

**FTP DOCUMENT IDENTIFICATION FORM**


<b>Document Name</b>	100% Design Submittal		
<b>Water System Identification</b>			
<b>WSID #</b>	5016	<b>Water System Name</b>	Town of Bennington
<b>Document Identification</b>			
<b>PID # or Project Name</b>	Corrective Action Area A II Operation Unit II (CAA II)		
<b>Division Recipient</b>	Tim Raymond, Patrick Smart		
<b>Document Type</b>	Construction Permit Document	100% Plan Set, Construction Specifications	
<b>Document Purpose</b>	New Permit Application		
<b>Author Identification</b>			
<b>Author Name</b>	Jason M. Dolmetsch, P.E.		
<b>Phone</b>	802-447-1402	<b>Email</b>	jdolmetsch@mskeng.com
<b>Relation to Water System</b>	Consulting Engineer		



# LEGEND

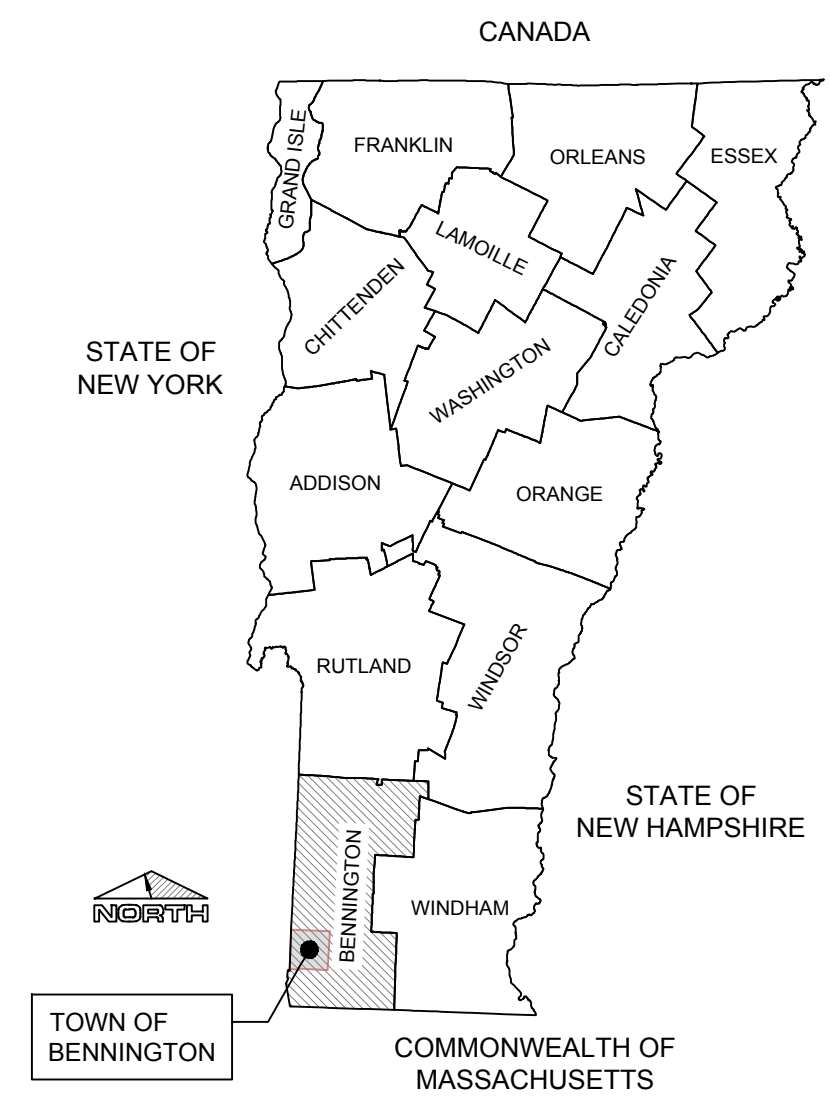
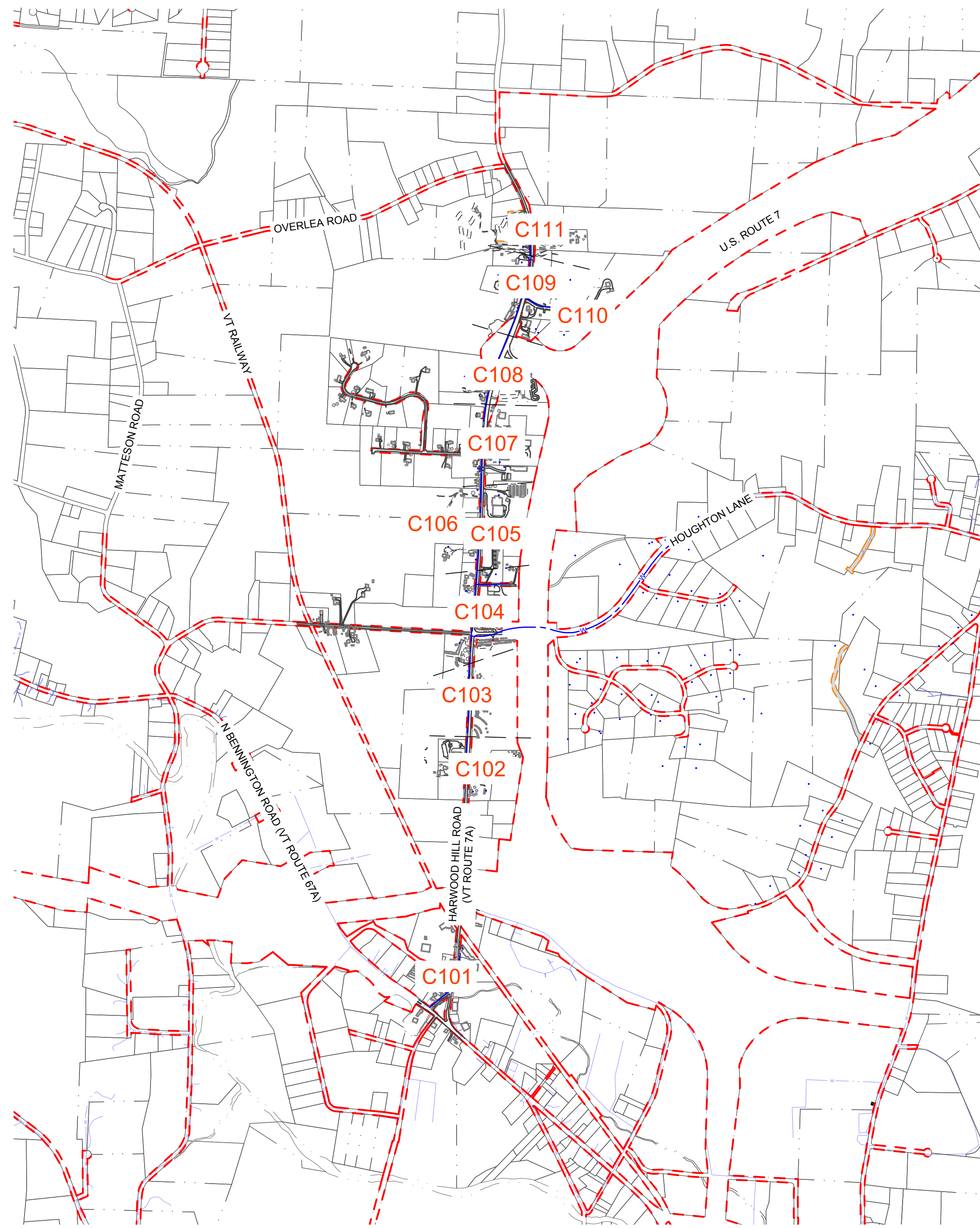
- BENCHMARK
- IRON PIN
- LEDGE PROBE OR BORING
- STATE OR MUNICIPAL RIGHT-OF-WAY
- EASEMENT
- SETBACK
- PROPERTY LINE
- ADJACENT PROPERTY LINE (ABUTTER)
- FENCE LINE
- PROJECT DEMARCATION FENCE
- SILT FENCE
- GUARD RAIL
- BOLLARD
- MAILBOX
- POST
- SIGN
- CATCH BASIN
- DRAINAGE MANHOLE
- STORM DRAIN
- SANITARY SEWER MANHOLE
- SANITARY SEWER
- ARV: AIR RELEASE VALVE (EXISTING)
- ARV: AIR RELEASE VALVE
- WATER SHUT-OFF (EXISTING)
- WATER SHUT-OFF
- GATE VALVE (EXISTING)
- GATE VALVE
- PRV: PRESSURE REDUCING VALVE (EXISTING)
- PRV: PRESSURE REDUCING VALVE
- FIRE HYDRANT (EXISTING)
- FIRE HYDRANT
- FLUSH HYDRANT (EXISTING)
- FLUSH HYDRANT
- SAMPLING STATION
- WELL
- WATER MAIN OR SERVICE (EXISTING)
- WATER MAIN (NEW)
- WATER SERVICE (NEW)
- STREET OR YARD LIGHT
- UTILITY MANHOLE
- UTILITY POLE
- GUY POLE/WIRE
- OVERHEAD UTILITY SERVICE
- UNDERGROUND ELECTRICAL SERVICE
- UNDERGROUND GAS SERVICE
- EDGE OF WATERWAY(OHW)  
RIVER, STREAM, LAKE OR POND
- TREE OR BRUSH LINE
- SHRUB
- DECIDUOUS TREE
- CONIFER TREE
- FLAGGED WETLAND LOCATION
- ROLLED EROSION CONTROL PRODUCT (REC/P)

NOTE: SOME SYMBOLS MAY NOT APPEAR ON ALL PLANS.

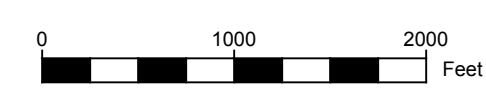
# TOWN OF BENNINGTON MUNICIPAL WATER SYSTEM REMEDIAL EXPANSION PHASE II BENNINGTON, VERMONT

## CONTRACT 5

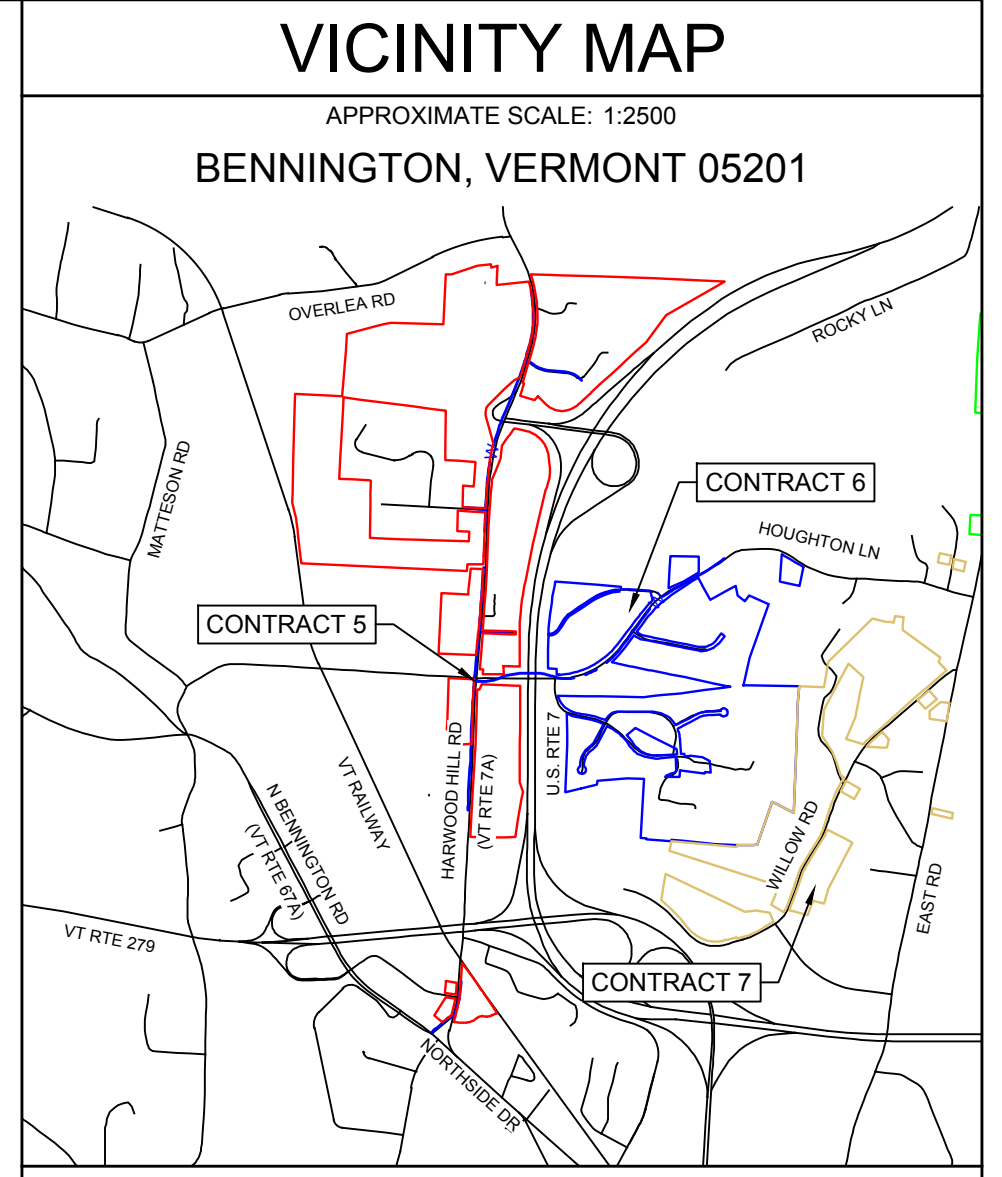
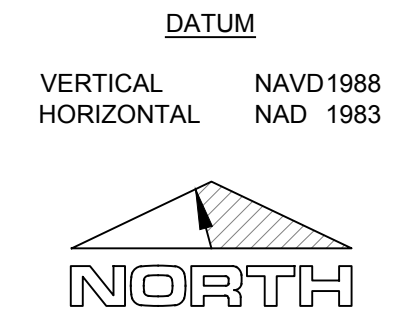
BERARD STREET/HARWOOD HILL ROAD (VT ROUTE 7A)  
TRANSPORT DRIVE/SETTLERS ROAD/BEAUDOIN LANE  
DISTRICT D PRV/SKY TOP HOMEOWNER'S ASSOCIATION/SUNSET MOBILE HOME PARK



