

OFF-SITE WATER & SEWER LINE PLANS

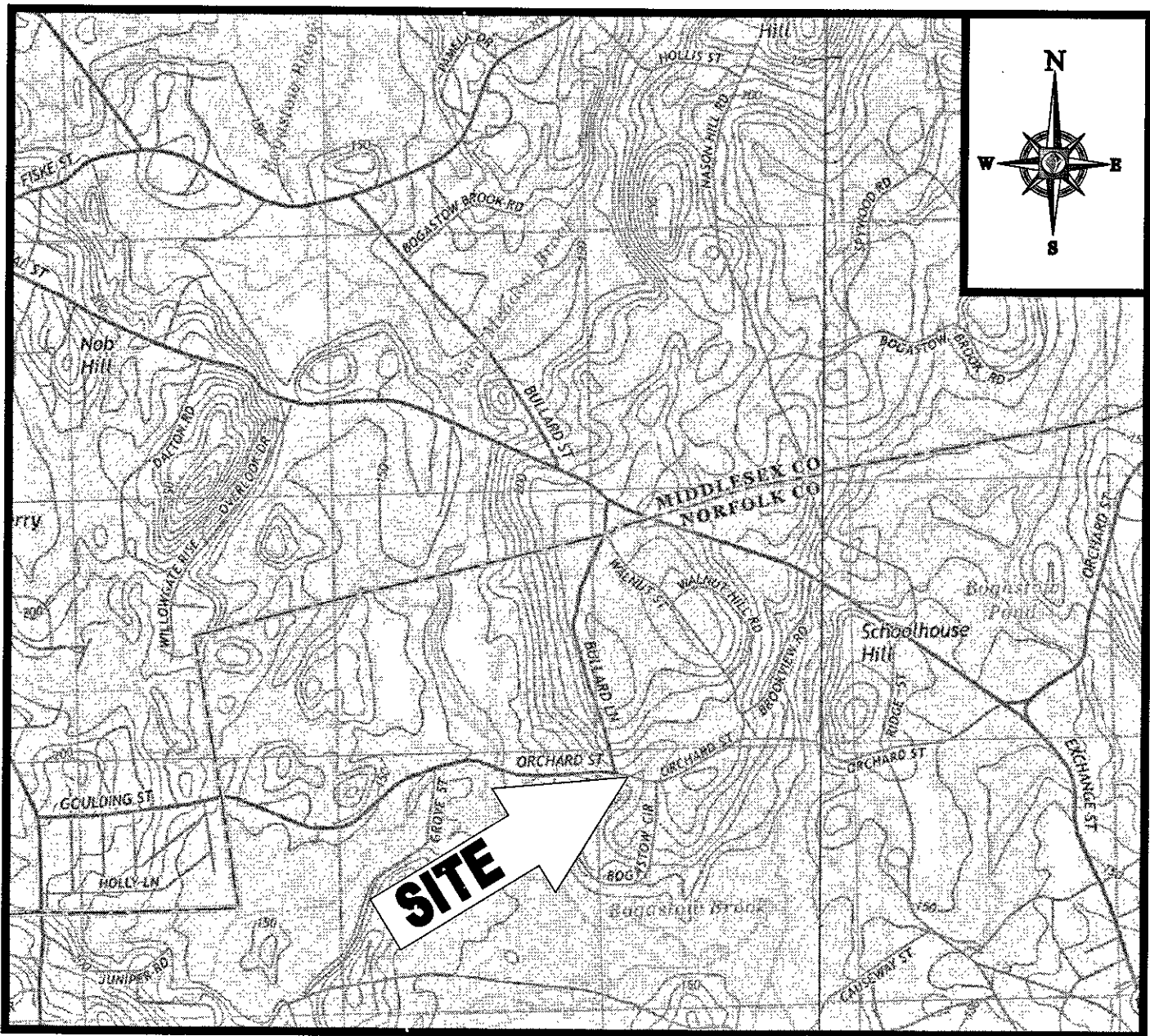
FOR:

TOLL BROTHERS, INC., NEW ENGLAND DIVISION
134 FLANDERS ROAD, SUITE 275
WESTBOROUGH, MA 01581

ORCHARD STREET, MIDDLESEX STREET, & EXCHANGE STREET

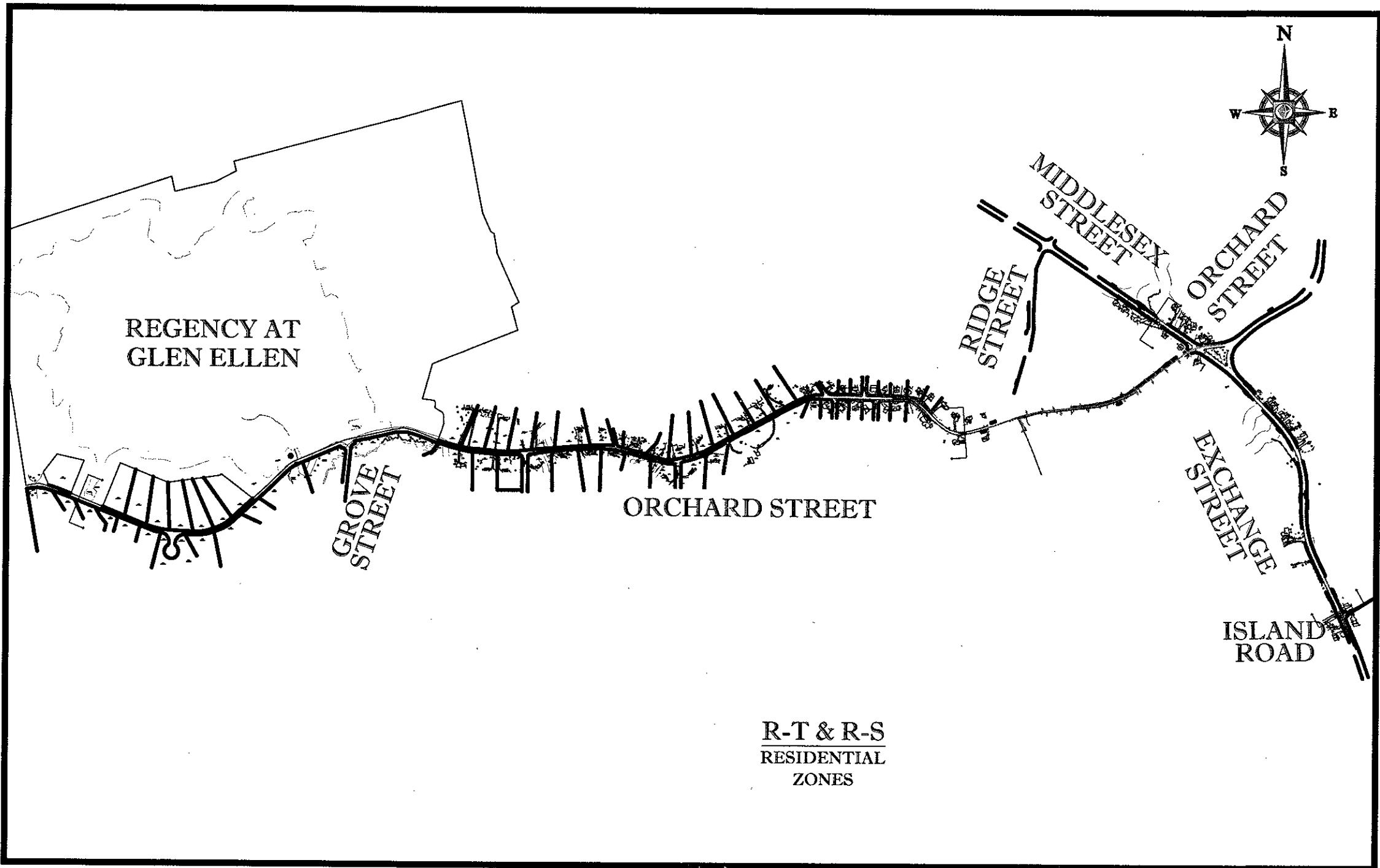
LOCATION OF SITE:

ORCHARD STREET, TOWN OF MILLIS
NORFOLK COUNTY, MASSACHUSETTS



LOCATION MAP

SCALE: 1"=2000'
PLAN REFERENCE: MEDFIELD, MASSACHUSETTS USGS QUADRANGLE



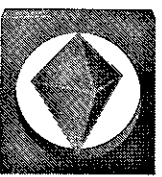
AREA PLAN

SCALE: 1"=750'

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PREPARED BY



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SITE CIVIL AND CONSULTING ENGINEERING

LAND SURVEYING PROGRAM MANAGEMENT LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN TRANSPORTATION PLANNING SERVICES

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• URBAN NEW YORK
• SOUTH EASTERN, PA
• BALTIMORE, MD
• NEW YORK, NY
• PHILADELPHIA, PA

SOUTHEAST
• ATLANTA, GA
• TAMPA, FL
• SOUTH FLORIDA

WEST COAST
• LOS ANGELES, CA
• SAN FRANCISCO, CA
• SEATTLE, WA
• PORTLAND, OR
• DENVER, CO
• CHICAGO, IL
• MINNEAPOLIS, MN
• ST. LOUIS, MO
• KANSAS CITY, MO
• COLUMBIA, SC
• JACKSONVILLE, FL
• MIAMI, FL
• HOUSTON, TX
• DALLAS, TX
• AUSTIN, TX
• SAN ANTONIO, TX
• FORT WORTH, TX
• EL PASO, TX
• PHOENIX, AZ
• TUCSON, AZ
• ALBUQUERQUE, NM
• SALT LAKE CITY, UT
• DENVER, CO
• BOULDER, CO
• COLORADO SPRINGS, CO
• FORT COLLINS, CO
• GREELEY, CO
• WYOMING
• MONTANA
• IDAHO
• WASHINGTON
• OREGON
• CALIFORNIA
• NEVADA
• ARIZONA
• NEW MEXICO
• TEXAS
• OKLAHOMA
• KANSAS
• MISSOURI
• ILLINOIS
• INDIANA
• OHIO
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• MARYLAND
• VIRGINIA
• NORTH CAROLINA
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• LOUISIANA
• MISSISSIPPI
• ARKANSAS
• TENNESSEE
• ALABAMA
• LOUISIANA
• MISSISSIPPI
• ARKANSAS
• TENNESSEE

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PERMIT SET

PROJECT No.: W161041
DRAWN BY: MMA
CHECKED BY: JTA/T
DATE: 09/14/2017
SCALE: AS NOTED
CAD I.D.: W161041 SS2 - SEWER

OFF-SITE SEWER LINE PLANS

FOR
TOLL BROS., INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

BOHLER ENGINEERING

352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
Phone: (508) 480-9900
Fax: (508) 480-9080
www.BohlerEngineering.com

W.D. GOEBEL

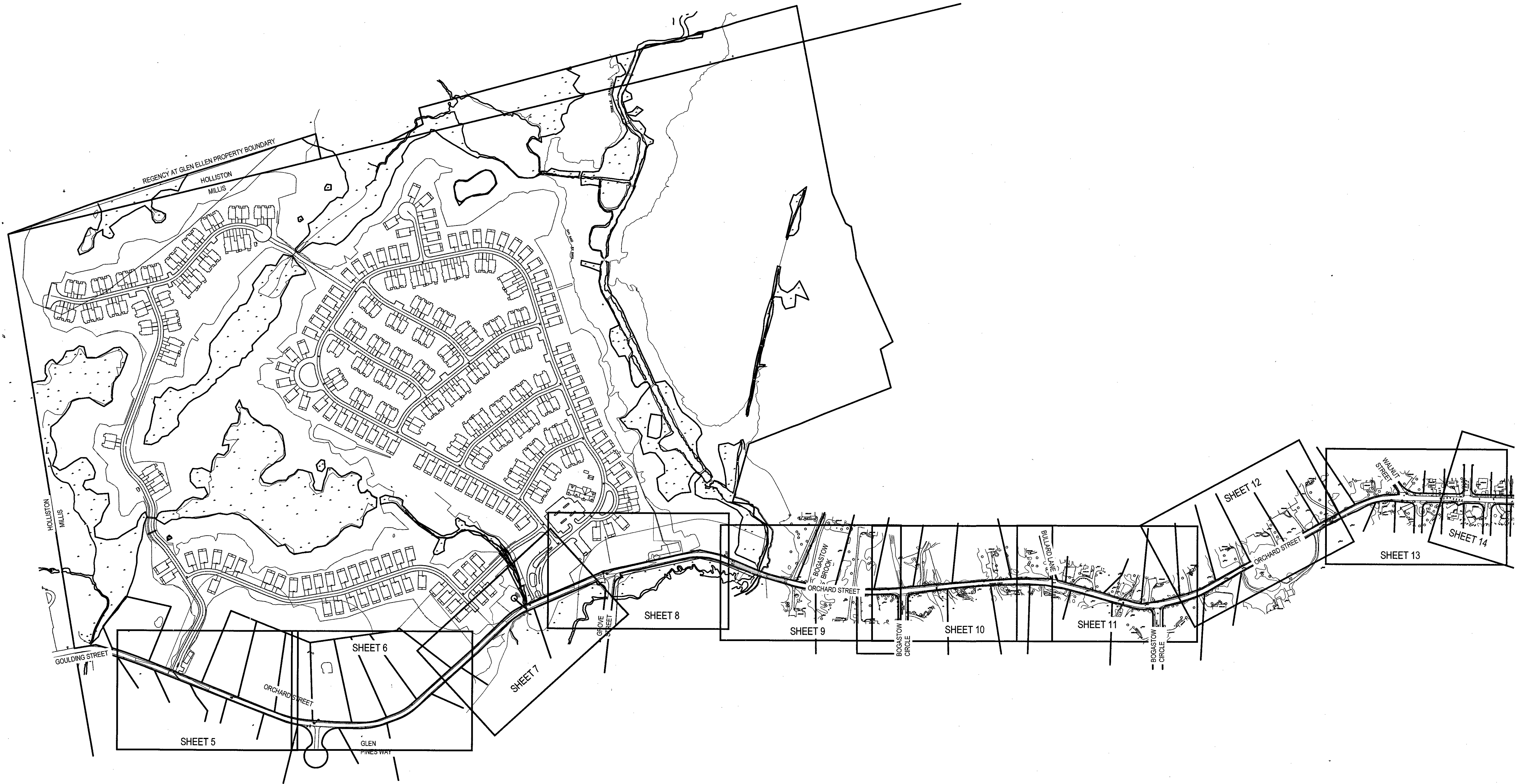
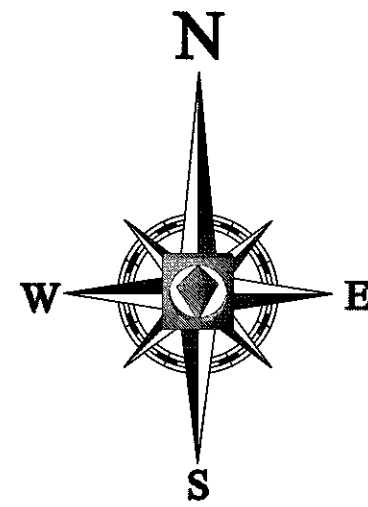
PROFESSIONAL ENGINEER

MASSACHUSETTS REG. NO. 15444-C
NEW ENGLAND REG. NO. 15444-C
NEW YORK REG. NO. 15444-C
FLORIDA REG. NO. 15444-C

COVER SHEET

SHEET NUMBER:
1
OF 27

REV 2 - 9/11/2017



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Know what's below.
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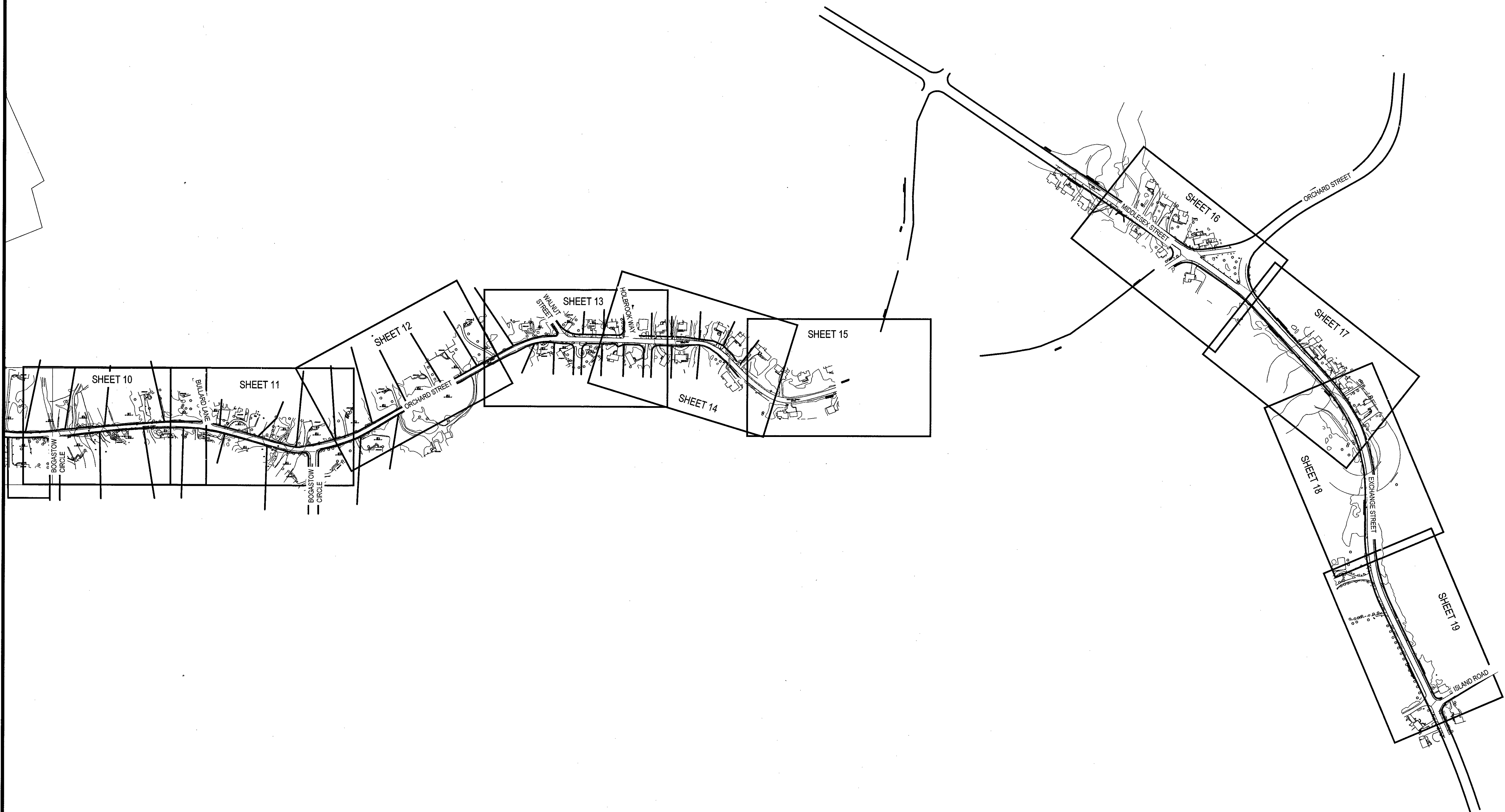
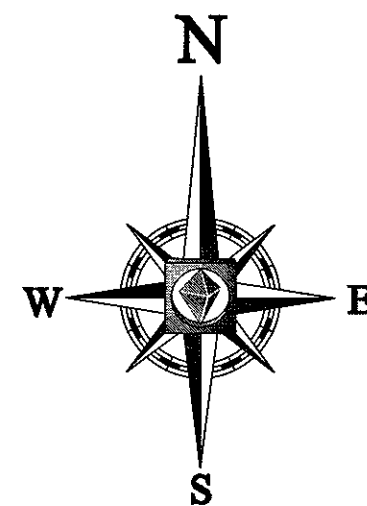
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CAD L.D.: W161041, SS2 - SEWER

PROJECT:
OFF-SITE SEWER LINE PLANS
FOR
TOLL BROS., INC.
LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

BOHLER ENGINEERING
352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
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NEW HAMPSHIRE LICENSE No. 10298
MAINE LICENSE No. 6490
NEW YORK LICENSE No. 071284-1
FLORIDA LICENSE No. 66202

SHEET TITLE:
INDEX PLAN A
SHEET NUMBER:
3 OF 27
REV 2 - 8/11/2017



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SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING PROGRAM MANAGEMENT LANDSCAPE ARCHITECTURE
SUSTAINABLE DESIGN TRANSPORTATION PLANNING
TRANSPORTATION DESIGN

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NORFOLK, VA • PHILADELPHIA, PA • RICHMOND, VA
SAN ANTONIO, TX • TAMPA, FL • WASHINGTON, DC

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PERMIT SET

PROJECT No.: W161041
DRAWN BY: MMA
CHECKED BY: JTAFT
DATE: 08/14/2017
SCALE: AS NOTED
CAD L.D.: W161041 SS2 - SEWER

OFF-SITE SEWER LINE PLANS

FOR

TOLL BROS., INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

BOHLER ENGINEERING

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SOUTHBOROUGH, MA 01772
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NEW HAMPSHIRE LICENSE NO. 10280
NEW YORK LICENSE NO. 071284-L
FLORIDA LICENSE NO. 66202

