LOCATED BELOW PAVEMENT, OR WHERE SHOWN ON THE UTILITIES PLAN.

ELECTRICAL AND COMMUNICATION CONDUIT

NO SCALE

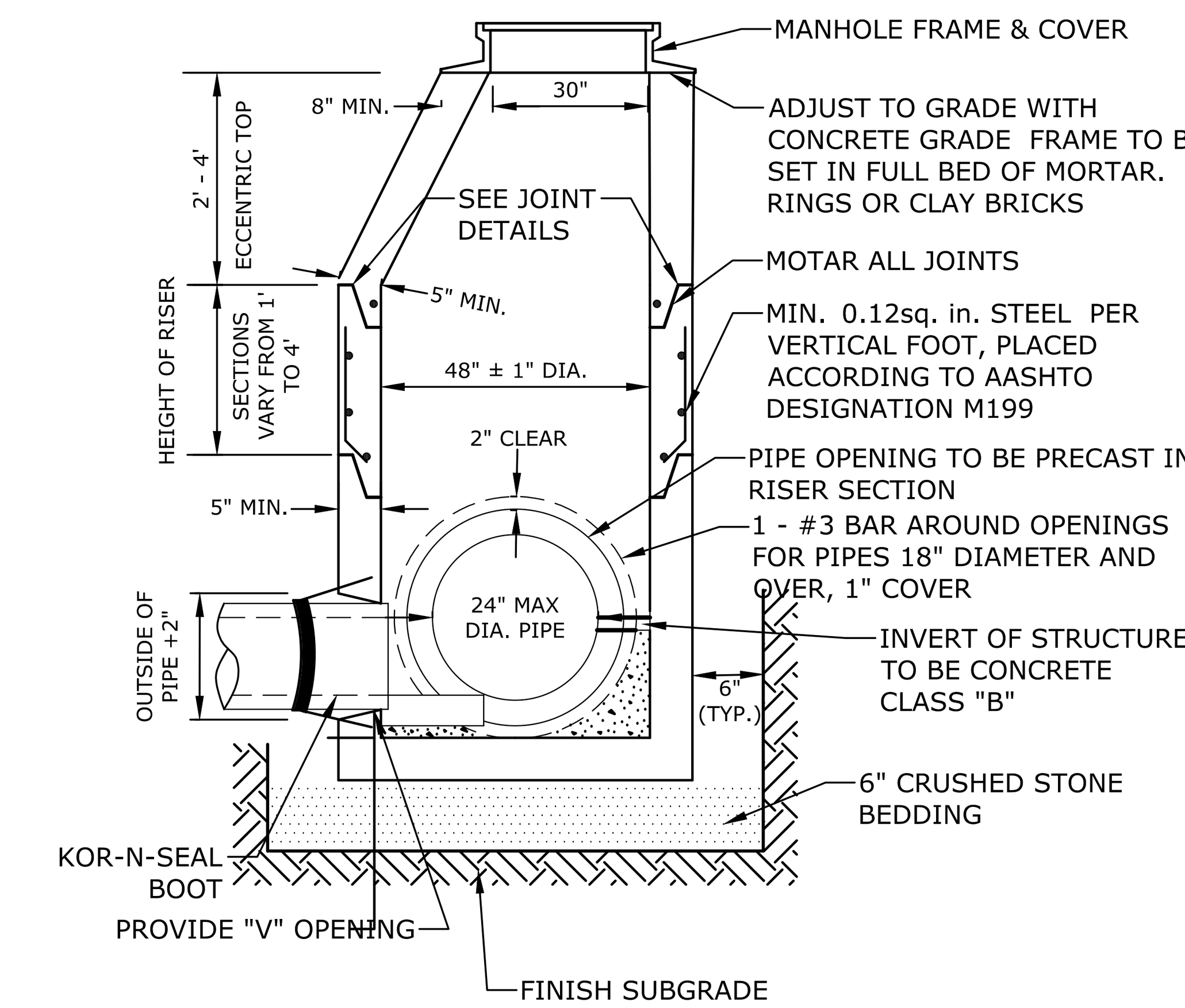


NOTES:

1. ALL SECTIONS SHALL BE CONCRETE CLASS AA(4000 psi).
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQ.IN. PER LINEAR FT. IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER THIRD OF THE WALL.
3. THE TONGUE AND GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQ. IN. PER LINEAR FT.
4. RISERS OF 1', 2', 3' & 4' CAN BE USED TO REACH DESIRED DEPTH.
5. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
6. THE TONGUE AND GROOVE JOINT SHALL BE SEALED WITH ONE STRIP OF BUTYL RUBBER SEALANT.

4' DIAMETER CATCHBASIN

NO SCALE

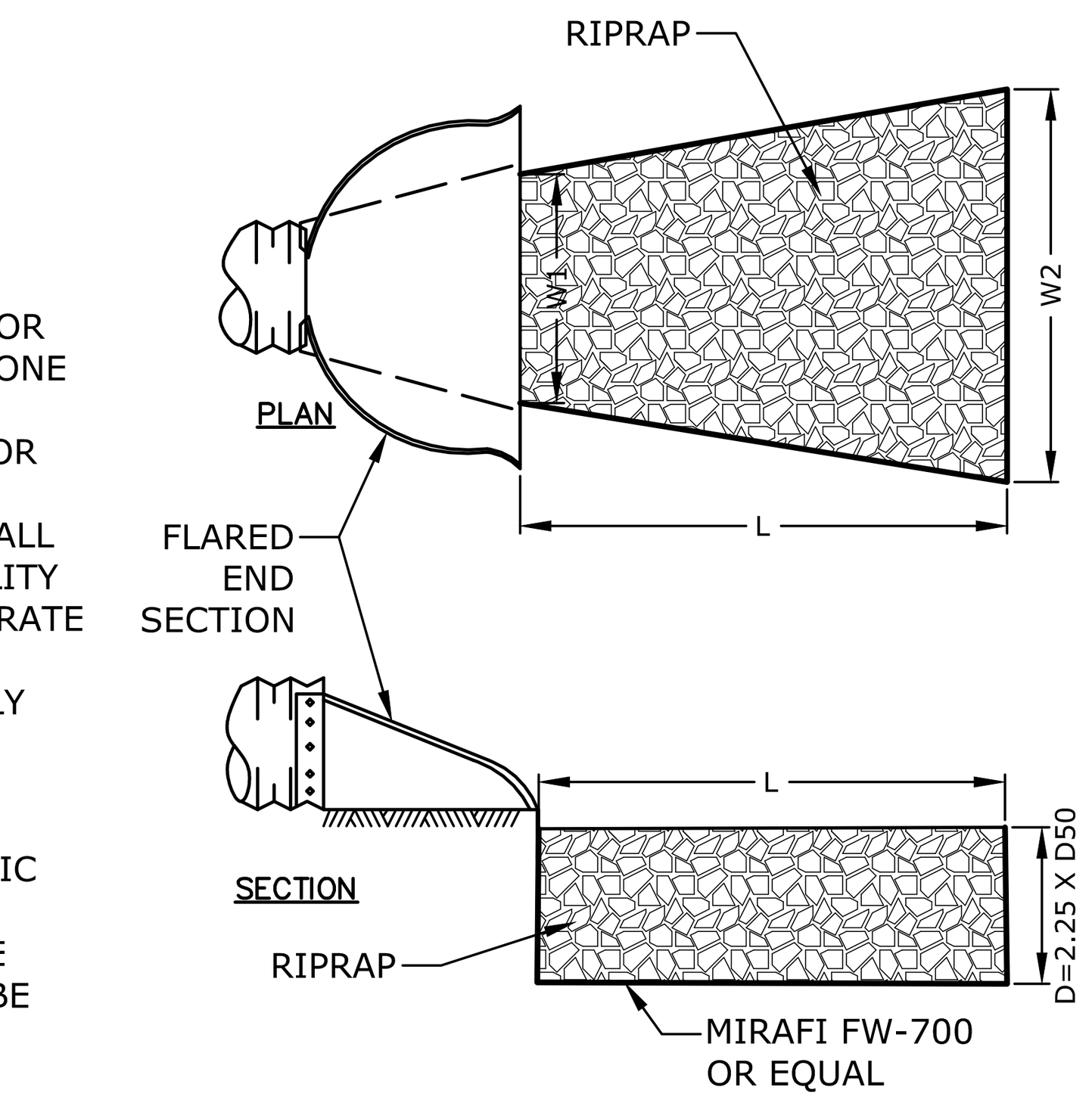


4' DIAMETER DRAIN MANHOLE

NO SCALE

NOTES:

1. STONE SIZE AND MAT DIMENSIONS DETAILED ON PLANS.
2. STONE SHALL CONSIST OF SUB-ANGULAR FIELD STONE OR ROUGH UNHEWN QUARRY STONE OF APPROXIMATELY RECTANGULAR SHAPE. FLAT OR ROUND ROCKS ARE NOT ACCEPTABLE. THE STONE SHALL BE HARD AND OF SUCH QUALITY THAT IT WILL NOT DISINTEGRATE ON EXPOSURE TO WATER OR WEATHERING, BE CHEMICALLY STABLE AND IT SHALL BE SUITABLE IN ALL OTHER RESPECTS FOR THE PURPOSE INTENDED. THE BULK SPECIFIC GRAVITY (SATURATED SURFACE-DRY BASIS) OF THE INDIVIDUAL STONES SHALL BE AT LEAST 2.5.
3. THE STONE SHALL BE COMPOSED OF A WELL-GRADED MIXTURE DOWN TO THE ONE-INCH SIZE PARTICLE SUCH THAT 50 PERCENT OF THE MIXTURE BY WEIGHT SHALL BE LARGER THAN THE D50 SIZE SPECIFIED. A WELL-GRADED MIXTURE IS DEFINED AS A MIXTURE COMPOSED PRIMARILY OF THE LARGER STONE SIZE BUT WITH A SUFFICIENT MIXTURE OF OTHER SIZES TO FILL THE PROGRESSIVELY SMALLER VOIDS BETWEEN THE STONES. THE DIAMETER OF THE LARGEST STONE SIZE IN SUCH A MIXTURE SHALL BE 1.5 TIMES THE D50 SIZE.



RIPRAP APRON DETAIL

NO SCALE

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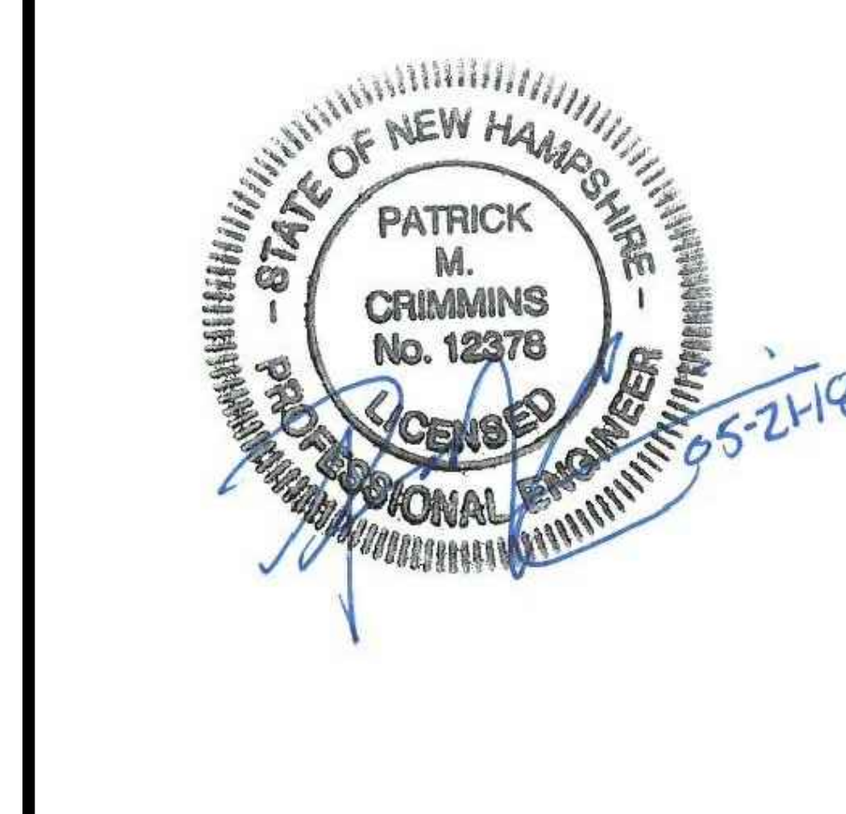
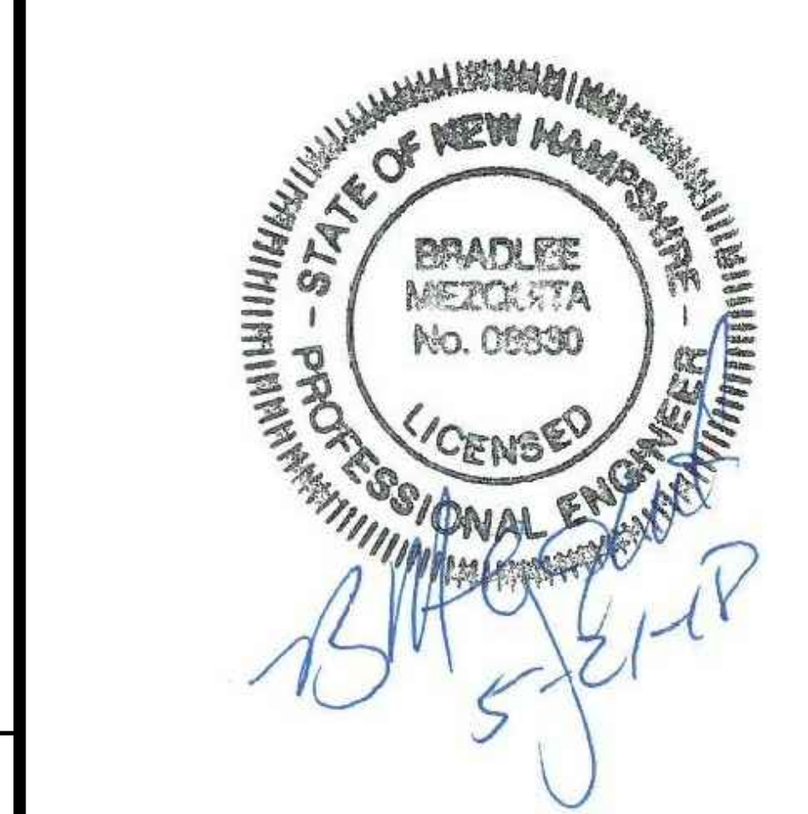
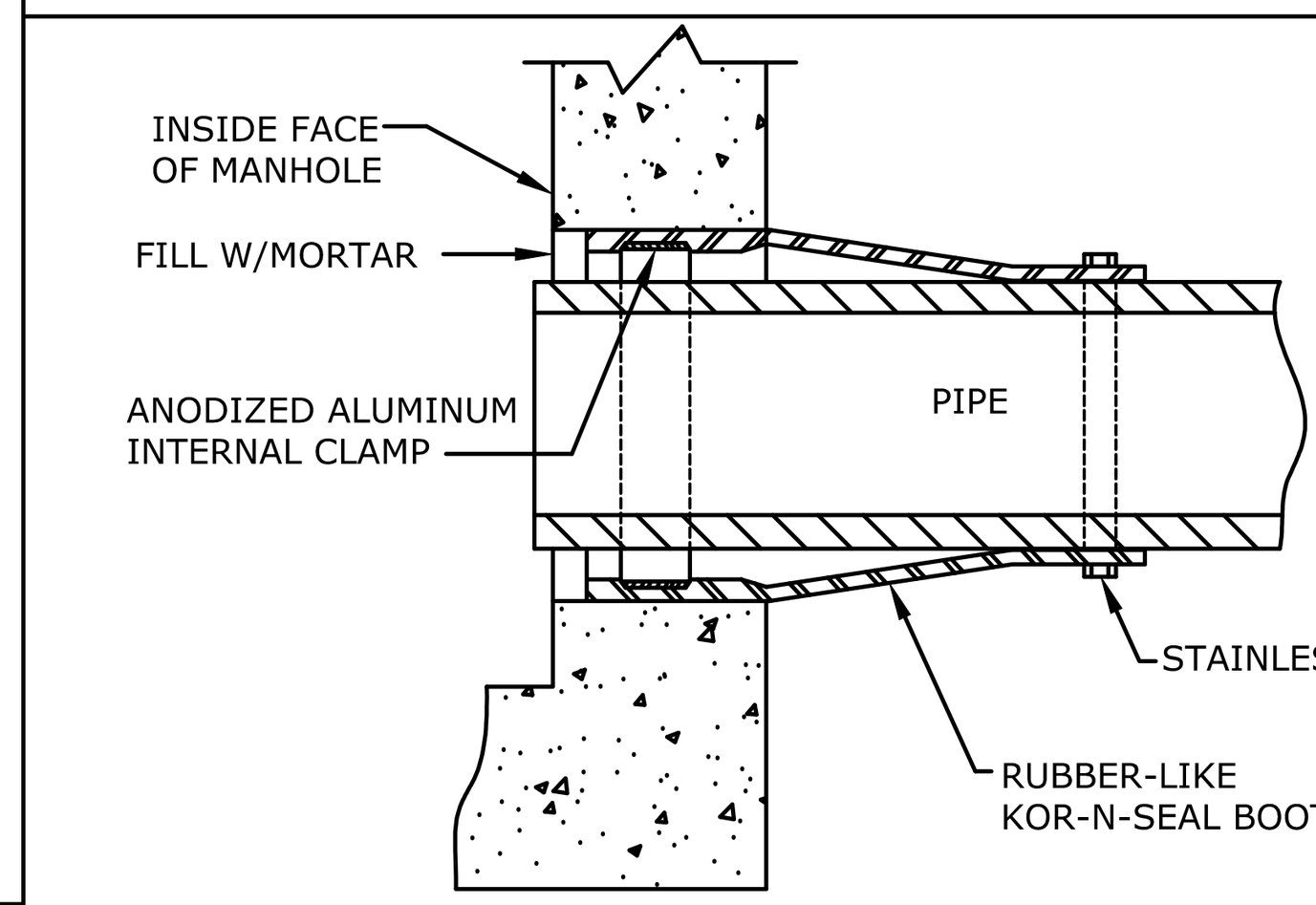
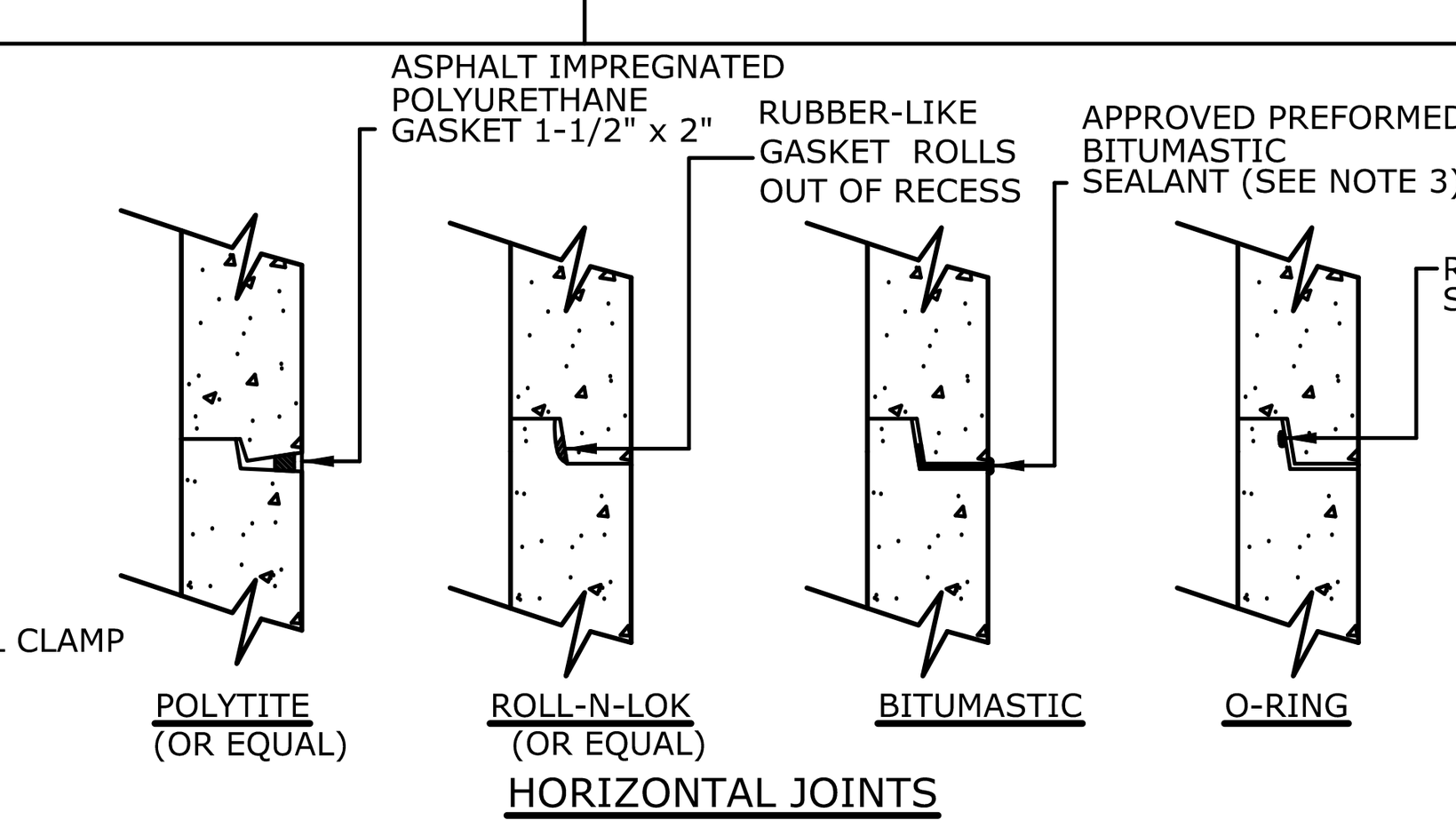






NOR-N-SEAL JOINT SLEEVE
(OR EQUAL)

PIPE TO MANHOLE JOINTS

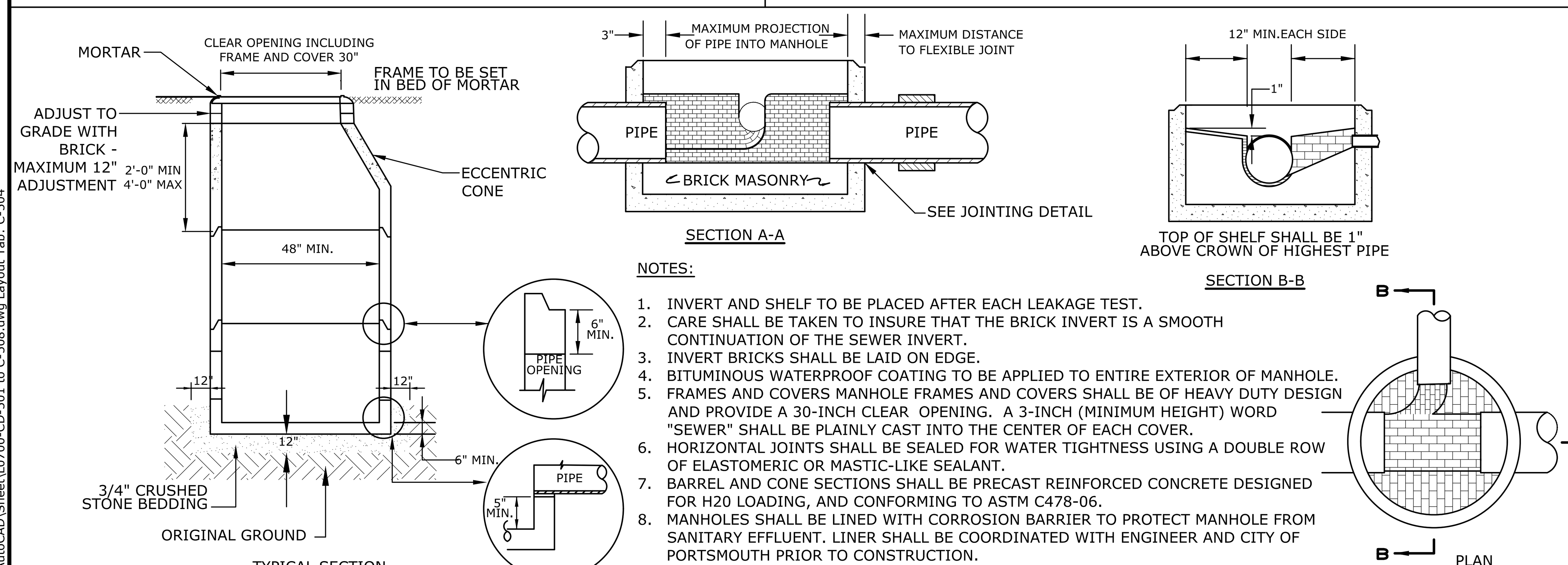


NOTES:

1. HORIZONTAL JOINTS BETWEEN THE SECTIONS OF PRECAST CONCRETE BARRELS SHALL BE PER CITY OF PORTSMOUTH DPW STANDARD AND SHALL BE SEALED FOR WATERTIGHTNESS USING A DOUBLE ROW ELASTOMERIC OR MASTIC-LIKE GASKET.
2. PIPE TO MANHOLE JOINTS SHALL BE PER CITY OF PORTSMOUTH DPW STANDARD.
3. FOR BITUMASTIC TYPE JOINTS THE AMOUNT OF SEALANT SHALL BE SUFFICIENT TO FILL AT LEAST 75% OF THE JOINT CAVITY.
4. ALL GASKETS, SEALANTS, MORTAR, ETC. SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS' WRITTEN INSTRUCTIONS.