### 1 DISTRICT D COVER SHEET AND KEY PLAN



Scale: 1:1000



### SHEET INDEX

CONTRACT 5	
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G005	COVER SHEET AND KEY PLAN
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C101A	PROFILE
C102	PLAN
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C103	PLAN
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C109A	PROFILE
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C401	PRV SITE PLAN
C402	SKY TOP HOA SITE PLAN
C403	SUNSET MHP SITE PLAN
C500	PRV VAULT DETAILS
C501	TRAFFIC CONTROL DETAILS
C502	TRAFFIC CONTROL DETAILS
C503	CONSTRUCTION DETAILS
C504	CONSTRUCTION DETAILS
C505	CONSTRUCTION DETAILS
C506	EPSC DETAILS
C507	STABILIZATION DETAILS
C508	PLUMBING DETAILS
C509	CONNECTION DETAILS
C601	SERVICE ENTRANCE DIAGRAMS
C602	SERVICE ENTRANCE DIAGRAMS
C603	SERVICE ENTRANCE DIAGRAMS
C604	SERVICE ENTRANCE DIAGRAMS

### GENERAL NOTES

THE CONTRACTOR SHALL ADHERE TO THE FOLLOWING GUIDELINES, UNLESS OTHERWISE NOTED:

- NEW 3/4" CORPORATION STOPS ARE TO BE INSTALLED FOR ALL SERVICES
- NEW 3/4" K COPPER IS TO BE INSTALLED FROM CORPORATION STOPS TO CURB STOPS
- NEW 1" HDPE IS TO BE INSTALLED FROM CURB STOPS TO SERVICE ENTRANCES OF ALL STRUCTURES
- CURB STOPS SHALL BE LOCATED NO LESS THAN 6 FEET NOR MORE THAN 8 FEET FROM EDGES OF ROADWAYS, AND (MINIMUM) 1 FOOT INSIDE STATE OR MUNICIPAL RIGHT-OF-WAYS. AVOID INSTALLING CURB STOPS IN DRIVE SURFACES, WHERE POSSIBLE.
- IN ACCORDANCE WITH VERMONT WASTEWATER AND POTABLE WATER SUPPLY RULES (04/12/2019), LEAKAGE CLAMPS ARE TO BE INSTALLED AT JOINTS ON WATER MAINS WITHIN 50' OF LEACH FIELDS AND SEPTIC TANKS, AND WITHIN 10' OF SANITARY PIPING. 8 mil POLYSTYRENE SLEEVES ARE TO BE APPLIED TO WATER SERVICES WITHIN 25' OF SANITARY SYSTEMS AND WITHIN 10' OF SANITARY PIPING.

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

### REVISIONS

NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

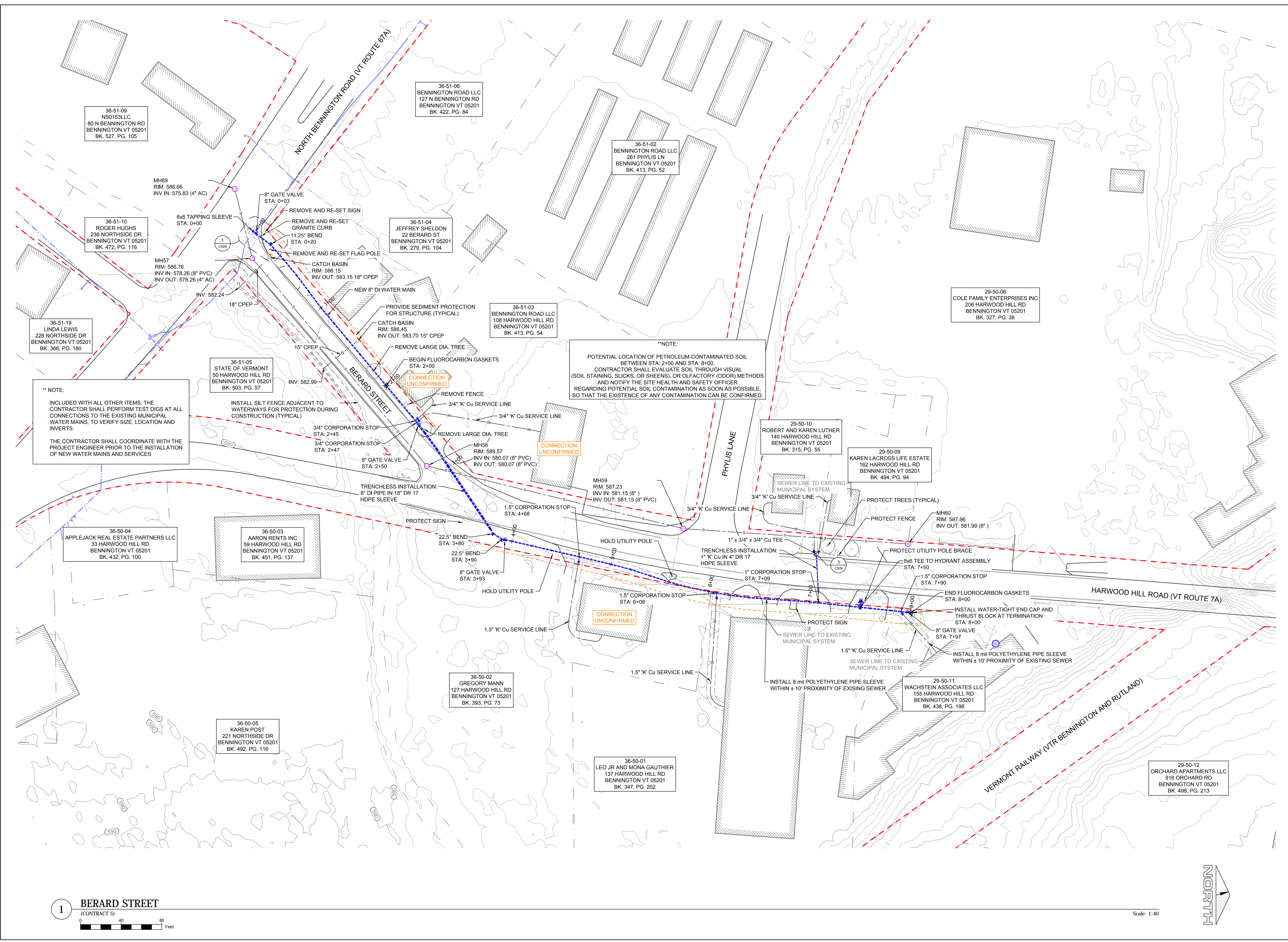
CONTRACT 5  
COVER SHEET AND  
KEY PLAN

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**G005**





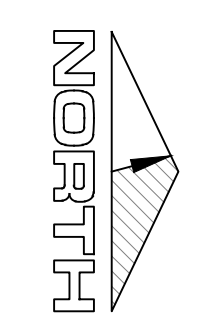


**\*\* NOTE:**  
 INCLUDED WITH ALL OTHER ITEMS, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
 THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

**\*\*NOTE:**  
 POTENTIAL LOCATION OF PETROLEUM-CONTAMINATED SOIL BETWEEN STA: 2+00 AND STA: 8+00. CONTRACTOR SHALL EVALUATE SOIL THROUGH VISUAL (SOIL STAINING, SLICKS, OR SHEENS), OR OLFACTORY (ODOR) METHODS AND NOTIFY THE SITE HEALTH AND SAFETY OFFICER REGARDING POTENTIAL SOIL CONTAMINATION AS SOON AS POSSIBLE, SO THAT THE EXISTENCE OF ANY CONTAMINATION CAN BE CONFIRMED.

**1 BERARD STREET**  
 (CONTRACT 5)  
 0 40 80 Feet

Scale: 1:40



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 BENNINGTON, VERMONT 05201  
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NO.	DATE	DESCRIPTION

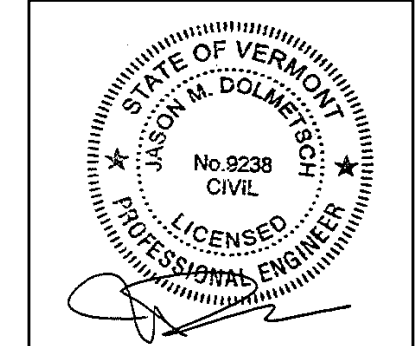
**TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT**

**SERVICE DISTRICT D  
 PLAN**

DRAWINGS THIS SHEET

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

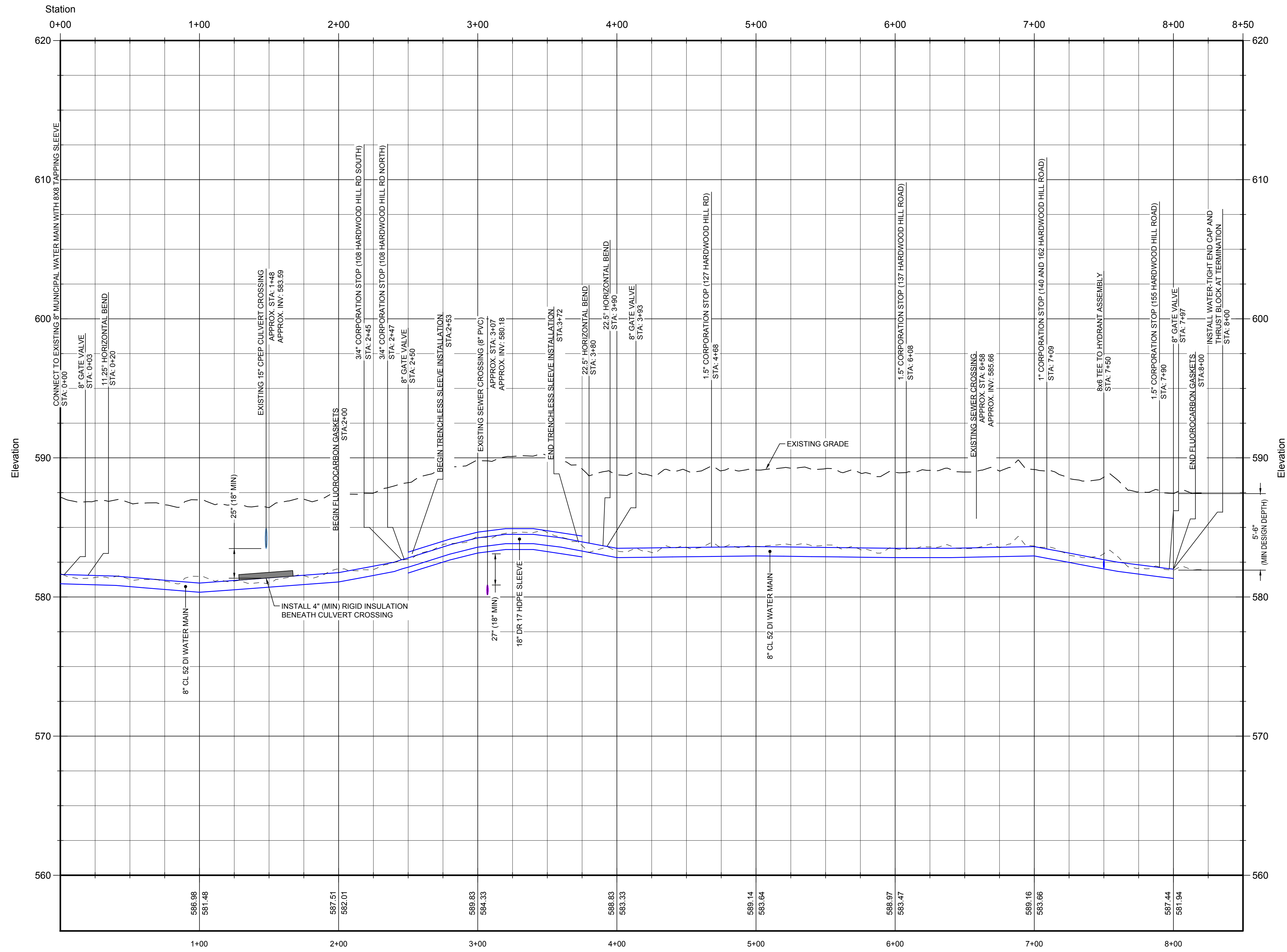
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**C101**