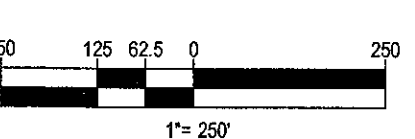
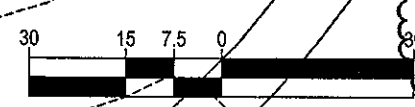
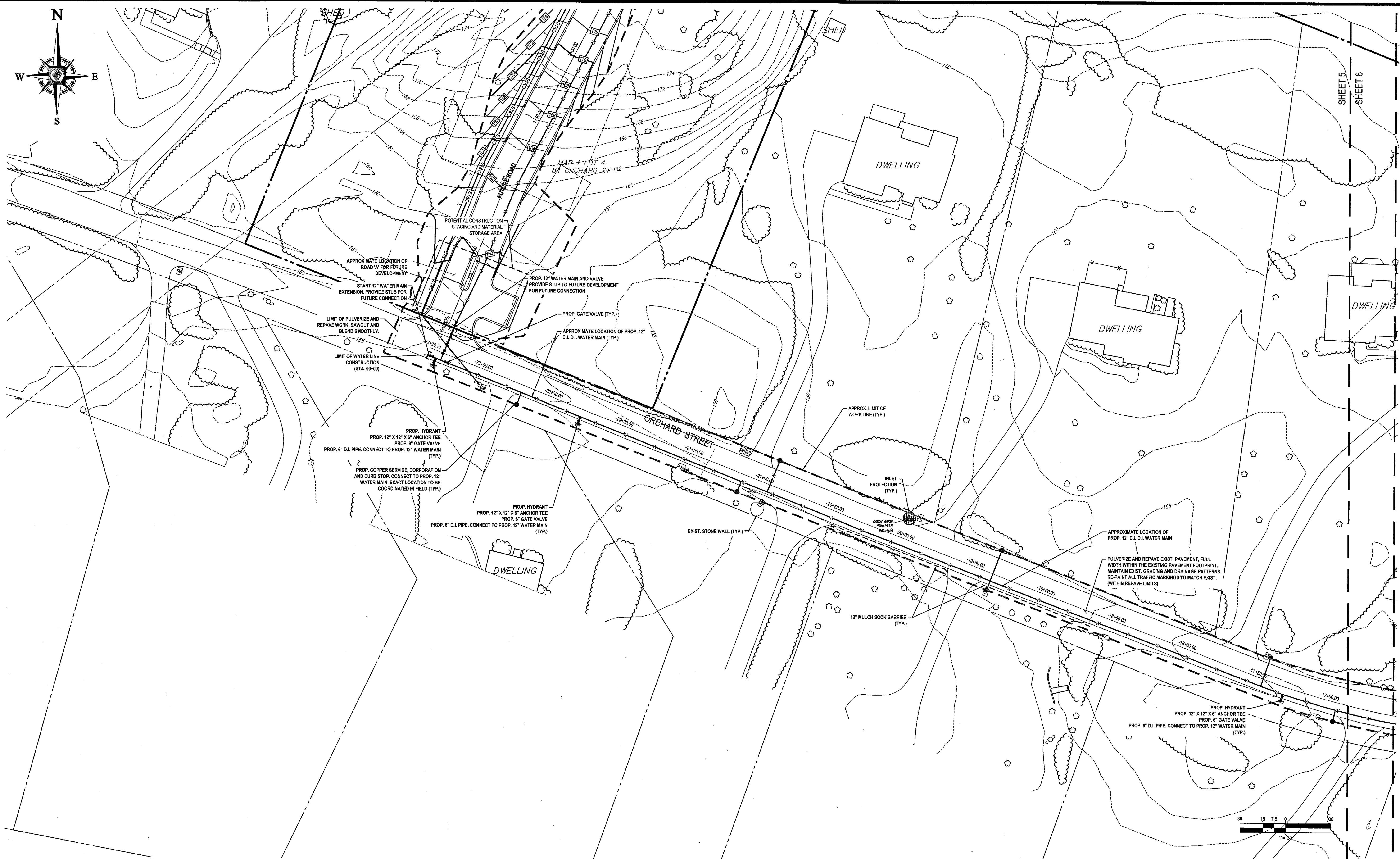
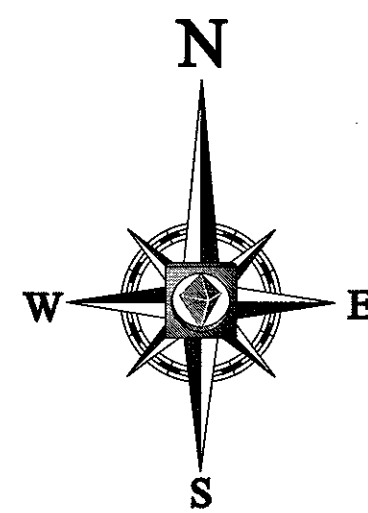
SHEET TITLE:

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SHEET NUMBER:

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REV 2 - 8/11/2017



DUE TO PRIVATE PROPERTY ACCESS RESTRICTIONS, WETLAND RESOURCE AREA BOUNDARIES ARE APPROXIMATED BASED ON FIELD OBSERVATIONS FROM ROADWAYS AND REVIEW OF MAPPING RESOURCES.

ALL WORK TO BE COORDINATED WITH THE TOWN OF MILLIS DPW

ALL PROPOSED SERVICES SHALL BE LOCATED WITH MINIMUM IMPACT TO EXISTING STONE WALLS AND TREES.

CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING THE SIZE, MATERIAL, AND LOCATION OF EXISTING SERVICES

LOCATE EXISTING INFRASTRUCTURE AND WATER SERVICES, AND REPLACE AND CONNECT TO NEW WATER MAIN. IF EXISTING INFRASTRUCTURE AND SERVICES DO NOT EXIST, PROVIDE NEW INFRASTRUCTURE AND SERVICES TO NEW WATER MAIN

THIS PLAN TO BE UTILIZED FOR UTILITIES PURPOSES ONLY

REFER TO GENERAL NOTES SHEET FOR GRADING & UTILITY NOTES

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LAND SURVEYING PROGRAM MANAGEMENT LANDSCAPE ARCHITECTURE
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NEW JERSEY, NJ
NEW ENGLAND
SOUTHEASTERN, PA
SOUTHERN, MD
BALTIMORE, MD
NEW YORK, NY
PHILADELPHIA, PA
CENTRAL, VA

CHARLOTTE, NC
ATLANTA, GA
TAMPA, FL
SOUTH FLORIDA

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PERMIT SET

PROJECT No.: W161041
DRAWN BY: MMA
CHECKED BY: JT/AFT
DATE: 08/14/2017
SCALE: AS NOTED
CAD I.D.: W161041_SS2 - SEWER

PROJECT:
OFF-SITE SEWER LINE PLANS
FOR
TOLL BROS., INC.
LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

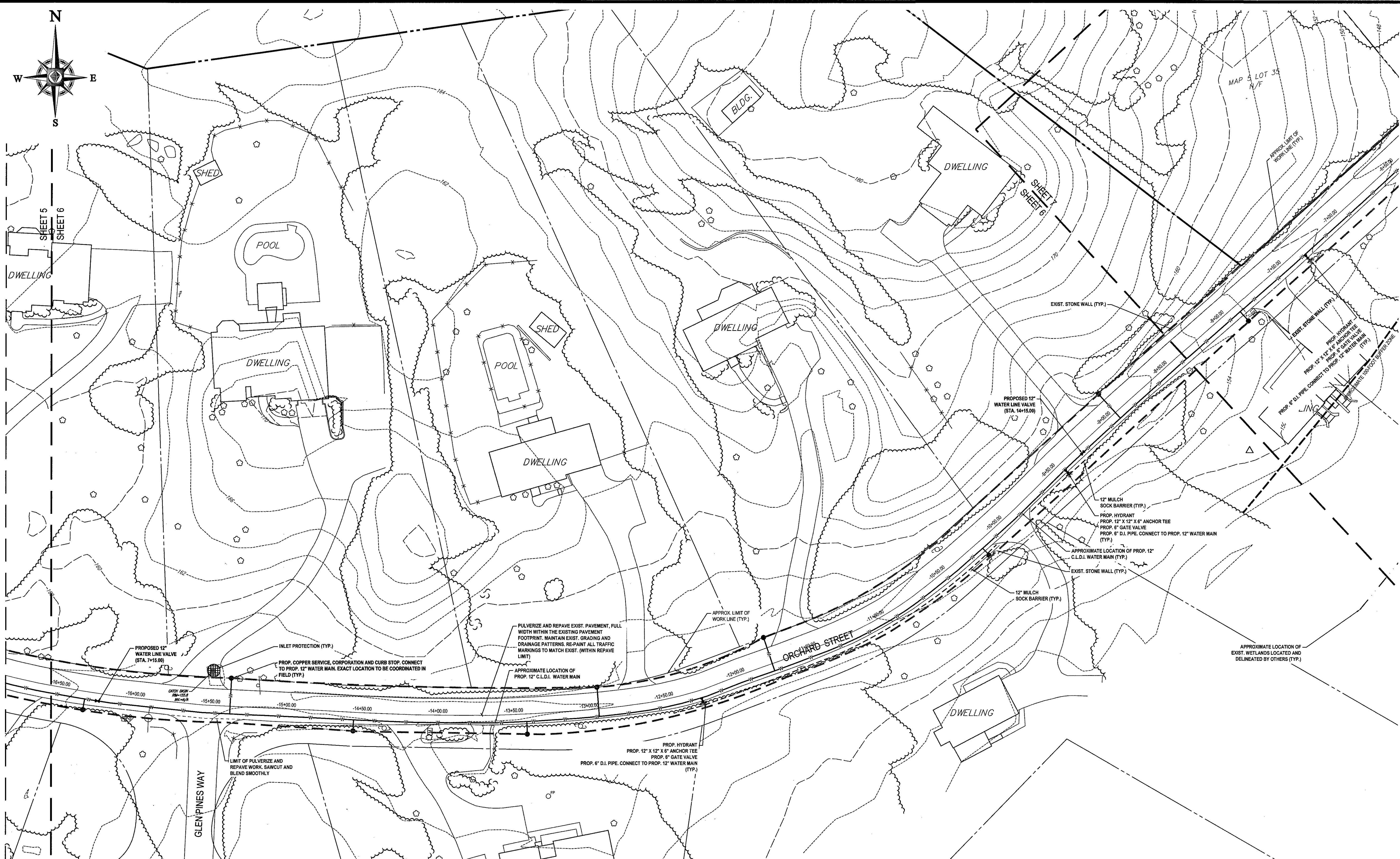
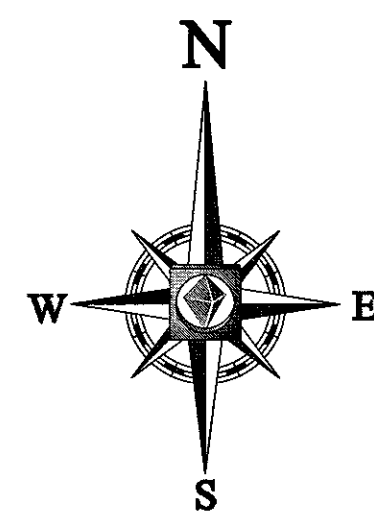
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W.D. GOEBEL

PROFESSIONAL ENGINEER
MASSACHUSETTS LICENSE NO. 1244-C
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MAINE LICENSE NO. 6490
NEW YORK LICENSE NO. 071284-1
FLORIDA LICENSE NO. 66202

SHEET TITLE:
ORCHARD ST. SEWER MAIN LAYOUT PLAN
SHEET NUMBER:
5
OF 27
REV 2 - 8/11/2017



DUE TO PRIVATE PROPERTY ACCESS RESTRICTIONS, WETLAND RESOURCE AREA BOUNDARIES ARE APPROXIMATED BASED ON FIELD OBSERVATIONS FROM ROADWAYS AND REVIEW OF MAPPING RESOURCES.

ALL WORK TO BE COORDINATED WITH THE TOWN OF MILLIS DPW

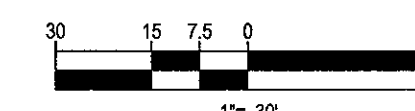
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THIS PLAN TO BE UTILIZED FOR UTILITIES PURPOSES ONLY

REFER TO GENERAL NOTES SHEET FOR GRADING & UTILITY NOTES



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SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEYING PROGRAM MANAGEMENT LANDSCAPE ARCHITECTURE
INSTALLATION OF SEWER LINES AND PIPES
TRANSPORTATION SERVICES

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NEW JERSEY, NJ
NEW HAMPSHIRE, NH
MASSACHUSETTS, MA
CONNECTICUT, CT
RHODE ISLAND, RI
PENNSYLVANIA, PA
DELAWARE, DE
MARYLAND, MD
VIRGINIA, VA
NORTH CAROLINA, NC
SOUTH CAROLINA, SC
GEORGIA, GA
FLORIDA, FL

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PERMIT SET

PROJECT NO.: W161041
DRAWN BY: MMA
CHECKED BY: JTAFT
DATE: 06/14/2017
SCALE: AS NOTED
CAD I.D.: W161041 SS2 - SEWER

PROJECT:
OFF-SITE SEWER LINE PLANS

FOR
TOLL BROS., INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

BOHLER ENGINEERING

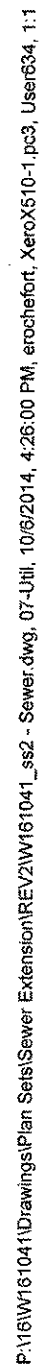
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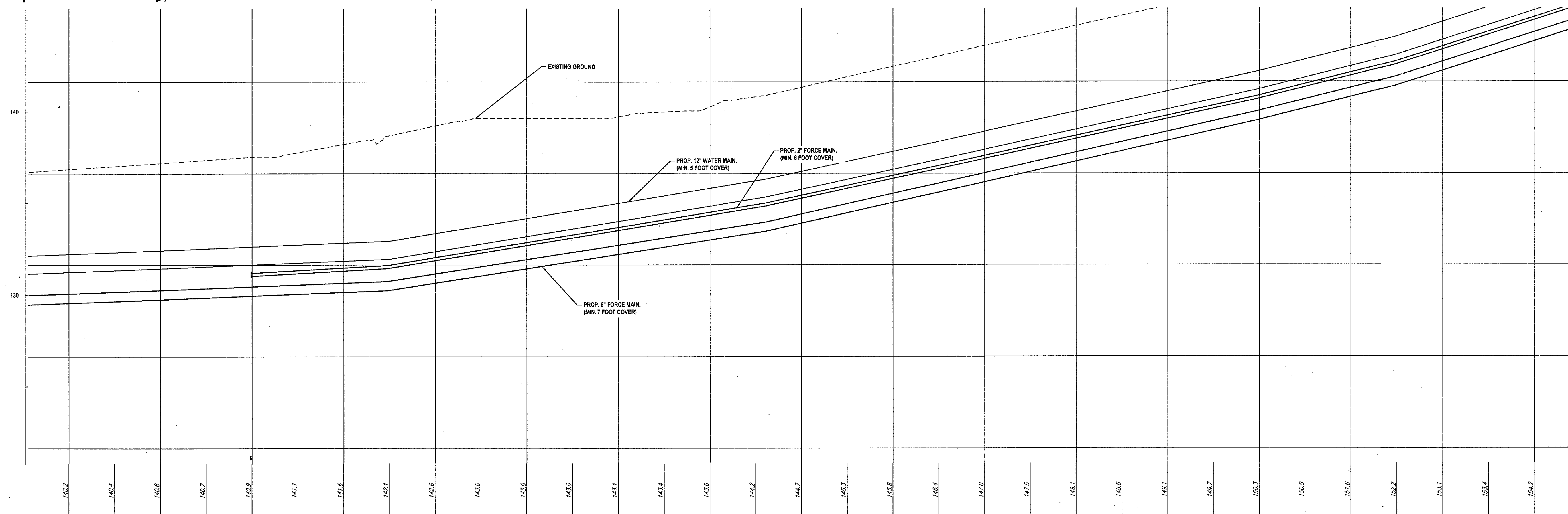
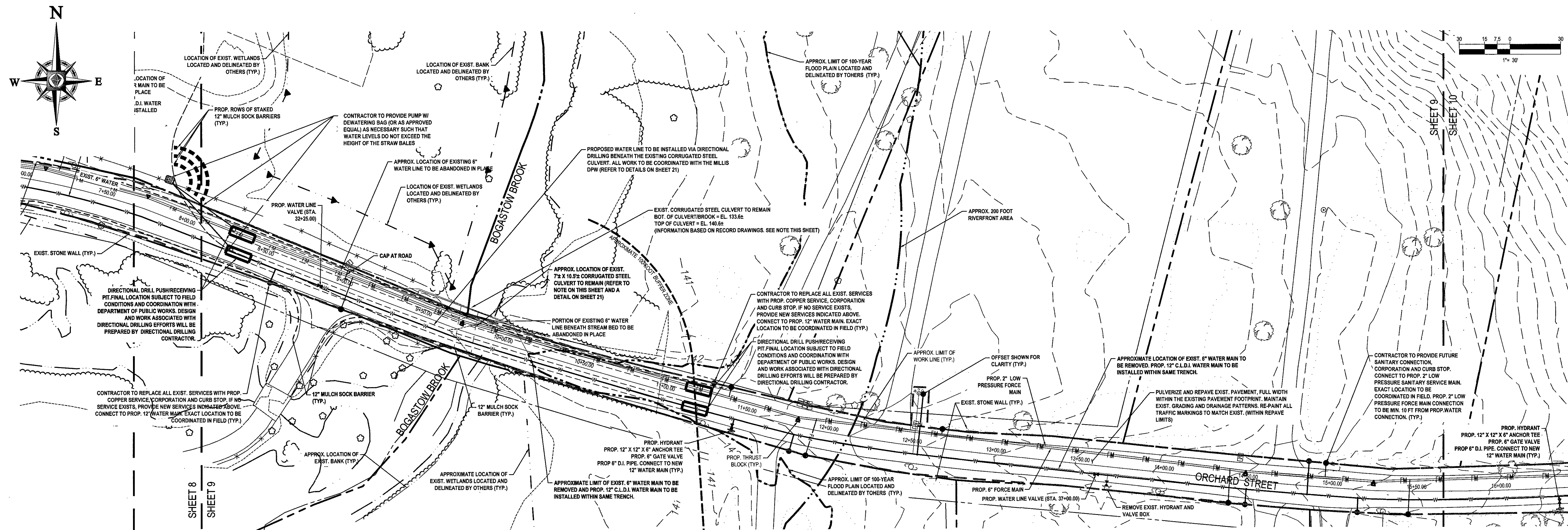
PROFESSIONAL ENGINEER
MASSACHUSETTS
LICENSE NO. 12184
NEW HAMPSHIRE LICENSE NO. 9490
NEW YORK LICENSE NO. 031254-1
FLORIDA LICENSE NO. 66302

SHEET TITLE:
ORCHARD ST. SEWER MAIN LAYOUT PLAN

SHEET NUMBER:
6
OF 27



REV 2 - 8/11/2017



DUE TO PRIVATE PROPERTY ACCESS
RESTRICTIONS, WETLAND RESOURCE
AREA BOUNDARIES ARE
APPROXIMATED BASED ON FIELD
OBSERVATIONS FROM ROADWAYS AND
REVIEW OF MAPPING RESOURCES.

ALL WORK TO BE
COORDINATED WITH THE
TOWN OF MILLIS DPW

**ALL PROPOSED SERVICES
SHALL BE LOCATED WITH
MINIMUM IMPACT TO EXISTING
STONE WALLS AND TREES.**

CONTRACTOR SHALL BE RESPONSIBLE FOR
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LOCATE EXISTING INFRASTRUCTURE AND
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REFER TO GENERAL NOTES SHEET
FOR GRADING & UTILITY NOTES

REVISIONS

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PERMIT
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PROJECT No.:	W161041
DRAWN BY:	MMA
CHECKED BY:	JT/AFT
DATE:	06/14/2017
SCALE:	AS NOTED
CAD I.D.:	W161041 SS2 - SEWER

PROJECT:
**OFF- SITE SEWER
LINE PLANS**

—FOR—
TOLL BROS.,
INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS


BOHLER
ENGINEERING

352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
Phone: (508) 480-9900
Fax: (508) 480-9080
www.BohlerEngineering.com

W.D. GOEBEL

COMMONWEALTH OF MASSACHUSETTS

WILLIAM D. GOEBEL

PROFESSIONAL ENGINEER

MASSACHUSETTS LICENSE NO. 42244-C

RIDGE ISLAND LICENSE NO. 1288

CONNECTICUT LICENSE NO. 1854

NEW HAMPSHIRE LICENSE NO. 10280

MAINE LICENSE NO. 9490

NEW YORK LICENSE NO. 071264-1

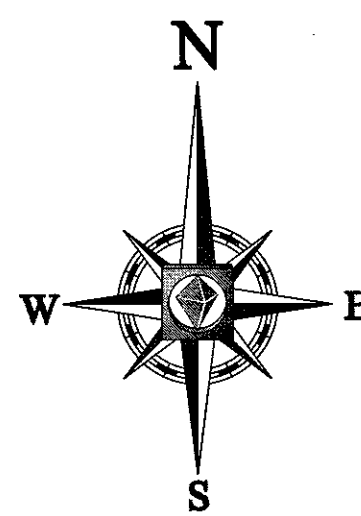
FLORIDA LICENSE NO. 56202

SHEET TITLE:

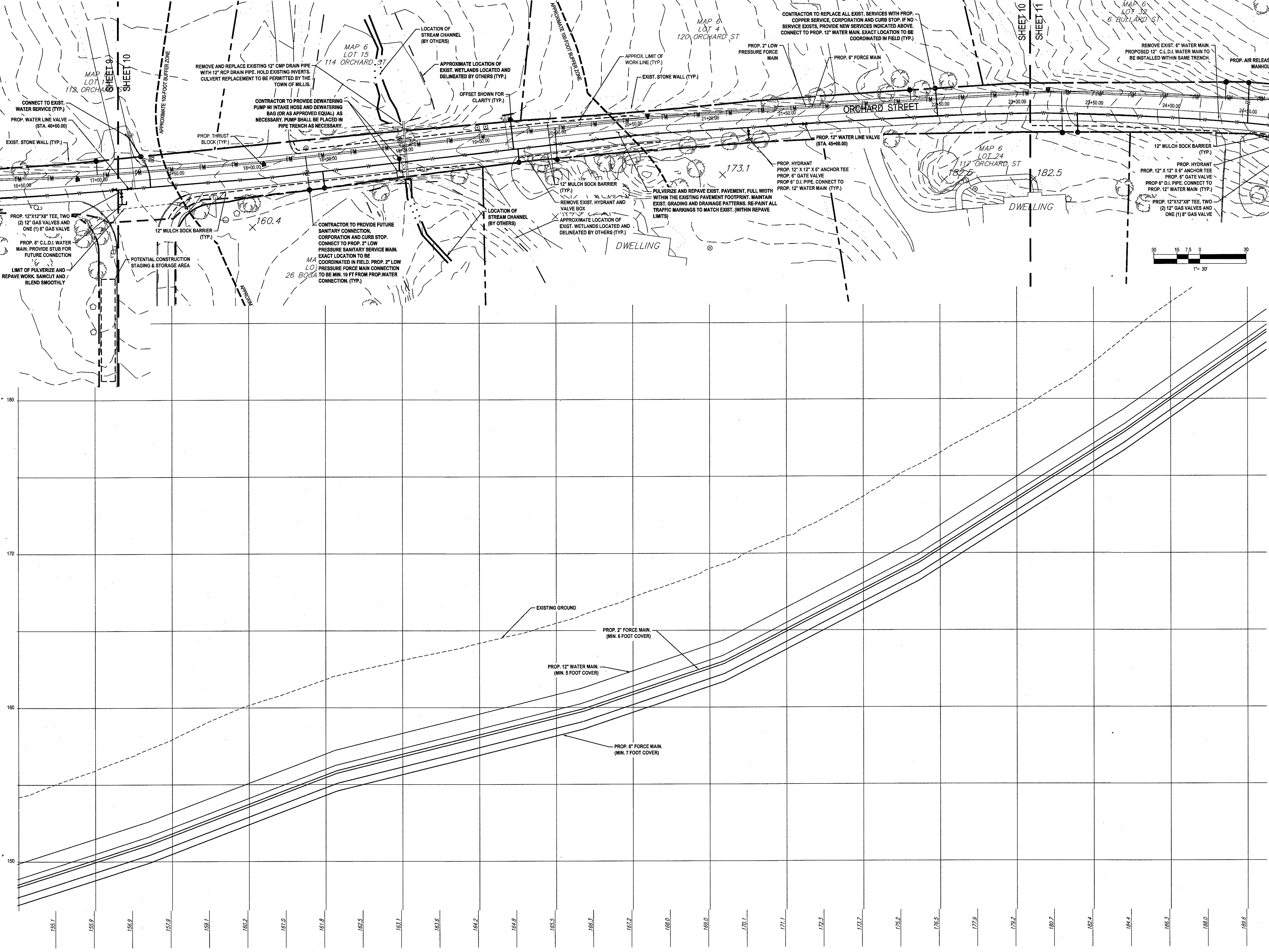
ORCHARD ST.
SEWER MAIN
LAYOUT PLAN

SHEET NUMBER:
9
OF 27

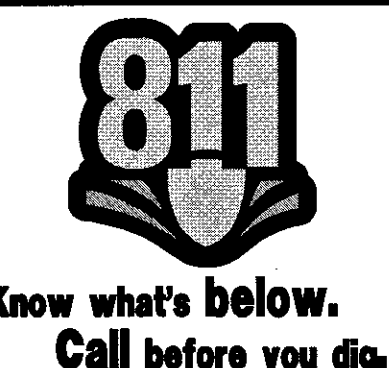
REV 2 - 8/11/2017



MAP 6 LOT 27
109 ORCHARD ST



ALL PROPOSED SERVICES SHALL BE LOCATED WITH MINIMUM IMPACT TO EXISTING STONE WALLS AND TREES.



CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING THE SIZE, MATERIAL AND LOCATION OF EXISTING SERVICES

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BOHLER ENGINEERING

SITE CIVIL AND CONSULTING ENGINEERING
LAND SURVEY DESIGN PROGRAMS LANDSCAPE ARCHITECTURE
SUBMITTALS PERMITS LANDSCAPE ARCHITECTURE
TRANSPORTATION SERVICES TRANSPORTATION SERVICES
TRANSPORTATION SERVICES TRANSPORTATION SERVICES

NEW YORK, NY
NEW JERSEY, NJ
NEW HAMPSHIRE, NH
MASSACHUSETTS, MA
CONNECTICUT, CT
RHODE ISLAND, RI
PENNSYLVANIA, PA
DELAWARE, DE
MARYLAND, MD
VIRGINIA, VA
NORTH CAROLINA, NC
SOUTH CAROLINA, SC
FLORIDA, FL
ALABAMA, AL
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MISSISSIPPI, MS
ARKANSAS, AR
OKLAHOMA, OK
NEBRASKA, NE
KANSAS, KS
MINNESOTA, MN
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INDIANA, IN
OHIO, OH
MICHIGAN, MI
WYOMING, WY
UTAH, UT
ARIZONA, AZ
NEW MEXICO, NM
IDAHO, ID
MONTANA, MT
WYOMING, WY
UTAH, UT
ARIZONA, AZ
NEW MEXICO, NM
IDAHO, ID
MONTANA, MT

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CAD ID: W161041_SS2 - SEWER

OFF-SITE SEWER LINE PLANS

FOR

TOLL BROS., INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

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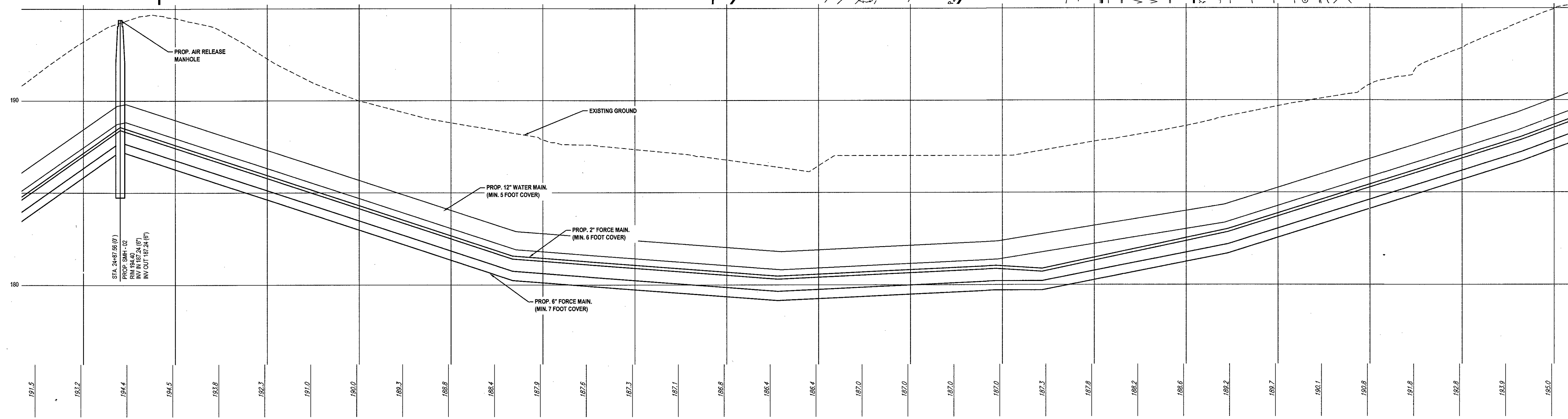
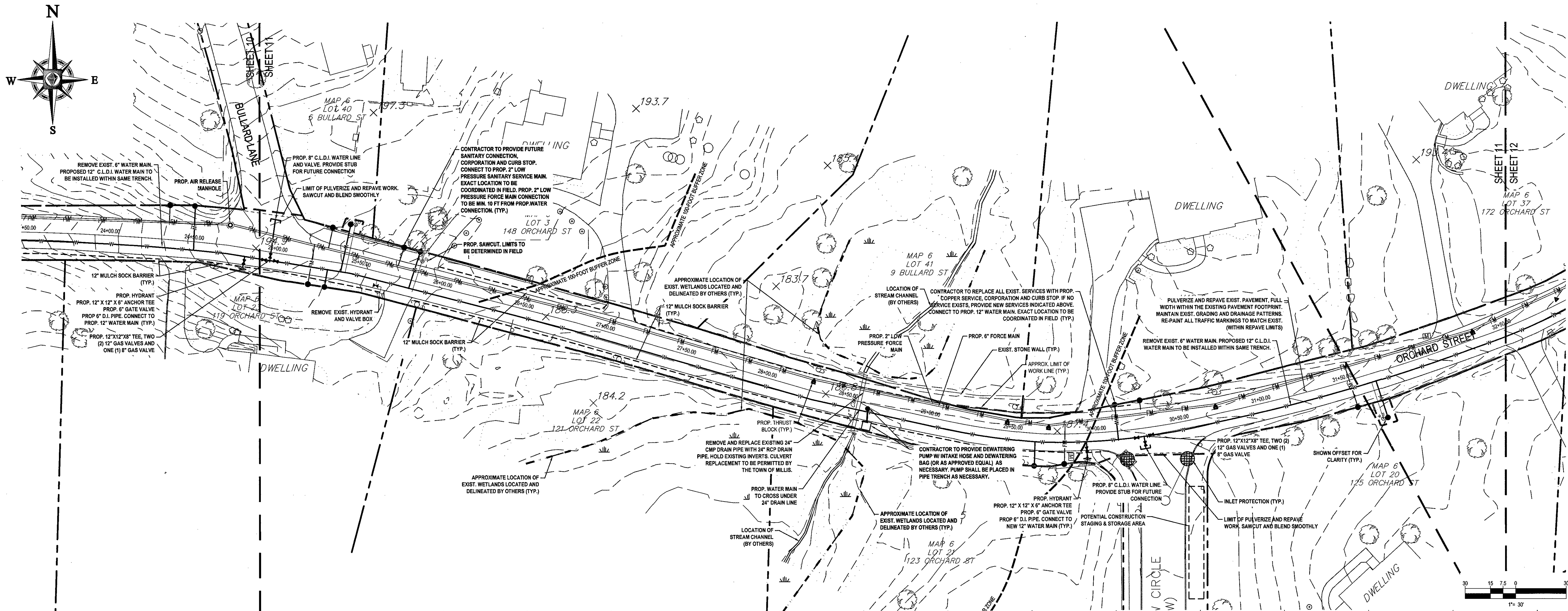
W.D. GOEBEL

PROFESSIONAL ENGINEER
MASSACHUSETTS REG. NO. 12513
NEW HAMPSHIRE REG. NO. 12513
NEW JERSEY REG. NO. 12513
FLORIDA LICENSE NO. 06202

SHEET TITLE:
ORCHARD ST. SEWER MAIN LAYOUT PLAN

SHEET NUMBER:
10
OF 27

REV 2 - 8/11/2017



CONTRACTOR SHALL BE RESPONSIBLE FOR
CONFIRMING THE SIZE, MATERIAL AND
LOCATION OF EXISTING SERVICES

DUE TO PRIVATE PROPERTY ACCESS
RESTRICTIONS, WETLAND RESOURCE
AREA BOUNDARIES ARE
APPROXIMATED BASED ON FIELD
OBSERVATIONS FROM ROADWAYS AND
REVIEW OF MAPPING RESOURCES.

LOCATE EXISTING INFRASTRUCTURE AND
WATER SERVICES, AND REPLACE AND
CONNECT TO NEW WATER MAIN. IF
EXISTING INFRASTRUCTURE AND SERVICES
DO NOT EXIST, PROVIDE NEW
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WATER MAIN

ALL WORK TO BE
COORDINATED WITH THE
TOWN OF MILLIS DPW

ALL PROPOSED SERVICES
SHALL BE LOCATED WITH
MINIMUM IMPACT TO EXISTING
STONE WALLS AND TREES.

THIS PLAN TO BE UTILIZED FOR
UTILITIES PURPOSES ONLY

REFER TO GENERAL NOTES SHEET
FOR GRADING & UTILITY NOTES

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1	08/03/17	REVISIONS PER COMMISSION FEEDBACK	MMA
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PERMIT SET

PROJECT No.: W161041
DRAWN BY: MMA
CHECKED BY: JT/AF
DATE: 06/14/2017
SCALE: AS NOTED
CAD I.D.: W161041 SS2 - SEWER

OFF-SITE SEWER LINE PLANS

FOR
TOLL BROS., INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
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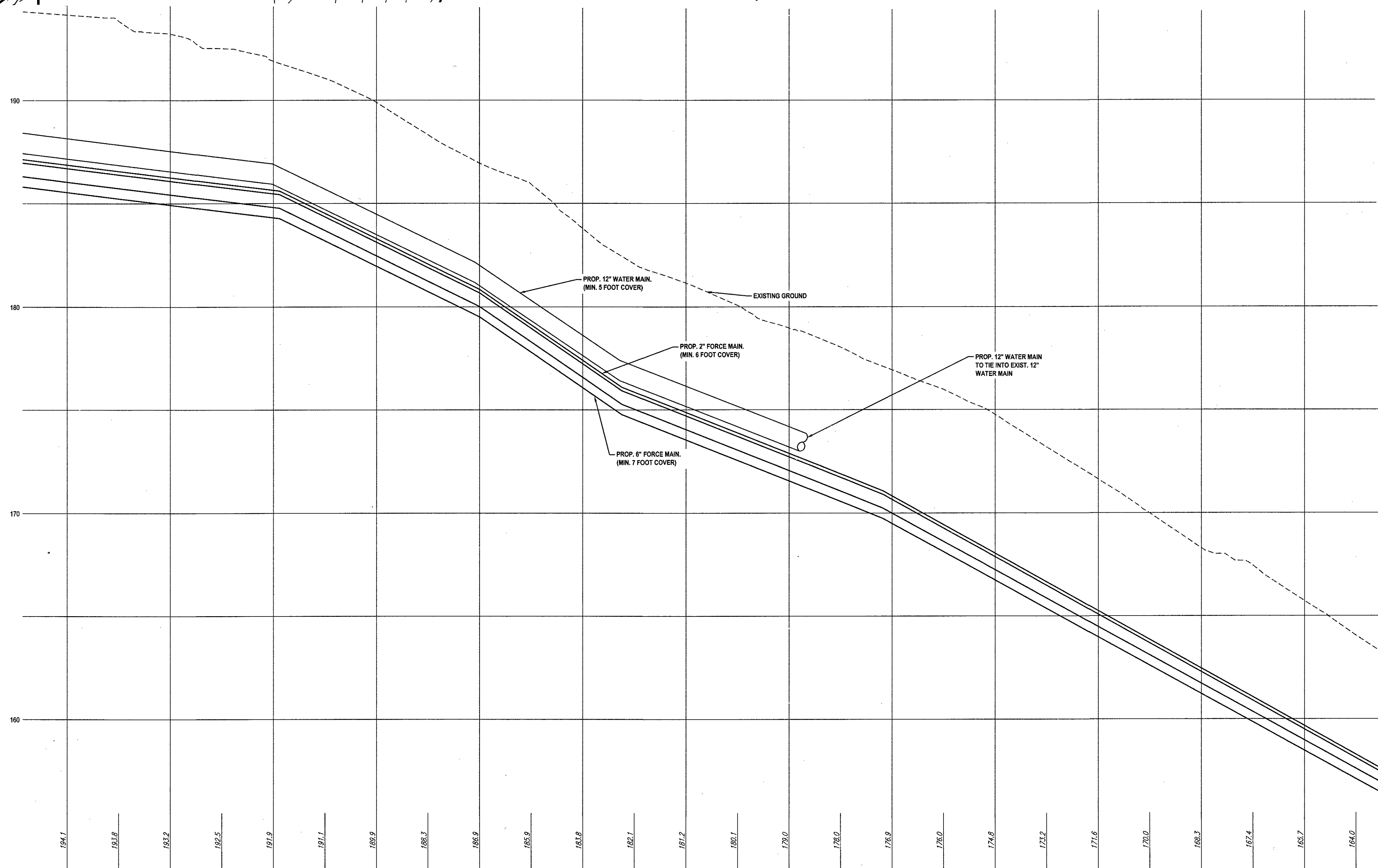
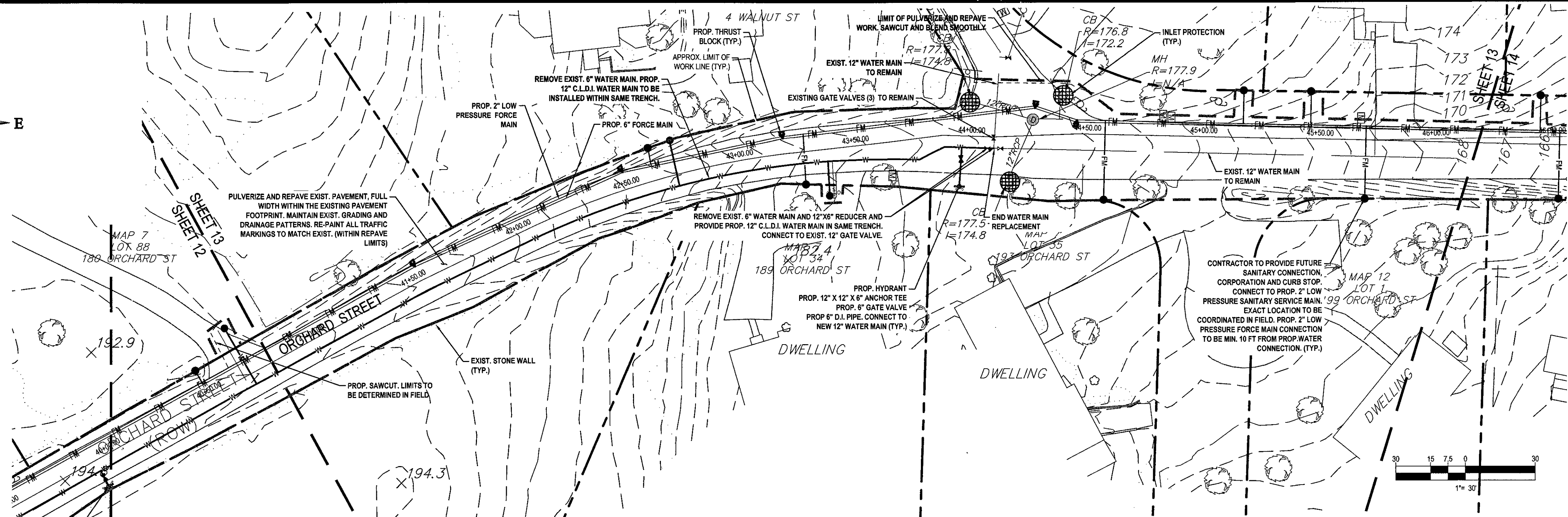
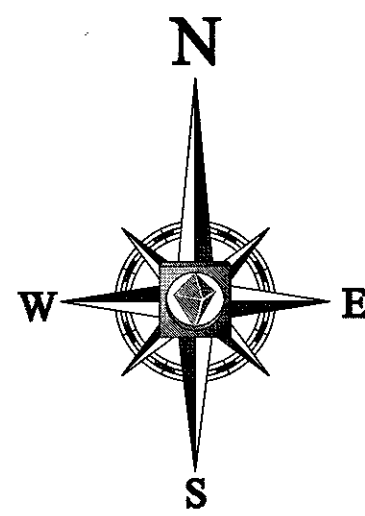
Professional Engineer
No. 10284
New York State License No. 021284-1
Florida License No. 06202

SHEET TITLE:
ORCHARD ST. SEWER MAIN LAYOUT PLAN

SHEET NUMBER:
11
OF 27

REV 2 - 8/11/2017

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DUE TO PRIVATE PROPERTY ACCESS
RESTRICTIONS, WETLAND RESOURCE
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PROJECT No.: W161041
DRAWN BY: MMA
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DATE: 06/14/2017
SCALE: AS NOTED
CAD I.D.: W161041-S22-SEWER

OFF- SITE SEWER LINE PLANS

FOR
TOLL BROS., INC.

LOCATION OF SITE
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NORFOLK COUNTY,
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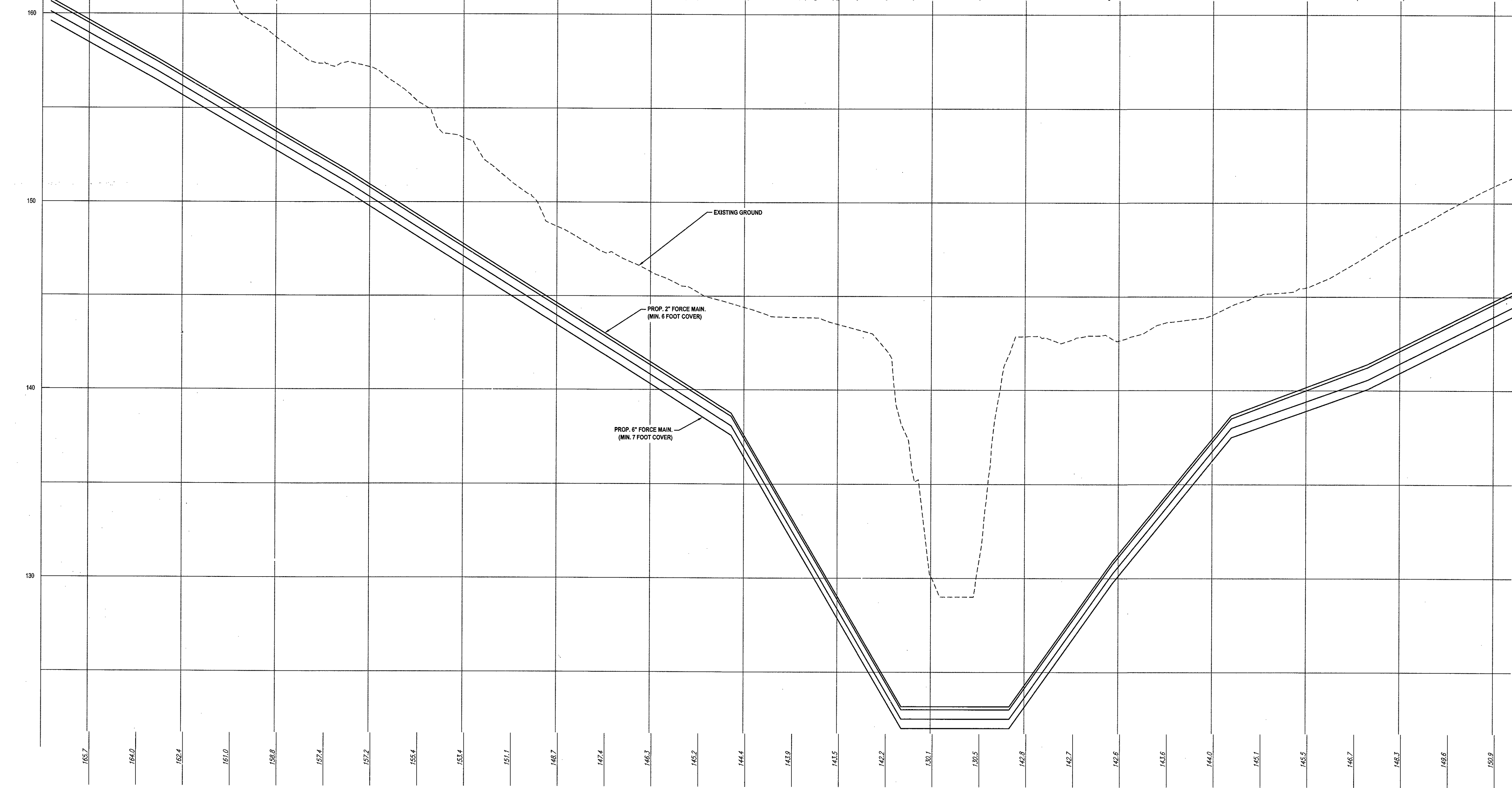
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MASSACHUSETTS REG. NO. 12884
FLORIDA LICENSE NO. 10280
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FLORIDA LICENSE NO. 68202