SEWER MANHOLE JOINTS

NOT TO SCALE

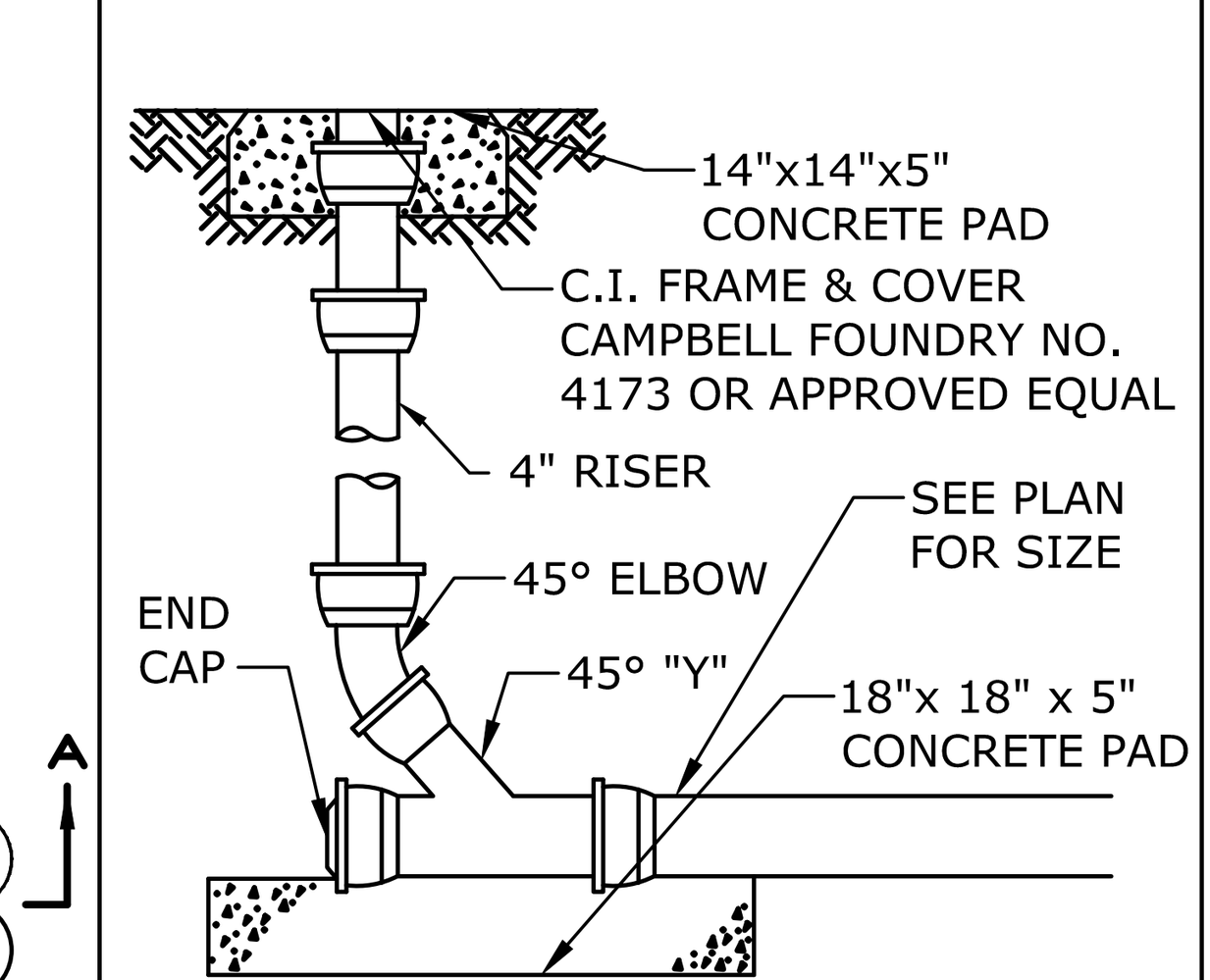


NOTES:

1. INVERT AND SHELF TO BE PLACED AFTER EACH LEAKAGE TEST.
2. CARE SHALL BE TAKEN TO INSURE THAT THE BRICK INVERT IS A SMOOTH CONTINUATION OF THE SEWER INVERT.
3. INVERT BRICKS SHALL BE LAID ON EDGE.
4. BITUMINOUS WATERPROOF COATING TO BE APPLIED TO ENTIRE EXTERIOR OF MANHOLE.
5. FRAMES AND COVERS MANHOLE FRAMES AND COVERS SHALL BE OF HEAVY DUTY DESIGN AND PROVIDE A 30-INCH CLEAR OPENING. A 3-INCH (MINIMUM HEIGHT) WORD "SEWER" SHALL BE PLAINLY CAST INTO THE CENTER OF EACH COVER.
6. HORIZONTAL JOINTS SHALL BE SEALED FOR WATER TIGHTNESS USING A DOUBLE ROW OF ELASTOMERIC OR MASTIC-LIKE SEALANT.
7. BARREL AND CONE SECTIONS SHALL BE PRECAST REINFORCED CONCRETE DESIGNED FOR H20 LOADING, AND CONFORMING TO ASTM C478-06.
8. MANHOLES SHALL BE LINED WITH CORROSION BARRIER TO PROTECT MANHOLE FROM SANITARY EFFLUENT. LINER SHALL BE COORDINATED WITH ENGINEER AND CITY OF PORTSMOUTH PRIOR TO CONSTRUCTION.

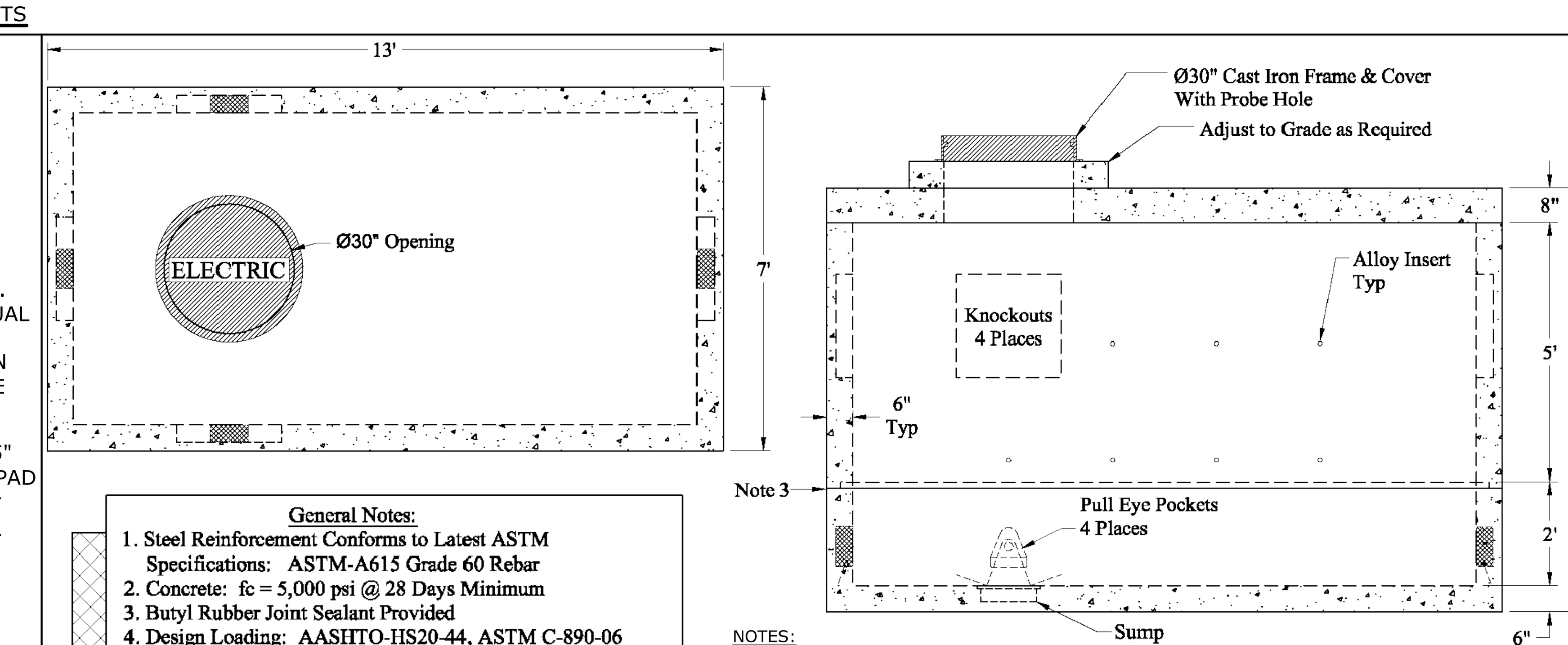
SEWER MANHOLE

NO SCALE



CLEAN–OUT

NO SCALE



General Notes:

1. Steel Reinforcement Conforms to Latest ASTM Specifications: ASTM-A615 Grade 60 Rebar
2. Concrete: fc = 5,000 psi @ 28 Days Minimum
3. Butyl Rubber Joint Sealant Provided
4. Design Loading: AASHTO-HS20-44, ASTM C-890-06
5. Design Specified As: ASTM C-1227-08, ASTM C-913-08
6. Exterior Coating Provided
7. Meets Or Exceeds PSNH Dwg # R-10001-1

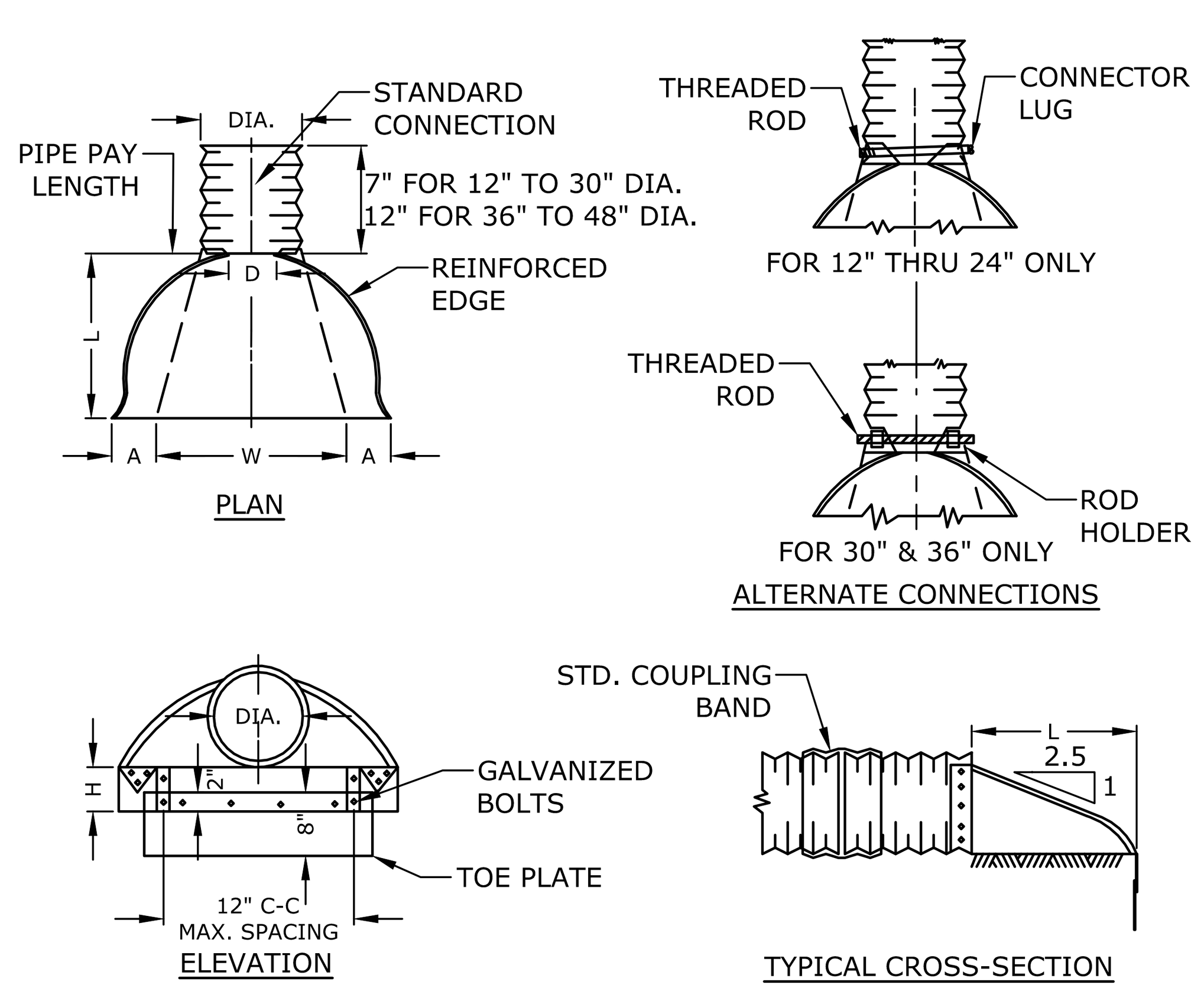
NOTES:

1. DIMENSIONS SHOWN REPRESENT TYPICAL REQUIREMENTS. MANHOLE LOCATIONS AND REQUIREMENTS SHALL BE COORDINATED WITH EVERSOURCE PRIOR TO CONSTRUCTION

Est. Weights:

Top Slab:	8,500 Lbs
Riser:	13,300 Lbs
Base:	12,100 Lbs
Total:	33,900 Lbs

TYPICAL ELECTRIC MANHOLE



PIPE DIA.	METAL GAGE	DIMENSIONS A (1" TOL.)	B MAX.	H (1" TOL.)	L (1 " TOL.)	W (2" TOL.)
12"	16	6"	6"	6"	21"	24"
15"	16	7"	8"	6"	26"	30"
18"	16	8"	13"	6"	31"	36"
24"	16	10"	16"	6"	41"	48"
30"	14	12"	16"	8"	51"	60"
36"	14	14"	19"	9"	60"	72"
42"	12	16"	22"	11"	69"	84"
48"	12	18"	27"	12"	78"	90"

NOTES:

1. END SECTION FOR 12" TO 30" DIA. PIPE IN ONE PIECE, FOR 36" TO 48" DIA. PIPE TO BE MADE FROM TWO SHEETS JOINED BY RIVETING OR BOLTING ON CENTER LINE.
2. CONNECTOR SECTION, CORNER PLATE AND TOE PLATE TO BE SAME THICKNESS AS END SECTION AND EACH TO BE GALVANIZED.

METAL FLARED END SECTION

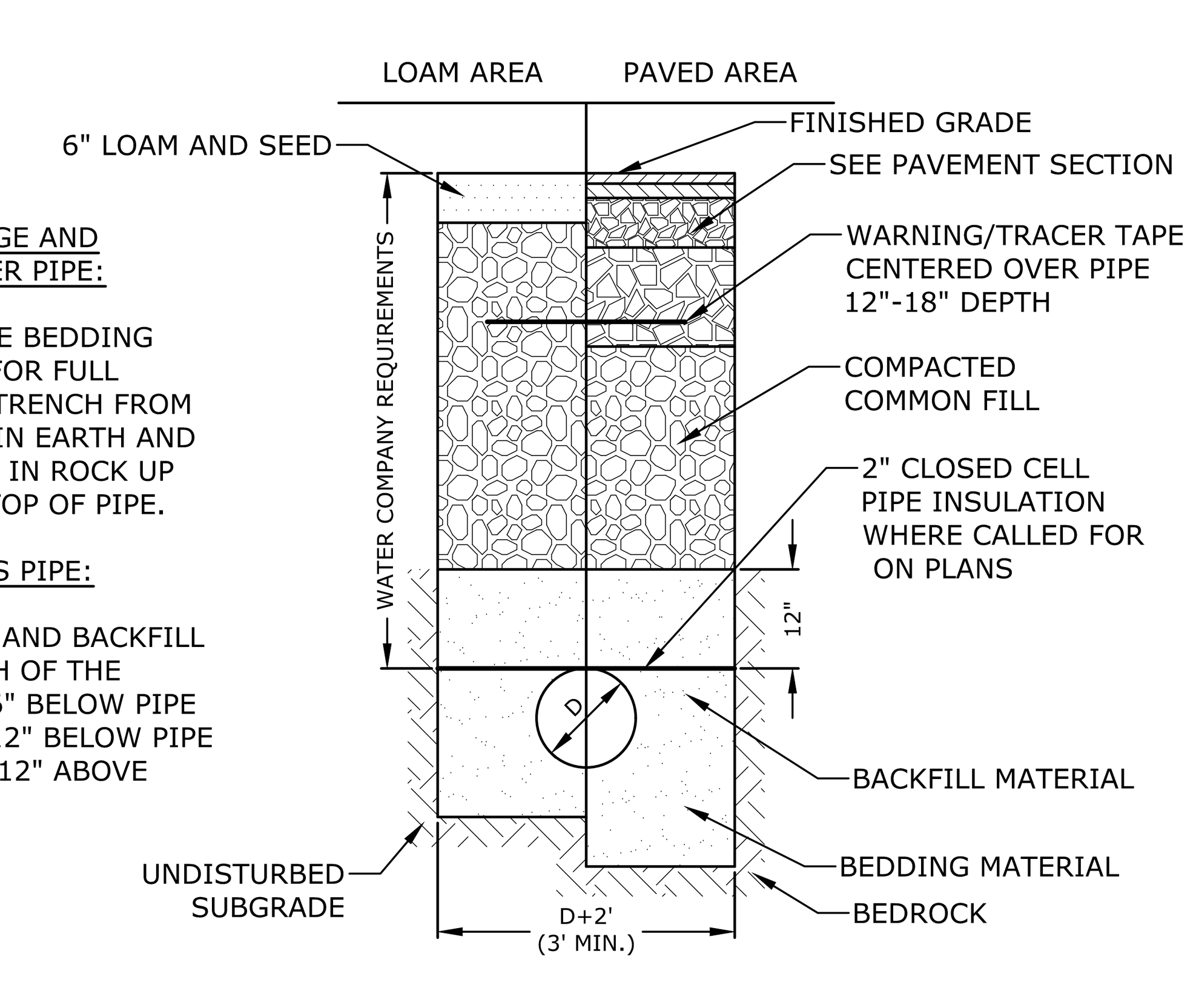
NO SCALE

STORM DRAINAGE AND SANITARY SEWER PIPE:

CRUSHED STONE BEDDING AND BACKFILL FOR FULL WIDTH OF THE TRENCH FROM 6" BELOW PIPE IN EARTH AND 12" BELOW PIPE IN ROCK UP TO 12" ABOVE TOP OF PIPE.

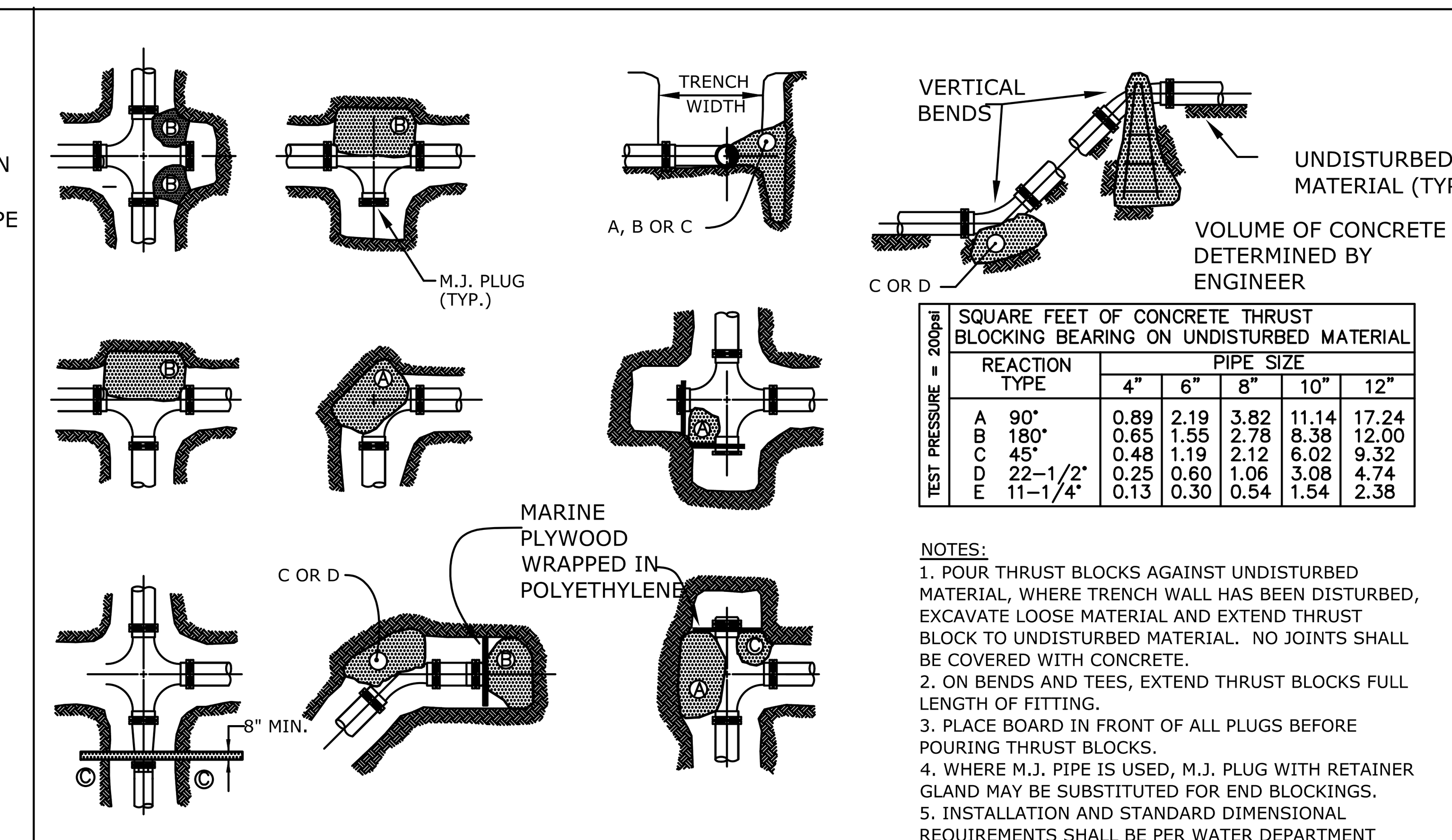
WATER AND GAS PIPE:

SAND BEDDING AND BACKFILL FOR FULL WIDTH OF THE TRENCH FROM 6" BELOW PIPE IN EARTH AND 12" BELOW PIPE IN ROCK UP TO 12" ABOVE TOP OF PIPE.