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 2 May 2019 14:48:33



WL - Berard Street PROFILE



1 BERARD STREET  
(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1281

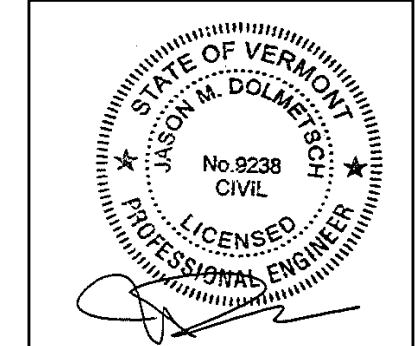
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT D  
PROFILE

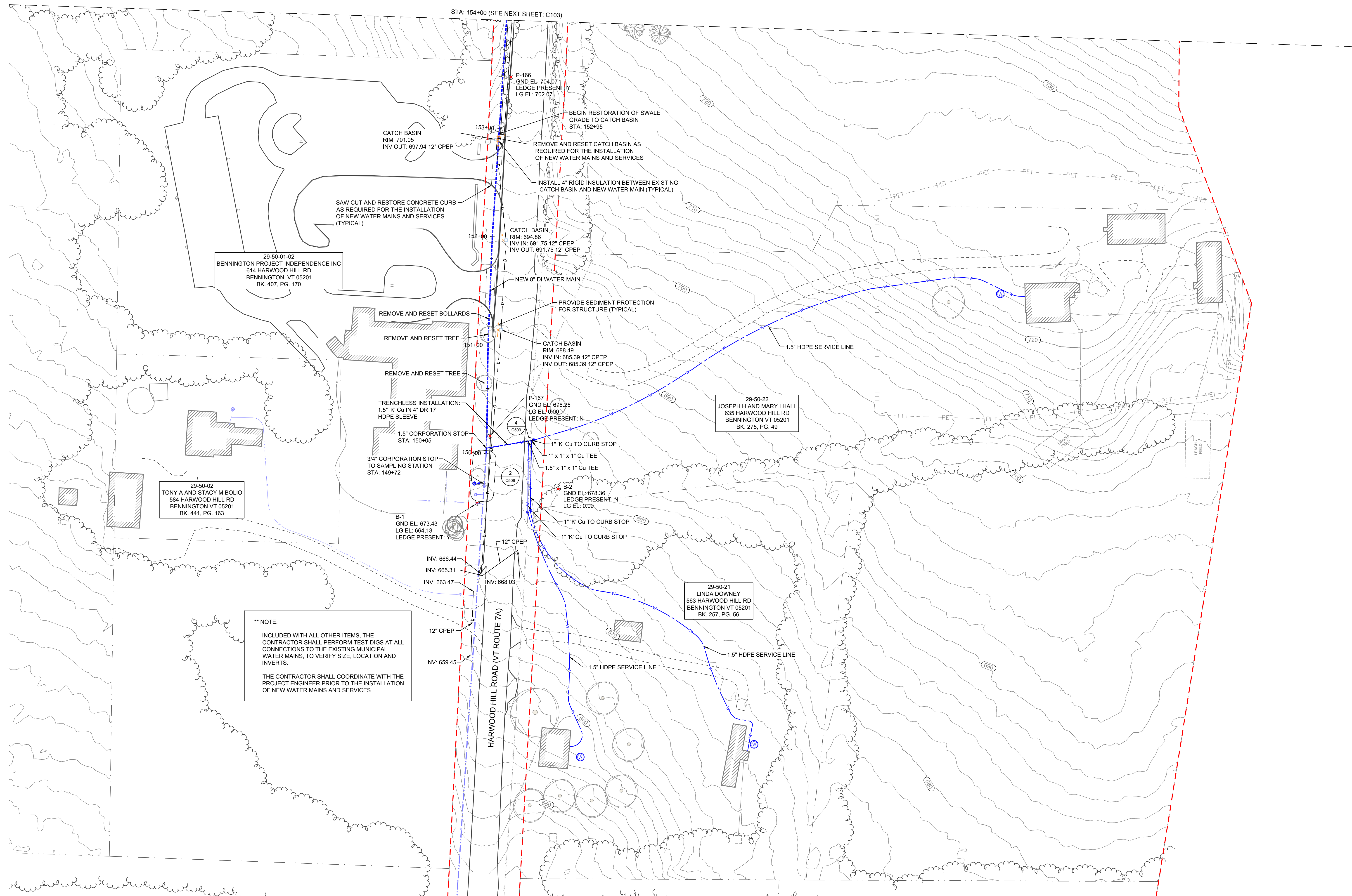
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1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C101A**



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29-50-01-02  
 BENNINGTON PROJECT INDEPENDENCE INC  
 614 HARWOOD HILL RD  
 BENNINGTON, VT 05201  
 BK. 407, PG. 170

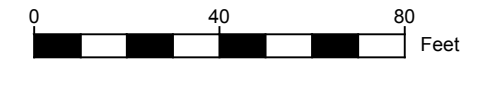
29-50-02  
 TONY A AND STACY M BOLIO  
 584 HARWOOD HILL RD  
 BENNINGTON VT 05201  
 BK. 441, PG. 163

29-50-22  
 JOSEPH H AND MARY I HALL  
 635 HARWOOD HILL RD  
 BENNINGTON VT 05201  
 BK. 275, PG. 49

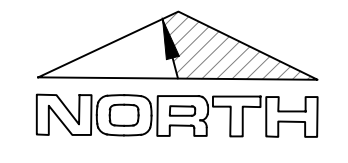
29-50-21  
 LINDA DOWNEY  
 563 HARWOOD HILL RD  
 BENNINGTON VT 05201  
 BK. 257, PG. 56

**\*\* NOTE:**  
 INCLUDED WITH ALL OTHER ITEMS, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
 THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

**1 HARWOOD HILL ROAD (VT ROUTE 7A)**  
 (CONTRACT 5)



Scale: 1:40



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 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
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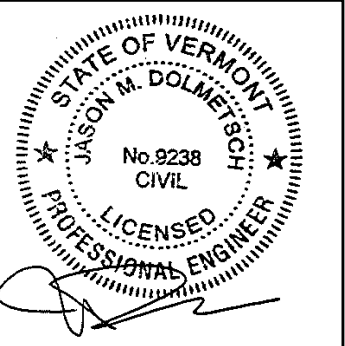
REVISIONS	
NO.	DESCRIPTION

**TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT**

**SERVICE DISTRICT D  
 PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

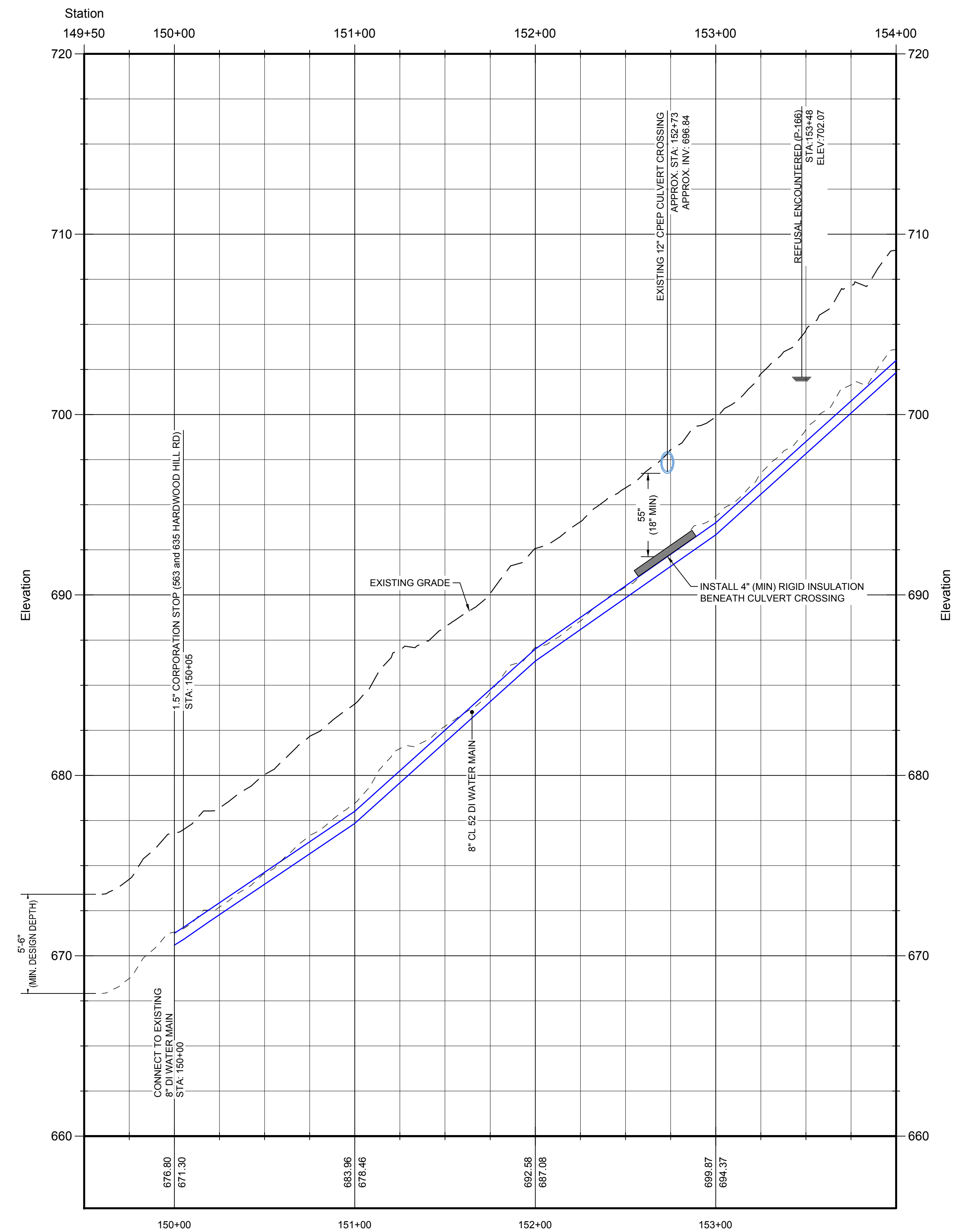
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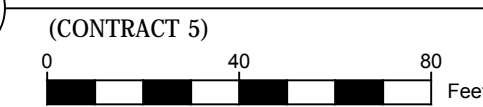
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WL - D1 Harwood Hill Rd PROFILE



1 HARWOOD HILL ROAD (VT ROUTE 7A)  
(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

MSK

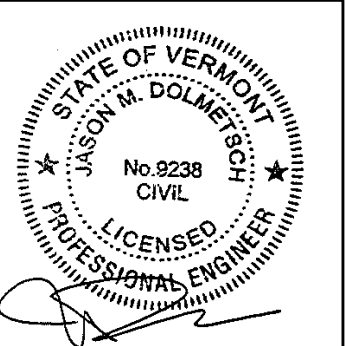
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