ORCHARD ST. SEWER MAIN LAYOUT PLAN

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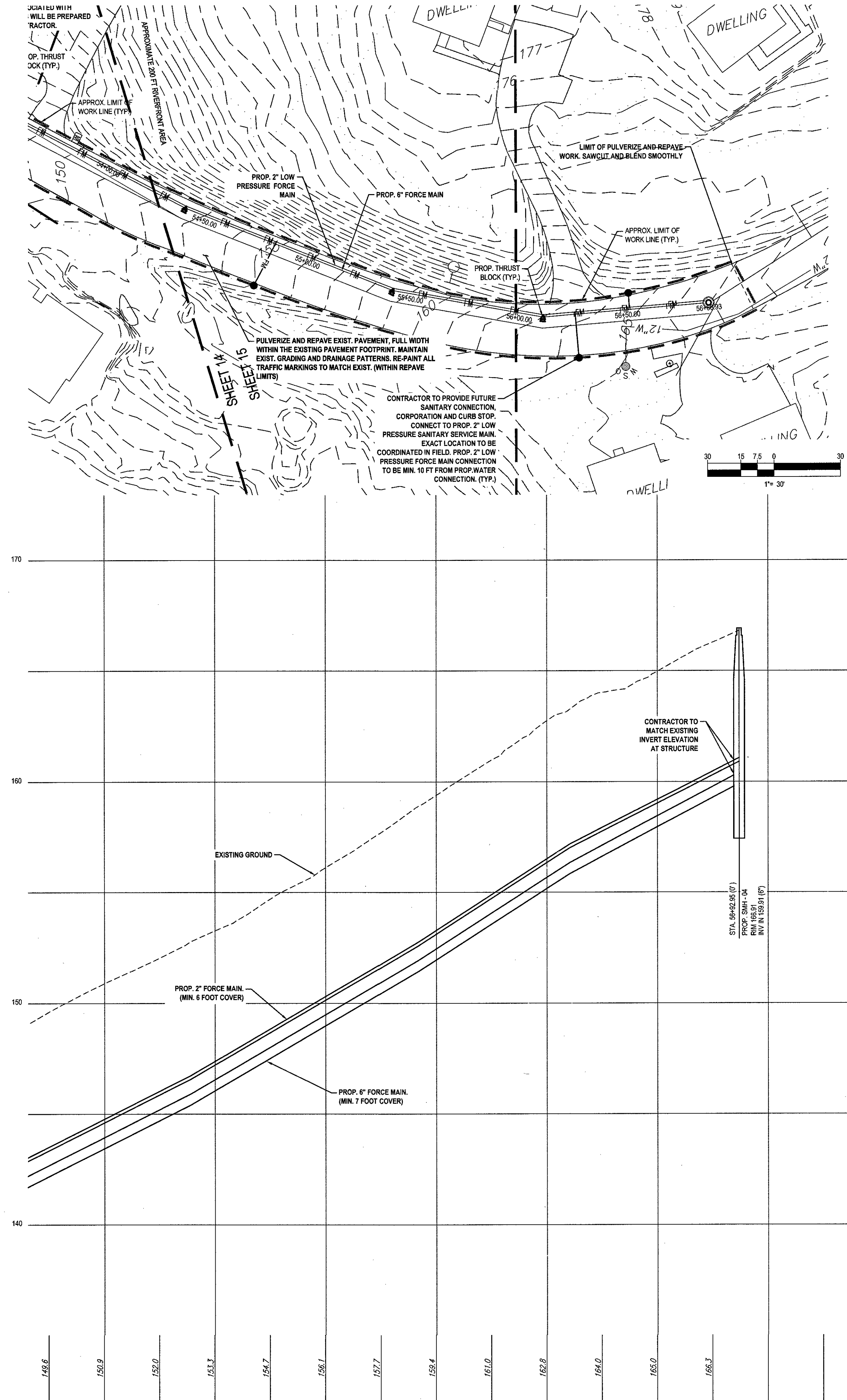
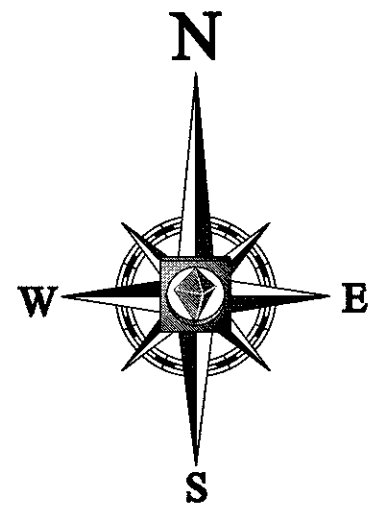
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CAD L.D.: W161041_SS2 - SEWER

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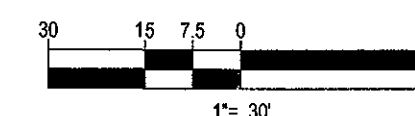
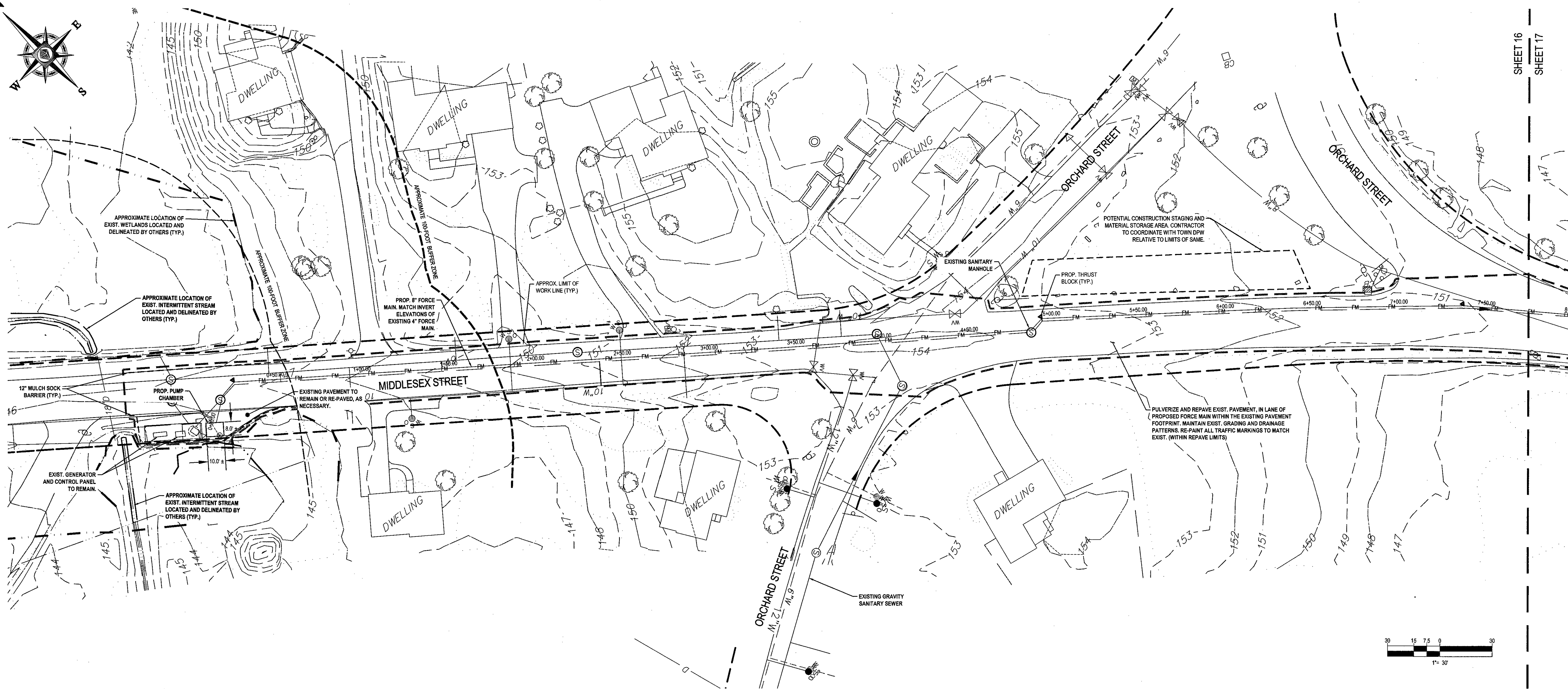
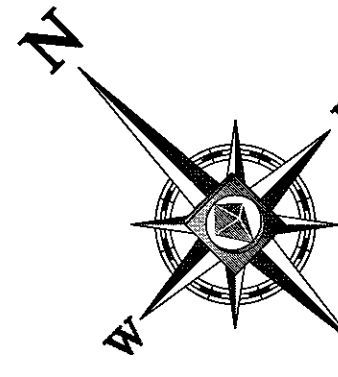
W.D. GOEBEL

PROFESSIONAL ENGINEER
MASSACHUSETTS REG. NO. 12586
FLORIDA LICENSE NO. 10280
NEW YORK LICENSE NO. 071284-1
FLORIDA LICENSE NO. 06202

ORCHARD ST. SEWER MAIN LAYOUT PLAN

SHEET NUMBER:
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SHEET 16
SHEET 17

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PROJECT NO.: W161041
DRAWN BY: MMA
CHECKED BY: JT/AF
DATE: 06/14/2017
SCALE: AS NOTED
CAD ID: W161041_SS2 - SEWER

OFF-SITE SEWER LINE PLANS

FOR
TOLL BROS., INC.

LOCATION OF SITE
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NORFOLK COUNTY,
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MASSACHUSETTS REG. NO. 20144-C
RECEIVED EXPIRATION DATE 12/31/2020
CONTRACT LICENSE NO. 100280
NEW HAMPSHIRE REG. NO. 01254-1
FLORIDA LICENSE NO. 66202

SHEET TITLE:
**MIDDLESEX ST.
SEWER MAIN
LAYOUT PLAN**

SHEET NUMBER:
16
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REV 2 - 8/11/2017

DUE TO PRIVATE PROPERTY ACCESS RESTRICTIONS, WETLAND RESOURCE AREA BOUNDARIES ARE APPROXIMATED BASED ON FIELD OBSERVATIONS FROM ROADWAYS AND REVIEW OF MAPPING RESOURCES.

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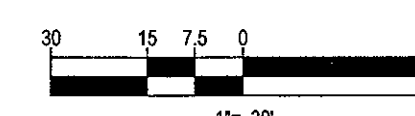
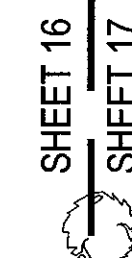
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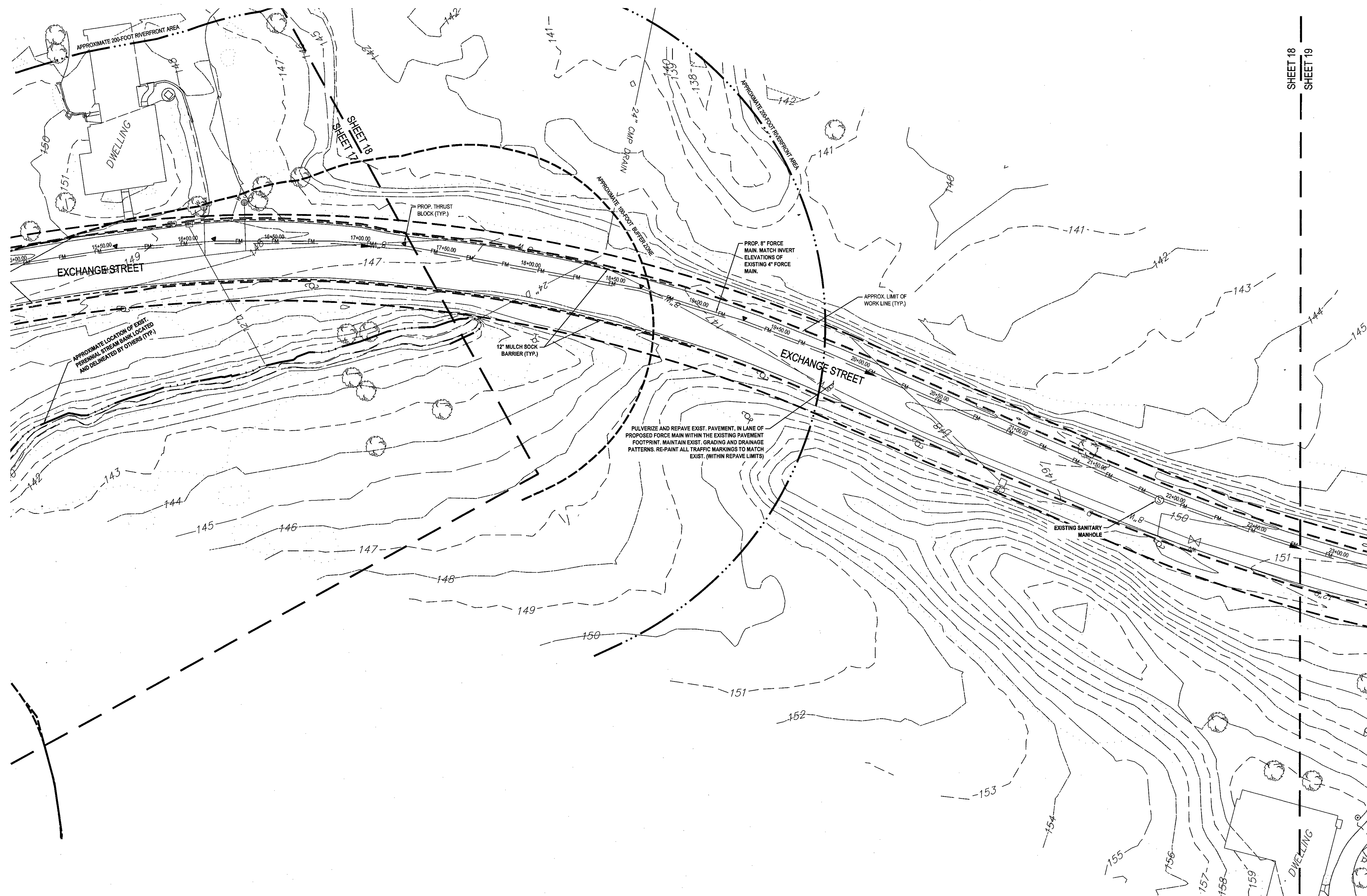
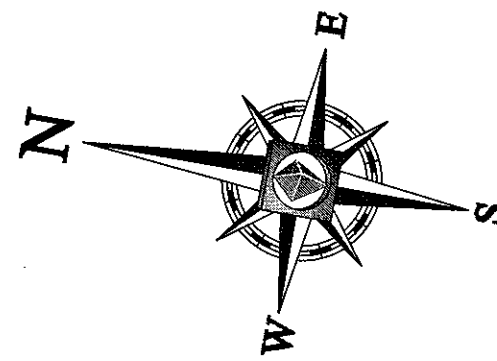
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PROJECT NO.: W161041
DRAWN BY: MMA
CHECKED BY: JT/FT
DATE: 06/14/2017
SCALE: AS NOTED
CAD ID: W161041_SS2-SEWER

PROJECT: OFF-SITE SEWER LINE PLANS

FOR TOLL BROS., INC.

LOCATION OF SITE ORCHARD STREET TOWN OF MILLIS NORFOLK COUNTY, MASSACHUSETTS

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NEW YORK LICENSE NO. 021254-1
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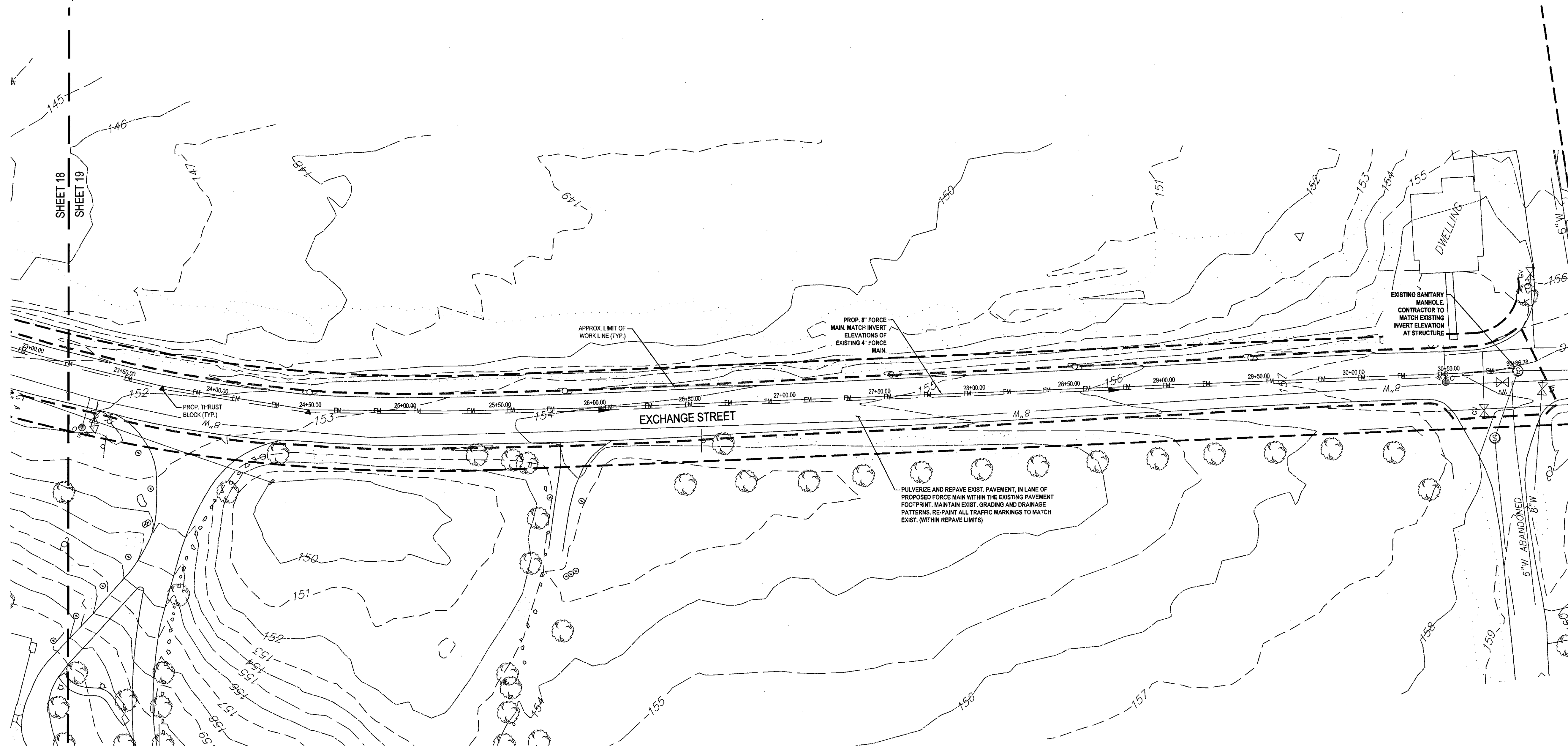
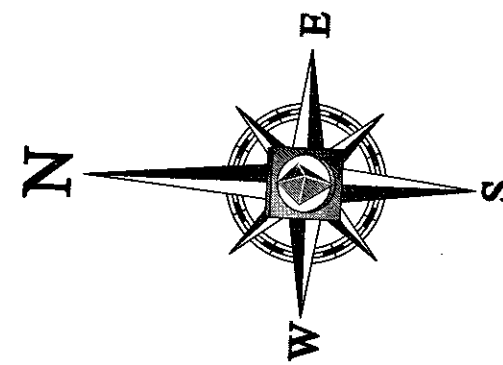
SHEET TITLE: MIDDLESEX ST. SEWER MAIN LAYOUT PLAN

SHEET NUMBER: 18 OF 27

REV 2 - 8/11/2017



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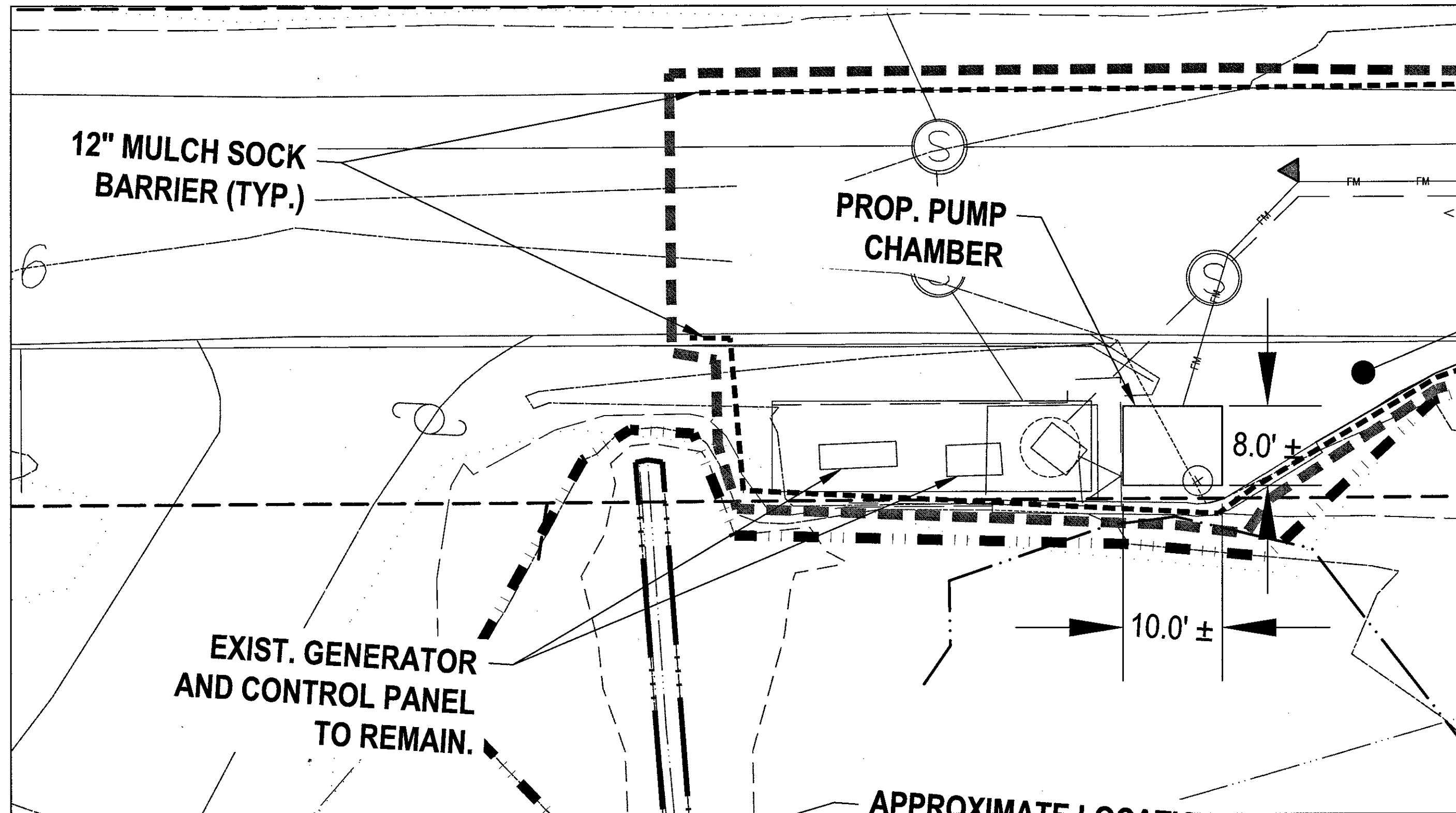
PERMIT SET
PROJECT No.: W161041
DRAWN BY: MMA
CHECKED BY: JTA/T
DATE: 08/14/2017
SCALE: AS NOTED
CAD I.D.: W161041 SS2 - SEWER