UTILITY TRENCH

NO SCALE



SQUARE FEET OF CONCRETE THRUST BLOCKING BEARING ON UNDISTURBED MATERIAL (TEST PRESSURE = 200psi)

REACTION TYPE		PIPE SIZE 4"	6"	8"	10"	12"
A	90°	0.89	2.19	3.82	11.14	17.24
B	180°	0.65	1.55	2.78	8.38	12.00
C	45°	0.48	1.19	2.12	6.02	9.32
D	22–1/2°	0.25	0.60	1.06	3.08	4.74
E	11–1/4°	0.13	0.30	0.54	1.54	2.38

NOTES:

1. POUR THRUST BLOCKS AGAINST UNDISTURBED MATERIAL, WHERE TRENCH WALL HAS BEEN DISTURBED, EXCAVATE LOOSE MATERIAL AND EXTEND THRUST BLOCK TO UNDISTURBED MATERIAL. NO JOINTS SHALL BE COVERED WITH CONCRETE.
2. ON BENDS AND TEES, EXTEND THRUST BLOCKS FULL LENGTH OF FITTING.
3. PLACE BOARD IN FRONT OF ALL PLUGS BEFORE POURING THRUST BLOCKS.
4. WHERE M.J. PIPE IS USED, M.J. PLUG WITH RETAINER GLAND MAY BE SUBSTITUTED FOR END BLOCKINGS.
5. INSTALLATION AND STANDARD DIMENSIONAL REQUIREMENTS SHALL BE PER WATER DEPARTMENT STANDARDS.

THRUST BLOCK DETAIL

NO SCALE

Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

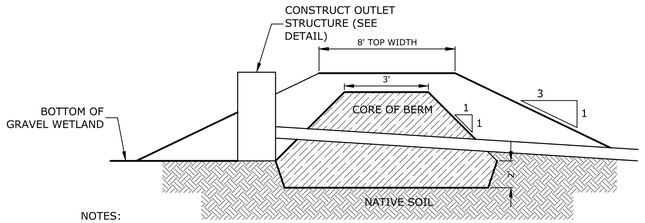
PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-501 to C-508.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEETS

SCALE: AS SHOWN

C-504

Last Save Date: May 21, 2018 2:25 PM By: BCLARK
Plot Date: Monday, May 21, 2018 Plotted By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings_Figures\AutoCAD\Sheet\L0700-CD-501 to C-508.dwg Layout Tab: C-504

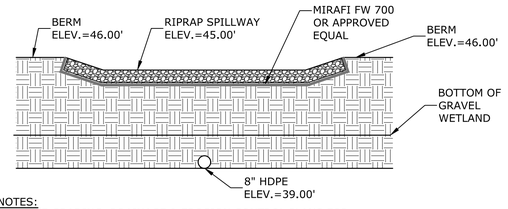


NOTES:
1. CORE MATERIAL SHALL MEET USGS CLASSIFICATION SC, SM, CL OR ML AND HAVE A MAXIMUM PARTICLE SIZE OF 3" AND A PERMEABILITY LESS THAN 0.000005 CM/S, AND MEET THE FOLLOWING GRADATION

SIEVE SIZE	PERCENT FINER BY WEIGHT
3 INCH	100
No. 200	50 -100.

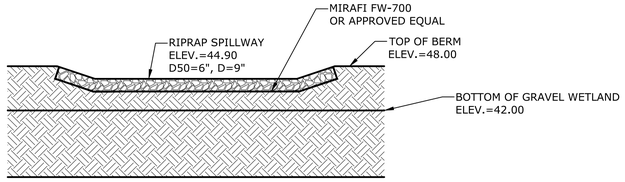
2. PIPE SHALL BE FULLY EMBEDDED IN CORE TO ELIMINATE SEEPAGE

CLAY CORE BERM
NO SCALE



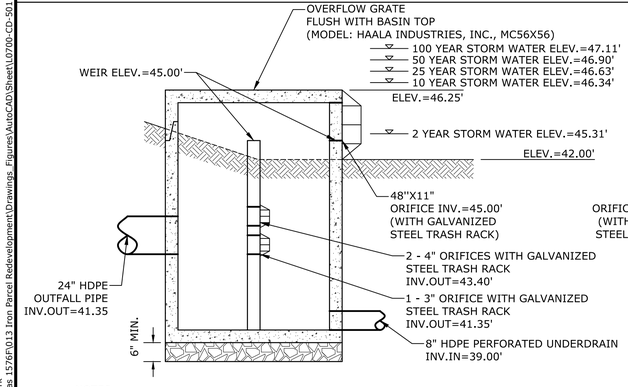
NOTES:
1. SEE GRADING, DRAINAGE & EROSION CONTROL PLANS FOR LOCATIONS AND ELEVATIONS.

GRAVEL WETLAND SPILLWAY
NO SCALE



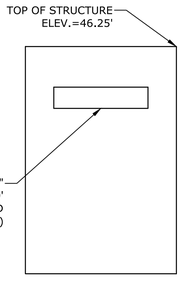
NOTE:
SEE GRADING, DRAINAGE & EROSION CONTROL PLANS, SHEET C-110, FOR LOCATIONS AND ELEVATIONS.

RIPRAP SPILLWAY
NO SCALE

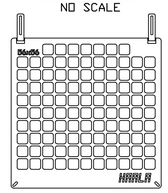


NOTES:
1. ALL SECTIONS SHALL BE 4,000 PSI CONCRETE (TYPE II CEMENT).
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQUARE INCHES PER LINEAR FOOT IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER OF THE THIRDE WALL.
3. THE TONGUE OR THE GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQUARE INCHES PER LINEAR FOOT.
4. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
5. ALL JOINTS ON THE STRUCTURE AND PIPING SHALL BE WATERTIGHT.

OUTLET STRUCTURE
NO SCALE

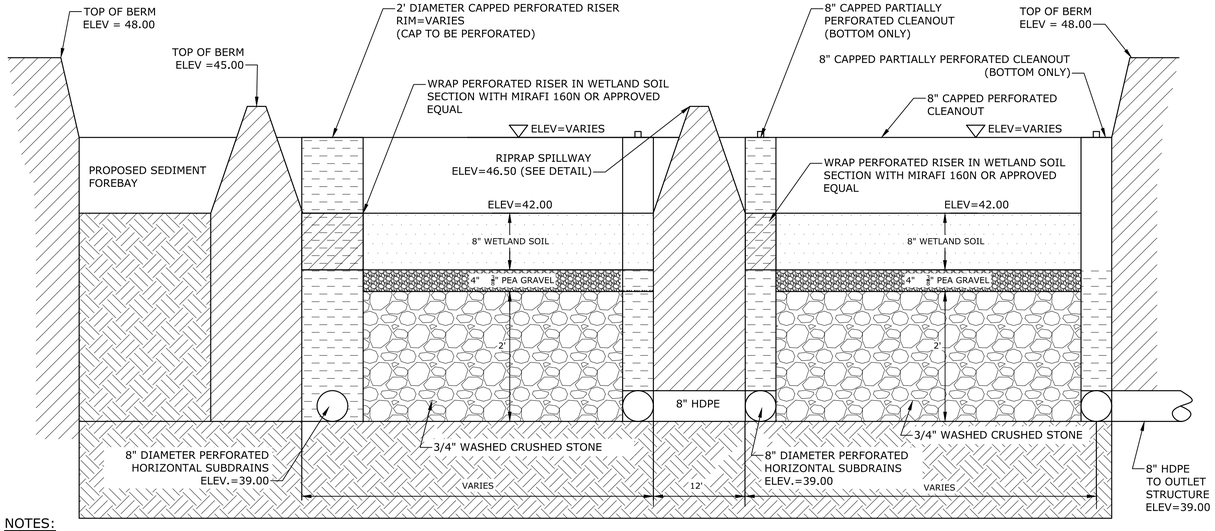


WEIR DETAIL
NO SCALE



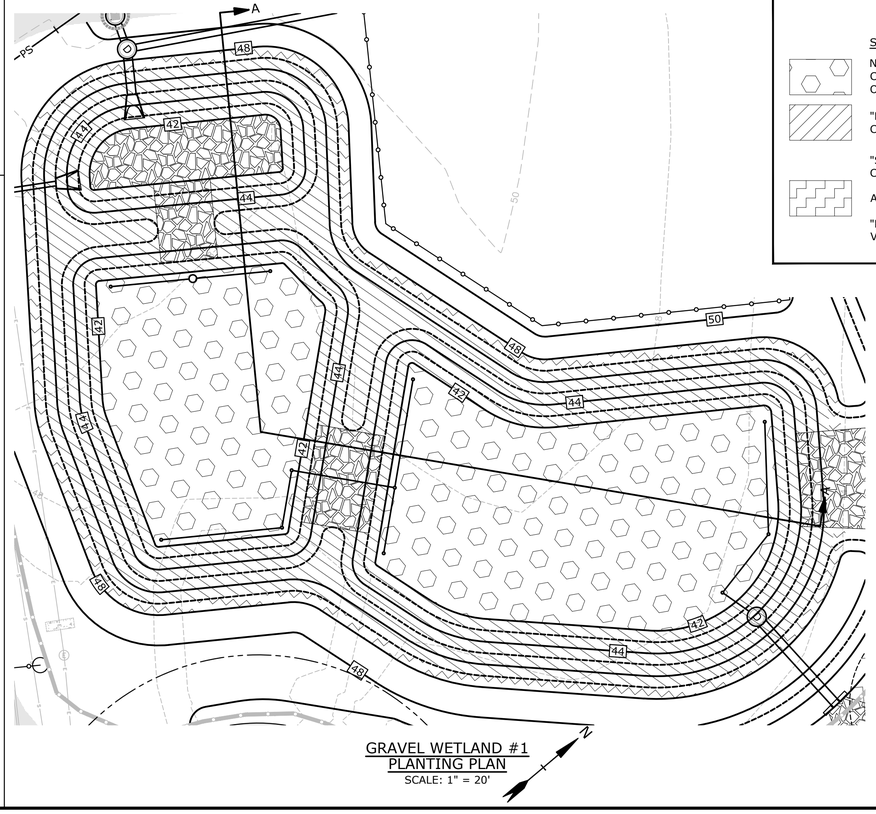
NOTES:
1. GRATE SHALL BE HAALA INDUSTRIES, INC. MC56X56 TOP MOUNT GRATE OR EQUAL.
2. GRATE TO BE SECURED TO CONCRETE STRUCTURE.

OVERFLOW GRATE
NO SCALE



NOTES:
1. WETLAND SOIL SHALL BE A SANDY CLAY LOAM WITH A HYDRAULIC CONDUCTIVITY OF 0.1-0.01 FT/DAY. ORGANIC CONTENT SHALL BE GREATER THAN 15% BY VOLUME. CLAY CONTENT SHALL BE LESS THAN 15% BY VOLUME. THE MAXIMUM PARTICLE SIZE SHALL BE 3".
2. INFILTRATION TESTING OF THE NATIVE SOILS AT THE SUBGRADE OF THE PROPOSED GRAVEL WETLAND SHALL OCCUR PRIOR TO THE INSTALLATION OF THE GRAVEL WETLAND AND SHALL BE COORDINATED WITH THE ENGINEER. IF THE NATIVE SOILS EXCEED A PERMEABILITY RATE OF 0.03FT/DAY THE SOILS SHOULD AMENDED OR LINER ADDED AS DETERMINED BY THE ENGINEER.
3. PERFORATED RISERS SHALL HAVE VERTICAL SLOTS CUT INTO RISERS ABOVE GRADE MEASURING 3"x1/8".
4. SEE GRADING, DRAINAGE & EROSION CONTROL PLANS, SHEETS C-2A AND C-2B, FOR LOCATIONS AND ELEVATIONS.

GRAVEL WETLAND SECTION A-A
NO SCALE



GRAVEL WETLAND #1 PLANTING PLAN
SCALE: 1" = 20'

GRAVEL WETLAND PLANTING PLAN

SPECIES	PLANT SIZE	QUANTITY/SPACING
NEW ENGLAND EROSION CONTROL/RESTORATION MIX OR EQUIVALENT		35LB/ACRE
"RED OSIER DOGWOOD" CORNUS SERICEA	2'-3'	8'-10' ON CENTER
"SILKY DOGWOOD" CORNUS AMMOMUM AND "HIGHBUSH BLUEBERRY" VACCINUM CORYBOSSUSUM	2'-3'	8'-10' ON CENTER

Gravel Wetland Inspection/Maintenance Requirements

Inspection/ Maintenance	Frequency	Action
Monitor to ensure that Gravel Wetland functions effectively after storms	Four (4) times annually (quarterly) and after any rainfall event exceeding 2.5" in a 24-hr period	- Trash and debris to be removed - Any required maintenance shall be addressed - Inspect soil and repair eroded areas, especially on slopes. - Check inlets, outlets, and overflow spillway for blockage, structural integrity and evidence of erosion.
Inspect Vegetation	Annually	- Inspect the condition of all gravel wetland vegetation - Prune back overgrowth - Replace dead vegetation - Remove any invasive species -Coordinate with UNH Stormwater Center for further vegetation management guidelines
Inspect Drawdown Time - The system shall drawdown within 48-hours following a rainfall event.	Annually	- Hire qualified professional to assess the condition of the facility to determine measures required to restore the filtration function, including but not limited to removal of accumulated sediments or reconstruction of the filter.

Tighe&Bond
Engineers | Environmental Specialists

PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE 5-21-18

BRADLEE MEZICKTA No. 09590 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE 5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-501 to C-508.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEETS

SCALE: AS SHOWN

C-505

Last Save Date: May 21, 2018 2:25 PM By: BCLARK
Plot Date: May 21, 2018 2:25 PM By: Benjamin Clark
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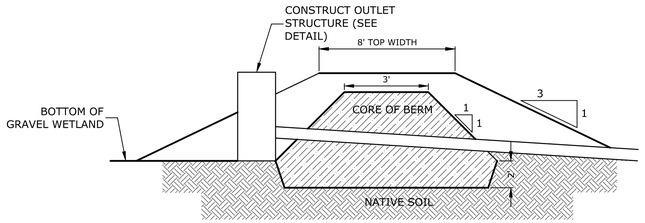

NOTES:
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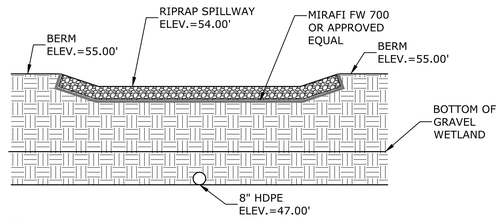
SIEVE SIZE	PERCENT FINER BY WEIGHT
3 INCH	100
No. 200	50 -100.

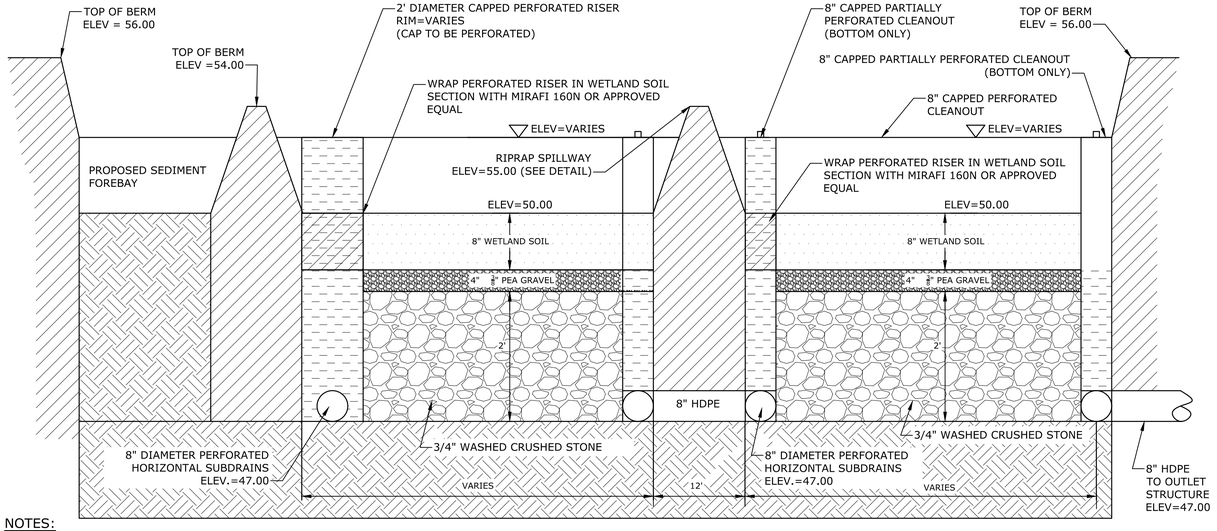
2. PIPE SHALL BE FULLY EMBEDDED IN CORE TO ELIMINATE SEEPAGE

CLAY CORE BERM
NO SCALE



NOTES:
1. SEE GRADING, DRAINAGE & EROSION CONTROL PLANS FOR LOCATIONS AND ELEVATIONS.

GRAVEL WETLAND SPILLWAY
NO SCALE



NOTES:
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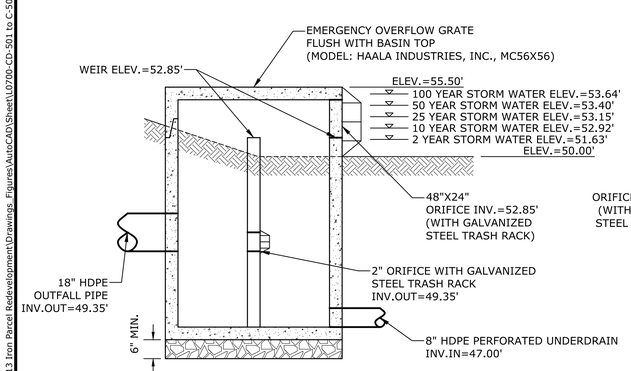
GRAVEL WETLAND SECTION A-A
NO SCALE



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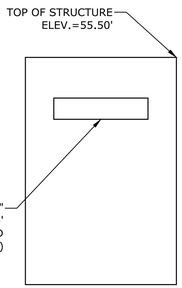
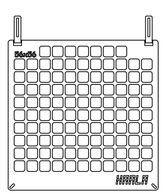
OUTLET STRUCTURE
NO SCALE



WEIR DETAIL
NO SCALE



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OVERFLOW GRATE
NO SCALE

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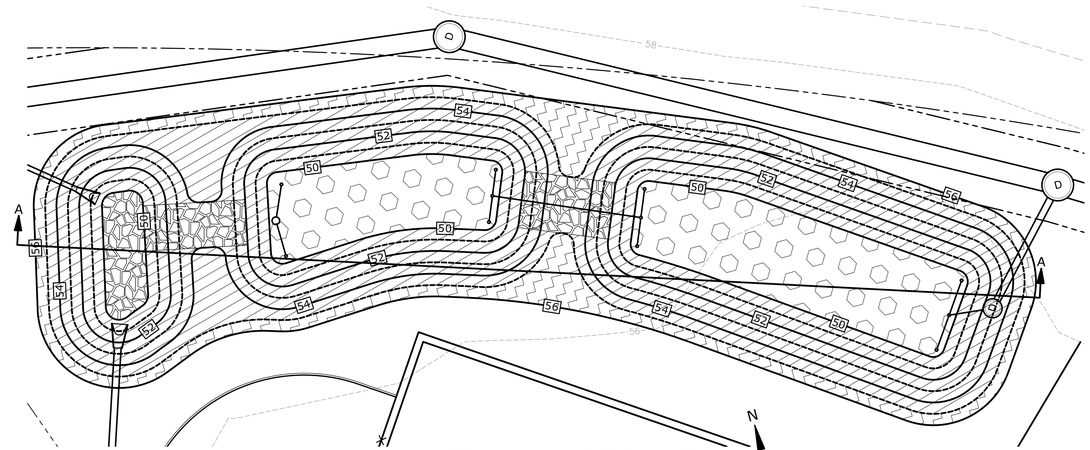
Inspect Drawdown Time - The system shall drawdown within 48-hours following a rainfall event.	Annually	- Hire qualified professional to assess the condition of the facility to determine measures required to restore the filtration function, including but not limited to removal of accumulated sediments or reconstruction of the filter.



GRAVEL WETLAND #2 PLANTING PLAN
SCALE: 1" = 20'

GRAVEL WETLAND PLANTING PLAN

SPECIES	PLANT SIZE	QUANTITY/SPACING
NEW ENGLAND EROSION CONTROL/RESTORATION MIX OR EQUIVALENT		35LB/ACRE
"RED OSIER DOGWOOD" CORNUS SERICEA	2'-3'	8'-10' ON CENTER
"SILKY DOGWOOD" CORNUS AMMOMUM AND "HIGHBUSH BLUEBERRY" VACCINUM CORYBOSSUSUM	2'-3'	8'-10' ON CENTER

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Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
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DATE:	04/03/2018
FILE:	L0700-CD-501 to C-508.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

DETAILS SHEETS

SCALE: AS SHOWN

C-506

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Plot Date: Monday, May 21, 2018 2:25 PM By: Benjamin Clark
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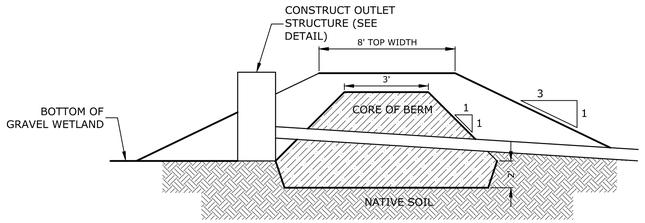

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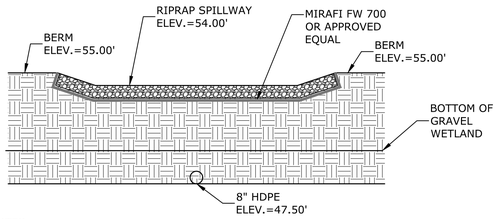
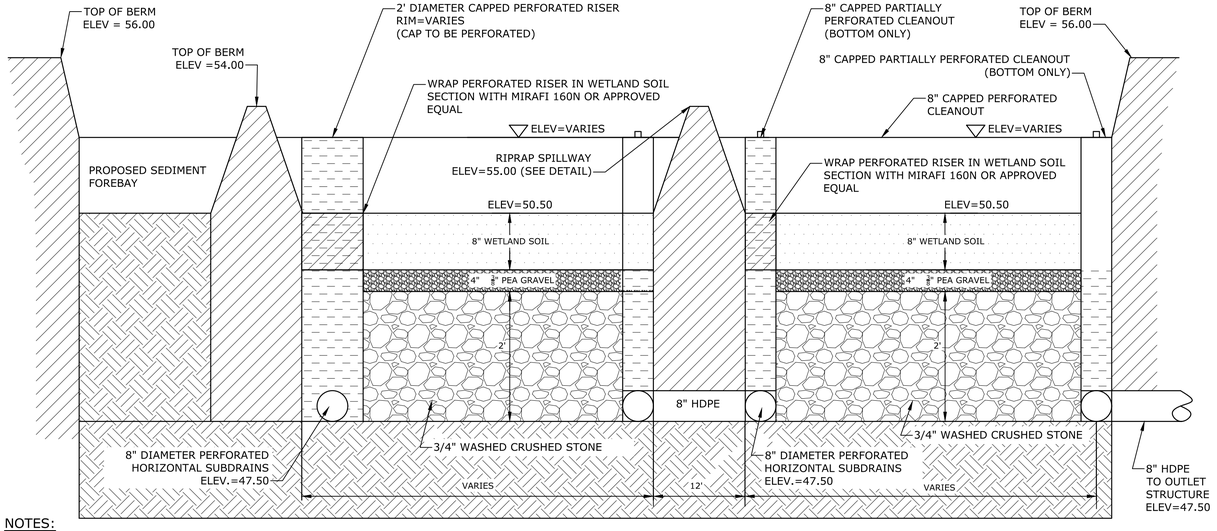
2. PIPE SHALL BE FULLY EMBEDDED IN CORE TO ELIMINATE SEEPAGE

CLAY CORE BERM
NO SCALE



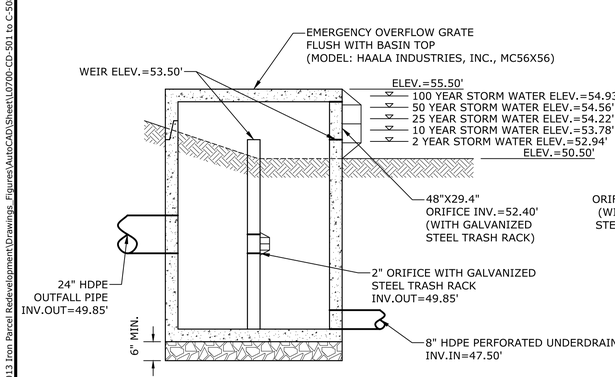
NOTES:
1. SEE GRADING, DRAINAGE & EROSION CONTROL PLANS FOR LOCATIONS AND ELEVATIONS.