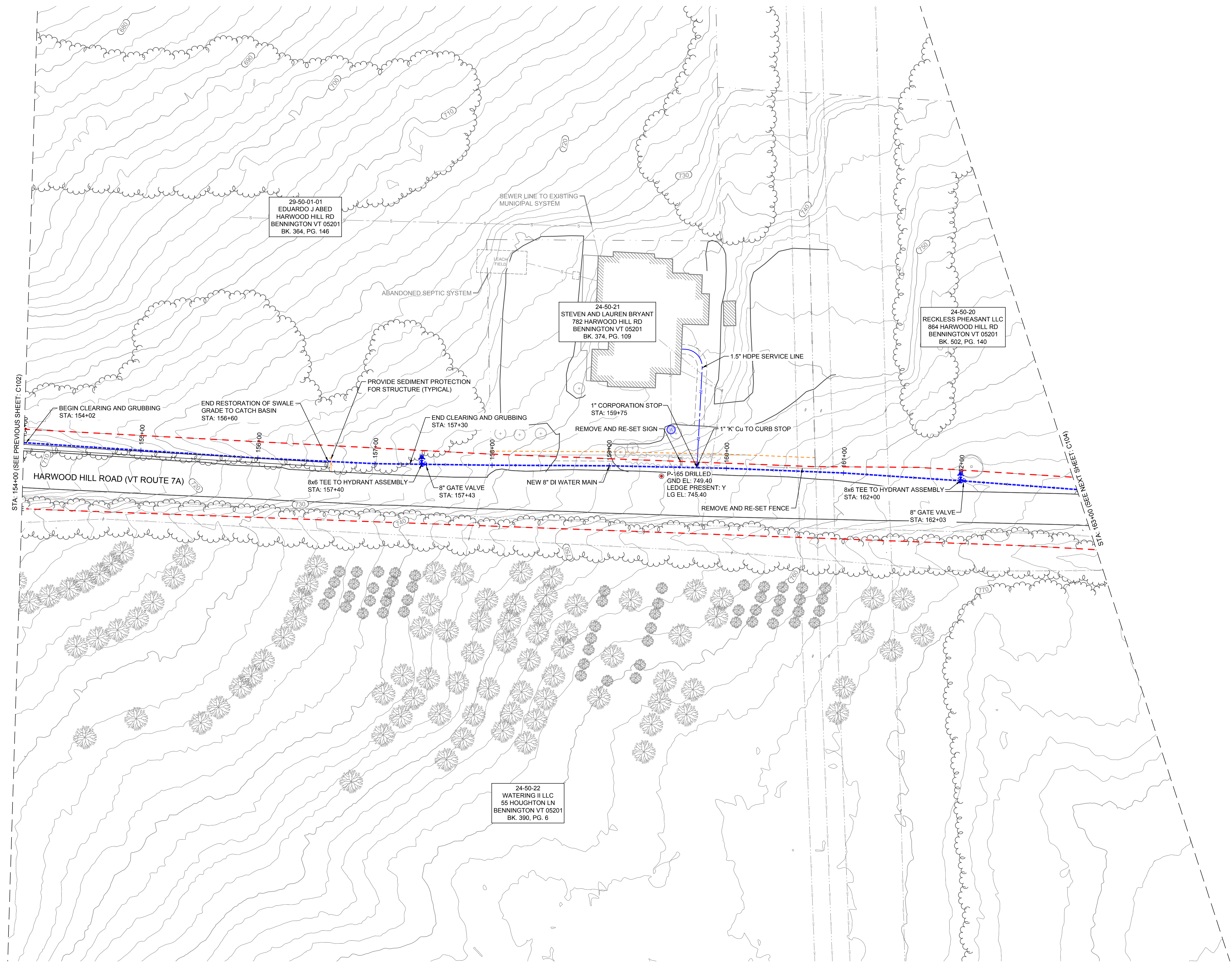
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NUMBER	DATE
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MSK	JMD

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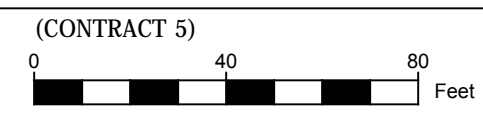


STA: 154+00 (SEE PREVIOUS SHEET: C102)

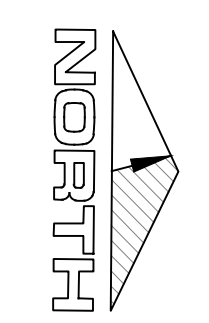
STA: 163+00 (SEE NEXT SHEET: C104)

HARWOOD HILL ROAD (VT ROUTE 7A)

**1 HARWOOD HILL ROAD (VT ROUTE 7A)**



Scale: 1:40



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 BENNINGTON, VERMONT 05201  
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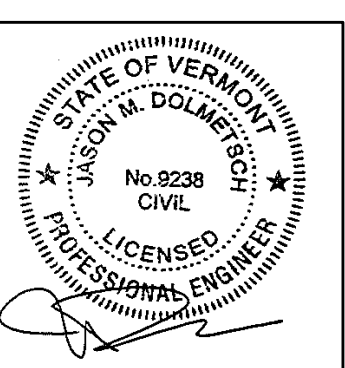
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**TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT**

**SERVICE DISTRICT D  
 PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

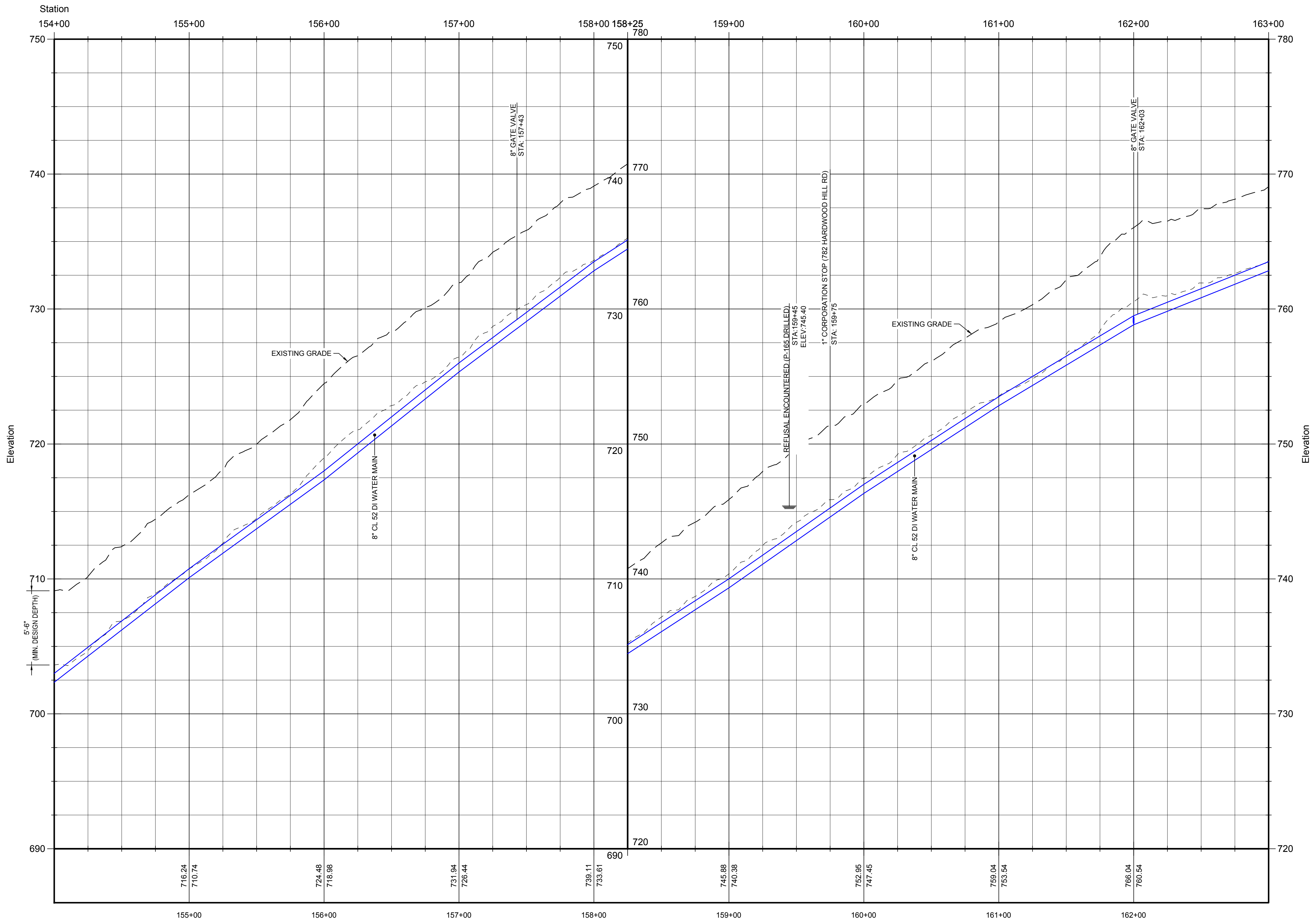
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**C103**



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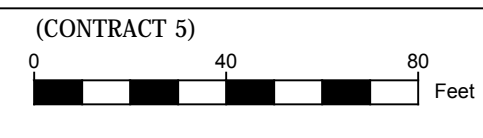


### WL - D1 Harwood Hill Rd PROFILE



5'-6"  
(MIN. DESIGN DEPTH)

1 HARWOOD HILL ROAD (VT ROUTE 7A)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 441-1402 FAX: (802) 445-1281

NO.	DATE	DESCRIPTION

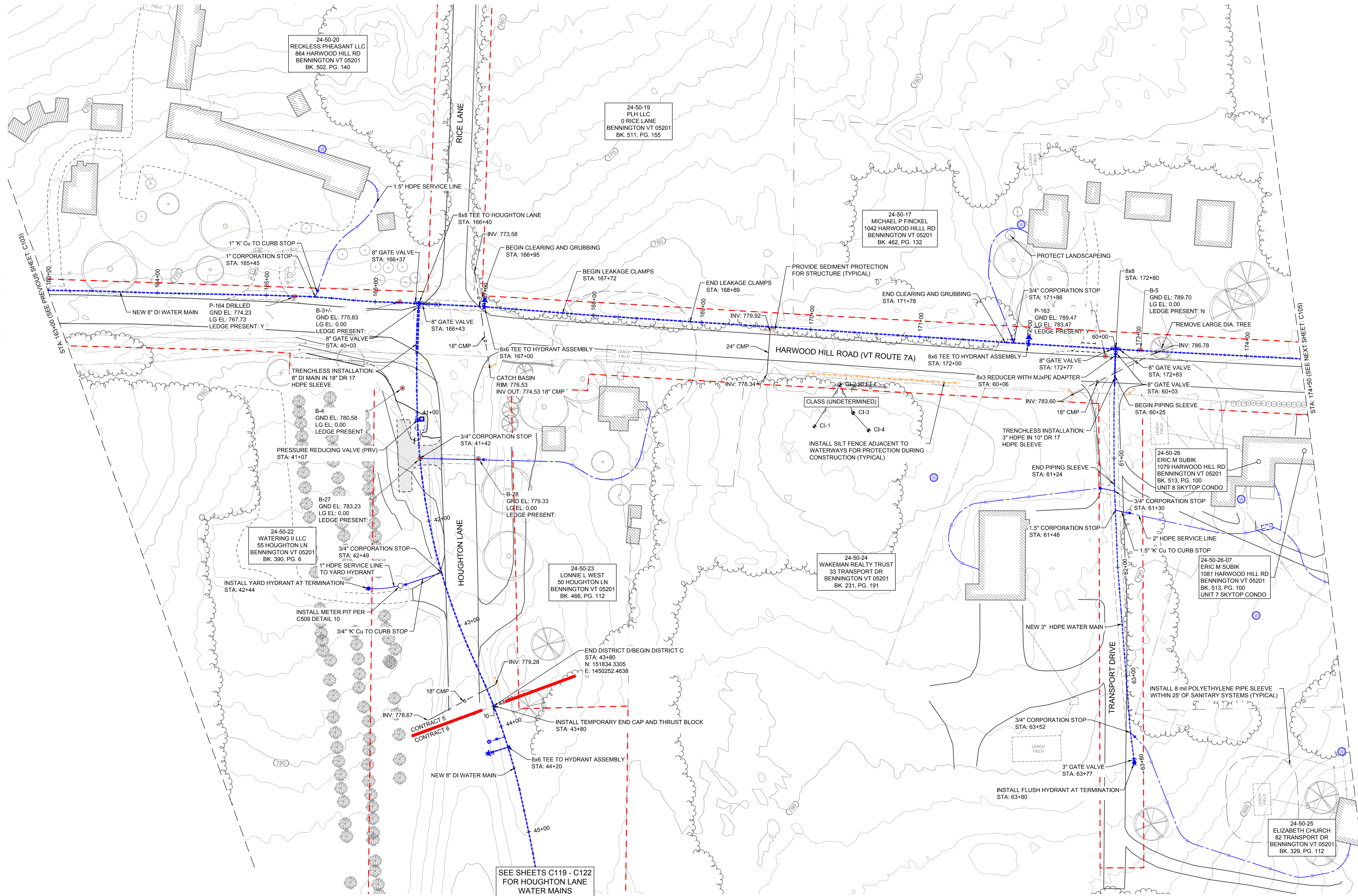
TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**SERVICE DISTRICT D  
 PROFILE**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C103A**





24-50-20  
RECKLESS PHEASANT LLC  
864 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 502, PG. 140

24-50-19  
PLH LLC  
0 RICE LANE  
BENNINGTON VT 05201  
BK. 511, PG. 155

24-50-17  
MICHAEL P FINCKEL  
1042 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 462, PG. 132

24-50-22  
WATERING II LLC  
55 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 390, PG. 6

24-50-23  
LONNIE L WEST  
50 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 466, PG. 112