OFF-SITE SEWER LINE PLANS
FOR
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LOCATION OF SITE
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NORFOLK COUNTY,
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PROFESSIONAL ENGINEER
MASSACHUSETTS LICENSE NO. 444-C
NEW HAMPSHIRE LICENSE NO. 10280
NEW YORK LICENSE NO. 012584-1
FLORIDA LICENSE NO. 66202

SHEET TITLE:
MIDDLESEX ST. SEWER MAIN LAYOUT PLAN
SHEET NUMBER:
19
OF 27
REV 2 - 8/11/2017



PUMP CHAMBER SYSTEM NOTES:

- ALL ENTRIES FOR PUMP CHAMBER SHALL BE TIGHT SEAL OR EQUIVALENT.
- DESIGN OPERATING VOLUME TO CLEAR THE VOLUME OF THE FORCE MAIN ON EACH PUMP CYCLE.
- PUMP STATION ACCESS HATCH CENTERED OVER PUMPS TO BE A WATER TIGHT STAINLESS STEEL H-20, 48" SQUARE AS NOTED. INLET HATCH SHALL BE CENTERED OVER INLET PIPES AND WATER TIGHT STAINLESS STEEL H-20, 36" SQUARE AS NOTED. BOTH HATCHES SHALL BE SUPPORTED ON A PRE-CAST CONCRETE RISER DESIGNED TO ACCOMMODATE STAINLESS STEEL H-20 HATCHES. OPENINGS IN TOP OF PUMP CHAMBER SHALL MATCH THE HATCH DIMENSIONS.
- AVENT SHALL BE LOCATED THROUGH THE TOP OF THE PUMP CHAMBER OR ALTERNATIVELY THROUGH THE PRECAST HATCH RISER. VENT PIPING SHALL BE SHOWN TO A LOCATION WHERE A CHARCOAL FILTER MAY BE LOCATED. IF NECESSARY, THE CHARCOAL FILTER WILL BE PROTECTED BY BOLLARDS.
- AN AUDIBLE HORN, RED FLASHING LIGHT AND EMERGENCY CONTACT SIGN MOUNTED NEXT TO THE LIGHT SHALL BE FURNISHED TO PROVIDE NOTIFICATION OF PUMP STATION FAILURE AND PROVIDE AN EMERGENCY CONTACT NUMBER IF HORN/LIGHT ARE SOUNDING/VISIBLE. SUCH EQUIPMENT SHALL BE IDENTICAL TO THOSE USED ON OTHER TOWN OF MILLIS DPW PUMP STATIONS EXCEPT DIFFERENT CONTACT NUMBERS.
- AN "AUTO DIALER" SHALL BE PROVIDED WITH THE STATION CONTROLS WHICH WILL NOTIFY A MANNEED 24/7 LOCATION FOR EMERGENCY RESPONSE. DIALER SHALL PROVIDE PRIMARY AND BACKUP RESPONSE CALLS AND DIAL OUT TO FIRE DISPATCH IF ALL RESPONSES FAIL.
- PUMPS SHALL ALTERNATE AND A RUN TIME METER SHALL BE INSTALLED IN THE CONTROL PANEL FOR EACH PUMP. EACH PUMP AND ALARM SHALL BE ON SEPARATE CIRCUITS.
- SEWER PUMP SYSTEM VENDOR MAINTENANCE CONTRACT TO BE PROVIDED PRIOR TO TESTING AND ACTIVATING PUMP SYSTEM. WATER TIGHT TESTING, MAINTENANCE TESTING AND VACUUM TESTING OF ALL SYSTEM COMPONENTS INCLUDING PUMP CHAMBER SHALL BE ACCORDING TO THE TOWN OF MILLIS DPW REGULATIONS. CONTRACTOR SHALL TEST FORCE MAIN PIPE IN THE PRESENCE OF AN ENGINEER USING A HYDROSTATIC TEST OF AT LEAST 1.5 TIMES THE SHUTOFF HEAD OF THE CONNECTED PUMPS OR 150 PSI, WHICHEVER IS GREATER. LOSS OF WATER PRESSURE DURING TEST SHALL NOT EXCEED 5 PSI IN A 2-HOUR PERIOD. ANY DEFECTIVE WORK SHOWN BY THIS TEST SHALL BE REPLACED ENTIRELY AT THE CONTRACTOR'S EXPENSE.
- ALL INTERIOR PIPING AND HARDWARE SHALL BE STAINLESS STEEL.
- SHOP DRAWINGS OF THE PUMP CHAMBER AND ALL PUMP EQUIPMENT TO BE APPROVED BY DPW AFTER REVIEW BY THE DESIGN ENGINEER.
- CONTRACTOR SHALL PROVIDE TRAINING AND START UP SERVICES BY MANUFACTURER'S REP FOR PUMP STATION. START UP SERVICES SHALL INCLUDE INSTRUCTION AND DEMONSTRATION INCLUDING OPERATION WITH BACKUP POWER USING PORTABLE GENERATOR. SEWER PUMP SYSTEM O&M MANUAL TO BE PROVIDED AND REVIEWED BY DPW AND SHALL INCLUDE EMERGENCY CONTACTS AND MAINTENANCE VENDOR.
- PUMP INSTALLATION, POWER FEED, ALARMS AND PUMP CONTROL PANEL TO BE INSTALLED BY A QUALIFIED LICENSED ELECTRICIAN.
- CONTROL PANEL SHALL HAVE AN OUTLET WIRED TO ALLOW CONNECTION OF AN EMERGENCY GENERATOR WITH SUITABLE CAPABILITY TO ISOLATE THE CONTROL PANEL WHILE POWERED BY BACK UP GENERATOR.
- A SEPARATE AS-BUILT SHALL BE PROVIDED TO DPW FOR THE SEWER PUMP STATION.
- BOTH PUMPS MUST BE EQUIPPED WITH AN ALARM LOCATED IN THE BUILDING SERVED WHICH IS POWERED BY A CIRCUIT SEPARATE FROM THE CIRCUIT TO THE PUMPS. PUMPS SHALL BE CAPABLE OF PASSING A MINIMUM SOLID SIZE OF 1 1/4 INCH DIAMETER AND SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
- THE SUBMERSIBLE PUMPS SHALL BE INSTALLED WITH A HYDRAULICALLY SEALED SLIDE COUPLING ARRANGEMENT SO THAT THE PUMPS CAN BE REMOVED FROM THE PUMP CHAMBER FOR SERVICE AND INSPECTION AND THEN RETURNED TO SERVICE WITHOUT ENTERING THE PUMP CHAMBER TO UNBOLT OR UNLOCK THE CONNECTION BETWEEN THE PUMP AND PIPING.
- DUPLEX PUMP CONTROLS SHALL BE PROVIDED IN THE PUMP CONTROL PANEL LOCATION WITHIN THE BUILDING AND CONTAINED IN WEATHER PROOF NEMA ENCLOSURE.
- EACH SUBMERSIBLE PUMP SHALL BE EQUIPPED WITH 25 FEET OF POWER CABLE WITH EPOXY SEALED HOUSING WITH SECONDARY PRESSURE GROMMET FOR SEALING AND STRAIN RELIEF. ALL INCOMING LEAD WIRES SHALL BE SPLICED IN THE MOTOR TERMINAL HOUSINGS.
- THE CONTRACTOR SHALL FURNISH AND INSTALL FIVE (5) MERCURY LIQUID LEVEL SENSORS WITH SUFFICIENT LENGTH OF CABLE FOR EACH PUMP STATION. SUSPENDED TYPE OF LEVEL SENSORS SHALL BE MERCURY TYPE PILOT DUTY DEVICES MOUNTED IN A CORROSION RESISTANT POLYPROPYLENE HOUSING, AND MOUNTED TO TANK INTERIOR BY A DETACHABLE BRACKET TO BE EASILY ACCESSIBLE FROM THE EXISTING MANWAYS.
- THE PUMP MOTORS SHALL MEET THE REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE, AND SHALL BE FITTED WITH HOUR METERS THAT ARE RECORDED WITHIN THE PUMP PANEL.

PUMP CHAMBER SYSTEM:

PUMP REQUIREMENTS: TOTAL DYNAMIC HEAD= 46.75 FT @ 775 GPM

PUMP SPECIFICATIONS: USE TWO (2) BARNES SUBMERSIBLE SEWAGE PUMP MODEL 6SHVLXSHVL 19.1 HP, 3 PHASE, 60 HZ, WITH 6" IMPELLER OR APPROVED EQUAL.

BOTH PUMPS MUST BE EQUIPPED WITH AN ALARM LOCATED IN THE CONTROL PANEL WHICH IS POWERED BY A CIRCUIT SEPARATE FROM THE CIRCUIT TO THE PUMPS. PUMPS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

DESIGN CALCULATIONS

DESIGN FLOW CALCS:

AREAS SERVED:	
GLEN ELLEN DEVELOPMENT	71,087.00 GPD
ORCHARD STREET	17,502.00 GPD
BOGASTOW CIRCLE	12,710.00 GPD
BULLARD LANE	11,103.00 GPD
AREA F (EXISTING FLOW TO MIDDLESEX ST PUMP STATION 3/25/2005)	31,585.00 GPD
AREA F	78,333.00 GPD

ESTIMATED SEWAGE GENERATION

DESIGN FLOW	222,320.00 GPD
-------------	----------------

WET WEATHER FLOW ADJUSTMENT:

INFILTRATION ESTIMATE	250.00
(GPD-INCH DIA PIPE-MILE OF PIPE)	7,200.00 FT
TOTAL LENGTH OF NEW 8" SEWER PIPE	2,727.27 GPD
WET WEATHER FLOWS	

TOTAL PEAK WET WEATHER FLOWS	225,047.27 GPD
	156.28 GPM

PEAKING FACTOR

PEAKING FACTOR DESIGN FLOW	5.00
	1,111,600.00 GPD
	771.94 GPM
DOSE VOLUME	2,992.20 GAL
PUMP RUNNING TIME PER CYCLE	3.86 MIN.
PUMP RUNNING TIME (LAG PUMP)	4.44 MIN.
PUMP DISCHARGE RATE	775.00 GPM

PUMP SWITCHING DESIGN:

DOSE VOLUME	2992.20 GALLONS	400.95 CUBIC FEET
LENGTH	8.00 FT. (INSIDE DIMENSION)	
WIDTH	10.00 FT. (INSIDE DIMENSION)	
HEIGHT	5.00 FT. (FOR DOSE VOLUME)	
INLET INVERT ELEVATION		136.22
OUTLET INVERT ELEVATION		141.42
DOSES PER DAY		75.21 DOSES
STANDING WATER LEVEL IN CHAMBER		2.10 FT
ELEVATION OF TANK BOTTOM		128.12
L1= ELEVATION OF ALL PUMPS OFF		130.22
L2= ELEVATION OF LEAD PUMP ON		135.22
L3= ELEVATION OF ALARM ON		135.72
L4=ELEVATION OF LAG PUMP ON		135.97

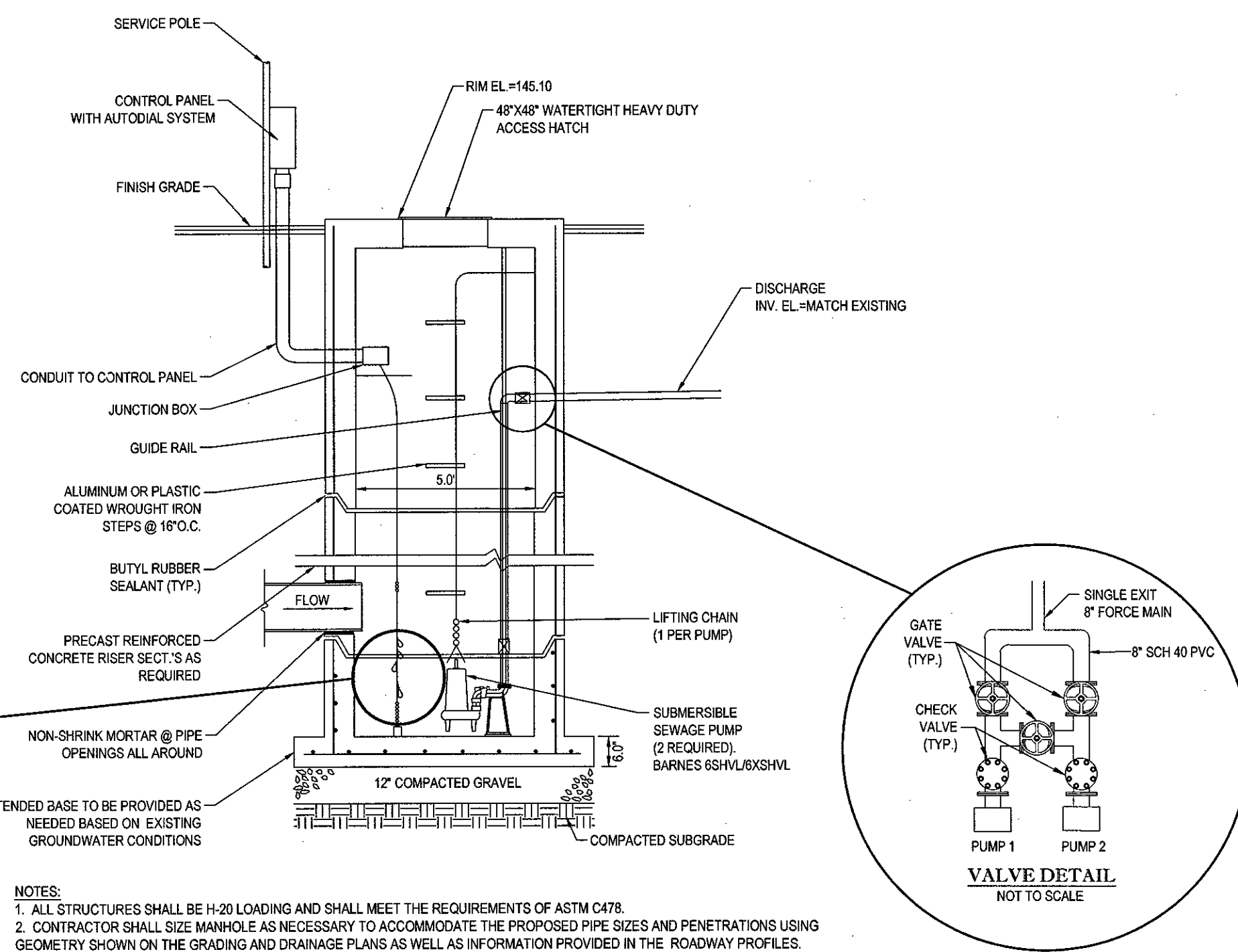
DESTINATION INVERT ELEVATION

L2-L1		5.00 FT
DESTINATION INVERT ELEVATION		148.70 FT

FRICTION LOSSES:

COEFFICIENT	8	C		
DELIVERY PIPE LENGTH		INCH		
FRICTION LOSS IN DELIVERY PIPE PER 100 FT			150.00	FOR PVC
EQUIVALENT LENGTH OF PIPE FOR FITTINGS & VALVES			3,095.00	FT.
			0.88	FT/100 FT
ENLARGEMENT	0.0	0.0		
CONTRACTION	0.0	0.0		
CHECK VALVE	1.0	33.6		FT
ELBOWS 90	7.0	10.1		70.70 FT
ELBOWS 45	1.0	5.4		5.40 FT
BALL VALVE	0.0	3.8		FT
EQUIVALENT LENGTH FROM FITTINGS			109.70	FT.
TOTAL EQUIVALENT LENGTH OF PIPE			3,204.70	FT.
TOTAL HEAD LOSS FROM DELIVERY PIPE & FITTINGS			28.27	FT
MANIFOLD & LATERAL LOSSES = (1.51 X DISTILL PRESSURE)				FT.
TOTAL SYSTEM FRICTION HEAD LOSS			28.27	FT
STATIC HEAD			18.48	FT
TOTAL DYNAMIC HEAD = STATIC + FRICTION			46.75	FT

TDH (ft)	46.75 ft
Flow (GPM)	775 gpm
Pump Duration	3.9 min
Volume per cycle	2992 Gallons
Velocity	4.95 ft/sec
	GOOD



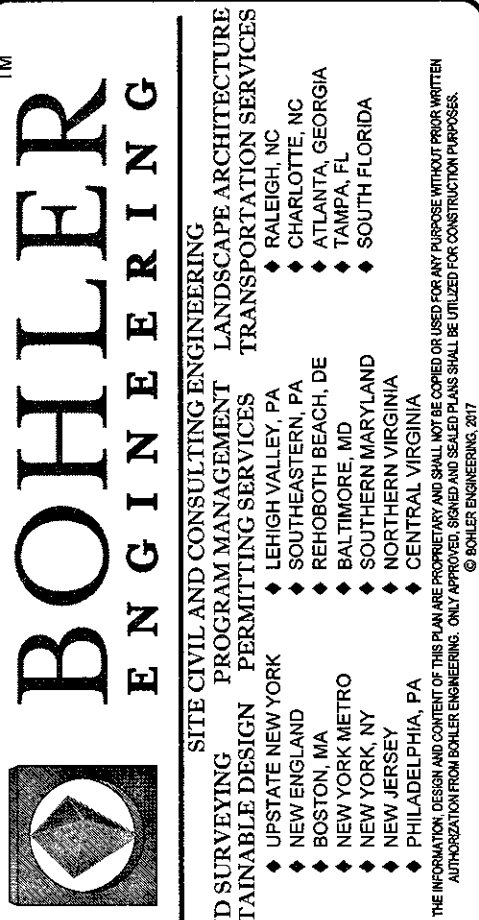
PUMP STATION 1 DETAIL

- NOTES:
- ALL STRUCTURES SHALL BE H-20 LOADING AND SHALL MEET THE REQUIREMENTS OF ASTM C478.
 - CONTRACTOR SHALL SIZE MANHOLE AS NECESSARY TO ACCOMMODATE THE PROPOSED PIPE SIZES AND PENETRATIONS USING GEOMETRY SHOWN ON THE GRADING AND DRAINAGE PLANS AS WELL AS INFORMATION PROVIDED IN THE ROADWAY PROFILES.

REFER TO GENERAL NOTES SHEET
FOR GRADING & UTILITY NOTES

NOTE:
CONTRACTOR SHALL PERFORM THE REQUISITE TESTING TO THE SATISFACTION OF THE TOWN OF MILLIS AND STATE, AS APPROPRIATE, UPON COMPLETION OF THE SANITARY SEWER SYSTEM.

NOTE:
PROPOSED LOCATION OF UNDERGROUND ELECTRIC CONDUIT AND ALARM PANEL FOR PUMP CHAMBER TO BE COORDINATED WITH OWNER OR OWNERS REPRESENTATIVE AND ENGINEER. COORDINATE ELECTRICAL REQUIREMENTS/ADEQUACY OF CIRCUITS AND CONNECTION LOCATIONS FOR ALARMS WITH ARCHITECT AND ENGINEER.