GRAVEL WETLAND SPILLWAY
NO SCALE



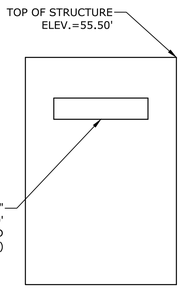
NOTES:
1. WETLAND SOIL SHALL BE A SANDY CLAY LOAM WITH A HYDRAULIC CONDUCTIVITY OF 0.1-0.01 FT/DAY. ORGANIC CONTENT SHALL BE GREATER THAN 15% BY VOLUME. CLAY CONTENT SHALL BE LESS THAN 15% BY VOLUME. THE MAXIMUM PARTICLE SIZE SHALL BE 3".
2. INFILTRATION TESTING OF THE NATIVE SOILS AT THE SUBGRADE OF THE PROPOSED GRAVEL WETLAND SHALL OCCUR PRIOR TO THE INSTALLATION OF THE GRAVEL WETLAND AND SHALL BE COORDINATED WITH THE ENGINEER. IF THE NATIVE SOILS EXCEED A PERMEABILITY RATE OF 0.03FT/DAY THE SOILS SHOULD AMENDED OR LINER ADDED AS DETERMINED BY THE ENGINEER.
3. PERFORATED RISERS SHALL HAVE VERTICAL SLOTS CUT INTO RISERS ABOVE GRADE MEASURING 3"x1/8".
4. SEE GRADING, DRAINAGE & EROSION CONTROL PLANS, SHEETS C-2A AND C-2B, FOR LOCATIONS AND ELEVATIONS.

GRAVEL WETLAND SECTION A-A
NO SCALE

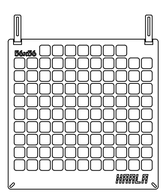


NOTES:
1. ALL SECTIONS SHALL BE 4,000 PSI CONCRETE (TYPE II CEMENT).
2. CIRCUMFERENTIAL REINFORCEMENT SHALL BE 0.12 SQUARE INCHES PER LINEAR FOOT IN ALL SECTIONS AND SHALL BE PLACED IN THE CENTER OF THE THIRDE WALL.
3. THE TONGUE OR THE GROOVE OF THE JOINT SHALL CONTAIN ONE LINE OF CIRCUMFERENTIAL REINFORCEMENT EQUAL TO 0.12 SQUARE INCHES PER LINEAR FOOT.
4. THE STRUCTURES SHALL BE DESIGNED FOR H20 LOADING.
5. ALL JOINTS ON THE STRUCTURE AND PIPING SHALL BE WATERTIGHT.

OUTLET STRUCTURE
NO SCALE

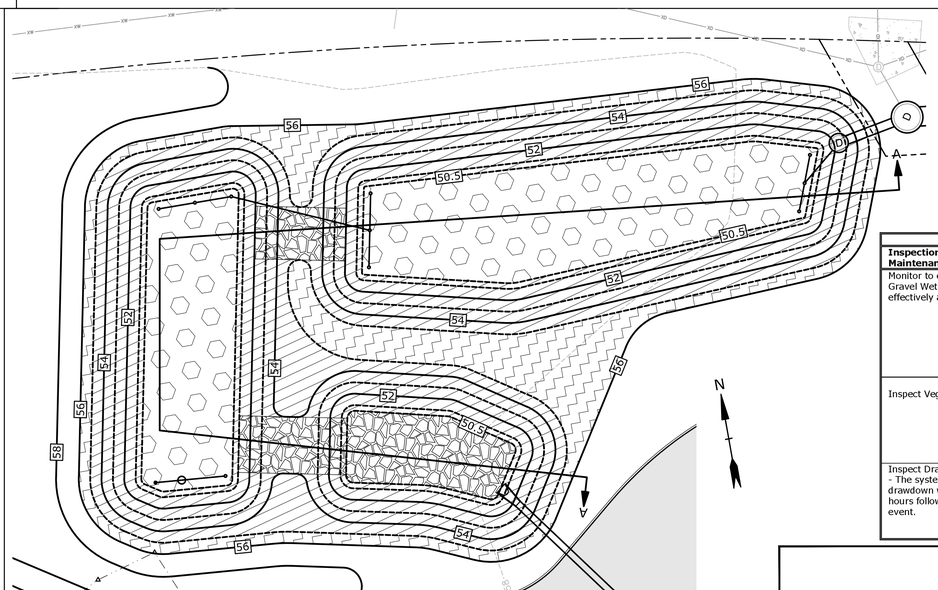


WEIR DETAIL
NO SCALE



NOTES:
1. GRATE SHALL BE HAALA INDUSTRIES, INC. MC56X56 TOP MOUNT GRATE OR EQUAL.
2. GRATE TO BE SECURED TO CONCRETE STRUCTURE.

OVERFLOW GRATE
NO SCALE



GRAVEL WETLAND #3 PLANTING PLAN
SCALE: 1" = 20'

Gravel Wetland Inspection/Maintenance Requirements

Inspection/ Maintenance	Frequency	Action
Monitor to ensure that Gravel Wetland functions effectively after storms	Four (4) times annually (quarterly) and after any rainfall event exceeding 2.5" in a 24-hr period	- Trash and debris to be removed - Any required maintenance shall be addressed - Inspect soil and repair eroded areas, especially on slopes. - Check inlets, outlets, and overflow spillway for blockage, structural integrity and evidence of erosion.
Inspect Vegetation	Annually	- Inspect the condition of all gravel wetland vegetation - Prune back overgrowth - Replace dead vegetation - Remove any invasive species -Coordinate with UNH Stormwater Center for further vegetation management guidelines
Inspect Drawdown Time - The system shall drawdown within 48-hours following a rainfall event.	Annually	- Hire qualified professional to assess the condition of the facility to determine measures required to restore the filtration function, including but not limited to removal of accumulated sediments or reconstruction of the filter.

GRAVEL WETLAND PLANTING PLAN

SPECIES	PLANT SIZE	QUANTITY/SPACING
NEW ENGLAND EROSION CONTROL/RESTORATION MIX OR EQUIVALENT		35LB/ACRE
"RED OSIER DOGWOOD" CORNUS SERICEA	2'-3'	8'-10' ON CENTER
"SILKY DOGWOOD" CORNUS AMMOMUM AND "HIGHBUSH BLUEBERRY" VACCINUM CORYBOSSUSUM	2'-3'	8'-10' ON CENTER

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PATRICK M. CRIMMINS No. 12278 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE 5-21-18

BRADLEE MEZICKTA No. 09590 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE 5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CD-501 to C-508.dwg
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APPROVED:	BLM

DETAILS SHEETS

SCALE: AS SHOWN

C-507

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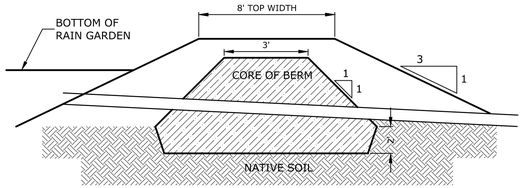
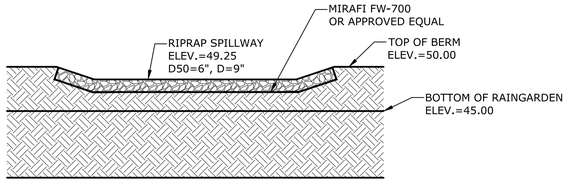


NOTES:
1. CORE MATERIAL SHALL MEET USGS CLASSIFICATION SC, SM, CL OR ML AND HAVE A MAXIMUM PARTICLE SIZE OF 3" AND A PERMEABILITY LESS THAN 0.000005 CM/S, AND MEET THE FOLLOWING GRADATION

SIEVE SIZE	PERCENT FINER BY WEIGHT
3 INCH	100
No. 200	50 -100.

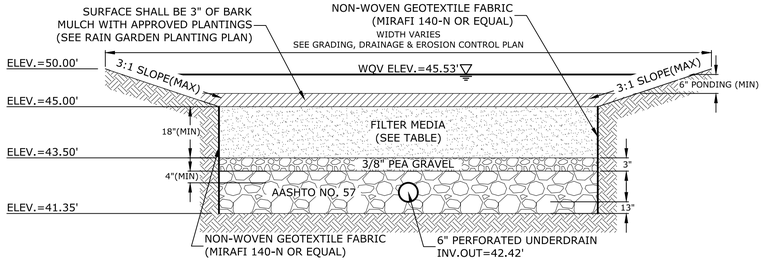
2. PIPE SHALL BE FULLY EMBEDDED IN CORE TO ELIMINATE SEEPAGE

CLAY CORE BERM
NO SCALE



NOTE:
SEE GRADING, DRAINAGE & EROSION CONTROL PLANS, SHEET C-110, FOR LOCATIONS AND ELEVATIONS.

RIPRAP SPILLWAY
NO SCALE



SECTION VIEW

FILTER MEDIA COMPOSITION:

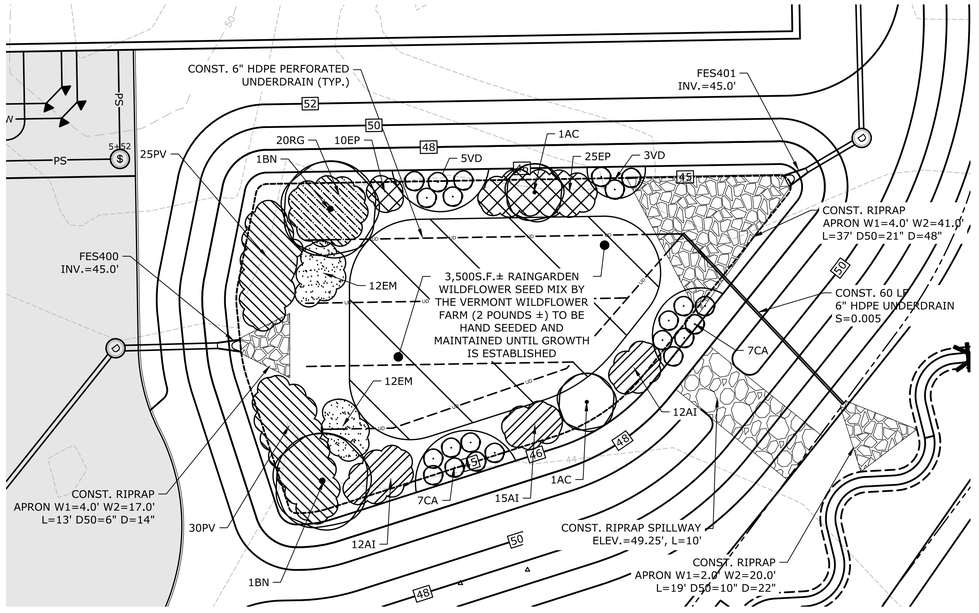
COMPONENT MATERIAL	PERCENT OF MIXTURE BY VOLUME	GRADATION OF MATERIAL SIEVE NO.	PERCENT PASSING
ASTM C-33 CONCRETE SAND	50-55	SEE NOTE #5	
LOAMY SAND TOPSOIL	20-30	200	15-25
MODERATELY FINE SHREDDED BARK OR WOOD FIBER MULCH	20-30	200	5 MAX.

NOTES:
1. BARK MULCH SHALL BE AGED A MINIMUM OF 12 MONTHS AND SHALL NOT FLOAT.
2. RAIN GARDENS SHALL NOT BE PLACED INTO SERVICE UNTIL THE PRACTICE HAS BEEN PLANTED AND ITS CONTRIBUTING AREAS HAVE BEEN FULLY STABILIZED.
3. DO NOT TRAFFIC EXPOSED SOIL SURFACES WITH CONSTRUCTION EQUIPMENT. CONTRACTOR SHALL KEEP ALL EXCAVATION EQUIPMENT OUTSIDE OF THE LIMIT OF THE RAIN GARDEN.
4. SEE GRADING, DRAINAGE & EROSION CONTROL PLAN FOR LOCATIONS, LAYOUTS, AND ELEVATIONS.
5. THE SAND PORTION OF THE FILTER MEDIA SHALL MEET THE FOLLOWING GRADATION (ASTM C-33):

SIEVE SIZE	PERCENT PASSING
3/8"	100
#4	95-100
#8	80-100
#16	50-85
#30	25-60
#50	5-30
#100	0-10

RAIN GARDEN
NO SCALE

RAINGARDEN PLANT SCHEDULE				
CODE	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
TREES				
BN	BETULA NIGRA	RIVER BIRCH	12 - 14' HT	B & B (CLUMP)
AC	AMALANCHIER CANADENSIS	SHADBLOW SERVICEBERRY	6 - 7' HT	B & B (CLUMP)
SHRUBS				
VD	VIBURNUM DENTATUM	ARROWWOOD VIBURNUM	5 GALLON	CONTAINER
CA	CLETHERA ALNIFOLIA	SUMMERSWEET CLETHERA	5 GALLON	CONTAINER
PERENNIALS				
PV	PANICUM VIRGATUM 'SHENANDOAH'	SHENANDOAH SWITCH GRASS	3 GALLON	CONTAINER
EM	EUPATORIUM MACULATUM	JOE PYE WEED	2 GALLON	CONTAINER
AI	ASCLEPIAS INCARNATA	MARSH MILKWEED	2 GALLON	CONTAINER
RG	RUDBECKIA 'GOLDSTURM'	GOLDSTURM BLACKEYED SUSAN	1 GALLON	CONTAINER
EP	ECHINACEA 'PURPUREA'	PURPLE CONEFLOWER	1 GALLON	CONTAINER



RAIN GARDEN PLANTING PLAN
SCALE: 1" = 20'

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BRADLEE MEZICKTA No. 09590 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE 5-21-18

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

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DETAILS SHEETS

SCALE: AS SHOWN

C-508

Last Save Date: May 21, 2018 2:25 PM By: BCLARK
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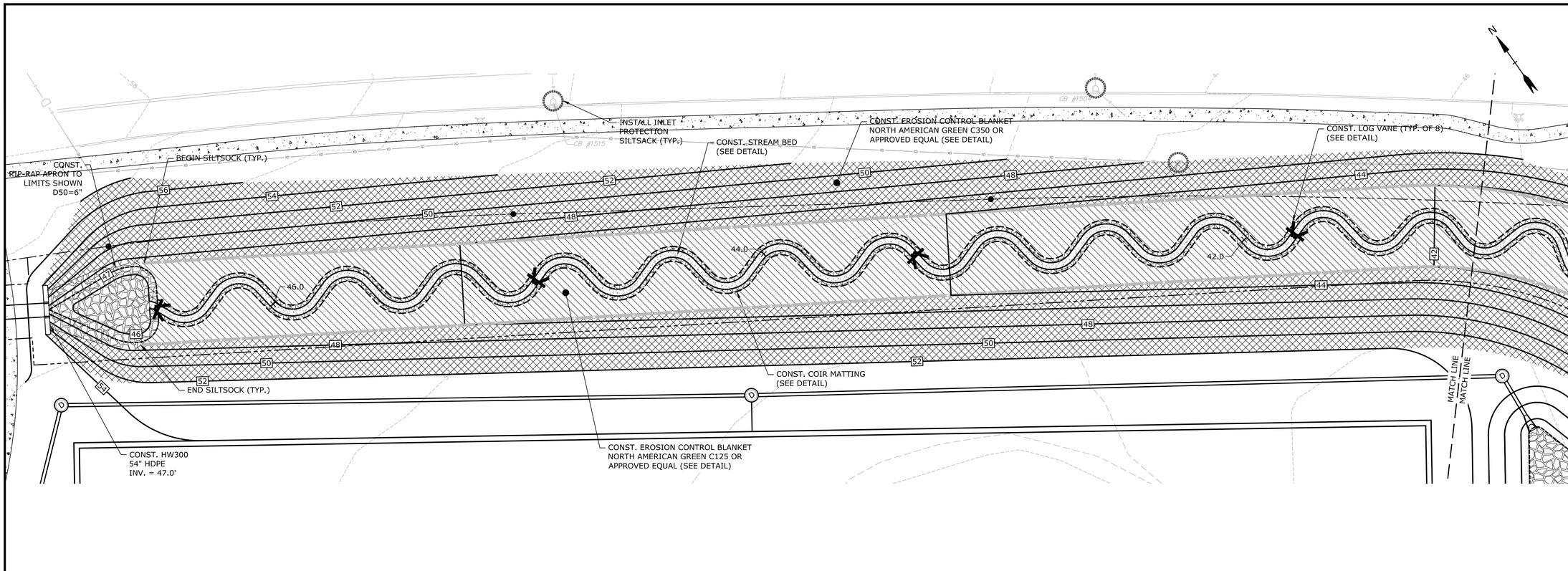

SEE SHEET C-108 FOR GRADING, DRAINAGE & EROSION CONTROL NOTES

LEGEND

- MATCH LINE
- EXISTING EDGE OF WETLAND
- EXISTING DRAIN LINE
- PROPOSED FINISHED GRADE
- PROPOSED STREAM BANK
- PROPOSED DRAIN LINE (TYP)
- SILT SOCK
- PROPOSED LIMIT OF C125 EROSION CONTROL BLANKET
- PROPOSED LIMIT OF C350 EROSION CONTROL BLANKET
- PROPOSED LIMIT OF GRAVEL STREAM BED
- PROPOSED LIMIT OF COIR MATTING
- PROPOSED RIPRAP
- PROPOSED LOG VANE
- TYP — TYPICAL

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STATE OF NEW HAMPSHIRE PATRICK M. CRIMMINS No. 12378 LICENSED PROFESSIONAL ENGINEER 5-21-18

STATE OF NEW HAMPSHIRE BRADLEE MEZQUITA No. 09830 LICENSED PROFESSIONAL ENGINEER 5-21-18

SCALE IN FEET 0 20' 40'
GRAPHIC SCALE

Proposed Industrial Development

Lonza Biologics

Portsmouth, New Hampshire

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CHECKED:	PMC
APPROVED:	BCC

HODGSON BROOK GRADING, DRAINAGE & EROSION CONTROL PLAN

SCALE: AS SHOWN

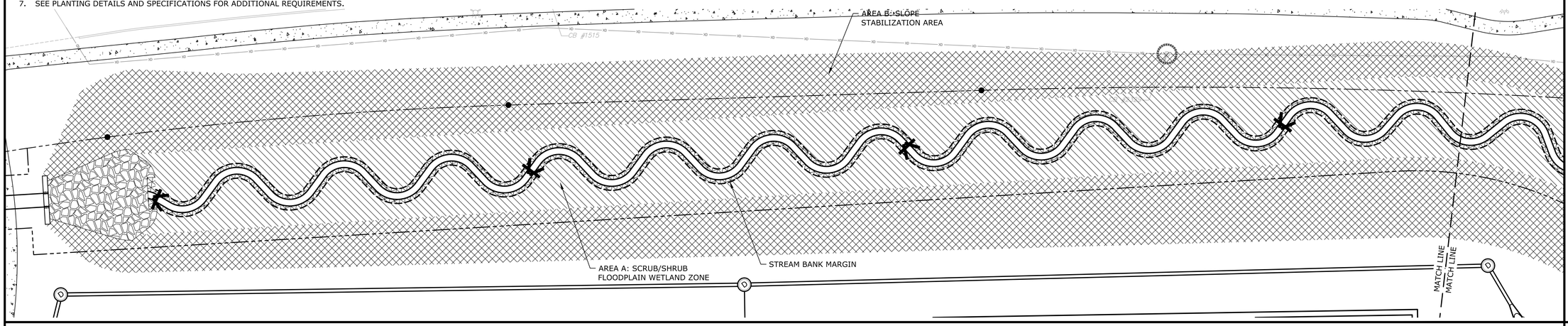
C-701

Last Save Date: May 17, 2018 8:41 AM By: BCLARK
Plot Date: Monday, May 21, 2018 Plotted By: Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings_Figures\AutoCAD\Sheet\L0700-CS-701 to C-703.dwg Layout Tab: C-701

PLANTING NOTES:

1. THE CONTRACTOR SHALL FURNISH AND PLANT ALL PLANTS IN QUANTITIES AS SHOWN ON THIS PLAN. NO SUBSTITUTIONS WILL BE PERMITTED UNLESS APPROVED BY OWNER. ALL PLANTS SHALL BE NURSERY GROWN.
2. ALL PLANTS SHALL BE NURSERY GROWN AND PLANTS AND WORKMANSHIP SHALL CONFORM TO THE AMERICAN ASSOCIATION OF NURSERYMEN STANDARDS, INCLUDING BUT NOT LIMITED TO SIZE, HEALTH, SHAPE, ETC., AND SHALL BE SUBJECT TO THE APPROVAL OF THE LANDSCAPE ARCHITECT PRIOR TO ARRIVAL ON-SITE AND AFTER PLANTING.
3. PLANT STOCK SHALL BE GROWN WITHIN THE HARDINESS ZONES 4 THRU 7 ESTABLISHED BY THE PLANT HARDINESS ZONE MAP, MISCELLANEOUS PUBLICATIONS NO. 814, AGRICULTURAL RESEARCH SERVICE, UNITED STATES DEPARTMENT AGRICULTURE, LATEST REVISION.
4. PLANT MATERIAL SHALL BEAR THE SAME RELATIONSHIP TO FINISHED GRADE AS TO THE ORIGINAL PLANTING GRADE PRIOR TO DIGGING.
5. NO SUBSTITUTION OF PLANT MATERIALS WILL BE ALLOWED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE OWNER'S REPRESENTATIVE.
6. THE CONTRACTOR SHALL LOCATE, VERIFY AND MARK ALL EXISTING AND NEWLY INSTALLED UNDERGROUND UTILITIES PRIOR TO ANY LAWN WORK OR PLANTING. ANY CONFLICTS WHICH MIGHT OCCUR BETWEEN PLANTING AND UTILITIES SHALL IMMEDIATELY BE REPORTED TO THE OWNER SO THAT ALTERNATE PLANTING LOCATIONS CAN BE DETERMINED.
7. SEE PLANTING DETAILS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
8. PLANTING SHALL BE COMPLETED FROM APRIL 15TH THROUGH OCTOBER 1ST, WITH THE EXCEPTION OF THE WHIPS. WHIPS SHALL BE PLANTED DURING THE DORMANT SEASON, OCTOBER 1ST THROUGH DECEMBER 15TH AND/OR MARCH 15TH THROUGH APRIL 15TH. NO PLANTING DURING JULY AND AUGUST UNLESS SPECIAL PROVISIONS ARE MADE FOR DROUGHT, SUCH AS DAILY WATERING AS REQUIRED.
9. ALL PLANTS SHALL BE WATERED THOROUGHLY TWICE DURING THE FIRST 24 HOUR PERIOD AFTER PLANTING. ALL PLANTS SHALL BE WATERED WEEKLY, OR MORE OFTEN, IF NECESSARY DURING THE FIRST GROWING SEASON.
10. THE CONTRACTOR SHALL GUARANTEE ALL PLANTINGS TO BE IN GOOD, HEALTHY, FLOURISHING AND ACCEPTABLE CONDITION FOR A PERIOD OF (1) YEAR BEGINNING AT THE DATE OF ACCEPTANCE OF SUBSTANTIAL COMPLETION. ALL GRASSES, TREES AND SHRUBS THAT, IN THE OPINION OF THE LANDSCAPE ARCHITECT, SHOW LESS THAN 80% HEALTHY GROWTH AT THE END OF ONE YEAR PERIOD SHALL BE REPLACED BY THE CONTRACTOR.
11. UPON EXPIRATION OF THE CONTRACTOR'S ONE YEAR GUARANTEE PERIOD, THE OWNER SHALL BE RESPONSIBLE FOR LANDSCAPE MAINTENANCE INCLUDING WATERING DURING PERIODS OF DROUGHT
12. PRE-PURCHASE PLANT MATERIAL AND ARRANGE FOR DELIVERY TO MEET PROJECT SCHEDULE AS REQUIRED. IT MAY BE NECESSARY TO PRE-DIG CERTAIN SPECIES WELL IN ADVANCE OF ACTUAL PLANTING DATES.
13. SCRUB/SHRUB FLOODPLAIN AND FLOODPLAIN WETLAND ZONES (AREA A) PLANTING SEQUENCE:
    a. ONCE THE AREA HAS BEEN FULLY GRADED AND LOAMED, ENTIRE AREA SHALL BE SEEDED WITH "RIVERBANK STABILIZATION MIX" AT A RATE OF 1 POUND PER 2000 SF.
    b. THE EROSION CONTROL BLANKET SHALL THEN BE INSTALLED AS SHOWN ON SHEET C-701 AND DETAIL SHEET C-502.
    c. THE SHRUB PLANTINGS SHALL BE PLANTED ON 8' CENTERS IN LIKE GROUPS OF 3 TO 5, THROUGH THE EROSION CONTROL BLANKET.
14. SLOPE STABILIZATION AREA (AREA B) PLANTING SEQUENCE:
    a. ONCE THE AREA HAS BEEN FULLY GRADED AND LOAMED, ENTIRE AREA SHALL BE SEEDED WITH "RIVERBANK STABILIZATION MIX" AT A RATE OF 1 POUND PER 2000 SF.
    b. THE EROSION CONTROL BLANKET SHALL THEN BE INSTALLED AS SHOWN ON SHEET C-701 AND DETAIL SHEET C-502.
    c. THE SHRUB PLANTINGS SHALL BE PLANTED ON 6' CENTERS THROUGH THE EROSION CONTROL BLANKET.
15. STREAM BANK MARGINS PLANTING SEQUENCE:
    a. INSTALL COIR MATTING PER DETAILS SHEET C-703.
    b. PLANT WHIPS (1/2" - 3/4" DIAMETER, 3 TO 4 FEET IN LENGTH) OF SILKY DOGWOOD AND RED-OSIER DOGWOOD ON THE UPWARD AND DOWNWARD SIDE OF COIR MATS, AT A MINIMUM OF 1 TO 2 FEET INTO THE SOIL SUBSTRATE.
16. "RIVERBANK STABILIZATION MIX" SHALL CONSIST OF:
    a. AGROSTIS STOLONIFERA (CREEPING BENT GRASS)
    b. AGROSTIS ALBA (RED TOP)
    c. FRAXINUS PENNSYLVANICA (GREEN ASH)
    d. CORNUS STOLONIFERA (RED-OSIER DOGWOOD)
    e. CORNUS AMOMUM (SILKY DOGWOOD)
    f. ELYMUS RIPARIUS (RIVERBANK WILD RYE)
    g. VIBURNUM RECOGNITUM (NORTHERN ARROWWOOD)

AS SUPPLIED BY STONEY RIDGE ENVIRONMENTAL, LLC, ALTON, NH 603-776-0194, OR APPROVED EQUAL.



LEGEND

- MATCH LINE
- EXISTING EDGE OF WETLAND
- EXISTING DRAIN LINE
- PROPOSED STREAM BANK
- PROPOSED DRAIN LINE (TYP)
- PROPOSED PLANTING AREA A
- PROPOSED PLANTING AREA B
- PROPOSED STREAM BANK MARGIN PLANTING AREA
- PROPOSED RIPRAP
- PROPOSED LOG VANE

PLANT SCHEDULE			
SCIENTIFIC NAME	COMMON NAME	QUANTITY	SIZE/TYPE
AREA A			
CORNUS AMMOMUM	SILKY DOGWOOD	170	2-3' POTTED PLANTS
VIBURNUM RECOGNITUM	NORTHERN ARROWWOOD	170	2-3' POTTED PLANTS
AREA B			
CORNUS AMMOMUM	SILKY DOGWOOD	410	2-3' POTTED PLANTS
VIBURNUM RECOGNITUM	NORTHERN ARROWWOOD	410	2-3' POTTED PLANTS
STREAM BANK MARGIN			
CORNUS AMMOMUM	SILKY DOGWOOD	600	1/2" TO 3/4" WHIPS
CORNUS STOLONIFERA	RED-OSIER DOGWOOD	600	1/2" TO 3/4" WHIPS

SEE SHEET C-108 FOR GRADING, DRAINAGE & EROSION CONTROL NOTES

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

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HODGSON BROOK WETLAND PLANTING PLAN

SCALE: AS SHOWN

C-702

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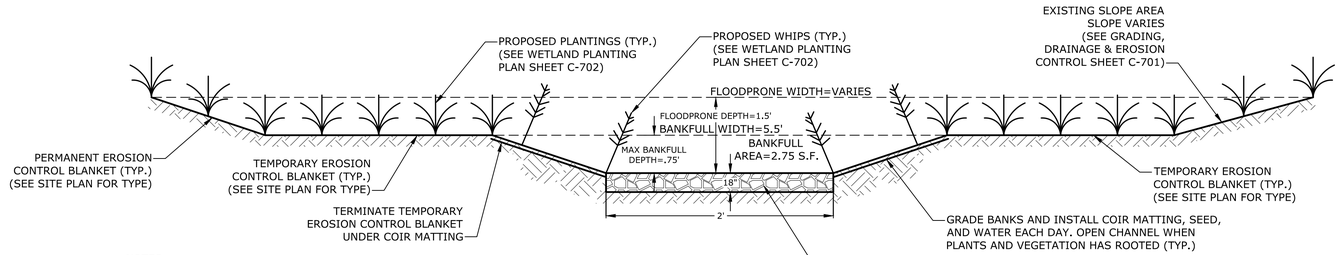
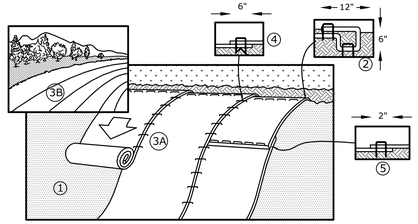


NOTES:

1. SEE WETLAND PLANTING PLAN SHEET C-702 FOR TYPE AND LOCATION OF PLANTS.
2. SEE SHEET C-701 FOR EROSION CONTROL BLANKET TYPE AND LOCATION.
3. ALL AREAS TO BE PLANTED SHALL ALSO RECEIVE 6" OF LOAM AND SEED. SEE WETLAND PLANTING SHEET C-702 PLAN FOR SEED MIX.

TYPICAL RIFFLE CROSS-SECTION

NO SCALE

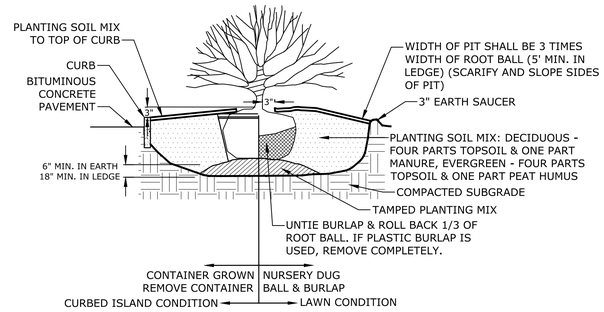


NOTES:

1. PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
2. BEGIN AT THE TOP OF THE SLOPE, 36" OVER THE GRADE BREAK, BY ANCHORING THE BLANKET IN A 6" DEEP X 6" WIDE TRENCH WITH APPROXIMATELY 12" OF BLANKET EXTENDED BEYOND THE UPSLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF TAPLES/STAKES 12" APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF BLANKET BACK OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES SPACED 12" APART ACROSS THE WIDTH OF THE BLANKET.
3. ROLL THE BLANKETS DOWN THE SLOPE. ALL BLANKETS MUST BE SECURELY FASTENED TO THE SOIL SURFACE BY PLACING STAPLES IN APPROPRIATE LOCATIONS AS SHOWN ON THE STAPLE PATTERN GUIDE.
4. STAPLE LENGTHS SHALL BE A MINIMUM OF 8 INCHES.

EROSION CONTROL BLANKET FOR SLOPE PROTECTION

NO SCALE

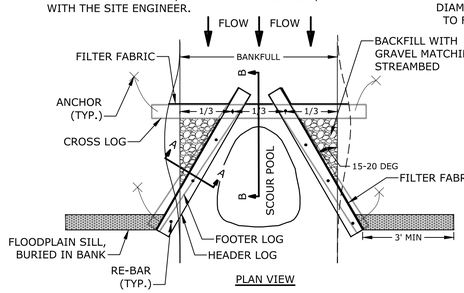


NOTE:
PLANT AT SAME DEPTH AS PREVIOUSLY PLANTED, OR WITHIN 2" ABOVE.

SHRUB PLANTING

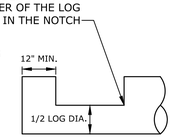
NO SCALE

NOTE:
INITIAL CONSTRUCTION AND ANY CHANGES SHALL BE COORDINATED ON-SITE, DURING CONSTRUCTION, WITH THE SITE ENGINEER.

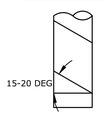


PLAN VIEW

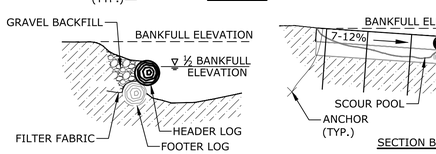
NOTCH SHALL BE CUT
2" WIDER THAN THE
DIAMETER OF THE LOG
TO FIT IN THE NOTCH



SIDE VIEW OF NOTCH



PLAN VIEW OF NOTCH



SECTION A-A

SECTION B-B

SINGLE LOG VANE CONSTRUCTION SEQUENCE:

1. EXCAVATE A TRENCH FOR THE VANE.
2. SET THE CROSS LOG
3. SET THE VANE LOG(S).
4. PIN THE LOG VANE ARMS WITH 4' LONG, ½" REBAR HAMMERED INTO PRE-DRILLED HOLES (2ft ON CENTER). HOLES ARE ANGLED OFF THE VERTICAL, ALTERNATING DIRECTION (UPSTREAM, DOWNSTREAM).
5. EXCAVATE A TRENCH FOR THE GEOTEXTILE FABRIC ON THE UPSTREAM SIDE OF THE VANE. THE TRENCH SHALL BE AT LEAST 1.5' DEEP.
6. ANCHORS SHALL BE CABLED TO THE LOGS BY >½" WIRE ROPE (CABLE), FASTENED WITH GRIPPLE CLIPS OR BOLTED CLAMPS.
7. ANCHORS SHALL BE EITHER LARGE (>100LB) ROCK OR REBAR CROSSES (TWO PIECES OF 2' LENTH, ½" REBAR FASTENED AT THEIR CENTERS).
8. STAPLE OR NAIL THE GEOTEXTILE ON THE UPSTREAM SIDE OF THE LOG, JUST ABOVE MID-DIAMETER, FOR THE FULL LENGTH OF THE LOG. FOLD OVER THE GEOTEXTILE FABRIC ALONG NAIL LINE. THE STAPLES/NAILS SHALL BE AT LEAST 1' ON CENTERS OR CLOSER. THE STAPLE/ NAIL LENGTH SHOULD BE AT LEAST 1".
9. BACKFILL THE UPSTREAM SIDE OF THE VANE.
10. EXCAVATE A SILL TRENCH (MINIMUM LENGTH OF 3') AT THE BANK-END OF THE LOG; EITHER A STONE SILL WITH MINIMUM DEPTH OF 2' OR A GEOTEXTILE SILL - TWO PARALLEL TRENCHES WITH A MINIMUM DEPTH OF 2'.
11. CONSTRUCT THE SILL: PLACE >1' SIZE STONES IN TRENCH, COVER WITH GEOTEXTILE (MIRAFI N140 OR APPROVED EQUAL), BACKFILL; OR PLACE GEOTEXTILE IN PARALLEL TRENCHES, COVERING A MOUND BETWEEN THEM, AND BACKFILL.
12. WEAVE ONE CONTINUOUS GEOTEXTILE ALONG VANE AND SILL.

GENERAL NOTES:

1. CROSS LOGS SHALL BE A MINIMUM OF 8" IN DIAMETER. VANE ARM LOGS SHALL BE A MINIMUM OF 6" IN DIAMETER. ALL LOGS SHOULD BE RELATIVELY STRAIGHT AND, OF A HARDWOOD, HEMLOCK, OR LARCH SPECIES.
2. CROSS LOGS SHALL BE A MINIMUM OF 8' IN LENGTH AND BE PINNED EVERY 2'. VANE ARM LOGS SHALL BE A MINIMUM OF 7', AND PINNED EVERY 2'.
3. VANE ARM LOGS SHALL BE BURIED INTO THE BANK A MINIMUM OF 2', WHERE THEY SHALL BE KEYED INTO THE BANK WITH A SILL OF A MINIMUM LENGTH OF 3'.
4. NAIL FILTER FABRIC (MIRAFI 140N OR APPROVED EQUAL) ON TOP OF FOOTER LOG USING 3" 10d GALVANIZED COMMON NAIL OR SIMILAR AT 1' INTERVALS ALONG THE LOG. FOLD OVER THE FILTER FABRIC ALONG THE NAIL LINE.
5. SET THE ELEVATION OF THE TOP OF THE CROSS LOG TO THE DESIGNED THALWEG (CENTERLINE) ELEVATION OF THE STREAMBED.
6. THE CROSS NOTCH CAN BE FORMED BY MAKING CUTS 1"-2" APART WITH A CHAINSAW, THEN KNOCKING OUT THE SECTIONS WITH A CHISEL AND HAMMER.
7. THE ANGLE OF THE CROSS NOTCH SHALL MATCH THE ANGLE BETWEEN THE VANE ARMS AND THE STREAM BANK.
8. SCOUR POOLS SHALL BE OVER DUG BY ~1.4x THE RIFFLE DEPTH, OR ABOUT 1' - 1.25' DEEP.

LOG CROSS VANE

NO SCALE

Tighe&Bond
Engineers | Environmental Specialists

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5-21-18

BRADLEE MEZICKTA No. 09590 LICENSED PROFESSIONAL ENGINEER STATE OF NEW HAMPSHIRE
5-21-18

SCALE IN FEET
0 20' 40'
GRAPHIC SCALE

Proposed Industrial Development

Lonza Biologics

Portsmouth,
New Hampshire

MARK	DATE	DESCRIPTION
2	5/21/2018	TAC SUBMISSION
1	4/3/2018	TAC WS SUBMISSION

PROJECT NO:	L-0700-13
DATE:	04/03/2018
FILE:	L0700-CS-701 to C-703.dwg
DRAWN BY:	NAH
CHECKED:	PMC
APPROVED:	BLM

HODGSON BROOK
DETAILS SHEET

SCALE: AS SHOWN

C-703

Last Save Date: May 17, 2018 8:41 AM By: BCLARK
Plot Scale: 1.0000 ft / in Plot Date/Time: May 21, 2018 by Benjamin Clark
T&B File Location: J:\L\L0700 Lonza Biologics Expansion was 1576F\013 Iron Parcel Redevelopment\Drawings, Figures\AutoCAD\Sheet\L0700-CS-701 to C-703.dwg Layout Tab: C-703



SCALE IN FEET
0 80' 160'
GRAPHIC SCALE

N

1992 AERIAL PHOTOGRAPH - LONZA BIOLOGICS
PORTSMOUTH, NEW HAMPSHIRE

Tighe&Bond
Consulting Engineers

July 1, 2016
L-0700-10 SITE.dwg

PROPOSED BUILDING #1
(TO BE CONSTRUCTED
WITH LAND AREA #1)

PROPOSED GARAGE #1
(TO BE CONSTRUCTED WITH
FIT-UP OF PROPOSED BUILDING #1)

PROPOSED BUILDING #3
(FINAL BUILDING TO BE CONSTRUCTED
IN THE FUTURE WITH LAND AREA #3)



The Restoration of Hodgson Brook at the Iron Rail Parcel at Pease Tradeport

28 March 2018

The benefits of stream restoration

Collecting and processing reference data

Design metrics for the stream and floodplain using natural channel design

Construction sequencing

Planting plan for the floodplain and riparian corridor

Five year monitoring plan and methods

Streamworks, PLLC

Joel Ballestero

Thomas P. Ballestero

The Benefits of Stream Restoration

The benefits to stream restoration are numerous to an ecosystem, especially so when land that had been developed into an urban area is reconstructed and allowed to grow more naturally again. This is case throughout history of Hodgson Brook, a stream whose watershed has been almost entirely developed. The watershed for the stream begins at the Pease Tradeport in Newington, and ends in the tidal waters of North Mill Pond in Portsmouth. At the project site and upstream, other than flowing through open drainage ditches and some wetlands, the stream is buried through a network of pipes that carry water flowing directly off impervious surfaces. This system prevents precipitation from filtering into the ground and recharging the groundwater table, a process which otherwise would filter the water from the urban contaminates it collects along its path. With the reduction of water lost into the ground, the amount that ends up directly in the waterway is increased, and commonly, the time it spends in a healthier environment is reduced. The time the water does spend in open channels, is spent under a lack of natural cover where it warms due to a lack of shade and a lack of cooler groundwater inflows that recharge the base flow, and moderate biogeochemical processes. The drainage ditch that is now Hodgson Brook is also poor habitat, lacking a diversity of flora and fauna that exist in a more natural setting.

This project proposes to daylight a section (~1,000 feet along the valley, ~1,200 feet of stream) of Hodgson Brook where it currently lies buried in a 4.5-foot diameter culvert before exiting the project site into a drainage ditch; this stream restoration will result in approximately 42,500 sf of stream and riparian buffer being created.

Daylighting the stream will restore a more natural riffle-pool sequence to a system that when it is presently in the open, is unnaturally straight, having been relocated and straightened to make way for development. The new stream corridor will provide an opportunity for storm flows to enter into the channel and adjacent floodplain, providing a connection for water to reenter and filter into the ground, in addition to being filtered and used by vegetation. The stream and corridor are hydraulically rougher and longer than the existing pipe, and will create a slower travel time over the same valley distance, in addition to increased storage volume. The corridor will benefit from native, riparian vegetation that will be allowed to grow unmaintained, encouraging wildlife use, nutrient/pollutant removal, and shade to keep the water cool. The habitat will help filter out common pollutants such as nitrogen and phosphorous, all while reducing the amount of contaminated water that enters North Mill Pond. Obviously this is one piece of a greater system between the Tradeport and North Mill Pond, therefore while the benefits of this specific projects are very high, it should be recognized that there are other impairments along the watershed also in need of attention.

The restoration work will provide a reconnection for a portion of a watercourse that has been heavily altered in the past, and hopefully provide an example of how a stream corridor may be restored in an urban environment and serve as a reference for the future.

Collecting and Processing Existing Data

Natural Channel Design involves obtaining metrics that are measured on natural, healthy systems (reference stream) which are then employed to serve as a template for the design metrics to the impaired watercourse, as long as the watersheds and streams have similar properties. It is not uncommon for this reference stream section to exist in healthy sections of the same stream, or at sections of adjacent streams. In the case of Hodgson Brook, unfortunately there is no existing healthy/natural/undeveloped section to observe, as most of the stream and its watershed exhibit significant urbanization and lack of stormwater management. There also exist few nearby streams that meet the criteria of being healthy, natural, and relatively unaltered that also share similar watershed characteristics; arguably, there exist few healthy, natural, and relatively unaltered streams anywhere that have highly impervious watersheds and little vegetation with such low stream slopes and are located near the New Hampshire coast. Simply put, there aren't many healthy streams (to say nothing of natural) that exist in an urban environment. In this case, the stream should aim to mimic its historic, natural system as best as possible while accounting for the upstream watershed conditions.

Luckily, there exists a relative wealth of information that has already been collected about the history of the Hodgson Brook watershed, the development over the years, how it exists now, and goals for restoring it. A 2004 restoration plan for Hodgson Brook was prepared by D. B. Truslow Associates with cooperation from the Hodgson Brook Local Advisory Committee, with funding provided by NHDES. This publication (among others) is available online at the DES' website for the watershed[1]. The publication contains much information about the history of the watershed, which provides a good place to start in order to find a relevant reference reach.

After reading the report, two sites were identified as having been restored at Pease – Grafton Ditch and Railroad Brook. Upon investigation of the two sites, and taking some brief measurements, neither site was suitable for use as a reference reach for Hodgson Brook. Stream form measurements were taken on Hodgson Brook, immediately at the outlet from the Iron Rail Parcel – where the stream is in no way natural or healthy, but years of flowing through the drainage ditch there has allowed the confined brook to erode some of the banks, and establish some plan form geometry, and can provide metrics on what the channel is able to pass currently. Classification of this section of stream, and the parameters used for evaluating the classification, may be seen in Table 2 below. The pipe system through the site was also surveyed, which provided the controlling upstream and downstream elevation, as well as the valley length.

Knowing the valley slope, the historic properties of the watershed, and approximate metrics from the regional geomorphic curves developed for New Hampshire, a dozen or so reference reaches were walked and visually assessed around the seacoast area. The most representative of all the reference reaches, Hutchins Creek in Kittery (43.106989°N, 70.705805°W), was then surveyed for plan form, cross sections, profile, and geomorphic properties. Overall, a 150-foot section of Hutchins Creek was surveyed (channel and floodplain). Planform geometry was collected for seven riffle-pool sequences over four

[1] The website is located at: https://www.des.nh.gov/organization/divisions/water/wmb/was/hodgson/index.htm

meander wavelengths along the valley. Profiles of the thalweg, top of bank, bankfull, and water surface elevation were all collected. A total of 11 cross sections (7 riffles and 4 pools) were taken at locations where bankfull indicators were evident, and for each section all stream and floodplain widths, depths, and ratios were extracted and calculated. Of those, the sections were weighted according to which appeared to be the healthiest and most stable in the field.

The parameters for the Hodgson Brook and Hutchins Creek watersheds may be found in Table 1, and the geomorphic metrics for the profile, cross section, and planform of Hutchins Creek in Table 3 and Lower Hodgson Brook in Table 2. Additionally, planform and cross sectional definitions are shown on pages A1 and A2 of the Appendix, for reference.