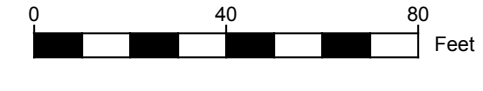
24-50-24  
WAKEMAN REALTY TRUST  
33 TRANSPORT DR  
BENNINGTON VT 05201  
BK. 231, PG. 191

24-50-26-07  
ERIC M SUBIK  
1081 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 513, PG. 100  
UNIT 7 SKYTOP CONDO

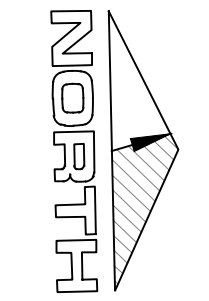
24-50-25  
ELIZABETH CHURCH  
82 TRANSPORT DR  
BENNINGTON VT 05201  
BK. 329, PG. 112

SEE SHEETS C119 - C122  
FOR HOUGHTON LANE  
WATER MAINS


**1 HARWOOD HILL ROAD (VT ROUTE 7A)**  
(CONTRACT 5)



Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
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BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291



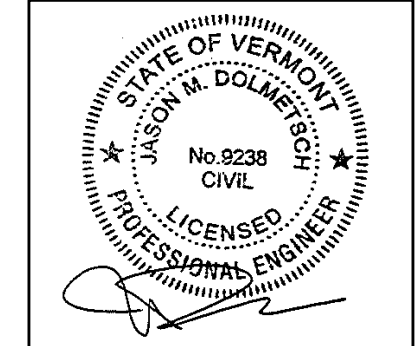
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT D  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

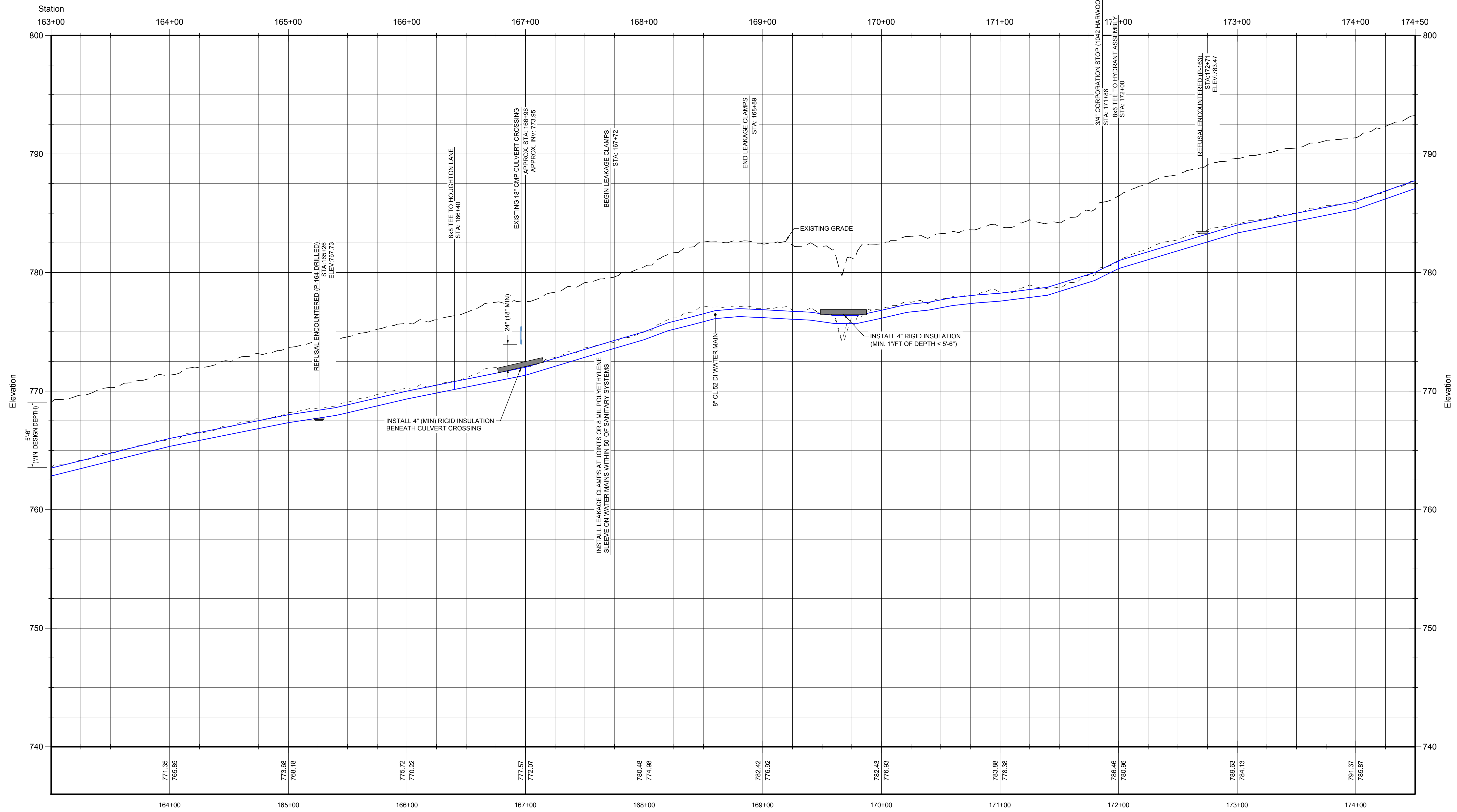
SHEET NUMBER  
**C104**



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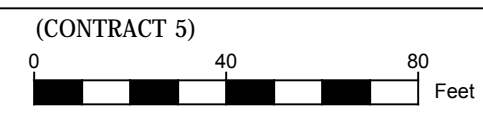


WL - D1 Harwood Hill Rd PROFILE




P:\DRAWING DATABASE\1001-2183\1001-2183 HARWOOD HILL ROAD\PROJECTS\1001-2183 HARWOOD HILL ROAD\DWG

1 HARWOOD HILL ROAD (VT ROUTE 7A)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 441-1402 FAX: (802) 445-1281



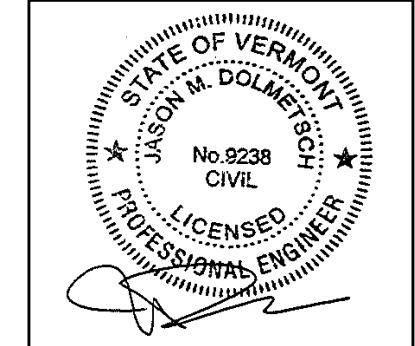
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**SERVICE DISTRICT D**  
**PROFILE**

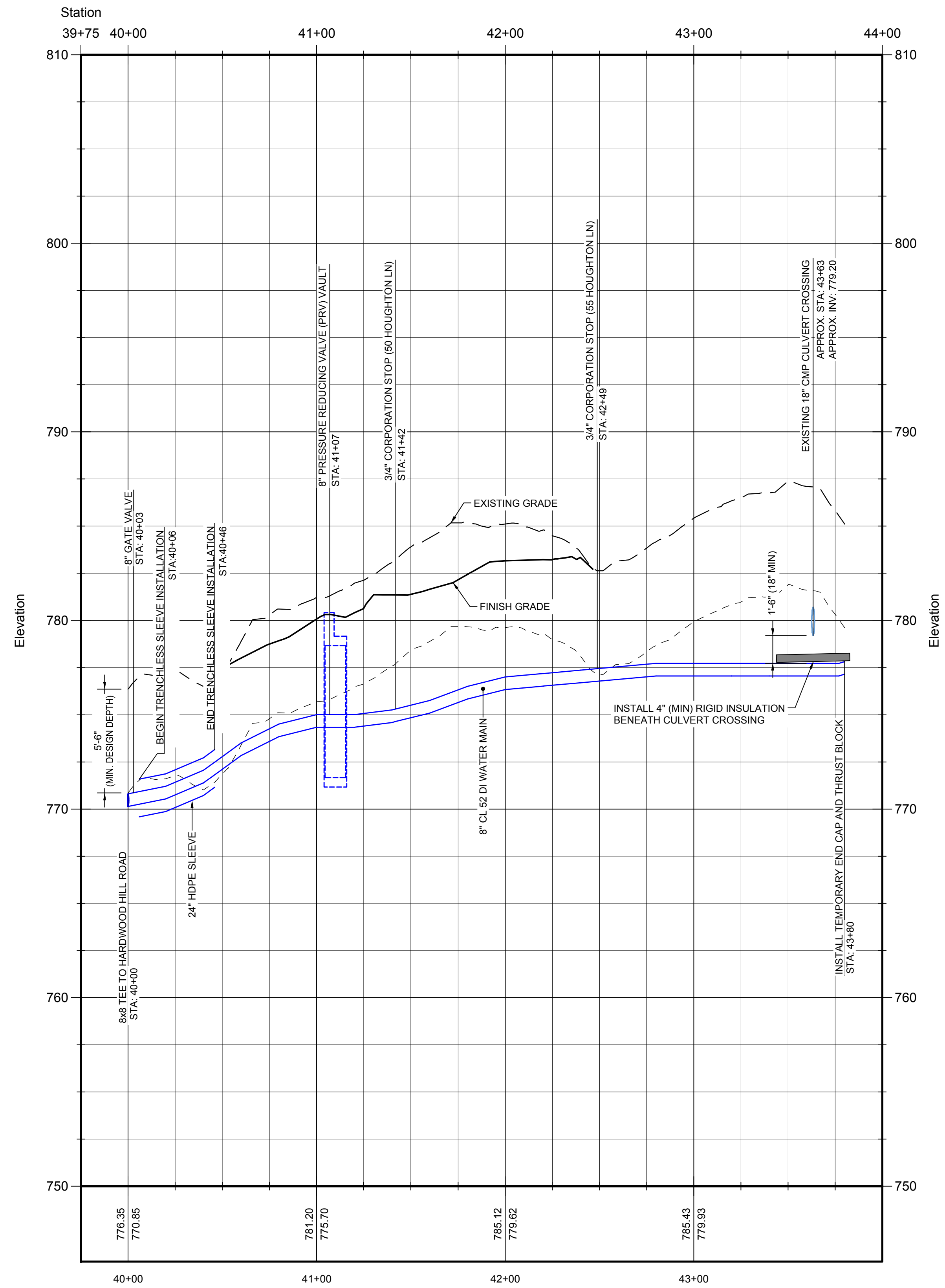
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C104A**





WL - D1 Houghton Ln PROFILE



1 HOUGHTON LANE  
(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1281

REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

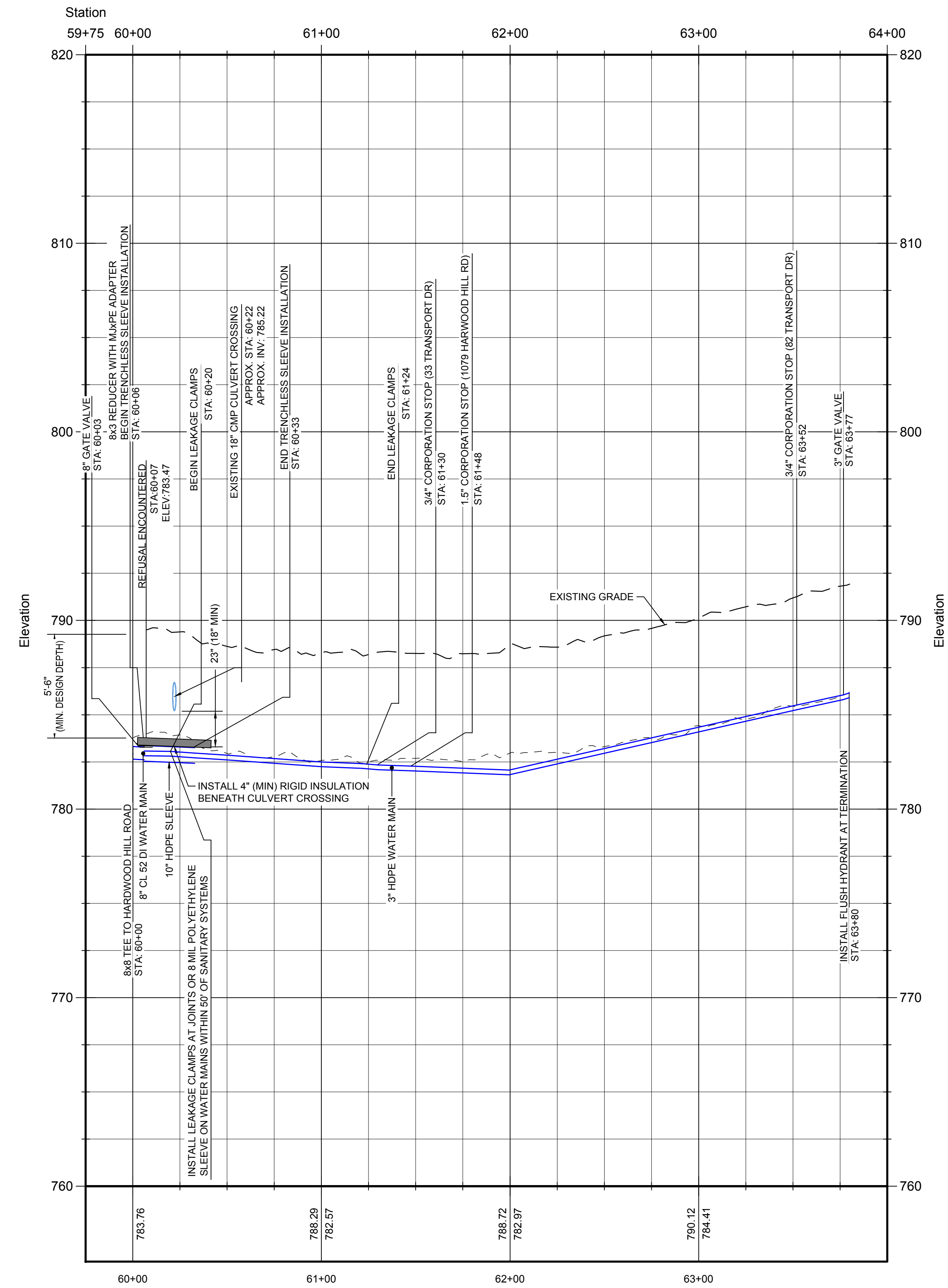
DRAWINGS THIS SHEET  
 SERVICE DISTRICT D  
 PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C104B**