REVISIONS

REV	DATE	COMMENT	BY
1	08/03/17	REVISIONS PER COMMISSION FEEDBACK	MMA
2	08/11/17	REVISIONS PER REVIEW COMMENTS	EKR
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PERMIT SET

PROJECT NO.: W161041
DRAWN BY: JTAFT
CHECKED BY: JTAFT
DATE: 06/14/2017
SCALE: AS NOTED
CAD I.D.: W161041_S52 - SEWER

OFF- SITE SEWER LINE PLANS

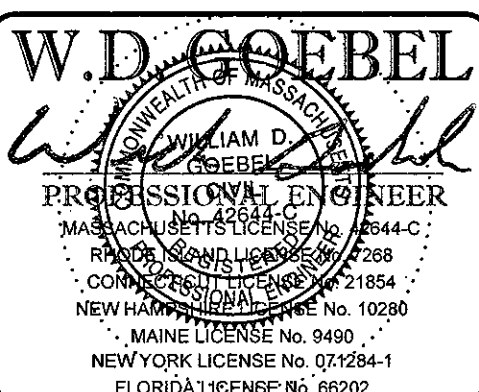
FOR

TOLL BROS., INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS



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SOUTH BOROUGHS, MA 01772
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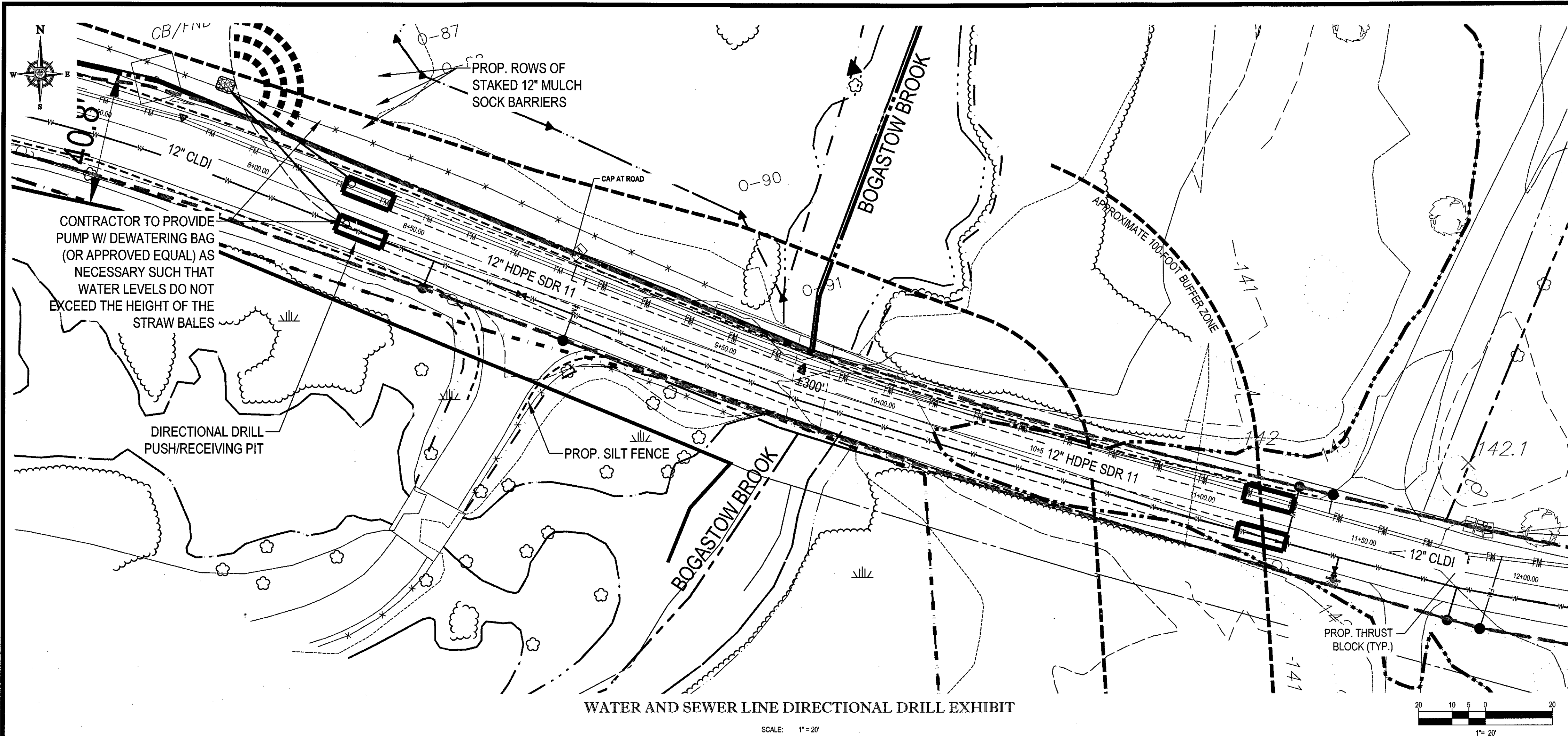
PUMP STATION 2 PLAN AND DETAILS

SHEET NUMBER: 20
OF 27

REV 2 - 8/11/2017



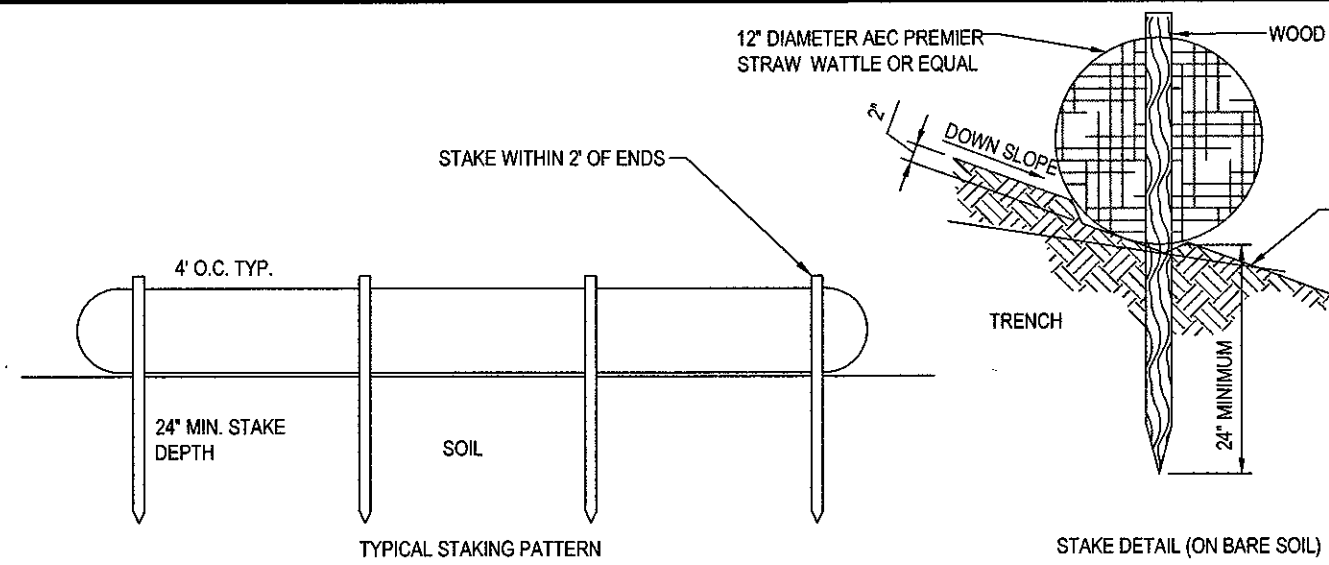
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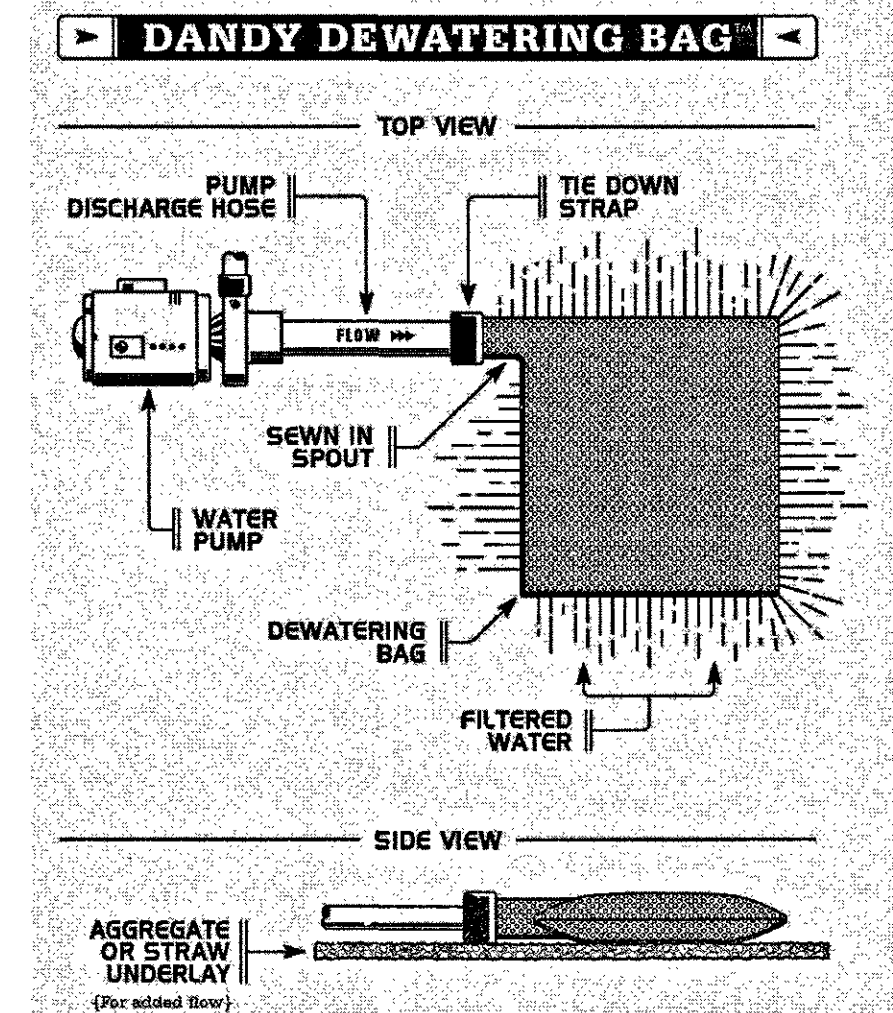
LAWNPRO GRASS MIX	
PROPERTIES	PERCENTAGE
PERENNIAL RYE	34.65%
CREeping RED FESCUE	34.65%
KENTUCKY BLUE GRASS	30.70%

LAWNPRO GRASS MIX

N.T.S.

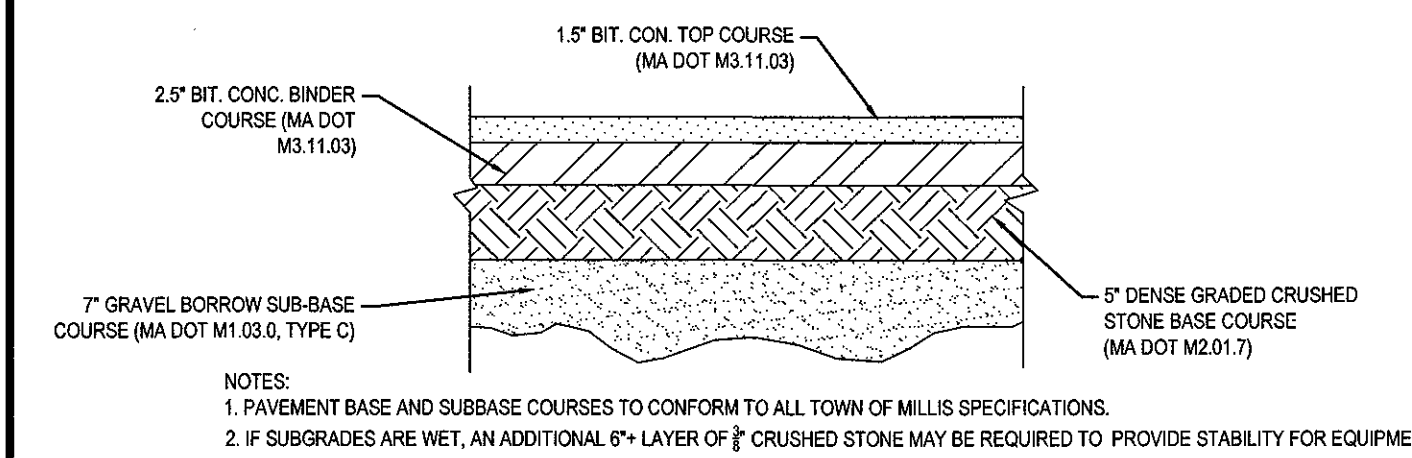


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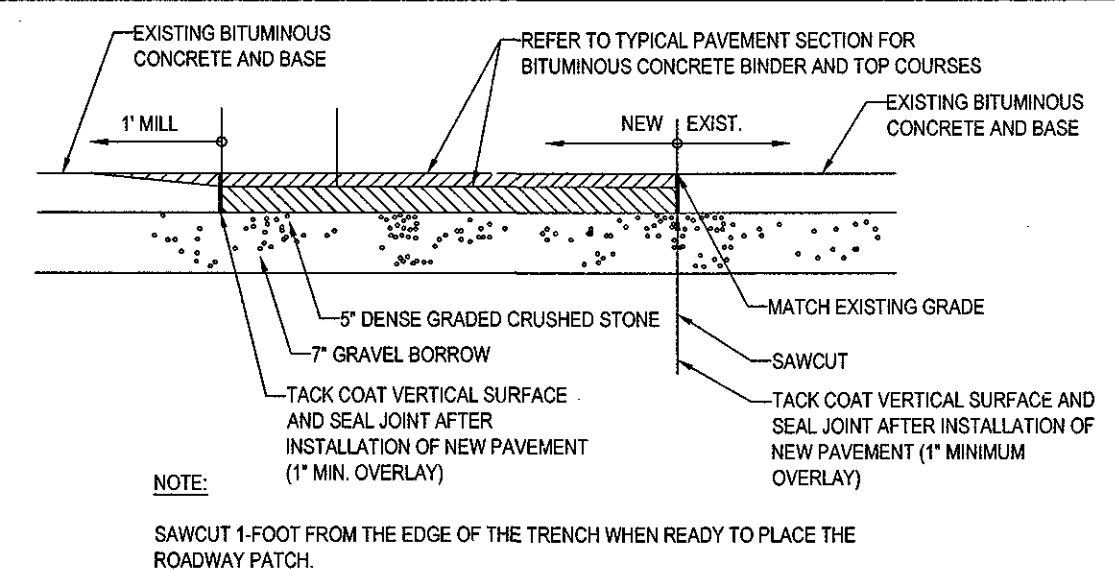


DEWATERING BAG DETAIL

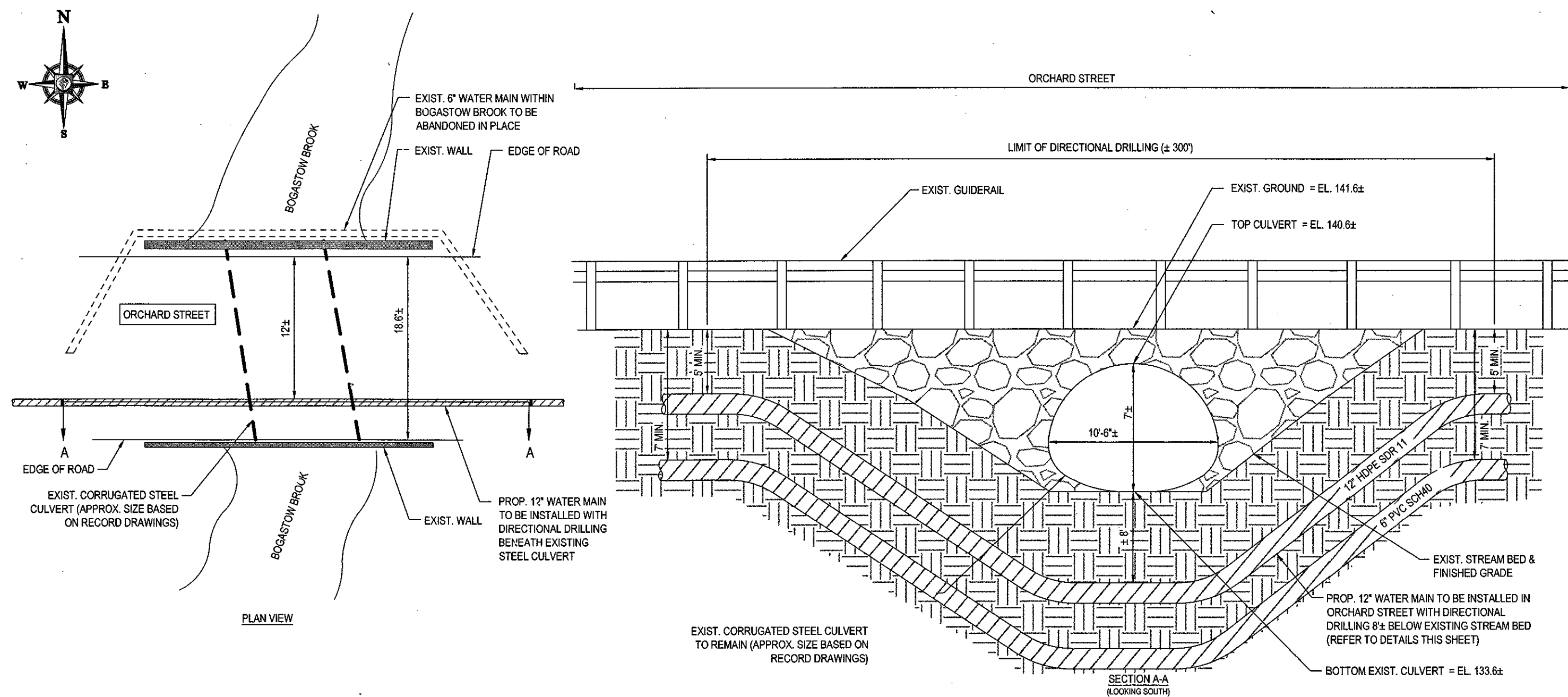
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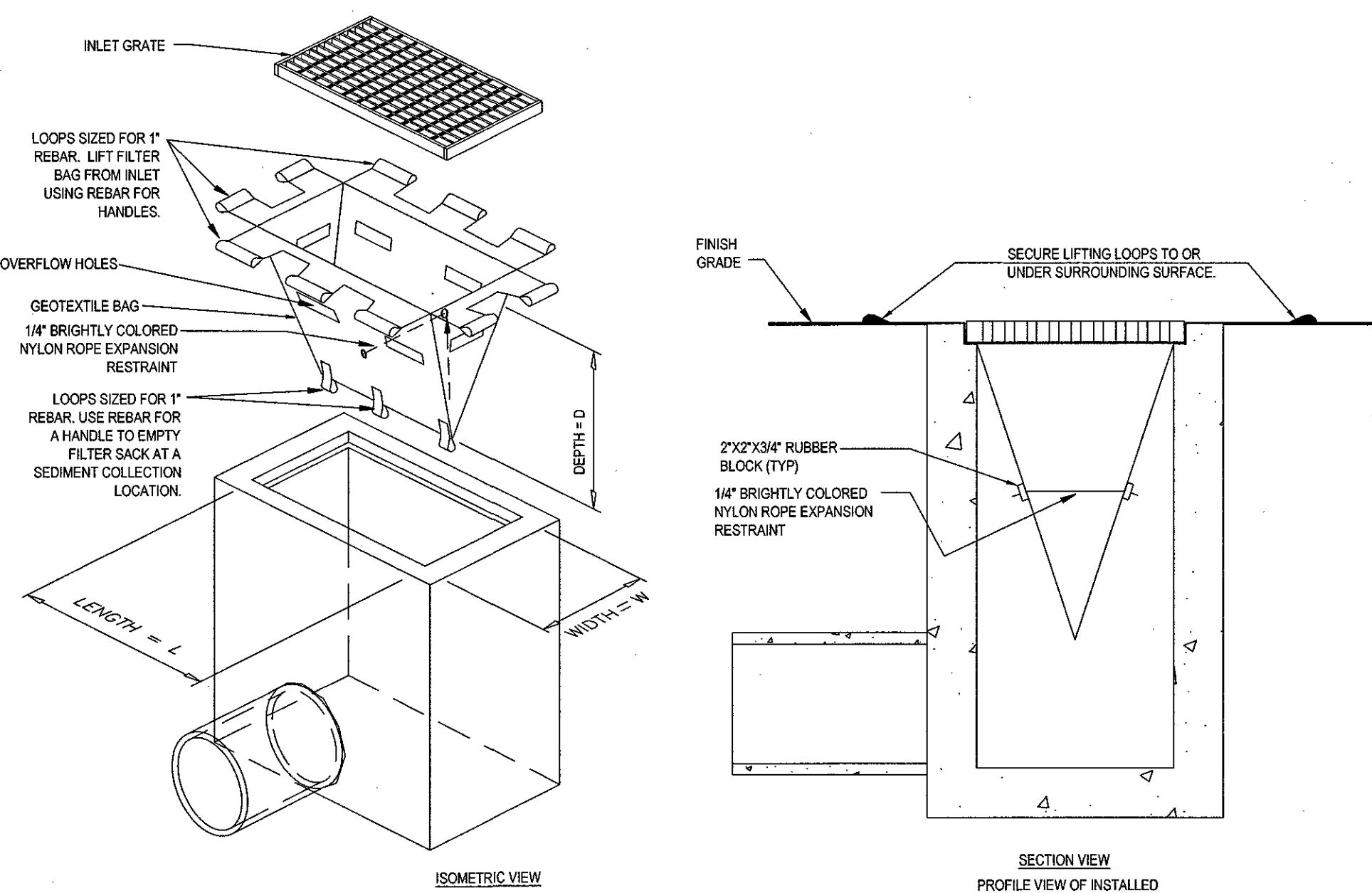
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N.T.S.



N.T.S.



LOW TO MODERATE FLOW GEOTEXTILE FABRIC SPECIFICATION TABLE		
PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4832	300 LBS
GRAB TENSILE ELONGATION	ASTM D-4832	20 %
PUNCTURE	ASTM D-4833	120 LBS
MULLEN BURST	ASTM D-3786	800 PSI
TRAPEZOID TEAR	ASTM D-4533	120 LBS
UV RESISTANCE	ASTM D-4355	80 %
APPARENT OPENING SIZE	ASTM D-4751	40 US SIEVE
FLOW RATE	ASTM D-4751	200 GAL/MIN/50 FT
PERMITTIVITY	ASTM D-4461	0.95 SEC-1

MODERATE TO HIGH FLOW GEOTEXTILE FABRIC SPECIFICATION TABLE		
PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4832	285 LBS
GRAB TENSILE ELONGATION	ASTM D-4832	20 %
PUNCTURE	ASTM D-4833	135 LBS
MULLEN BURST	ASTM D-3786	420 PSI
TRAPEZOID TEAR	ASTM D-4533	45 LBS
UV RESISTANCE	ASTM D-4355	90 %
APPARENT OPENING SIZE	ASTM D-4751	20 US SIEVE
FLOW RATE	ASTM D-4751	200 GAL/MIN/50 FT
PERMITTIVITY	ASTM D-4461	1.5 SEC-1

- REMOVE TRAPPED SEDIMENT WHEN BRIGHTLY COLORED EXPANSION RESTRAINT CAN NO LONGER BE SEEN.
- GEOTEXTILE SHALL BE A WOVEN POLYPROPYLENE FABRIC THAT MEETS OR EXCEEDS REQUIREMENTS IN THE SPECIFICATIONS TABLE.
- PLACE AN OIL ABSORBENT PAD OR PILLOW OVER INLET GRATE WHEN OIL SPILLS ARE A CONCERN.
- INSPECT PER REGULATORY REQUIREMENTS.
- THE WIDTH, "W", OF THE FILTER SACK SHALL MATCH THE INSIDE WIDTH OF THE GRATED INLET BOX.
- THE DEPTH, "D", OF THE FILTER SACK SHALL BE BETWEEN 18 INCHES AND 36 INCHES.
- THE LENGTH, "L", OF THE FILTER SACK SHALL MATCH THE INSIDE LENGTH OF THE GRATED INLET BOX.