Table 1 - Watershed Properties

Property	Code	Units	Lower Hodgson Brook	Hutchins Creek
Drainage Area	DA	mi^2	0.32	0.4
2-yr Peak Flow	Q2	cfs	6.80	6.46
5-Yr Peak Flow	Q5	cfs	11.1	14.332
10-yr Peak Flow	Q10	cfs	15.5	18.359
25-yr Peak Flow	Q25	cfs	24.0	24.008
50-yr Peak Flow	Q50	cfs	38.2	28.463
100-yr Peak Flow	Q100	cfs	53.0	33.409
Pipe/Valley Slope	S	ft/ft	0.01057	0.00176

Table 2 - Lower Hodgson Brook Reference Reach Data							
Characteristic		Code	Units	Lower Hodgson Brook Observations			
				1	2	3	4
Profile	Stream Slope	S	ft/ft	0.00316			
	Valley Slope	V_s	ft/ft	0.00565			
	Sinuosity	k		1.072			
	Pool Length	L_p	ft	9.2	5.3	20.6	10.6
	Pool to Pool Spacing	P-P	ft	18.7	11.1	22.6	37.6
Cross Section	Bankfull Width	W_{bkf}	ft	5.76	4.60	3.69	5.54
	Floodprone Width	W_{fp}	ft	7.03	9.35	6.26	9.67
	Maximum Bankfull Depth	D_{max}	ft	0.89	0.76	0.62	0.80
	Average Bankfull Depth	D_{avg}	ft	0.55	0.44	0.51	0.40
	Entrenchment Ratio	ER	ft/ft	1.21882	2.03221	1.69578	1.74704
	Width to Depth Ratio	W/D	ft/ft	10.4979	10.486	7.21621	13.8066
Plan Form	Radius of Curvature	R_c	ft	40.66	15.81	22.41	8.93
	Arc Length		ft				
	Average Bankfull Width	W_{bkf}	ft	5.8	5.5	5	4.6
	Rc:Wbkf Ratio		ft/ft	7.01	2.87	4.48	1.94
	Meander Belt Width	MBW	ft	13.1	16.9	14.7	
	Average Bankfull Width	W_{bkf}	ft	4.6	5	5.8	
	MBW/Wbkf		ft/ft	2.85	3.38	2.53	
	Meander Length	ML	ft	56.04	56.53	46.32	
	Average Bankfull Width	W_{bkf}	ft	5.8	5	4.6	
	ML/Wbkf		ft/ft	9.66	11.31	10.07	
Classification	Entrenchment Ratio	ER	ft/ft	1.21882	2.03221	1.69578	1.74704
	Width to Depth Ratio	W/D	ft/ft	10.4979	10.486	7.21621	13.8066
	Sinuosity	k		1.072	1.072	1.072	1.072
	Stream Slope	S	ft/ft	0.00316	0.00316	0.00316	0.00316
	Bed Material	-	-	Sand	Sand	Sand	Sand
	Classification	-	-	G5c	B5c	G5c	G5c

Table 3 - Hutchins Creek Reference Reach Data													
Characteristic		Code	Units	Hutchins Creek Observations										
				1	2	3	4	5	6	7	8	9	10	11
Profile	Stream Slope	S	ft/ft	0.00165										
	Valley Slope	V_s	ft/ft	0.00176										
	Sinuosity	k		1.20										
	Pool Length	L_p	ft	10.9	7.3	1.4	9.8	11.5	10.3	3.7				
	Pool to Pool Spacing	P-P	ft	24.4	13.5	14.6	15.1	15.1	21					
Cross Section	Bankfull Width	W_{bkf}	ft	7	6.5	6.5	5	5	7	5.5	5.5	6	5.5	5.0
	Floodprone Width	W_{fp}	ft	25	18	20	30	20	30	20	20	25	39.1	37.8
	Maximum Bankfull Depth	D_{max}	ft	0.68	0.62	0.55	0.65	0.58	0.96	0.87	0.65	0.64	0.69	0.74
	Average Bankfull Depth	D_{avg}	ft	0.476	0.434	0.385	0.455	0.406	0.672	0.609	0.455	0.448	0.38	0.48
	Entrenchment Ratio	ER	ft/ft	3.57	2.77	3.08	6.00	4.00	4.29	3.64	3.64	4.17	7.11	7.60
	Width to Depth Ratio	W/D	ft/ft	14.71	14.98	16.88	10.99	12.32	10.42	9.03	12.09	13.39	14.42	10.38
Plan Form	Radius of Curvature	R_c	ft	11.8	7.6	8.3	9.6	7.6	15.3	3.7	13.6			
	Arc Length		ft	16.3	7.0	10.1	11.6	8.1	13.6	7.4	12.0			
	Average Bankfull Width	W_{bkf}	ft	4.8	4.0	4.0	4.6	3.3	3.8	3.4	5.0			
	Rc:Wbkf Ratio		ft/ft	2.48	1.91	2.07	2.08	2.33	4.02	1.10	2.72			
	Meander Belt Width	MBW	ft	14.5	13.5	10.0	10.5	9.0	17.0					
	Average Bankfull Width	W_{bkf}	ft	5.0	4.5	4.5	4.0	4.0	5.0					
	MBW/Wbkf		ft/ft	2.90	3.00	2.22	2.63	2.25	3.40					
	Meander Length	ML	ft	40.1	23.8	27.2	30.4	30.3	36.0					
	Average Bankfull Width	W_{bkf}	ft	5.0	4.5	4.5	4.0	4.0	5.0					
	ML/Wbkf		ft/ft	8.02	5.28	6.04	7.59	7.57	7.20					

Design Metrics for Stream and Floodplain Using Natural Channel Design

The natural channel design process uses the collected reference reach data to develop proposed metrics to create a design which is controlled by site constraints (usually things like incoming flows, upstream and downstream invert elevations, valley width, sediment supply, etc.). The site constraints control selected design metrics, which then are used to calculate – often quite iteratively – the remaining metrics within a range, determined by the reference reach data. The constraints at the project site include the stream inverts at the start and end, the valley width, the watershed properties, and the flows incoming to the site. The most difficult of all the constraints to calculate for this project were the flows incoming to the site. Upstream of the site, the watershed is extremely developed, and in order to calculate flows using common methods (Rational Method, SCS Curve Number Method, regression equations, etc.), a full watershed model would have been necessary. Such a model could have been developed, but the output may not have been very applicable to determining channel-forming flows. The dominant channel-forming flow is referred to as the bankfull flow, and for undeveloped watersheds is commonly in the range of the 1.5 to 2 year peak flow. However, this is just an approximation, and is not globally true for all watersheds and streams. The actual channel-forming flow may have a more or less common return period, and that is the flow to which the channel should be designed.

In order to appropriately estimate what this flow might be, a more site-specific method was used. Immediately downstream of the site, Hodgson Brook has – for decades – existed in an overly deep drainage ditch with no access to a floodplain. Over those years, it has eroded the banks during larger flows, and created some observable bankfull indicators. Using the survey data taken at this location, with specific data taken at bankfull locations, flows could be calculated to estimate what the channel-forming and larger flows likely would be. The flows that formed the more natural sections of the unnatural drainage ditch may be assumed to be the same as what would flow in Hodgson Brook at the site. These calculated bankfull flows may be found in Table 1.

Knowing all the constraints at the site, the metrics controlled by the constraints were calculated, and the remaining design metrics were iteratively determined to conform to the flows as best as possible. The calculated metrics and constraining variables may be found in Table 4.

In addition to the designed stream metrics, several other site-specific factors are important to consider, and should be accounted for in the design. Due to the highly developed nature of the watershed, the sediment supply to the site will be quite limited. There is not much of a source of sediment, other than construction activities and sanding during the winter. Thus, the sediment supply is sure to be of a much finer gradation and in much more limited supply than the natural stream used to have. Because of this, vegetation will be very important to maintaining the stream structure, and the sediment gradation used for construction will need to be sized and mixed well to prevent against vertical erosion of the restored stream. In addition to the vegetation and sediment, in-stream structures (log cross vanes) are recommended to help keep the stream in place, and floodplain sills are recommended to help prevent against avulsion. To help the stream keep its form while vegetation is allowed to grow, the banks may be constructed out of biodegradable compost sock. These usually have a lifespan of 3-5 years before they

begin to degrade, which should allow enough growing seasons for faster growing riparian vegetation and plants to take root and hold the stream form.

Table 4 – Hodgson Brook Proposed Stream Metrics					
Property		Code	Units	Value	Range (+/-)
Cross Section	Maximum Bankfull Depth	Dmax	ft	0.75	0.1
	Average Bankfull Depth	Davg	ft	0.50	0.1
	Floodprone Depth	Dfp	ft	1.50	0.2
	Bankfull Width	Wbkf	ft	5.5	0.5
	Floodprone Width	Wfp	ft	30.0	2
	Width/Depth Ratio	W/D	-	11.0	1.3
	Entrenchment Ratio	ER	-	5.5	0.1
	Bankfull Area	Abkf	sqft	2.75	0.8
Plan Form	Sinuosity	k	-	1.23	0.05
	Meander Belt Width	MBW	ft	18.0	2
	Meander Length	ML	ft	40.0	5
	Radius of Curvature	Rc	ft	12.5	2.5
	Pool Length	Lp	ft	16.2	4
	Pool to Pool Spacing	P2P	ft	24.5	4.5
	Stream Slope	Slope	ft/ft	0.00946	0.0020
	Valley Slope	VS	ft/ft	0.01160	0.0010
Flow	Low Flow	Qlf	cfs	0.2	0.1
	Bankfull Flow	Q	cfs	6.9	0.4
	Floodprone Flow	Qfp	cfs	32	2
Stable Particle Size	Low Flow - Rosgen	RDlf	in	0.7	-
	Bankfull - Rosgen	RDbkf	in	2.5	-
	Floodprone - Rosgen	RDfp	in	2.8	-
	Full Flow - Rosgen	RD100	in	5.7	-
	Low Flow - LWM	LDlf	in	0.2	-
	Bankfull - LWM	LDbkf	in	0.9	-
	Floodprone - LWM	LDfp	in	1.1	-
	Full Flow - LWM	LD100	in	2.9	-
	Low Flow	LDlf	in	0.4	0.3
	Bankfull	LDbkf	in	1.7	0.8
	Floodprone	LDfp	in	1.9	0.9
	Full Flow	LD100	in	4.3	1.4

Some of the design metrics may be seen on pages A3 and A4 of the Appendix, for reference of what part of the stream they apply to, and their values. Conceptual details for constructing a log cross vane and a floodplain sill may also be found in the Appendix, on pages A5 and A6.

Construction Sequencing

In general, stream restoration begins at the upstream end of the project and works downstream. At the site, the proposed stream corridor does not follow the path of the existing piping carrying Hodgson Brook, but will be reconnected to the infrastructure at the start and end of the project. This is beneficial, as the stream can be constructed in the dry and temporarily stabilized before being opened up to flows and fully vegetated. As this is a part of a larger development project as a whole, the construction sequence below details only activities pertaining to the stream corridor. It does not include activities that might usually be included in such a sequence, such as (but not limited to) clearing and grubbing, construction layout, traffic control, erosion control, and material disposal. The sequence is subject to change to integrate fluidly with the entire project, and may change to the desires of the contractor, as they see best fit. Any changes shall be discussed, cleared, and/or proposed by project engineers, and may be made in the field during construction. This construction sequence assumes that the existing drainage infrastructure is to remain in place until the stream is built, and that proposed drainage infrastructure that will direct flows into the stream will have already been installed. An overview of the sequence is listed below, followed by a detailed sequence which describes each step in greater detail.

Stream Corridor Construction Sequence Overview:

1. Excavate and grade the stream corridor from the top of the valley, down to the top of the floodplain, and on down towards the center of the corridor.
2. Perform fine grading of stream channel, banks, structures, and sills.
3. Seed the site with temporary stabilization and allow to grow.
4. Open up stream at each end to flows.
5. Seed and plant the site fully.
6. Establish monitoring locations and components.

Detailed Stream Corridor Construction Sequence:

1. Excavate and grade the stream corridor, from the top of the valley, down to the top of the floodplain and into the center of the corridor, leaving an access ramp at the start and end of the project. If required, the grade may be set lower to allow for backfilling of loam, should the existing earth be of poor material. Do not over-compact floodplain or valley slopes; compact only by track-walking or applying pressure with the bucket of the excavator. The floodplain and slopes should be left rough, to allow seed to grow more easily. Leave an access path along the top of the valley to one or both sides, to allow for the transport and temporary staging of in-stream materials and movement of heavy equipment. This may also be done by using the upstream access ramp to deliver materials behind the excavator, using the corridor as the path. This is not preferred, since over-compaction is likely to occur resulting from the excessive use.
2. Because the construction will be performed in the dry, construction will start at the downstream end of the restored Hodgson Brook. Starting at the downstream end of the stream, begin by excavating the pool which will redirect water into the existing culverts below Goose Bay Drive from upstream of the pool. Working from upstream of the section under construction, begin the fine grading of the stream channel. This may be done by over-excavating the channel and banks,

then installing the compost log roll stream banks. Initially the bed slope of the stream is graded uniform, and then riffles and pools graded near the finishing steps. The lower compost log should sit below the thalweg of the stream, and once set in place at the correct elevation, may have fill placed behind the rolls. The stream channel should then be backfilled at the riffles and pools with appropriately graded material, leaving the pools as deeper features in the stream channel. As construction continues upstream, merging the compost log rolls should be done such that the upstream-most end of the rolls is curled out from the bank, such that the next upstream rolls may be placed linearly into the bank, and flows will be directed as to not cause erosion or avulsion between the rolls (shiplapped construction). Extra heavy attachment (connections) of the rolls at these locations should be performed with biodegradable materials. While construction continues, backfilling of any floodplain loam – should it be deemed necessary – should be performed to the final grade of the floodplain. Construct in-stream structures (log cross vanes) as they are reached, as well as floodplain sills. Additional floodplain features may be constructed at this time, such as habitat logs and boulders, tree stands, and vernal pools (all optional, but recommended). Construction materials may be provided on-demand using the access path along the top of the valley. Materials (logs, rebar, geotextile, riffle material, compost rolls, etc.) may be set outside the stream corridor, and gathered by the excavator from inside the corridor, or less preferably, placed behind the excavator in the corridor. All fine grading and structures should be checked for elevations and geomorphic metrics before starting the next upstream section.

3. Seed and mulch the corridor and top of valley with the temporary stabilization seed mix (preferably a conservation mix with at least 10% wildflower seeds, though may be of a perennial ryegrass). Seed to the amounts as specified by the seed manufacturer – with greater application on the steeper valley slopes – and mulch with wood chips (90% ground coverage) or straw (to a depth of 1 inch). Water as specified by the seed manufacturer, if drought persists longer than the recommended watering rate. Allow the grass to grow to a height of 2 inches before proceeding to the next step. If any bare patches exist, reseed and mulch to ensure stabilization. This step may be performed as a section of stream is constructed, which may reduce the overall construction duration, though it may come at a cost of increased watering effort.
4. When all previous steps have been completed, the stream should be opened up to flows. First, the existing drainage culvert at the downstream end should be excavated and removed. Grade and temporarily stabilize the incoming flows to the downstream pool. Proceed to the inlet to the stream and construct (if not already done in step 2) the inlet pool and grading. Flows may then be directed into the stream channel, in a manner that shall be determined in the field, based on the manner in which the incoming culvert and upstream infrastructure is being constructed. Allowing incoming flows to the stream may be performed concurrently with that of the outlet, provided the contractor has the labor and equipment available. However, caution should be exercised to ensure that flows are able to exit the corridor fully and appropriately, to prevent damage and/or flooding to the site.
5. With the stream now carrying flows, the entire site should be seeded and planted as specified in the planting plan. This may be done completely or partially as construction of the stream takes place. At this point the temporary stabilization grass should have taken hold enough to provide

some cover for seeds, and keep in moisture during the day. This step should only be done during a growing season and not in mid-summer or winter, to help ensure planting success. This step may be done after step 6, if construction ends before a planting season is set to begin. This step should be performed when the appropriate equipment is available. This may help expedite the process, rather than performing it all completely by hand.

6. Finally, monitoring devices and components should be installed, measurements recorded, and instruments calibrated as necessary. Please refer to the monitoring plan section of this report for more details on the monitoring methods and schedules.

As noted in the detailed construction sequencing, some aspects of construction may overlap, or may be done concurrently, per the desires of the contractor. For example, backfilling of loam may be reserved for after the stream has been constructed, if it is desired to be performed from the top of the valley. Planting of livestakes and other riparian plants may be done as the stream is constructed. This may require watering to be performed regularly, especially lower on the floodplain, to ensure the vegetation has enough water to grow without any baseflow in the stream. It may also require longer stagnant time for the plants, which would have to be kept healthy during the duration of the construction. More detailed information and planting notes may be found in the following section. Habitat features (floodplain boulders, logs, vernal pools, etc.) may be constructed after the stream is finished, from the top of the valley. As stated before, any alterations to the construction sequence will first be cleared by the project engineers before implementing them during construction.

Planting Plan for the Floodplain and Riparian Corridor

The stream corridor has two distinct zones for planting: the floodplain (Zone 1) and the upland, or valley slopes (Zone 2). These two zones are set as such, based on the available water, rate of inundation, and the drain rate. The two zones were broken down even further, with each zone having a Lower and an Upper part (1L, 1U; 2L, 2U). Furthermore, Zone 1L contains an additional sub-zone that refers to the stream banks, just up onto the top of the banks. Here, grasses and groundcover is often not successful, but shrubs may, and these are to be planted differently than the rest of Zone 1L, resulting in its own classification. This sub-zone contains two sections, one along the outer bank of each bend, and the other containing all the other banks (inner bend and riffles). The outer bank of each pool is referred to as Zone 1Lp, and the other banks are in Zone 1Lb. The difference in the two zones is only to differentiate between planting densities, and to help determine quantities.

Table 5 – Planting Plan Species

	Planting Species	Common Name	Zone
Grasses	Lolium Perenne	Perennial Ryegrass	1, 2
	Cornus canadensis	Bunchberry	1U
	Solidago spp.	Goldenrod	1
	Impatiens capensis	Jewelweed	1
	Mitchella repens	Partridgeberry	1U, 2
	Asclepias incarnata	Swamp Milkweed	1
	Thalictrum polyganum	Tall Meadow Rue	1
Shrubs	Prunus virginiana	Chokecherry	1U, 2
	Cornus racemosa	Gray Dogwood	1U, 2
	Viburnum alnifolium	Hobblebush	1
	Vaccinium angustifolium	Lowbush Blueberry	2
	Salix discolor	Pussy Willow	1
	Rubus idaeus	Raspberry	2
	Cornus stolonifera	Red Osier Dogwood	1
	Cornus amomum	Silky Dogwood	1
	Alnus rugosa	Speckled Alder	1
	Hammamelis virginiana	Witch Hazel	1
Trees	Salix nigra	Black Willow	2U
	Prunus serotine	Black Cherry	2U
	Acer rubrum	Red Maple	2U
	Quercus alba	White Oak	2U
	Fraxinus americana	White Ash	2U

The species selected for the project are listed in Table 5, and are sorted by the type of species – grasses and ground cover, bush-like trees and shrubs, and trees. Each species is listed by both their common name and Latin name, as well as the zone at which it is to be planted. The zone for each may be listed specifically (1L), or more broadly (2). These species were selected from the list of Native Shoreland/Riparian Buffer Plantings for New Hampshire; a table species which are both native and non-

invasive, which was published by the NH Department of Environmental Services. While this list provides many species, the final species used in construction of the site may not be limited to those listed. Any other species will be checked and approved by the engineer before being ordered, or placed in the field. This is especially true of any seed mix that may be used at the site; the selected mix (mixes) that the contractor shall use should be checked by the engineer before placement, or before ordering any such seed mix.

A list of densities and species to be planted in each zone may be found in Table 6, for quick reference.

Table 6 – Planting Plan Details

Planting Zone	Zone Description	Species	Density
1Lp	On the outer bend of a pool from the point of curvature to the point of tangency, beginning at the mid-bank elevation, up over the top of the bank, and offset from the top of the bank 1 foot.	Livestakes of Pussy Willow, Red Dogwood, Silky Dogwood, and Speckled Alder	2 livestakes per 1 sf
1Lb	From the mid-bank elevation up over the top of the bank and back 1 foot, for all stream banks other than Zone 1Lp	Livestakes of Pussy Willow, Red Dogwood, Silky Dogwood, and Speckled Alder	1 livestake per 2 sf
1L	From one outer bend of the channel down one meander wavelength to the next outer bend of the channel, inwards along the top of the bank.	Perennial Rye (temporary stabilization); Native Wetland Seed Mix including but not limited to: Tall Meadow Rue, Goldenrod, Swamp Milkweed, Jewelweed, and Ryegrass; Hobblebush, Pussy Willow, Red Dogwood, Silky Dogwood, Speckled Alder, and Witch Hazel	Rye: per seed mix Wetland Mix: per seed mix Shrubs: 1 plant per 75 sf
1U	On the floodplain bench, outside the meander belt width corridor, up to the top of the floodplain bench	Perennial Rye (temporary stabilization); Native Wetland Seed Mix (as described previously); Bunchberry, Partridgeberry, Swamp Milkweed, Chokecherry, Gray Dogwood, Hobblebush, Pussy Willow, Witch Hazel	Rye: per seed mix Wetland Mix: per seed mix Shrubs: 1 plant per 50 sf
2L	From the top of the floodplain bench, up 1/4 of the way up the riparian corridor slope	Perennial Rye (temporary stabilization); Native Conservation Seed Mix; Partridgeberry, Chokecherry, Gray Dogwood, Lowbush Blueberry, Raspberry, Black Willow	Rye: per seed mix Shrubs: 1 plant per 20 lf
2U	From the top of Zone 2L, up over the top of the riparian corridor and back 1 foot.	Perennial Rye (temporary stabilization); Native Conservation Seed Mix; Lowbush Blueberry, Raspberry; Black Willow, Black Cherry, Red Maple, White Oak, White Ash	Rye: per seed mix Shrubs: 1 plant per 25 lf Trees: 1 tree per 40 lf

Vegetating the project site will be done using several types of planting methods. Closest to the stream, livestakes should be placed, rather than planting full shrubs. Livestakes are relatively straight clippings two to four feet in length and no greater than an inch in diameter at the base, cut from live and healthy species, and should be cleared from leaves and smaller branches. Leaves left on the livestake cause it to dry out more easily. From places where branches and buds are removed, roots and new branches will sprout from the clipping. Livestakes should be soaked in water for at least two days prior to installation, if at all possible, long enough for roots to sprout. To plant a livestake, first create a hole using a sledge hammer and a hammer rod (a piece of 1" diameter rebar works as well), to a depth of one third the length of the livestake. Gently place the livestake in the hole without damaging the base, and tamp-down the ground around the hole with a hand or foot. Livestakes should be kept wet for the first two weeks, until they have had the opportunity to sprout roots.

Seed will also be placed and mulched as described following, all along the floodplain and upland slopes. Seeding will first be done with a rye grass to stabilize any bare earth expected to exist longer than 5 days. The floodplain may then be seeded with a wetland, riparian, or conservation seed mix that contains no invasive or non-native species. Seeding with such a mix should follow the manufacturer's guidelines. A general specification for the final seeding is a conservation mix with at least 10% wildflower seeds.

Finally, planting of trees and shrubs (and flowering plants, should no wetland/riparian seed mix be used) will be performed throughout the floodplain and upland areas. It is preferable to have mature plants over planting seeds, and more mature plants are preferred to saplings. Younger plants are more vulnerable to being transplanted, and do not recover well – if at all – from grazing. Again, trees and shrubs should be placed in their appropriate zones, and should be planted in a non-linear fashion.

To begin the planting, first the grounds should be checked for any invasives, or any debris/trash, and cleared. Seeding should occur over the entire construction area, and should begin with temporary stabilization. Stabilization should be of a Rye seed mix, which should be mulched with straw, preferably (to a depth of 1"). The mulch should be clean and free of invasives and any other contaminants. The grounds should be watered as necessary, or as specified by the seed manufacturer. At the same time, livestakes (if they were not already set during construction) may be placed in the stream banks and at the top of the banks.

After the grass has been allowed to grow, and any bare spots have been reseeded, planting and seeding of the remaining site may be performed, beginning at the lowest part of the floodplain, on up to the top of the valley slopes. Protective tubing may be desirable to help prevent any young plants from grazing before they reach a more adult size. Support stakes and twine may also be used, to help stabilize the plants until they develop larger root systems. Planting instructions for each plant should be followed, as some require more specific needs than others, and may even have different planting seasons when they should be installed. The instructions for each may be very important, as a survival rate of 75% within the first 3 years is commonly determined to be the goal of a restoration project in New Hampshire.