WL - D1.2 Transport Dr PROFILE



1 TRANSPORT DRIVE

(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

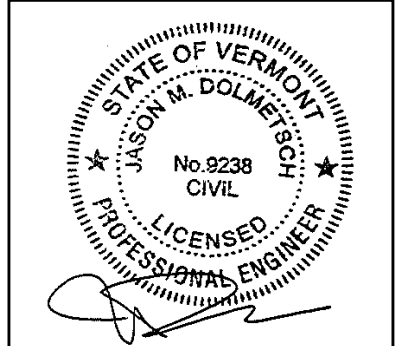
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**SERVICE DISTRICT D  
PROFILE**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

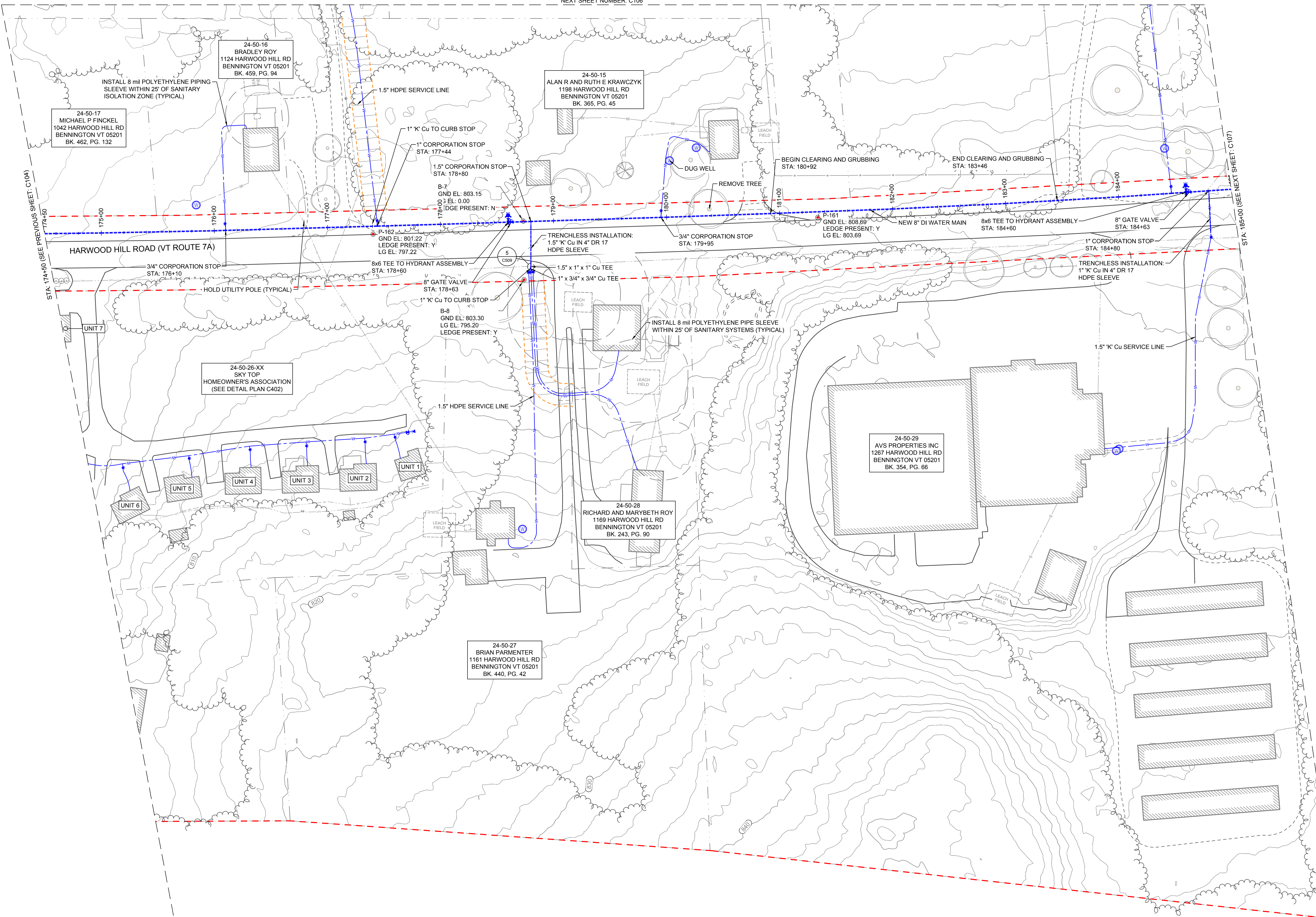
SHEET NUMBER  
**C104C**



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 441-1402 FAX: (802) 445-1201







24-50-17  
MICHAEL P FINCKEL  
1042 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 462, PG. 132

24-50-16  
BRADLEY ROY  
1124 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 459, PG. 94

24-50-15  
ALAN R AND RUTH E KRAWCZYK  
1198 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 365, PG. 45

24-50-29  
AVS PROPERTIES INC.  
1267 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 354, PG. 66

24-50-28  
RICHARD AND MARYBETH ROY  
1169 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 243, PG. 90

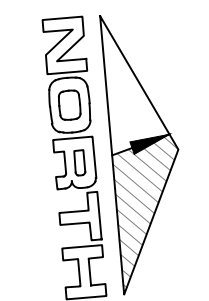
24-50-27  
BRIAN PARMENTER  
1161 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 440, PG. 42

24-50-26-XX  
SKY TOP  
HOMEOWNER'S ASSOCIATION  
(SEE DETAIL PLAN C402)

**1 HARWOOD HILL ROAD (VT ROUTE 7A)**  
(CONTRACT 5)



Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291



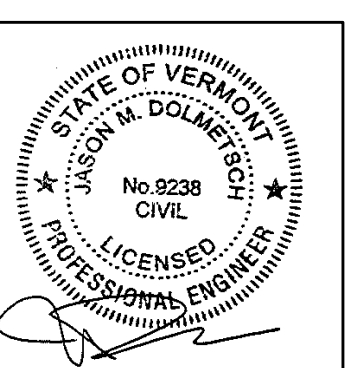
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT D  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

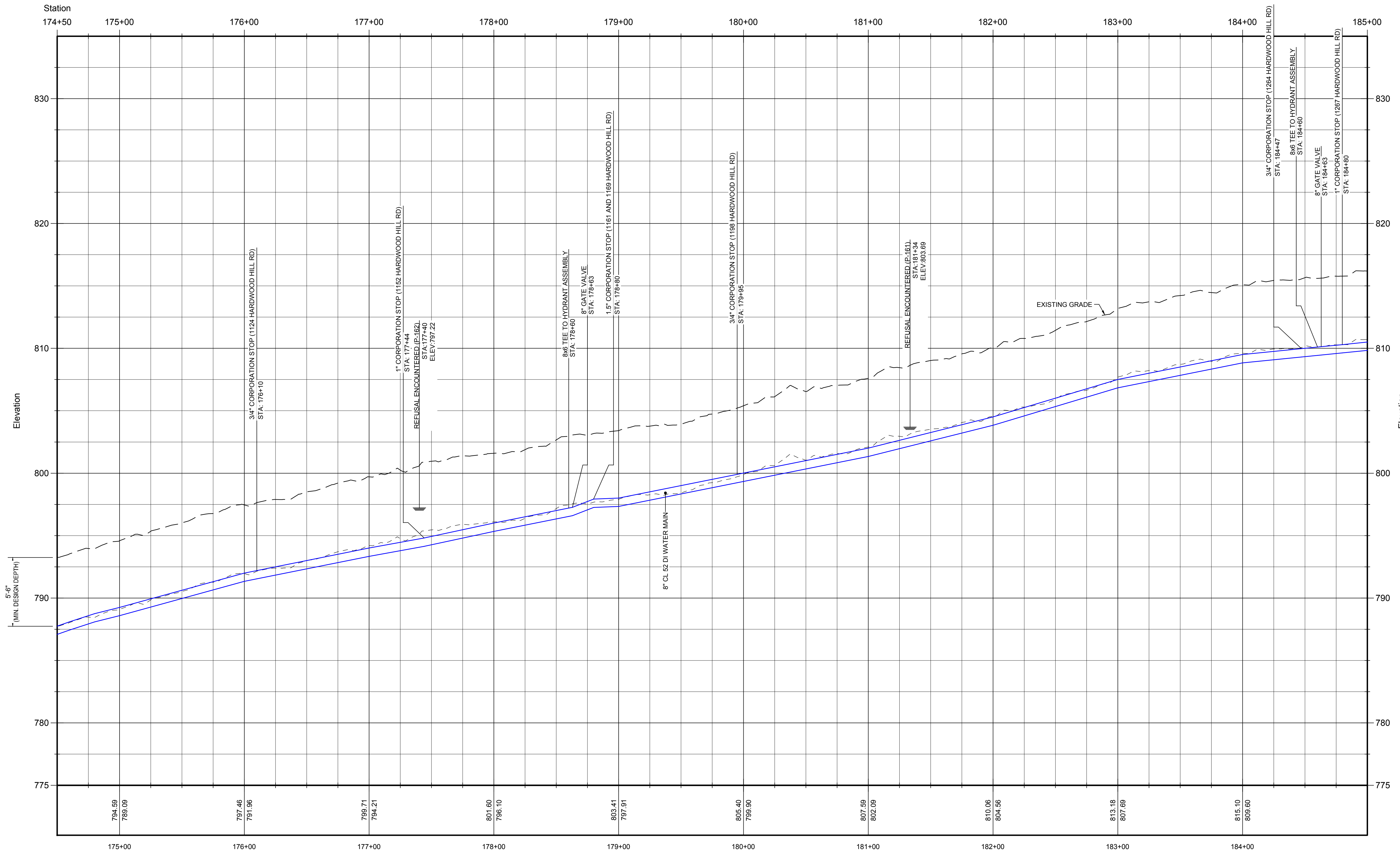
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**C105**



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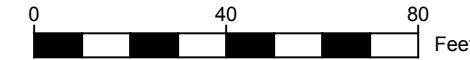
WL - D1.2 Harwood Hill PROFILE



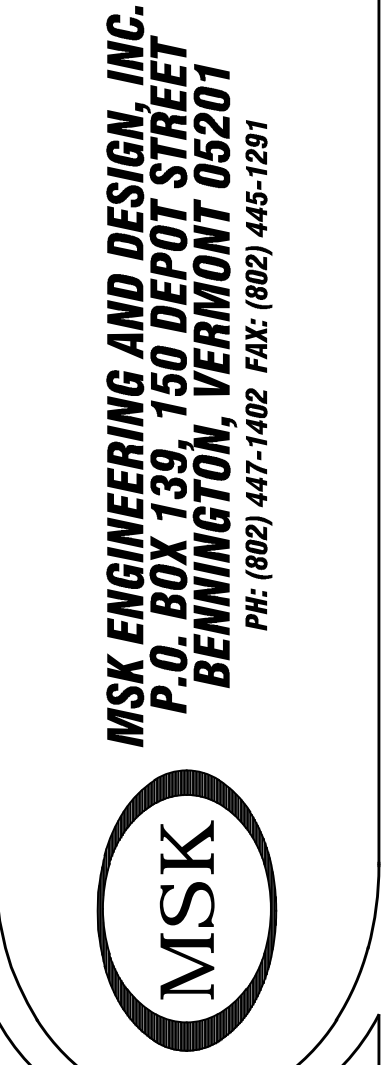
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HARWOOD HILL ROAD (VT ROUTE 7A)