DO NOT USE IN PAVED AREAS WHERE PONDING MAY CAUSE TRAFFIC HAZARDS.
TO BE USED IN EXISTING RIGHT OF WAY

N.T.S.

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MASSACHUSETTS REG. NO. 14909

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REVISIONS				
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PERMIT SET

PROJECT NO.: W161041
DRAWN BY: MMA
CHECKED BY: JTAFT
DATE: 06/14/2017
SCALE: AS NOTED
CAD I.D.: W161041_SS2-SEWER

OFF-SITE SEWER LINE PLANS

FOR
TOLL BROS., INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

BOHLER ENGINEERING

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W.D. COEBEL

PROFESSIONAL ENGINEER

MASSACHUSETTS REG. NO. 14909

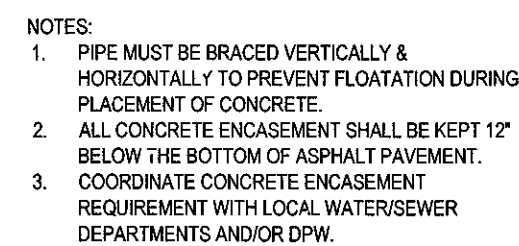
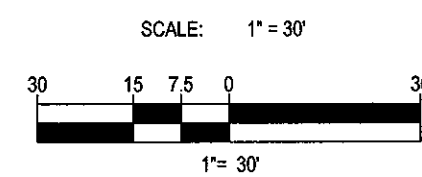
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CONSTRUCTION DETAIL SHEET

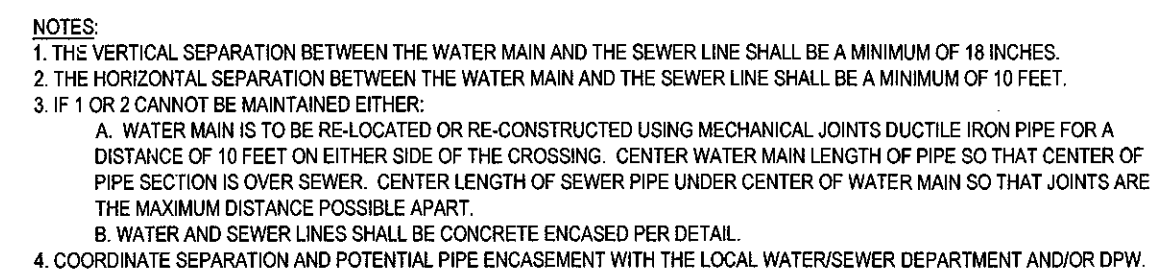
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OF 27

REV 2 - 8/11/2017



CONCRETE ENCASEMENT

N.T.S.



WATER MAIN CROSSINGS

N.T.S.

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REV	DATE	COMMENT	BY
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PROJECT No.:	W161041
DRAWN BY:	MMA
CHECKED BY:	JT/AFT
DATE:	06/14/2017
SCALE:	AS NOTED
CAD I.D.:	W161041_SS2 - SEWER

PROJECT:
**OFF- SITE SEWER
LINE PLANS**

—FOR—
TOLL BROS.,
INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

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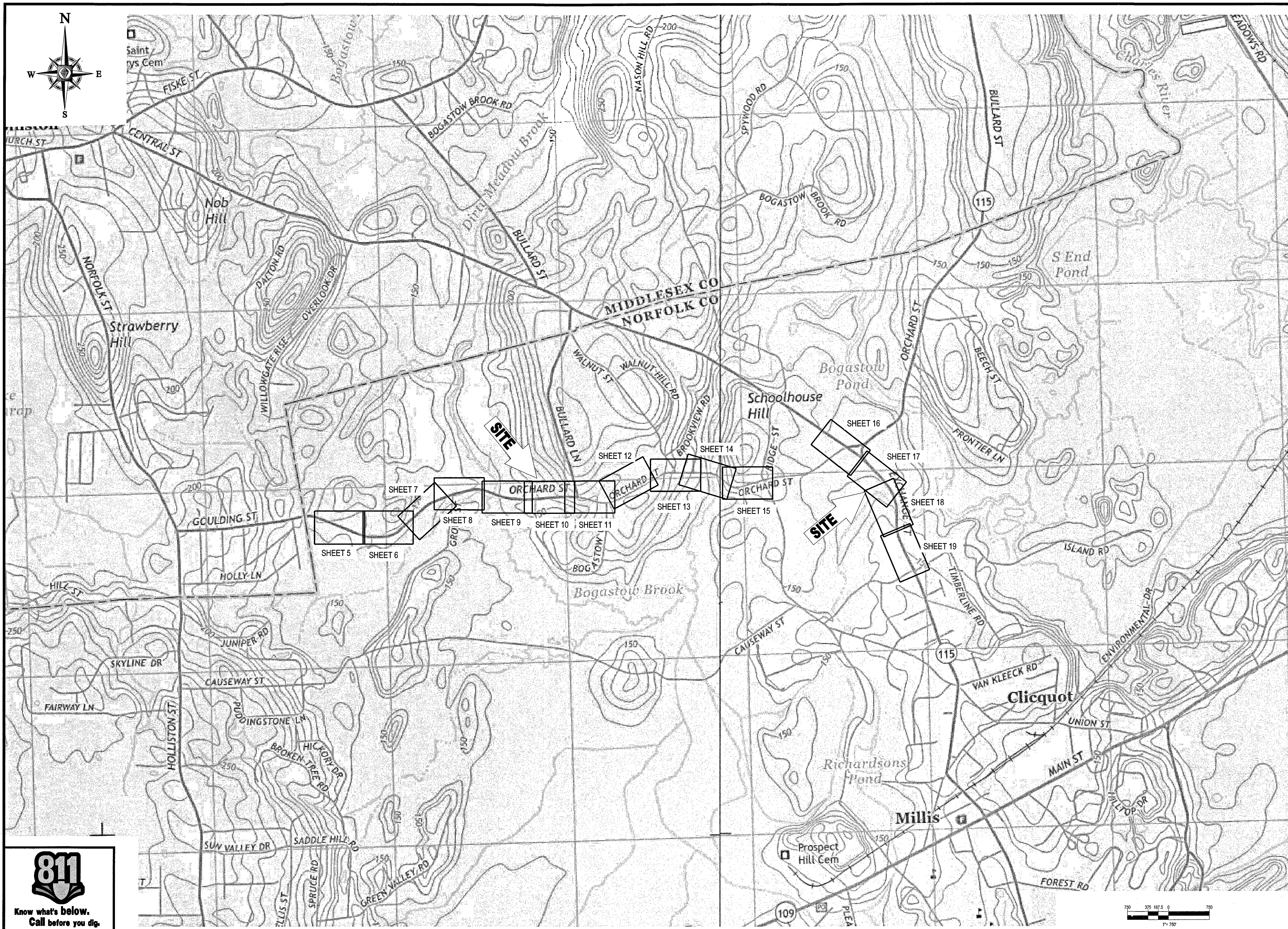
SHEET TITLE:

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PERMIT SET

PROJECT NO.: W161041
DRAWN BY: MMA
CHECKED BY: JT/AFT
DATE: 09/14/2017
SCALE: AS NOTED
CAD I.D.: W161041_S52 - SEWER

OFF- SITE SEWER LINE PLANS

—FOR—

TOLL BROS., INC.

LOCATION OF SITE
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TOWN OF MILLIS
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LOCUS STREET MAP

SHEET NUMBER:

23
OF 27

REV 2 - 8/11/2017



N.T.S.



NTS

6"	1"
8"	1"
10"	1"
12"	1-1/4"

Diagram labels and dimensions:

- EDGE TREATMENT
- FINISHED GRADE
- R.O.W. (Right of Way)
- SIDEWALK OR GRASS
- "BUFFALO" STYLE VALVE BOX & COVER IN SIDEWALK OR GRASS
- CURB STOP
- TO BUILDING SERVICE
- 12"
- 4"
- TYPE 2-SAND BLANKET BEDDING
- PLACE BRICK SUPPORT
- UNDISTURBED EARTH
- TYPE K COPPER SERVICE
- 5'-0" MIN. COVER
- 4'-6" MIN. COVER
- CORP. STOP
- WATER MAIN

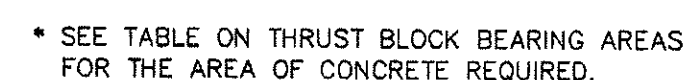
* WHERE THE SIZE OF THE CONNECTION EXCEEDS THAT GIVEN IN THE TABLE A BOSS SHALL BE PROVIDED OR THE TAP SHALL BE MADE BY MEANS OF MULTIPLE CORP. STOPS AND BRANCH FITTINGS, TAPPED TEE, OR TAPPED SADDLE. TAPPING SADDLES SHALL BE USED FOR ALL SIZES OF AC AND PVC WATER MAINS



NTS



N.T.S.



TYPICAL WATER MAIN
THRUST BLOCK SECTION DETAIL

N.T.S.

* TYPE OF SOIL IS MEDIUM CLAYEY, 6 OR MORE BLOWS PER FOOT, OR LOOSE GRANULAR, 9 OR MORE BLOWS PER FOOT. SOIL CONDITIONS OTHER THAN THOSE GIVEN WILL REQUIRE LARGER BEARING AREAS.

NOTES:

1. FOR FITTINGS WITH LESS THAN 45° DEFLECTION, USE BEARING AREAS FOR 45° BEND.
2. BEARING AREAS BASED ON HORIZONTAL PASSIVE SOIL PRESSURE OF 2000 P.S.F. AND INTERNAL WATER PRESSURE OF 150 P.S.I.G. JOINTS SHALL NOT BE ENCASED IN CONCRETE. BEARING AREAS MAY BE DEDICATED FOR TRENCHES IN ROCK WHERE THE TOP OF THE ROCK FACE IS AT OR ABOVE THE CROWN OF THE PIPE. HOWEVER, CONCRETE BACKING SHALL BE PLACED BETWEEN THE PIPE AND THE ROCK FACE.
3. THE CONTRACTOR SHALL SUBMIT 2 WEEKS IN ADVANCE OF PLACEMENT, WORKING DRAWINGS FOR EACH THRUST BLOCK TO THE ENGINEER FOR APPROVAL, PRIOR TO INSTALLATION.

NOTES:

1. FOR FITTINGS WITH LESS THAN 45° DEFLECTION, USE BEARING AREAS FOR 45° BEND.
2. BEARING AREAS BASED ON HORIZONTAL PASSIVE SOIL PRESSURE OF 2000 P.S.F. AND INTERNAL WATER PRESSURE OF 150 P.S.I.G. JOINTS SHALL NOT BE ENCASED IN CONCRETE. BEARING AREAS MAY BE DEGRADED FOR TRENCHES IN ROCK WHERE THE TOP OF THE ROCK FACE IS AT OR ABOVE THE CROWN OF THE PIPE. HOWEVER, CONCRETE BACKING SHALL BE PLACED BETWEEN THE PIPE AND THE ROCK FACE.
3. THE CONTRACTOR SHALL SUBMIT 2 WEEKS IN ADVANCE OF PLACEMENT, WORKING DRAWINGS FOR EACH THRUST BLOCK TO THE ENGINEER FOR APPROVAL PRIOR TO INSTALLATION.

THRUST BLOCK TABLE

NTS



N.T.S



* SEE TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED.

N.T.S.



* SEE TABLE ON THRUST BLOCK BEARING AREAS FOR THE AREA OF CONCRETE REQUIRED.

N.T.S.

CONSTRUCTION OF WATER SYSTEM COMPONENTS SHALL COMPLY WITH THE TOWN OF MILLIS "WATER MAIN CONSTRUCTION GUIDELINES", DATED JULY 2007, OR UPDATED THEREAFTER.

DETAILS SHOWN REFER TO
STANDARD TOWN OF MILLIS
CONSTRUCTION DETAILS

REVISIONS

REV	DATE	COMMENT	BY
1	08/03/17	REVISIONS PER COMMISSION FEEDBACK	MM
2	08/11/17	REVISIONS PER REVIEW COMMENTS	EK
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PROJECT No.: W1610404
DRAWN BY: MMM
CHECKED BY: JT/AF
DATE: 06/14/2011
SCALE: AS NOTE
CAD I.D.: W161041 SS2 - SEWER DE

PROJECT:

OFF- SITE SEWER LINE PLANS

—FOR—
TOLL BROS.,
INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS


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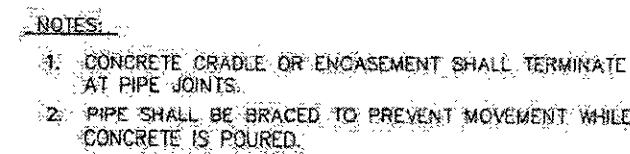
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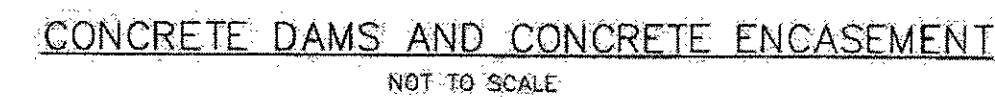
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N.T.S.



N.T.S.



N.T.S.



N.T.S.

- NOTES:**
1. ALL FORCE MAIN BENDS SHALL BE BACKED UP WITH A CONCRETE THRUST BLOCK BETWEEN THE PIPE AND UNDISTURBED MATERIAL.
 2. BEARING AREA REQUIRED ON VERTICAL PLANE 90 TO RADIUS: PLANE PASSING THROUGH MIDPOINT OF BEND SHALL BE 6 SQ. FT.
 3. MECHANICAL RESTRAINTS (MEGA-LUG OR EQUAL) ARE REQUIRED FOR ALL BENDS AND FITTINGS ALONG THE FORCE MAIN IN ADDITION TO CONCRETE THRUST BLOCKS.

DETAILS SHOWN REFER TO
STANDARD TOWN OF MILLIS
CONSTRUCTION DETAILS

REV 2 - 8/11/2017

REVISIONS			
REV	DATE	COMMENT	BY
1	08/03/17	REVISIONS PER COMMISSION FEEDBACK	MMA
2	08/11/17	REVISIONS PER REVIEW COMMENTS	EKR
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PERMIT
SET

PROJECT No.:	W161041
DRAWN BY:	MMA
CHECKED BY:	JT/AFT
DATE:	06/14/2017
SCALE:	AS NOTED
CAD I.D.:	W161041_SS2 - SEWER DET

PROJECT:

OFF- SITE SEWER LINE PLANS

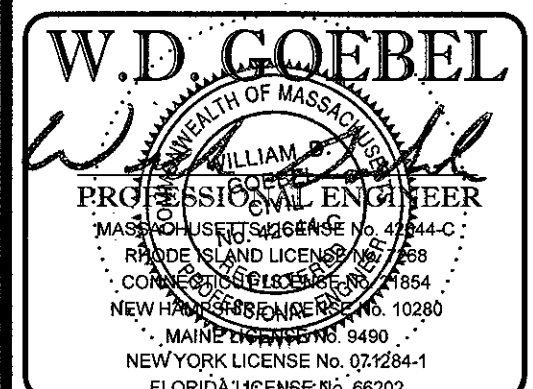
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TOLL BROS.,
INC.