When performing the final planting, it is important to note that the densities shown are for an average over the corridor, and to help determine quantities. Plantings should be performed in a non-linear (irregular) fashion, and should avoid being homogenous. Some areas should be more or less dense, with greater or fewer different species than other areas. Trees in the upland should be planted at the top of the valley, and partway down the slope; bushes may be clumped together near or far from the channel; livestakes should be planted mid-bank and to the top of the bank. The zones and densities are shown for reference, but are not firm constraints. Natural systems are usually very diverse and random, and projects should attempt to embrace and mimic that variability. In addition to Tables 5 and 6, a list of the wildlife which benefit from the planting species, as well as the food value each species provide, may be found in Table A1, on pages A7 and A8 in the Appendix.

Five Year Monitoring Plan and Methods

Hodgson Brook is the main source of fresh water to North Mill Pond in Portsmouth, and as such, the health of the stream is important to several local organizations (Advocates for the North Mill Pond [ANMP], Hodgson Brook Local Advisory Committee [HB LAC], Pease Development Authority [PDA]), and governments (city of Portsmouth, NH DES). There have been several studies completed on the watershed that are publicly available, and quite a few documents published that cover the history, water quality, and goals for restoring the watershed. Some of the publicly available documents include[2]: an Environmental Quality Characterization for Hodgson Brook in Portsmouth, New Hampshire (2003), a Watershed Restoration Plan for Hodgson Brook (2004), a Hodgson Brook Watershed Monitoring Plan – A guide for Monitoring Environmental Quality (2004), and an Implementation Plan for Hodgson Brook Watershed Restoration (2005). These documents provide detailed accounts of the history of the watershed, the current use and quality, and sets goals for restoring the watershed and methods to achieve those goals. The information provided in those documents was used to help develop the monitoring plan for the site. Monitoring of the site will be performed for five years after the construction of the project.

The NH DES lists water quality standards that provide a framework for assessing surface waters in the state, based on seven designated uses. The standards are divided into three parts: designated uses, water quality criteria, and antidegradation. The seven designated uses represent the ways in which the surface water is intended to be used: aquatic life, fish consumption, shellfish consumption, drinking water supply, primary contact recreation, secondary contact recreation, and wildlife. The water quality criteria are defined for each designated use by markers and limits, aimed at protecting each surface water use. Finally, the antidegradation provision is set to protect existing uses and to prevent any degradation to any surface water in terms of the existing water quality or designated uses.

Hodgson Brook (as detailed in the Watershed Monitoring Plan [WMP]), has been assigned three designated uses for which monitoring should be performed: Primary and Secondary Contact Recreation, and Aquatic Life. Indicators for each, and the recommended monitoring methods, were defined in the WMP, and are listed below. The methods and indicators below were cropped to eliminate indicators and methods that the report either did not recommend, or were considered not applicable. Also not included are some of the recommended monitoring methods that may not be applicable or may be included within other methods. Some of the monitoring frequencies have been adjusted in order to provide better data for a restoration project, and not existing conditions. In addition to the recommended monitoring methods given in the WMP, methods for monitoring the vegetation and stability of the constructed stream were developed. The full list of monitoring methods, schedules, and frequencies may be found in Table 7.

An annual monitoring report shall be produced and sent to all interested parties (ANMP, HB LAC,NH DES, etc.) and all data provided to NH DES for inclusion in the state databases at the same time. Please

[2] All four documents may be found at the DES website for Hodgson Brook: https://www.des.nh.gov/organization/divisions/water/wmb/was/hodgson/reports.htm

refer to state protocols for data reporting; different data may require different protocols. DES may also provide sampling kits and training for collecting select methods and indicators (1, 2, 3, 4, 5, and 10) through their Volunteer River Assessment Program (VRAP). The monitoring report should be produced annually in January or February, which gives enough time to process all the data collected during the previous year, and is after any sampling, vegetation monitoring, or surveying is likely to be done.

Table 7 - Iron Rail Parcel Restoration Monitoring Methods and Scheduling						
Indicator Number		Indicator	Monitoring Method	Events per Year	Number of Locations	Total Events
Recreation	1	Bacteria	Minimum of 4 (2 dry and 2 wet) E. Coli samples collected annually between 6/1 and 9/15	4	2	40
	2	Various Indicators	During sampling dates, record water color and the presence of any of the following on the field data sheet: algal bloom, foam, debris, scum, slicks, odors, and surface floating solids	4	2	40
Aquatic Life	3	Dissolved Oxygen	Minimum of 4 (2 dry and 2 wet) measurements taken annually from 6/1 to 9/15 between 5:00 am and 8:00 am	4	2	40
	4	pH	Taken at the same schedule as DO	4	2	40
	5	Habitat Assessment	Complete using DES Habitat Assessment Field Data Sheets annually during late fall	1	1	5
	6	Flow	Monitor flow conditions to determine baseflow and stormwater discharge for a range of flows may be done concurrently with sampling events, or as required to obtain enough flows to develop a comprehensive rating curve	4	2	40
Additional Indicators	7	Stream Stability	Full site survey of all topographic features performed once as an as built, then again in years 3 and 5	1	1	3
	8	Planting Success	Visual site assessment for any high-mortality areas, assessment of 4 vegetation plots three times; once after the first full growing season, then every other year (may be done during full survey)	1	4	12
	9	Visual Health Assessment	Pictures taken at set photo points twice per year, during the spring and the fall	2	1	10
	10	Other Indicators (Temperature, Turbidity, Conductivity)	Taken at the same schedule as DO	4	2	40

Monitoring locations for each of the methods listed in Table 7 should be determined either as construction is ongoing, or after completion. A map of suggested monitoring locations may be found on page A14 of the Appendix. Not all locations shown on the map are definite; many will be determined and set in the field, after construction is completed. For example, benchmarks and photo points will need to be located in locations with good viewing angles, and away from trafficked or maintained areas; staff gages (or monitoring probes) should be set in easily accessible locations, but in permanent water; vegetation plots should be set at areas of high interest, or in locations that represent a diverse range of variables (species, zones, sunlight, infrastructure, etc.), among other things. Detailed descriptions of the monitoring methods, recommended locations, and data are as follows:

Sampling

Sampling is recommended at two locations at the parcel: first at the existing junction box, located where the stream first enters the parcel (access may be obtained via the manhole cover and into the large junction box); the second, at the downstream end of the project where the stream empties into a pool which routes the water under Goose Bay Drive. If the first location is considered too dangerous, or no permission is granted to enter the box, sampling may occur at the outlet of the 54" HDPE pipe directing Hodgson Brook into the proposed stream corridor. It is preferred to sample at the junction box, as the water there has not come into contact with any proposed infrastructure (LID stormwater outfalls, stream corridor). This would be very useful to compare the quality of the water before the project and after. Sampling during high flows may easily be performed from outside the junction box, using sampling rods with attached sample containers. On sampling days, samples should first be taken at the downstream location, then upstream to minimize possible sample disturbance contamination. Performing the sampling should be completed in one day, with as little difference in time and climatic conditions as possible. Concurrent sampling is recommended. All sampling should conform to DES VRAP protocols, unless not available, in which case they should follow any State or EPA guidelines.

Sampling will be performed in two manners, with another set of data being collected observationally. Sampling for bacteria (E. Coli) will be conducted by obtaining samples collected in the field, preserved for transport, and having samples analyzed at a lab, reported in counts per 100 mL. For fresh water, DES has a limit of 126 counts per mL for E. Coli. Sampling for other indicators (Dissolved Oxygen, pH, Temperature, Turbidity, and Conductivity) will be done using probes or meters which can detect each parameter. Kits containing these devices may be available through the DES' VRAP program, and training for using the kit and contents may be available as well. Observational data to be taken at the same time as the samples include the weather, as well as other indicators of stream health: water color, algal bloom, foam, debris, scum, slicks, odors, or surface floating solids. These can be noted and recorded along with all the other indicators – except for bacteria – on the sample Hodgson Brook Field Data Sheets, seen on pages A12 and A13 in the Appendix. These data sheets were adjusted slightly from the data sheets given as part of the VRAP program.

In the Hodgson Brook WMP document, it is recommended that at least five samples are taken every other year (between 5/24 and 9/15 for E. Coli and 6/1 to 9/30 for all others) at locations defined in the paper. One of the locations is just downstream of the site, on the brook to the east of the intersection of Corporate Drive and Rye Street. This location has quite a bit of environmental monitoring data (EMD)

available publicly from the DES' OneStop data server, dating from 2005 to 2016. Sampling for the monitoring of this project is recommended to be performed four times each year – twice during 'dry' weather, and twice during 'wet' weather. Dry weather sampling should occur on a day without precipitation the day of sampling as well as the three full days prior to the sampling date. Wet weather sampling should occur during or immediately after a storm with a precipitation depth of >0.2 inches, when flows are elevated from the baseflow. Sampling during wet and dry weather provides a comparison of the water quality during baseflow and storm events, may help identify sources of contamination, and will show the performance of the site. It is preferable that sampling of all metrics be done at the same time, and to make the timing more easily defined, all sampling should be done between the latest start date and earliest end date defined in the WMP; thus sampling should take place from 6/1 to 9/15 between the hours of 5:00 am and 8:00 am.

Observations and Visual Assessments

Other data that will be taken at the site should assess the stream system health, and should include vegetation plots, photo points, habitat assessments, and flows. Photo points should be set after the construction has been completed, and should be marked at locations that can be repeated in subsequent years by both location and direction, so that pictures may be compared through the years. The photo points should capture the entire site, as well as any notable features, such as the vegetation plots, or any culvert inverts (to show scour, perhaps). Photo points should be taken twice per year, in the spring and fall, and should be included in the annual reports.

The habitat assessments will be performed using the Habitat Assessment Field Data Sheets for Low Gradient Streams. The assessment rates habitat parameters for health on a scale of 0 to 20, using descriptions to guide the assessor as to what to look for. The data should be compiled in the field, using any pictures as evidence and a field book for notes, and should be performed once each year in the fall, during a period of low flow. These sheets were obtained from the DES' VRAP website, and may be found reproduced here in the Appendix, on pages A9-A11.

Vegetation plots should be set after construction and the complete planting and seeding of the site has been completed, and should not be assessed until after one full growing season has passed. It is recommended that four vegetation plots be set, representing a thorough sample of variables; sunlight, planting zones, species density, etc. Two vegetation plots should span the width of the stream corridor, and two should be located in 10'x10' squares on the floodplain. These plots should be assessed for mortality of planted plants, coverage, invasives, and species diversity. In addition to the four plots, a site-wide visual assessment for the mortality of any of the planted plants should be conducted, tallied, and reported. A goal of 75% survival is usually recommended for projects of this type. The reason for the mortality of any plants should also be recorded to the most accurate extent possible – water content, sunlight, trampling, foraging, animal burrowing, etc.

Finally, flows should be observed, recorded, or downloaded from pressure transducers during each of the sampling events, at a minimum. More data is recommended to help create an accurate rating curve for each location. It is recommended to have two flow locations at the same two sampling locations. To begin, theoretical hydraulic rating curves (water depth versus discharge) for each site should be

developed. Over time, and with base flows and storm flows measurements, the curves may be more accurately empirically developed. Flow calibration should be performed at both sites for a range of flows, with a concentration of measurements at the low-flows. Calibration may be performed using a flow meter in the stream, or in a pipe, surveying a pipe and calculating the flow based on the flow depth, or by calibrated weirs or flumes that will give accurate flows, provided the water upstream has filled the reservoir created by the device. For each site, a minimum of 8 calibration flows are recommended for the empirical rating curve, and more points are encouraged. Early and frequent, accurate rating curve calibration will make the collection of this data go much more quickly in subsequent years.

Site Survey

The final monitoring method will be to perform a full site topographic survey, making sure to include all relevant and important features, such as: benchmarks, sampling locations, staff gages, infrastructure, in-stream structures, stream and corridor features, floodplain features, photo points, and all topographic features. From this survey, maps should be produced that display all monitoring locations, comparisons of the stream features from year-to-year, and any other relevant information. Stream comparisons may include stream profiles, cross sections, as well as any notable failures. A full site survey should be conducted first as an as-built survey of the site, then again in years 3 and 5, following the completion of the project. The products built from the site surveys should be included in the annual reports, during the years they are performed.

Appendix

A1. Metric Definitions – Section

A2. Metric Definitions – Plan

A3. Planting Zones

A4. Proposed Stream Metrics – Section and Plan

A5. Generic Log Cross Vane Detail

A6. Generic Floodplain Sill Detail

A7. Table A1 – Associated Birds & Mammals, and Food Value of Planting Species

A8. Table A1 – Associated Birds & Mammals, and Food Value of Planting Species (Cont.)

A9. Habitat Assessment Field Data Sheet – Page 1

A10. Habitat Assessment Field Data Sheet – Page 2

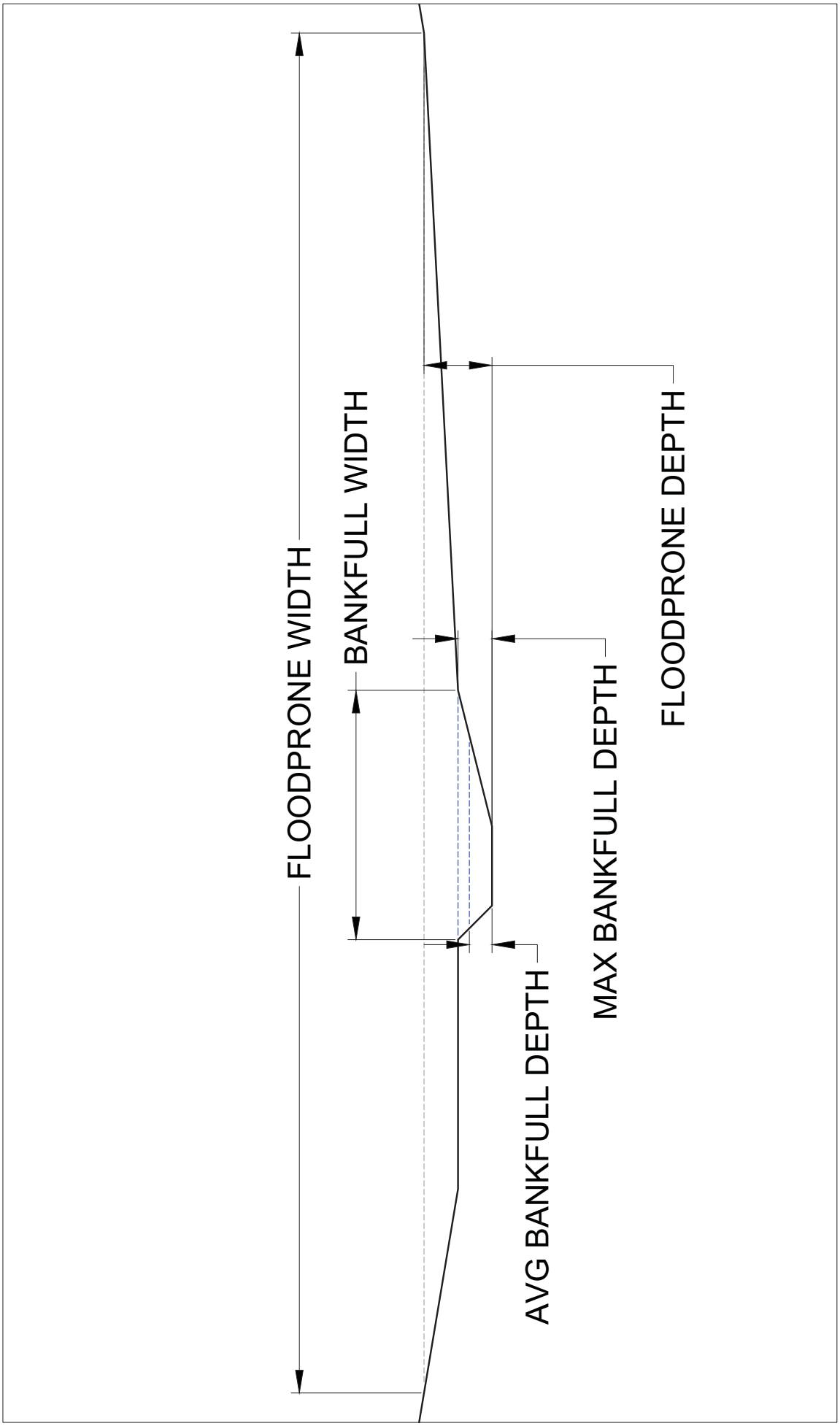
A11. Habitat Assessment Field Data Sheet – Page 3