(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL



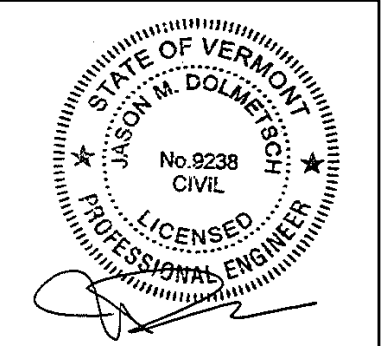
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT D  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

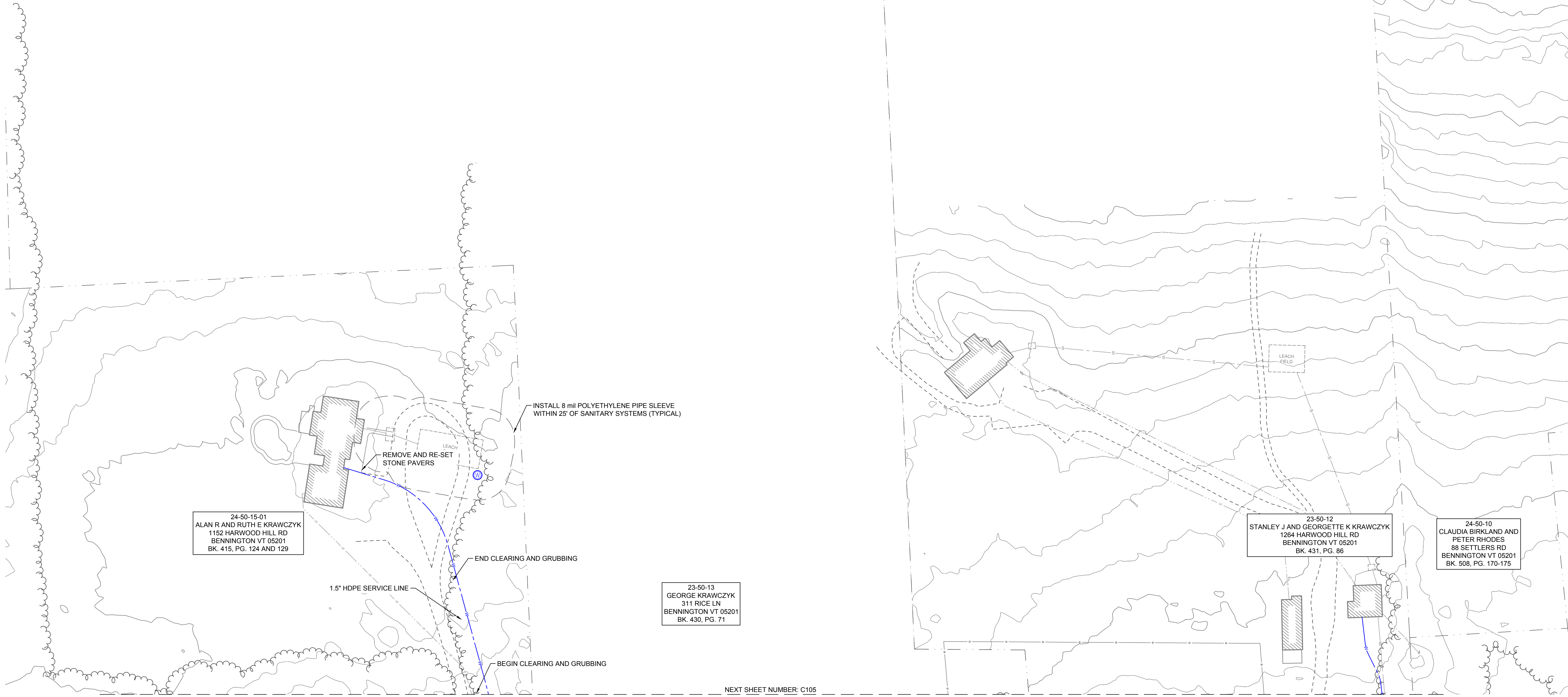
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**C105A**



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 12 May 2019 12:08:00



P:\DRAWING DATA\2019\1001-019.7\1001-019.7.DWG 2 May 2019 10:00:00



24-50-15-01  
ALAN R AND RUTH E KRAWCZYK  
1152 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 415, PG. 124 AND 129

REMOVE AND RE-SET  
STONE PAVERS

INSTALL 8 mil POLYETHYLENE PIPE SLEEVE  
WITHIN 25' OF SANITARY SYSTEMS (TYPICAL)

END CLEARING AND GRUBBING

1.5" HDPE SERVICE LINE

BEGIN CLEARING AND GRUBBING

23-50-13  
GEORGE KRAWCZYK  
311 RICE LN  
BENNINGTON VT 05201  
BK. 430, PG. 71

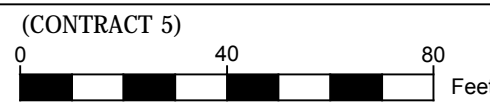
NEXT SHEET NUMBER: C105

23-50-12  
STANLEY J AND GEORGETTE K KRAWCZYK  
1264 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 431, PG. 86

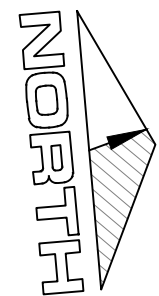
24-50-10  
CLAUDIA BIRKLAND AND  
PETER RHODES  
88 SETTLERS RD  
BENNINGTON VT 05201  
BK. 508, PG. 170-175

LEACH FIELD

**1 HARWOOD HILL ROAD (VT ROUTE 7A)**



Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1281



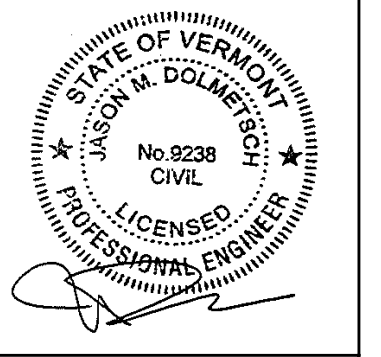
REVISIONS	
NO.	DATE

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

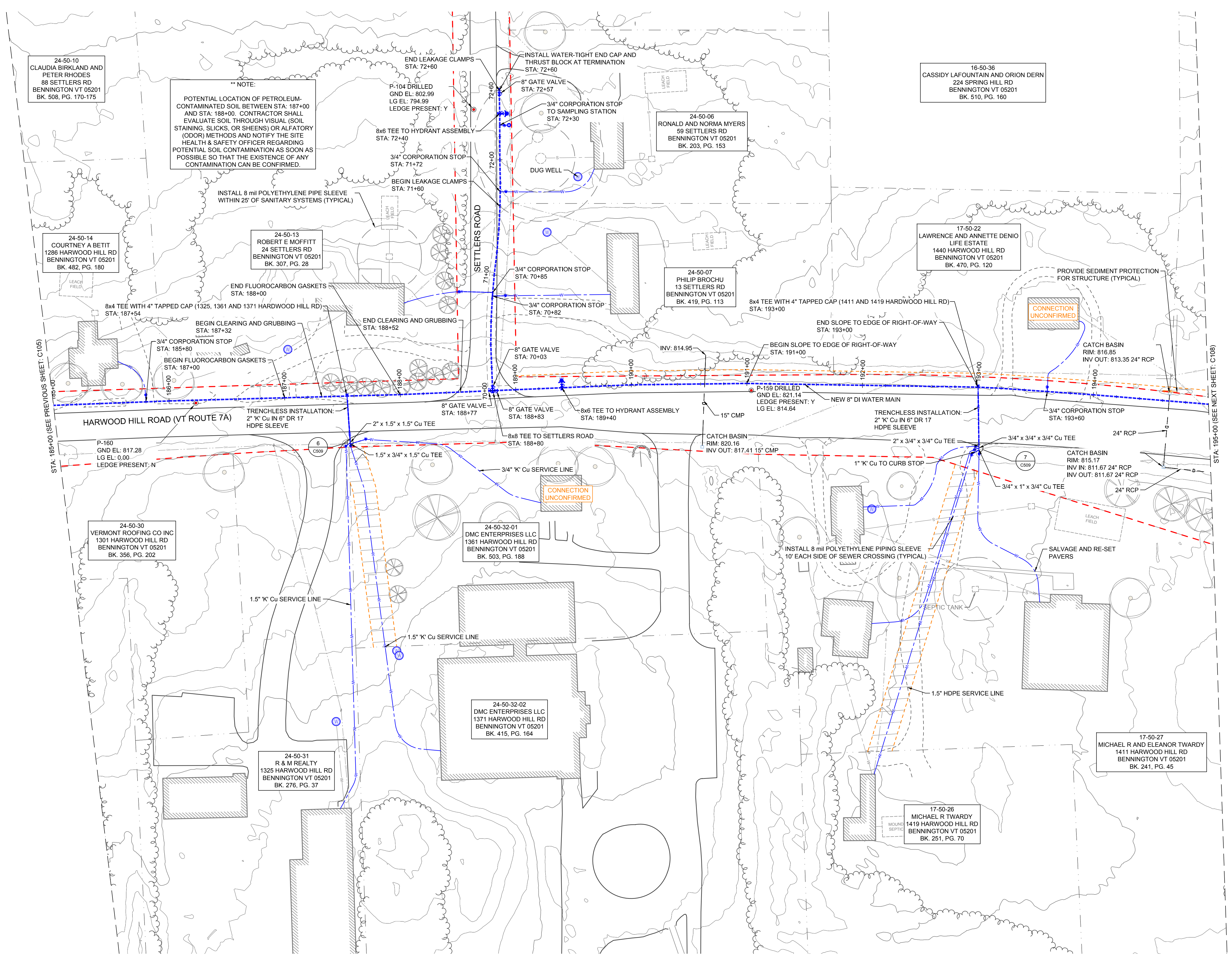
**DRAWINGS THIS SHEET**  
**SERVICE DISTRICT D  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

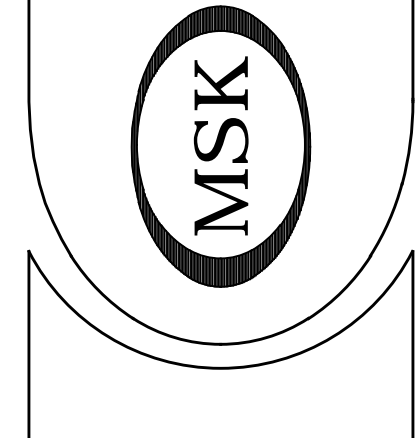
SHEET NUMBER  
**C106**







**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291



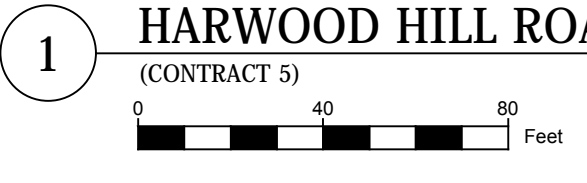
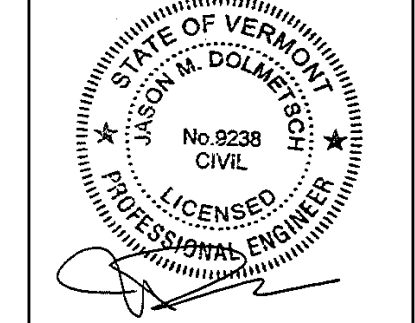
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT D  
 PLAN

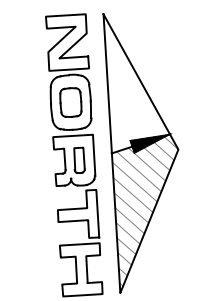
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C107**