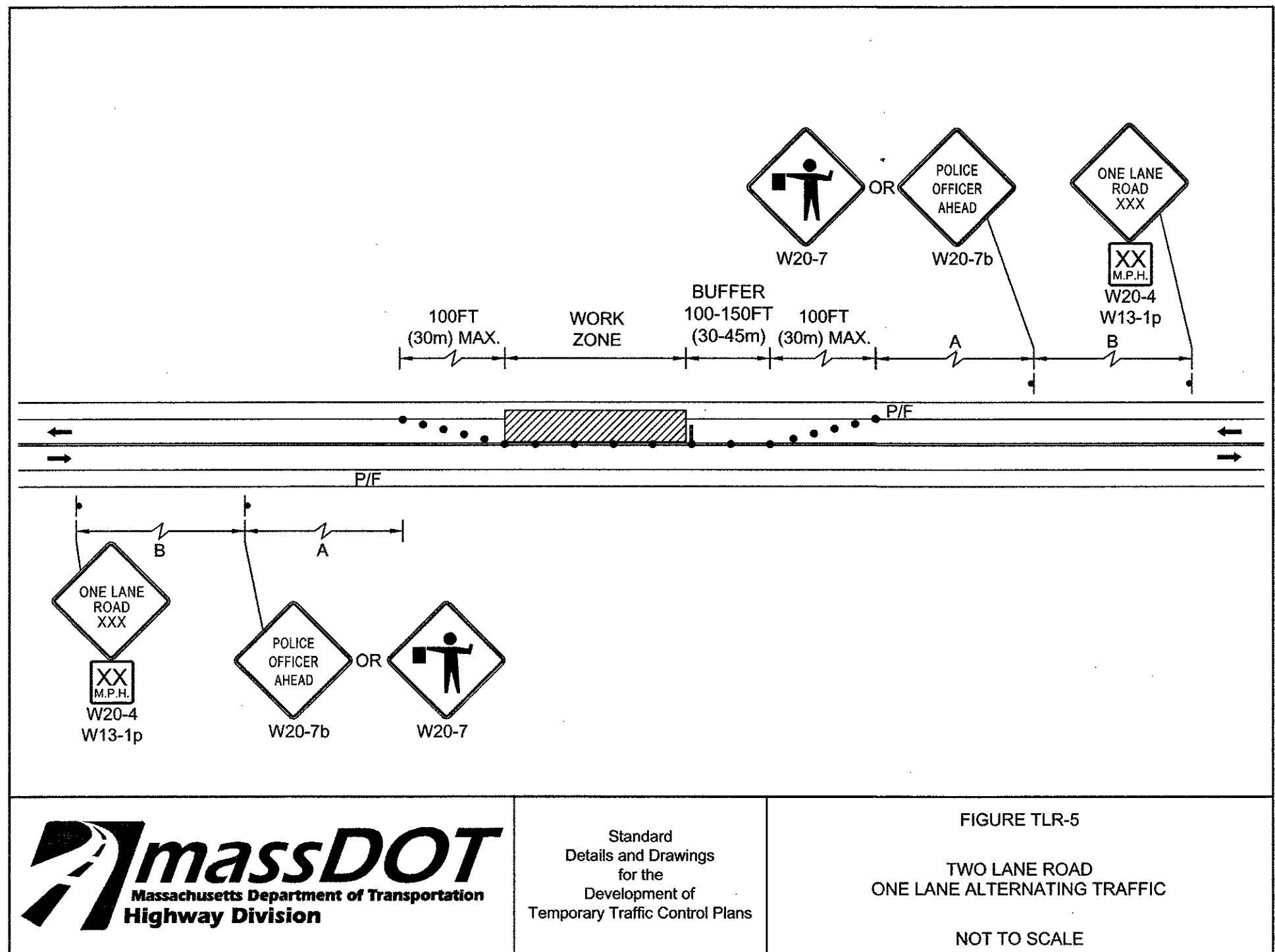
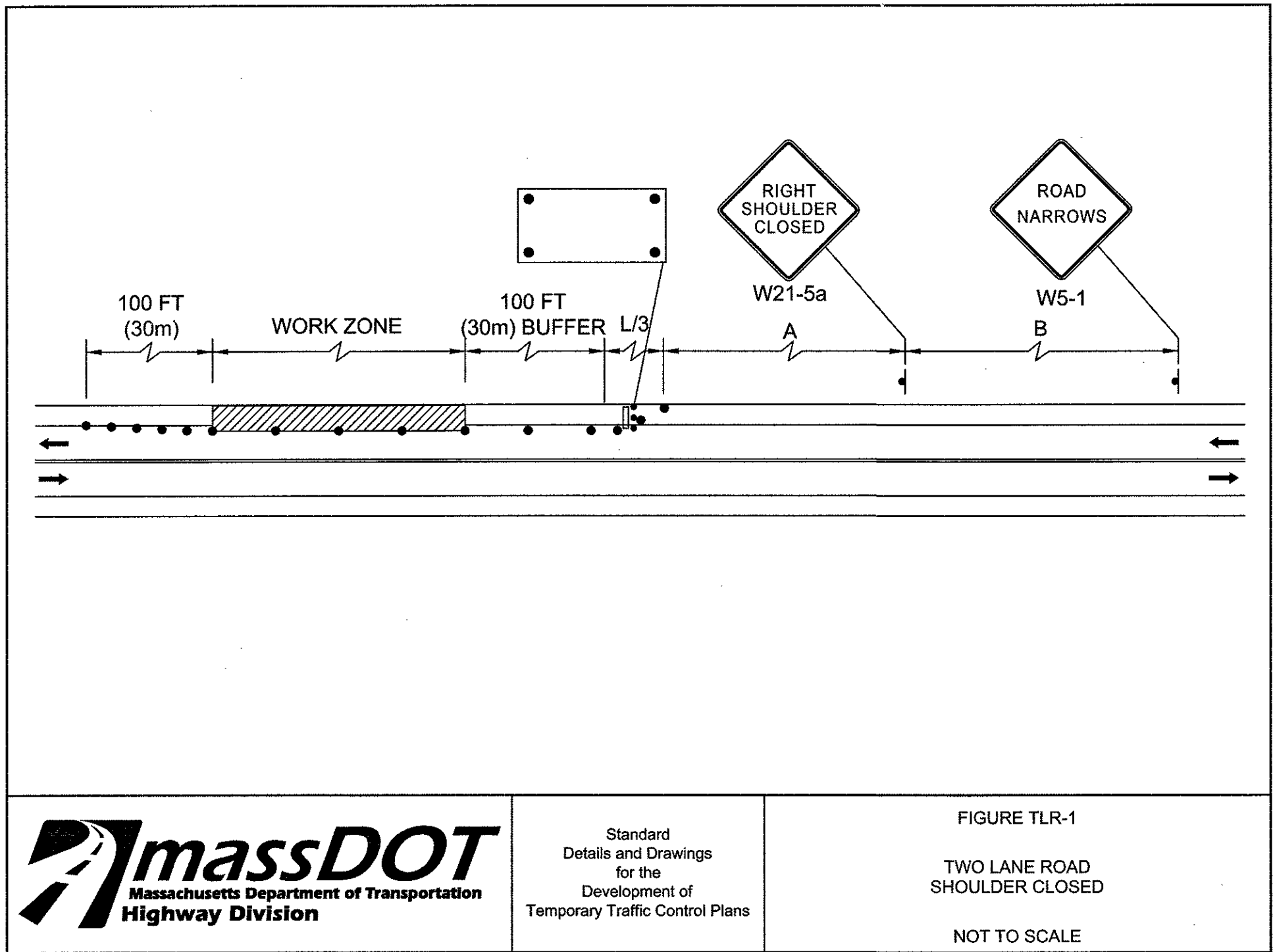
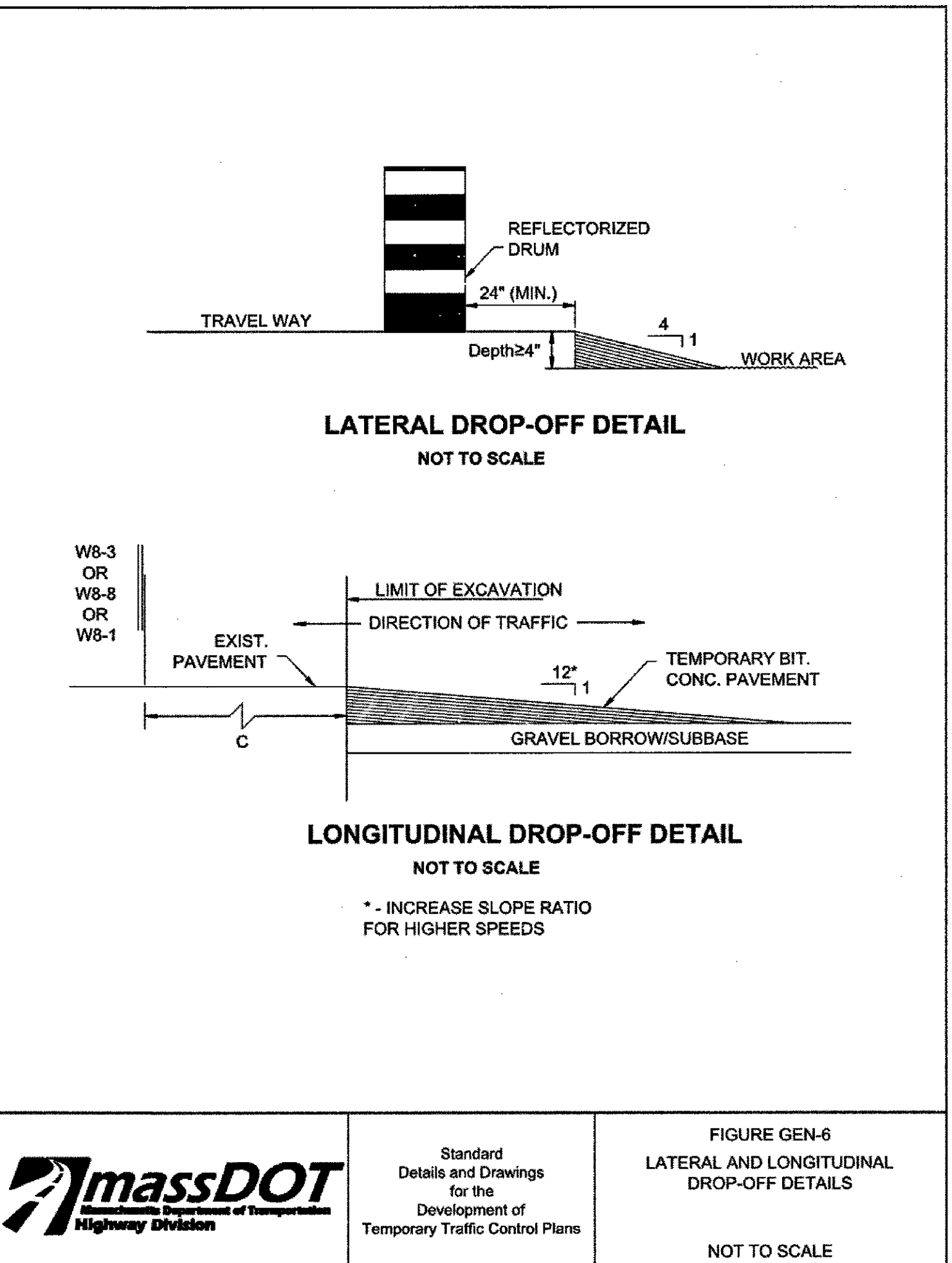
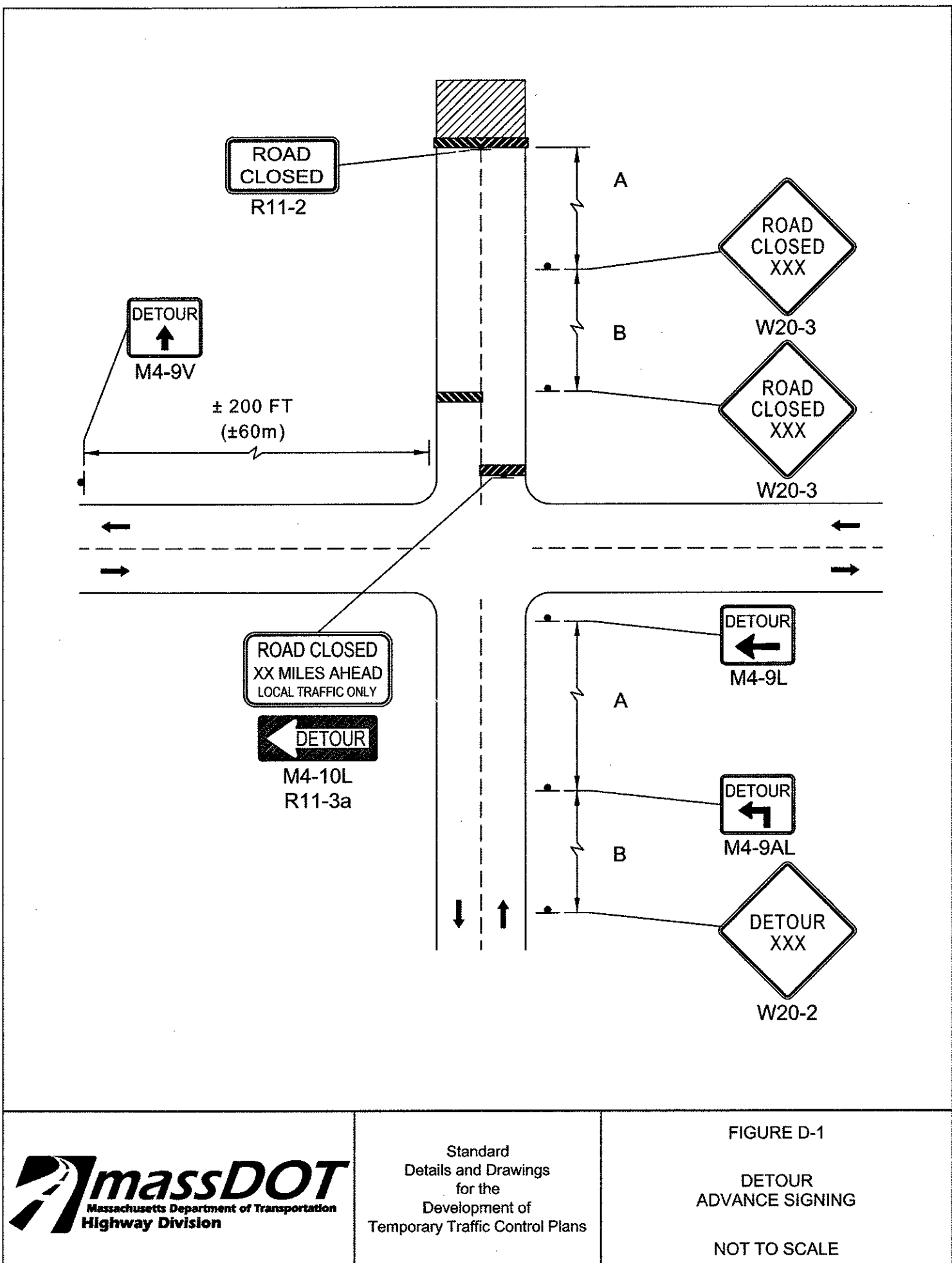
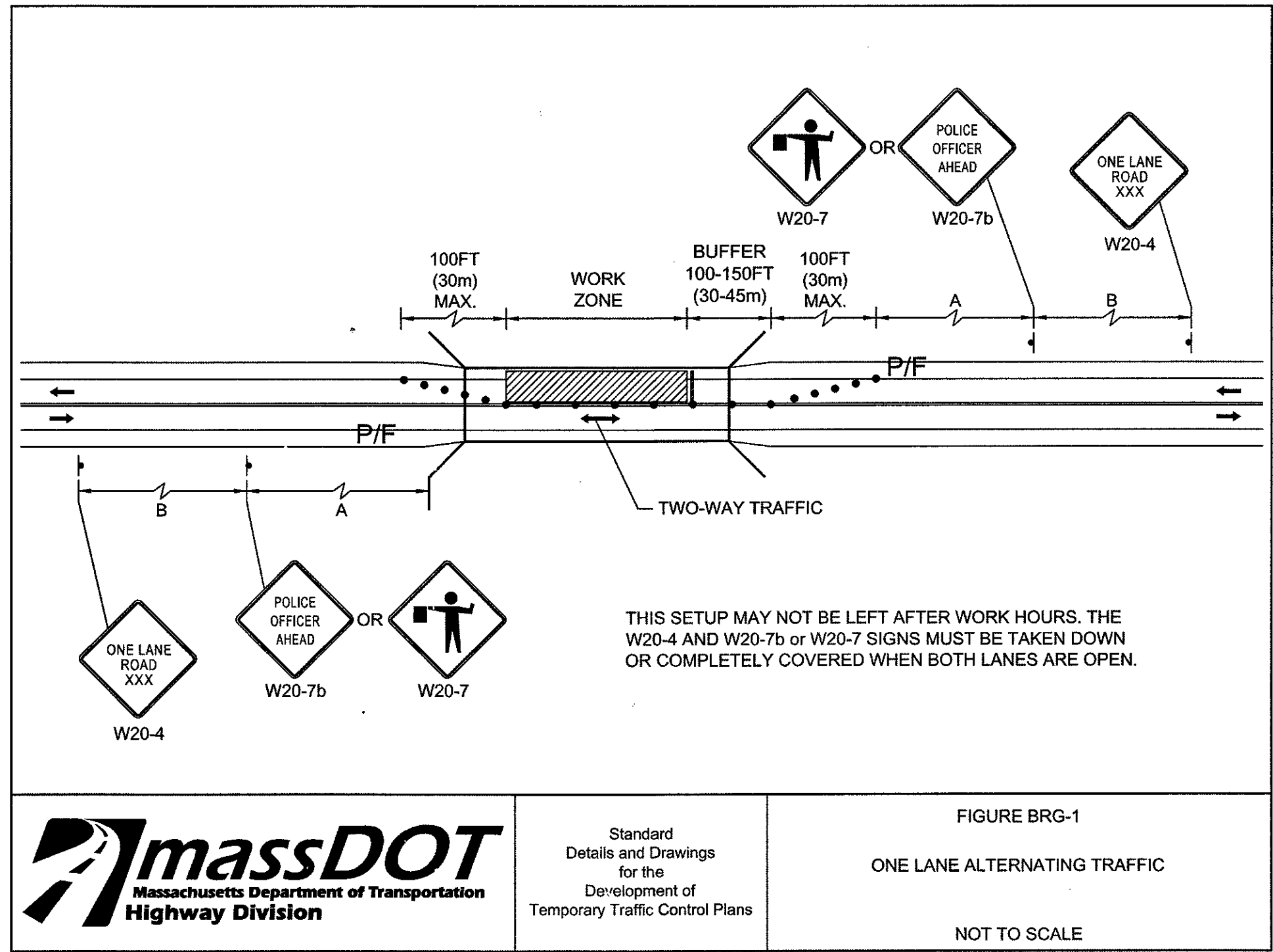
LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS



352 TURNPIKE ROAD
SOUTHBOROUGH, MA 01772
Phone: (508) 480-9900
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SHEET TITLE:



TRAFFIC CONTROL MEASURES
TO BE COORDINATED WITH
THE TOWN OF MILLIS DPW
AND EMERGENCY SERVICES

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PERMIT SET

PROJECT No.: W161041
DRAWN BY: MMA
CHECKED BY: JTAFT
DATE: 06/14/2017
SCALE: AS NOTED
CAD I.D.: W161041_SS2 - SEWER DET

OFF-SITE SEWER LINE PLANS

FOR
TOLL BROS., INC.

LOCATION OF SITE
ORCHARD STREET
TOWN OF MILLIS
NORFOLK COUNTY,
MASSACHUSETTS

BOHLER ENGINEERING
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NEW HAMPSHIRE REG. NO. 10290
NEW YORK LICENSE NO. 071254-1
FLORIDA LICENSE NO. 58202

SHEET TITLE:
TYPICAL TRAFFIC CONTROL DETAILS
SHEET NUMBER:
26
OF 27

811
Know what's below.
Call before you dig.

P:\18\1041\Drawings\Plan Sheet\Sever Extension\REV\W181041_s47 -Sever Det.dwg, 27-Traffic Control Notes, 10/6/2014, 4:28:00 PM, ericadler, Xerox610-1.pcd, User634, 11



Know what's below.
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NOTES:

- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
- ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK.
- TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN NCHRP REPORT 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
- CONTRACTORS SHALL NOTIFY EACH ADJUTER AT LEAST 24 HOURS IN ADVANCE OF THE START OF ANY WORK THAT WILL REQUIRE THE TEMPORARY CLOSURE OF ACCESS, SUCH AS CONDUIT INSTALLATION, EXISTING PAVEMENT EXCAVATION, TEMPORARY DRIVEWAY PAVEMENT PLACEMENT, AND SIMILAR OPERATIONS.
- THE FIRST FIVE PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH TYPE A LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- MAXIMUM SPACING OF TRAFFIC DEVICES IN A TAPER (DRUMS OR CONES) IS EQUAL IN FEET TO THE SPEED LIMIT IN MPH.
- MINIMUM LANE WIDTH IS TO BE 11 FEET (3.3m) UNLESS OTHERWISE SHOWN. MINIMUM LANE WIDTH TO BE MEASURED FROM THE EDGE OF DRUMS OR MEDIAN BARRIER.
- ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.

LEGEND:

- REFLECTORIZED PLASTIC DRUM OR 36" CONE
- P/F POLICE/FLAGGER DETAIL
- TYPE III BARRICADE
- CHANGEABLE MESSAGE SIGN
- ARROW BOARD
- WORK ZONE
- DIRECTION OF TRAFFIC
- IMPACT ATTENUATOR
- MEDIAN BARRIER WITH WARNING LIGHTS
- WORK VEHICLE
- TRUCK MOUNTED ATTENUATOR
- TRAFFIC OR PEDESTRIAN SIGNAL
- SIGN

THE IDEAL CAPACITY OF A MAJOR HIGHWAY IS GENERALLY CONSIDERED TO BE 1900 PASSENGER CARS PER HOUR PER LANE (PCPHPL). IN WORK ZONES ON A MULTI-LANE DIVIDED HIGHWAY, THE FOLLOWING VOLUME GUIDELINES HAVE BEEN SUGGESTED:

MEASURED AVERAGE WORK ZONE CAPACITIES

NUMBER OF LANES NORMAL (EXISTING)	NUMBER OF OPEN (TO TRAFFIC)	NUMBER OF STUDIES	AVERAGE CAPACITY	
			VPH	VPH/PL
3	1	7	1,170	1,170
3	1	1	1,240	1,240
5	2	2	2,740	1,370
4	2	4	2,960	1,480
3	2	9	2,980	1,490
4	3	4	4,560	1,520

Source: Dutek, C., Notes on Work Zone Capacity and Level of Service, Texas Transportation Institute, Texas A&M University, College Station, Texas (1984)

BY OBTAINING HOURLY TRAFFIC COUNTS FOR A PARTICULAR ROADWAY (WITH A MINIMUM OF A 48-HOUR AUTOMATIC TRAFFIC RECORDER (ATR) COUNT), THIS WILL HELP TO DETERMINE AT WHAT TIMES OF THE DAY OR NIGHT A CERTAIN NUMBER OF LANES MAY BE CLOSED.



Notes
for
Traffic Management

FIGURE GEN-1
GENERAL GUIDELINES

SUGGESTED WORK ZONE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS **		
	A	B	C
LOCAL OR LOW VOLUME ROADWAYS*	350 (100)	350 (100)	350 (100)
MOST OTHER ROADWAYS*	500 (150)	500 (150)	500 (150)
FREEWAYS AND EXPRESSWAYS*	1,000 (300)	1,500 (450)	2,640 (800)

* ROAD TYPE TO BE DETERMINED BY MASSDOT OFFICE OF TRANSPORTATION PLANNING.

** DISTANCES ARE SHOWN IN FEET (METERS). THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN THE DETAIL/TYPICAL SETUP FIGURES. THE A DIMENSION IS THE DISTANCE FROM THE TRANSITION OR POINT OF RESTRICTION TO THE FIRST SIGN. THE B DIMENSION IS THE DISTANCE BETWEEN THE FIRST AND SECOND SIGNS. THE C DIMENSION IS THE DISTANCE BETWEEN THE SECOND AND THIRD SIGNS. (THE "THIRD" SIGN IS THE FIRST ONE TYPICALLY ENCOUNTERED BY A DRIVER APPROACHING A TEMPORARY TRAFFIC CONTROL (TTC) ZONE.)

THE "THIRD" SIGN ABOVE IS TYPICALLY REFERRED TO AS AN "ADVANCE WARNING" SIGN ON THE TTC SETUPS. THESE ADVANCE WARNING SIGNS ARE LOCATED PRIOR TO THE PROJECT LIMITS ON ALL APPROACHES (I.E. THE W20-1 SERIES (ROAD WORK "X" TT) SIGNS), AND USUALLY REMAIN FOR THE DURATION OF THE PROJECT. ADDITIONAL SIGNS (I.E. "RIGHT LANE CLOSED 1 MILE" AND "LEFT LANE CLOSED 1 MILE") HAVE BEEN SHOWN IN SOME FIGURES AS EXAMPLES OF REINFORCEMENT SIGN PLACEMENT BUT ARE USED IN RARE OCCASIONS.

THE FIRST AND SECOND WARNING SIGNS ABOVE ARE REFERRED TO AS THE OPERATIONAL (DAY-TO-DAY) WORK ZONE SIGNS AND MAY BE MOVED DEPENDING ON WHERE THE SPECIFIC ROADWAY WORK FOR THAT DAY IS LOCATED.

R2-10a SIGNS SHALL BE PLACED BETWEEN THE SECOND AND THIRD SIGNS AS DESCRIBED ABOVE.

R2-10a, R2-10b, AND W20-1 SERIES SIGNS ARE TO BE INCLUDED ON ALL DETAILS/TYPICAL SETUPS.

Based on: Table 6C-1 MUTCD LATEST EDITION

STOPPING SIGHT DISTANCE AS A FUNCTION OF SPEED

SPEED* (mph)	DISTANCE (ft)	SPEED* (mph)	DISTANCE (ft)
30	35	20	115
40	50	25	155
50	65	30	200
60	85	35	250
70	105	40	305
80	130	45	360
90	160	50	425
100	185	55	495
110	220	60	570
120	250	65	645
		70	730
		75	820

*POSTED SPEED, OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED

THESE VALUES MAY BE USED TO DETERMINE THE LENGTH OF LONGITUDINAL BUFFER SPACES.

THE DISTANCES IN THE ABOVE CHART REPRESENT THE MINIMAL VALUES FOR BUFFER SPACING.

Source: Table 6C-2 MUTCD LATEST EDITION



Notes
for
Traffic Management

FIGURE GEN-2
NOTES ON WORK ZONE DISTANCES

CONVENTIONAL ROADWAY- A STREET OR HIGHWAY OTHER THAN A LOW-VOLUME ROAD, EXPRESSWAY, OR FREEWAY.

EXPRESSWAY- A DIVIDED HIGHWAY WITH PARTIAL CONTROL OF ACCESS.

FREEWAY- A DIVIDED HIGHWAY WITH FULL CONTROL OF ACCESS.

LOW-VOLUME ROAD- A FACILITY LYING OUTSIDE OF BUILT-UP AREAS OF CITIES, TOWNS, AND COMMUNITIES, AND IT SHALL HAVE A TRAFFIC VOLUME OF LESS THAN 400 ADT. IT SHALL NOT BE A FREEWAY, EXPRESSWAY, INTERCHANGE RAMP, FREEWAY SERVICE ROAD OR A ROAD ON A DESIGNATED STATE HIGHWAY SYSTEM.

Source: MUTCD LATEST EDITION

TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

TYPE OF TAPER	TAPER LENGTH (L)*
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	50 FT MIN.(15 m) 100 FT(30 m) MAX.
DOWNSTREAM TAPER	50 FT MIN.(15 m) 100 FT MAX.(30 m) PER LANE

Source: Table 6C-3 MUTCD LATEST EDITION

FORMULAS FOR DETERMINING TAPER LENGTHS

SPEED LIMIT (S)	TAPER LENGTH (L)	SPEED LIMIT (S)	TAPER LENGTH (L)
40 MPH OR LESS	$L = \frac{WS^2}{60}$	60 KM/H OR LESS	$L = \frac{WS^2}{155}$
45 MPH OR MORE	$L = WS$	70 KM/H OR MORE	$L = \frac{WS}{1.6}$

WHERE: L = TAPER LENGTH IN FEET (METERS)

W = WIDTH OF OFFSET IN FEET (METERS)

S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH (KM/H)

Source: Table 6C-4 MUTCD LATEST EDITION



Notes
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FIGURE GEN-3
NOTES ON WORK ZONE DISTANCES



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OFF- SITE SEWER LINE PLANS

FOR

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SHEET TITLE: TYPICAL TRAFFIC CONTROL NOTES

SHEET NUMBER:

27
OF 27

REV 2 - 8/11/2017

TRAFFIC CONTROL MEASURES
TO BE COORDINATED WITH
THE TOWN OF MILLIS DPW
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