A12. Field Data Sheet – Page 1

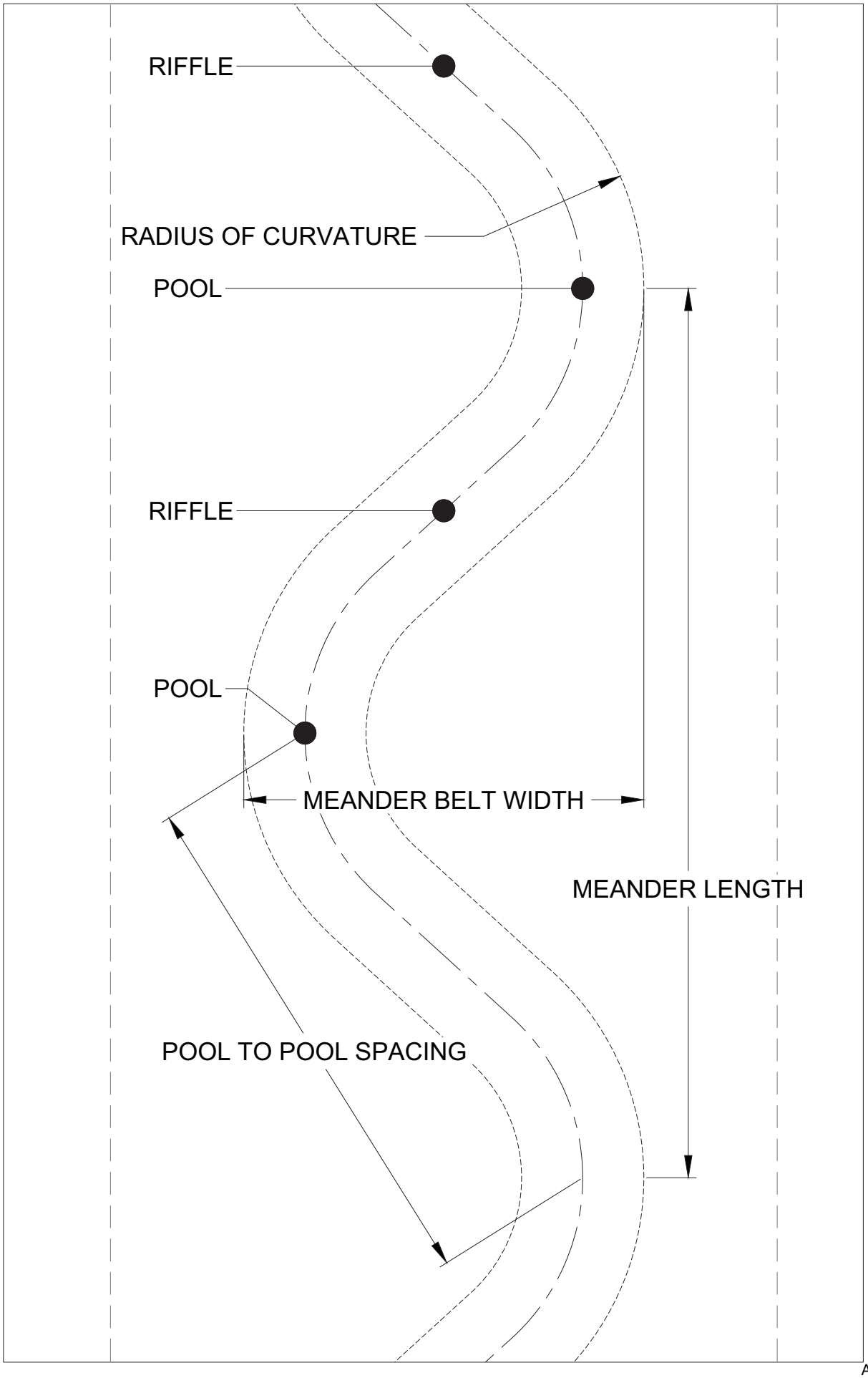
A13. Field Data Sheet – Page 2

A14. Example Monitoring Locations

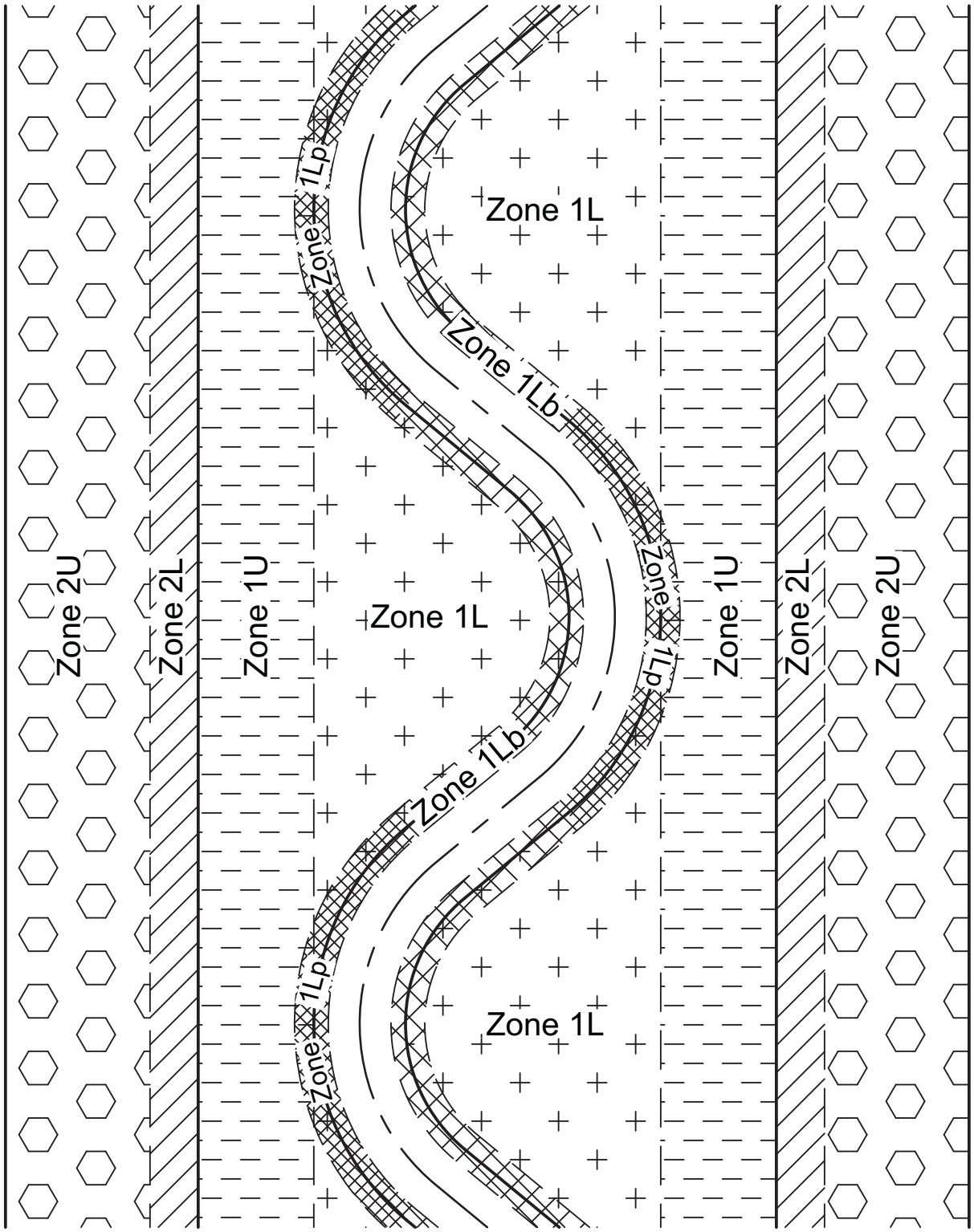
Metric Definitions - Section



Metric Definitions - Plan

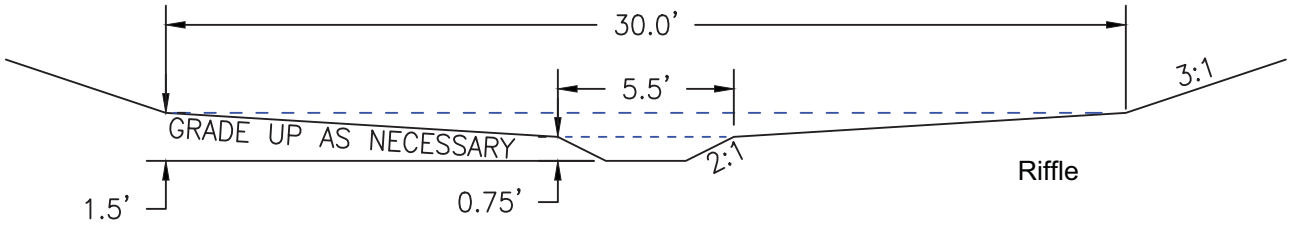


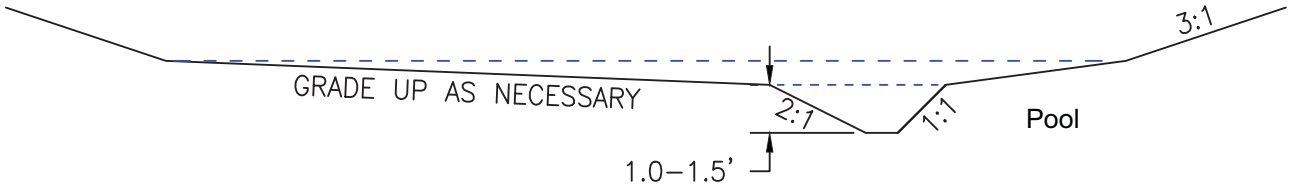
Planting Zones



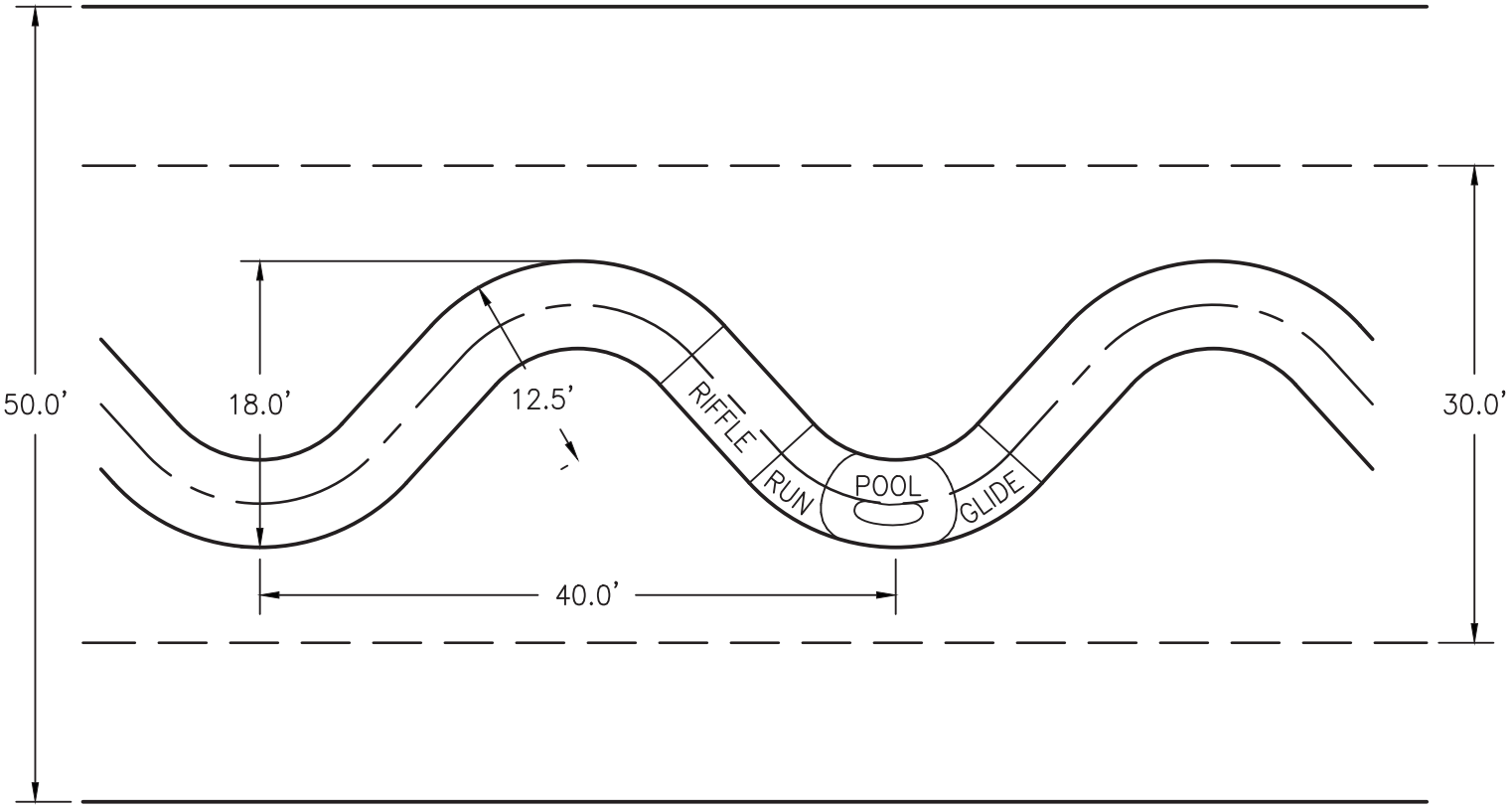
Proposed Stream Metrics

Section

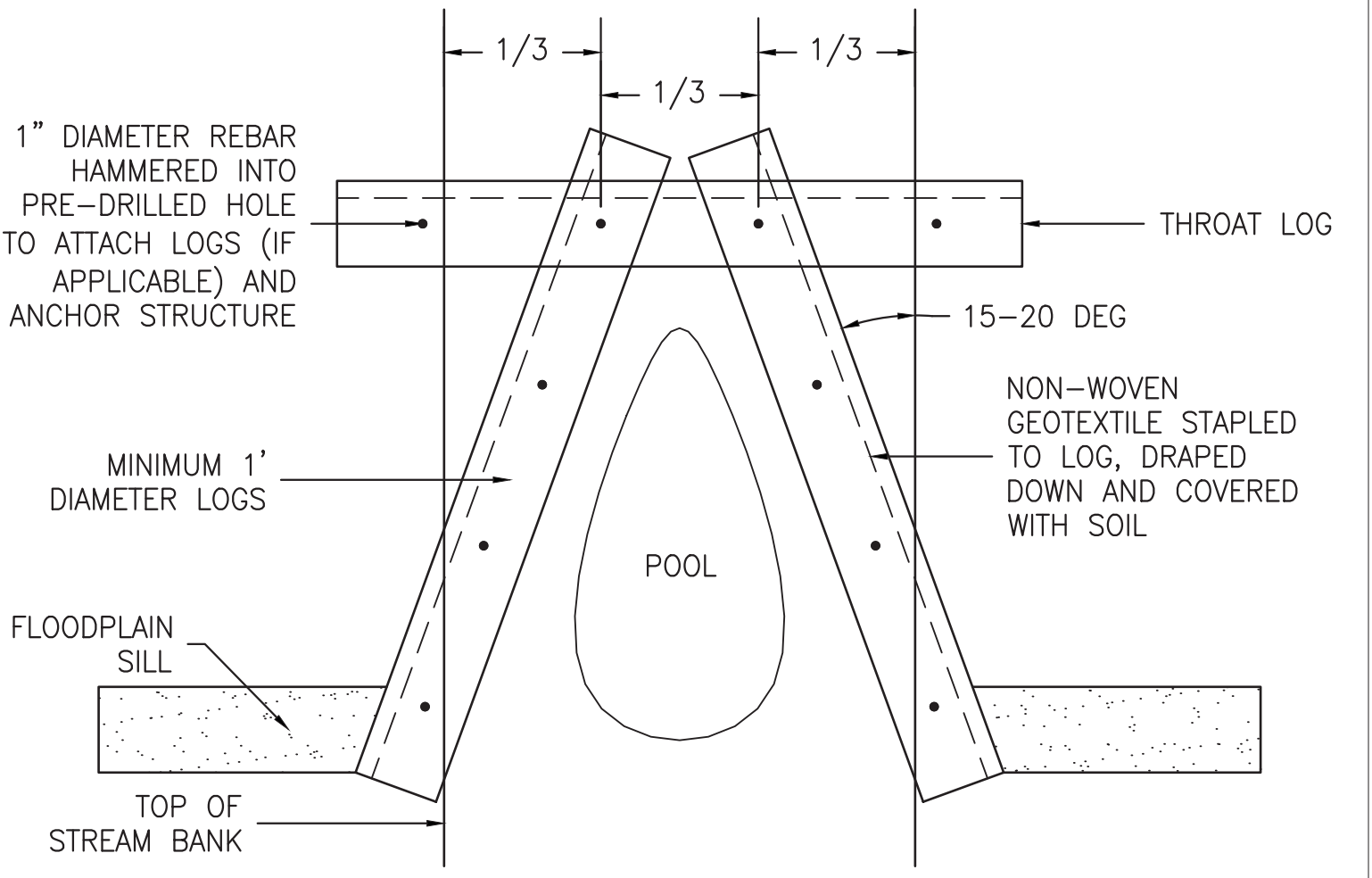


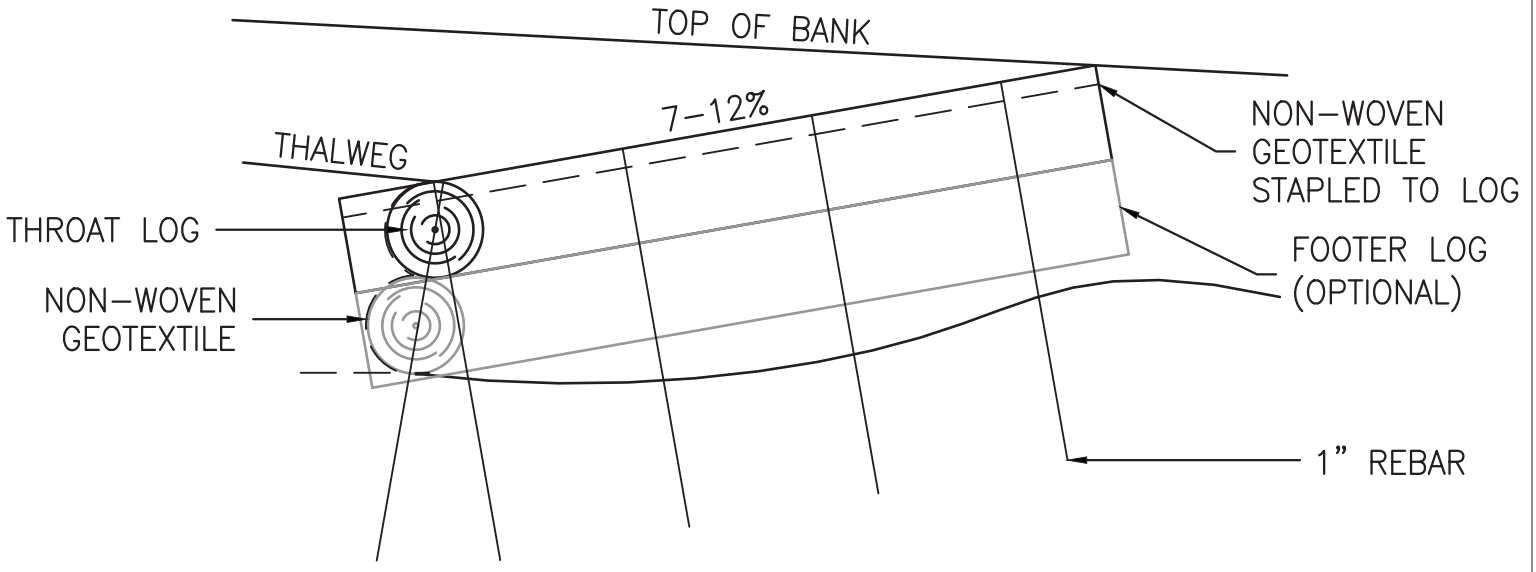


Plan



GENERIC LOG CROSS VANE DETAILS





GENERIC FLOODPLAIN SILL DETAILS

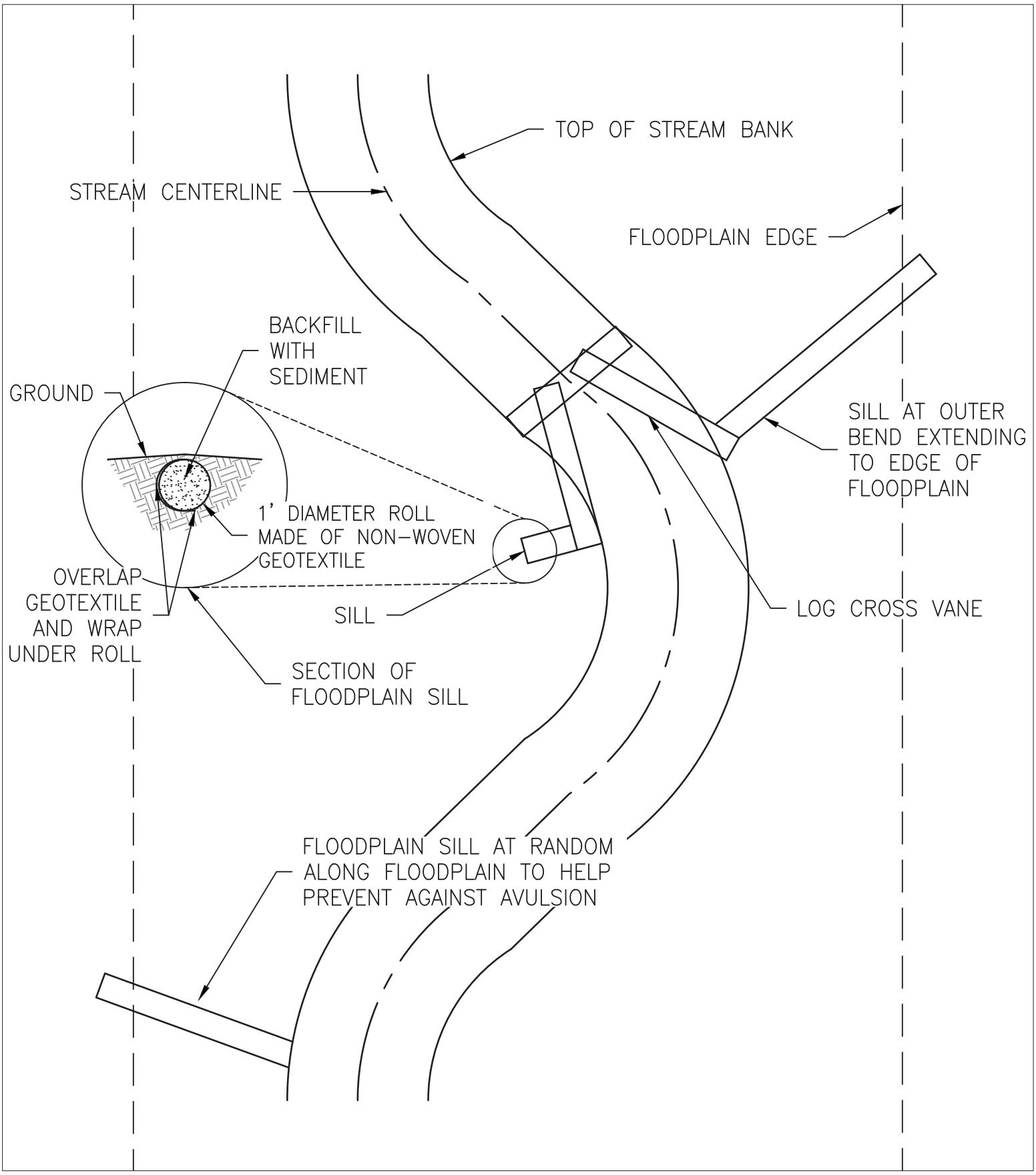


Table A1 – Associated Birds & Mammals, and Food Value	
Species	Wildlife and Food Value
Ryegrass	Temporary stabilization
Bunchberry	Wildlife: sharp-tailed grouse, spruce-grouse, moose Food: fruit, buds
Goldenrod	Wildlife: goldfinch, junco, ruffed grouse, swamp sparrow, butterflies and other insects, cottontail, meadow mice Food: seeds, nectar
Jewelweed	Wildlife: ring-necked pheasant, stuffed grouse, ruby-throated hummingbird, veery, butterflies and insects, white-footed mouse Food: nectar, seeds
Partridgeberry	Wildlife: grouse, mammals Food: berries
Swamp Milkweed	Wildlife: black duck, mallards, red-winged blackbird, ruby-throated hummingbird, monarch butterfly, other butterflies and insects, muskrat Food: nectar, seeds
Tall Meadow Rue	Wildlife: bees, butterflies Food: nectar
Chokecherry	Wildlife: bluebird, brown thrasher, catbird, crow, eastern kingbird, evening grosbeak, orioles, pileated woodpecker, ring-necked pheasant, robin, rose grosbeak, ruffed grouse, thrushes, yellow-bellied sapsucker, rabbit, squirrel Food: berries, buds, foliage
Gray Dogwood	Wildlife: blue jay, cardinal, catbird, cedar warwing, eastern kingbird, finch, flycatcher, grosbeak, hairy woodpecker, northern flicker, phoebe, pileated woodpecker, pine grosbeak, pine warbler, red-bellied woodpecker, ring-necked pheasant, robin, ruffed grouse, starling, swamp sparrow, tufted titmouse, veery, vireo, wild turkey, wood duck, wood thrush, woodcock, yellow-bellied sapsucker, chipmunk, deer, red fox, rabbit, squirrel Food: berries, twigs
Hobblebush	Wildlife: brown thrasher, cardinal, cedar warwing, evening grosbeak, robin Food: fruit
Lowbush Blueberry	Wildlife: blue jay, grouse, kingbird, oriole, robin, tangers, woodpeckers, squirrel Food: berries, foliage, twigs
Pussy Willow	Wildlife: American goldfinch, ruffed grouse, beaver, hare, rabbits, squirrel Food: buds, catkins, twigs, bark

Table A1 – Associated Birds & Mammals, and Food Value (cont.)	
Raspberry	Wildlife: songbirds and mammals Food: fruits
Red Osier Dogwood	Wildlife: bluebird, brown thrasher, cardinal, catbird, cedar waxwing, downy woodpecker, eastern kingbird, finches, northern flicker, pine warbler, purple finch, ringed-neck pheasant, ruffed grouse, vireo, wild turkey, woodpeckers, wood duck, chipmunk, deer, rabbit, squirrel Food: berries, twigs
Silky Dogwood	Wildlife: baltimore oriole, black-capped chickadee, blue jay, brown thrasher, cardinal, catbird, cedar waxwing, downy woodpecker, eastern kingbird, flycatcher, mockingbird, northern flicker, pine warbler, purple finch, red-bellied woodpecker, ringed-neck pheasant, robin, rose-breasted grosbeak, ruffed grouse, song sparrow, starlings, tufted-titmouse, wild turkey, wood duck, wood thrush, veery, chipmunk, deer, rabbit, raccoon, skunk, squirrel, white-footed mouse Food: buds, twigs, bark, leaves
Speckled Alder	Wildlife: alder flycatcher, catbird, goldfinch, mallards, pheasant, pine siskin, red-winged blackbird, ruffed grouse, swamp sparrow, yellow-bellied flycatcher, woodcock, bear, beaver, deer, cottontail, moose, muskrat, snowshoe hare Food: buds, twigs, bark, leaves
Witch Hazel	Wildlife: cardinal, ring-necked pheasant, ruffed grouse, wild turkey, deer, squirrels Food: seeds, buds, twigs, bark
Black Willow	Wildlife: songbirds and mammals Food: buds, catkins
Black Cherry	Wildlife: bluebird, blue jay, brown thrasher, cardinal, catbird, cedar waxwing, common crow, eastern kingbird, evening grosbeak, mockingbird, northern flicker, northern oriole, robin, ruffed grouse, sparrows, thrushes, veery, vireo, yellow-bellied sapsucker, bear, chipmunk, deer, fox, raccoon, squirrel Food: berries, buds, sap
Red Maple	Wildlife: cardinal, chickadee, evening and pine grosbeaks, finches, robin, yellow-bellied sapsucker, beaver, chipmunk, deer, opossum, squirrel, snowshoe hare Food: seeds, buds, bark, twigs, sap
White Oak	Wildlife: blue jay, brown thrasher, nuthatch, quail, ruffed grouse, towhee, wild turkey, wood duck, woodpecker, chipmunk, bear, deer, gopher, opossum, raccoon, squirrel Food: acorns
White Ash	Wildlife: finches, grosbeaks, red-winged blackbird, wood duck, deer, squirrel Food: seeds, foliage

Habitat Assessment Field Data Sheet
Low Gradient Streams

Stream Name	
Station #_____ Rivermile _____	
Lat _____ Long _____	
Storet #	
Form Completed By	Date _____ Time _____ AM PM

Habit Parameter				
1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover, mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30 - 50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10 - 30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	
2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	
3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	

4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% (<20% for low-gradient streams) of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% (20-50% for low-gradient) of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% (50%-80% for low-gradient) of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% (80% for low-gradient) of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
7.Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note-channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.	The bends in the stream length 2 to 3 times longer than if it was in a straight line.	The bends in the stream increase the stream length 2 to 1 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
8. Bank Stability (score each bank)	Banks stable: evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

9. Vegetative Protection (score each bank) Note: determine left or right side by facing downstream.	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clearcuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE ____ (LB)	Left Bank 10 9	8 7 6	5 4 3	2 1 0
SCORE ____ (RB)	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Hodgson Brook Field Data Sheet

Customized from the Volunteer River Assessment Program - Hodgson Brook Field Data Sheet, published by NH DES

Date: Start Time: End Time:

Kit #: Data Collected By:

Initial Turbidity Calibration Value: Time Dissolved Oxygen Meter Turned On:

Initial Conductivity Calibration Value (175-225 µS): Time of First Dissolved Oxygen Calibration:

Loca-tion Code	Location Name	Time Sampled (HH:MM)	Turbidity (NTU)	pH Cal. Slope ("SLP" = 92-102%)	pH (std. units)	Water Temp (°C)	Dissolved Oxygen Cal. (96-100%)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% sat.)	Dissolved Oxygen (% sat. in chamber)	Air Temp (°C)	Specific Conductance (µS)

Zero Oxygen Reading (mg/L): (% sat.): Station: Time:

6.0 pH Buffer Reading (5.8-6.3): Station: Time:

DI Blank Turbidity Reading: Station: Time:

Hodgson Brook Field Data Sheet

Weather Condition:

Current Weather (circle one) Clear Partly Cloudy Overcast Foggy Hazy Showers Downpour Snow Other: _____

Describle the past three days' local weather (days prior): 1: _____ 2: _____ 3: _____

Sampling Preparation Checklist (check if complete): _____

Scribe: _____

Check Maintenance Log _____
Fresh Solutions _____
Batteries _____

Post Calibrations: _____
pH Cal. Slope: _____
DO Cal. _____
Turbidity (1.0 std.) _____
Conductivity (200 µS std.) _____

End of the Day (check if completed): _____
All meters dry and off: _____
DO probe in chamber with wet sponge: _____
pH probe upright in storage solution _____
Turbidity sample vial rinsed and filled with DI water _____
Conductivity probe cleaned and in chamber _____
Kit clean of kimwipes, dirt, moisture _____

NOTES:

Indicate Presence of Visual Indicators for Each Sampling Station			
Indicator	Site		
Color			
Algal Bloom			
Foam			
Debris			
Scum			
Slicks			
Odors			
Surface Floating Solids			
Benthic Deposits			

Example Monitoring Locations