**1 HARWOOD HILL ROAD (VT ROUTE 7A)**  
 (CONTRACT 5)

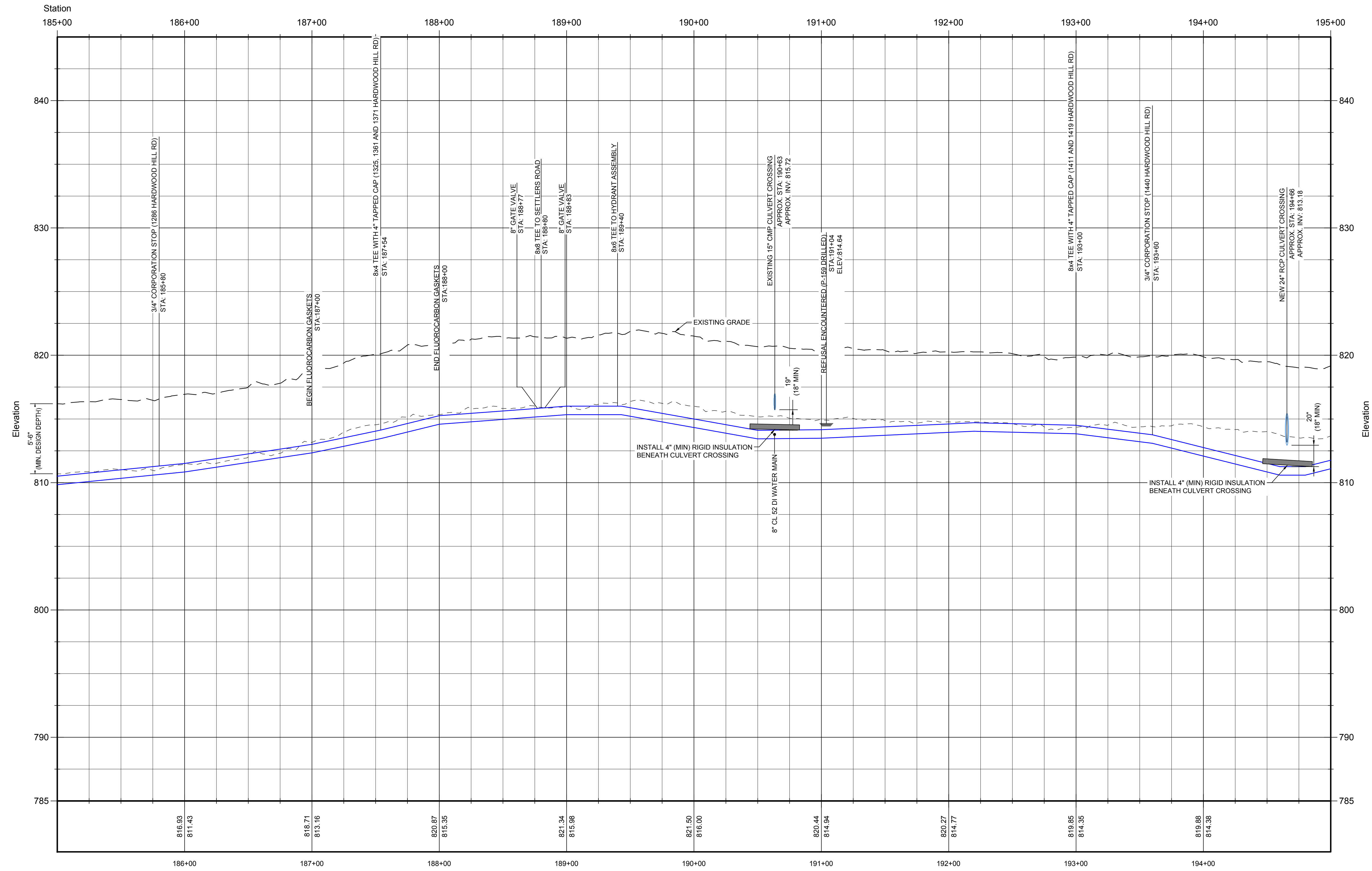
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# WL - D1.2 Harwood Hill PROFILE



**1 HARWOOD HILL ROAD (VT ROUTE 7A)**  
(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1281

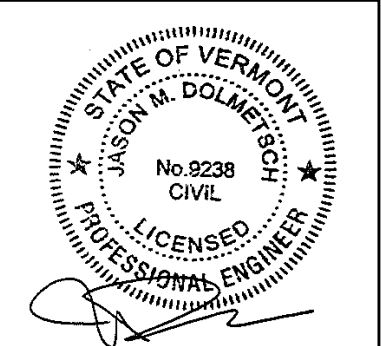
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT D  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

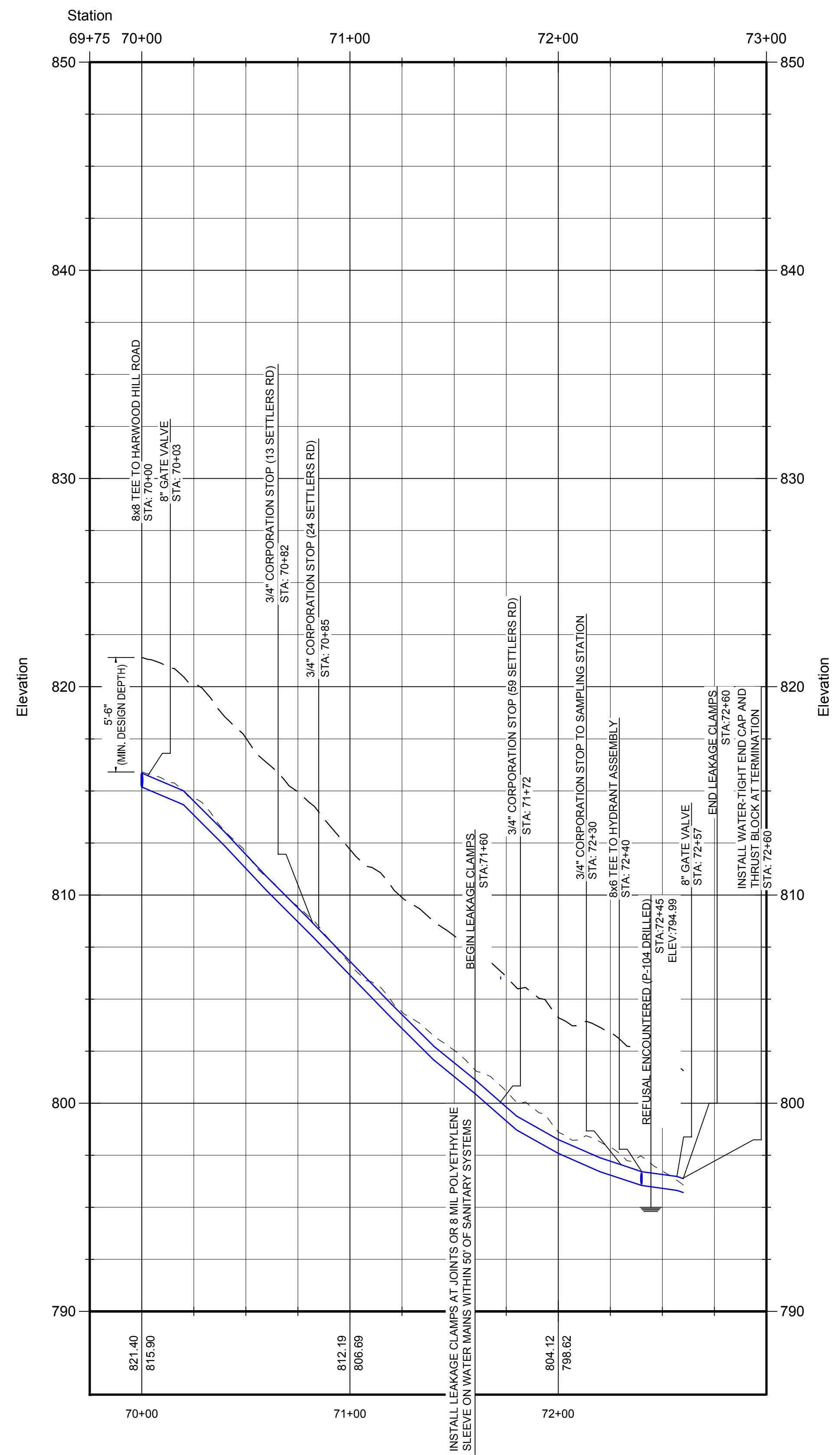
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**C107A**



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## WL - D1.2 Settlers Rd PROFILE



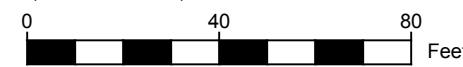
Elevation

Elevation

1

SETTLERS ROAD

(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL



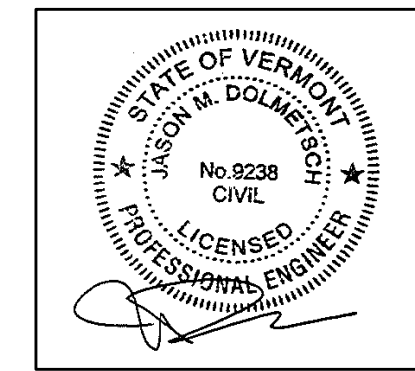
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

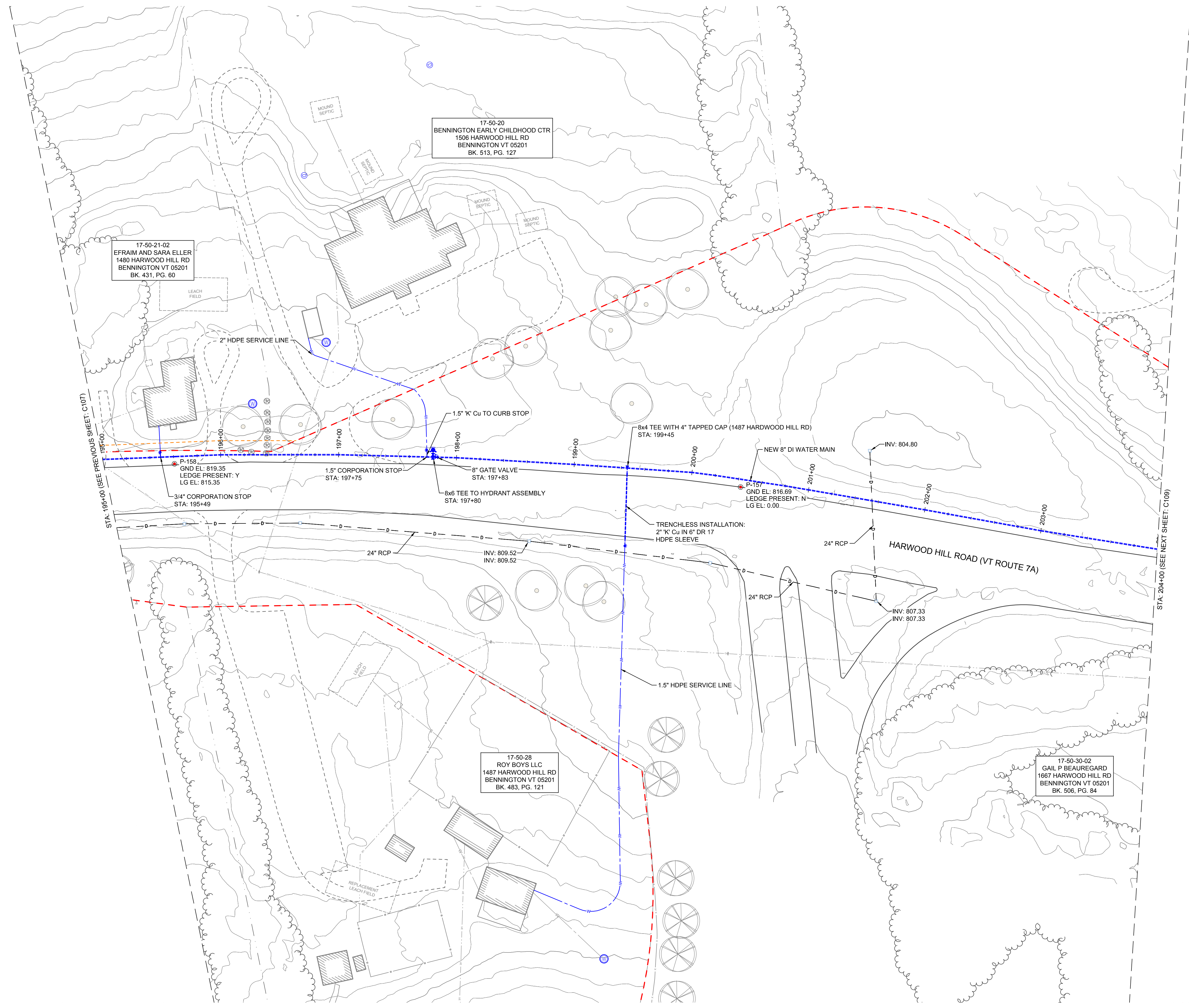
DRAWINGS THIS SHEET  
 SERVICE DISTRICT D  
 PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C107B**







17-50-20  
BENNINGTON EARLY CHILDHOOD CTR  
1506 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 513, PG. 127

17-50-21-02  
EFRAM AND SARA ELLER  
1480 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 431, PG. 60

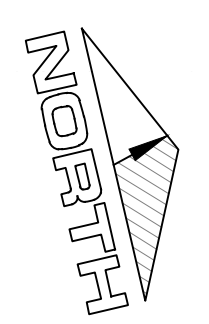
17-50-28  
ROY BOYS LLC  
1487 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 483, PG. 121

17-50-30-02  
GAIL P BEAUREGARD  
1667 HARWOOD HILL RD  
BENNINGTON VT 05201  
BK. 506, PG. 84

**1 HARWOOD HILL ROAD (VT ROUTE 7A)**  
(CONTRACT 5)



Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

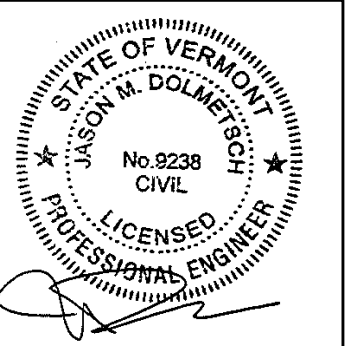
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT D  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

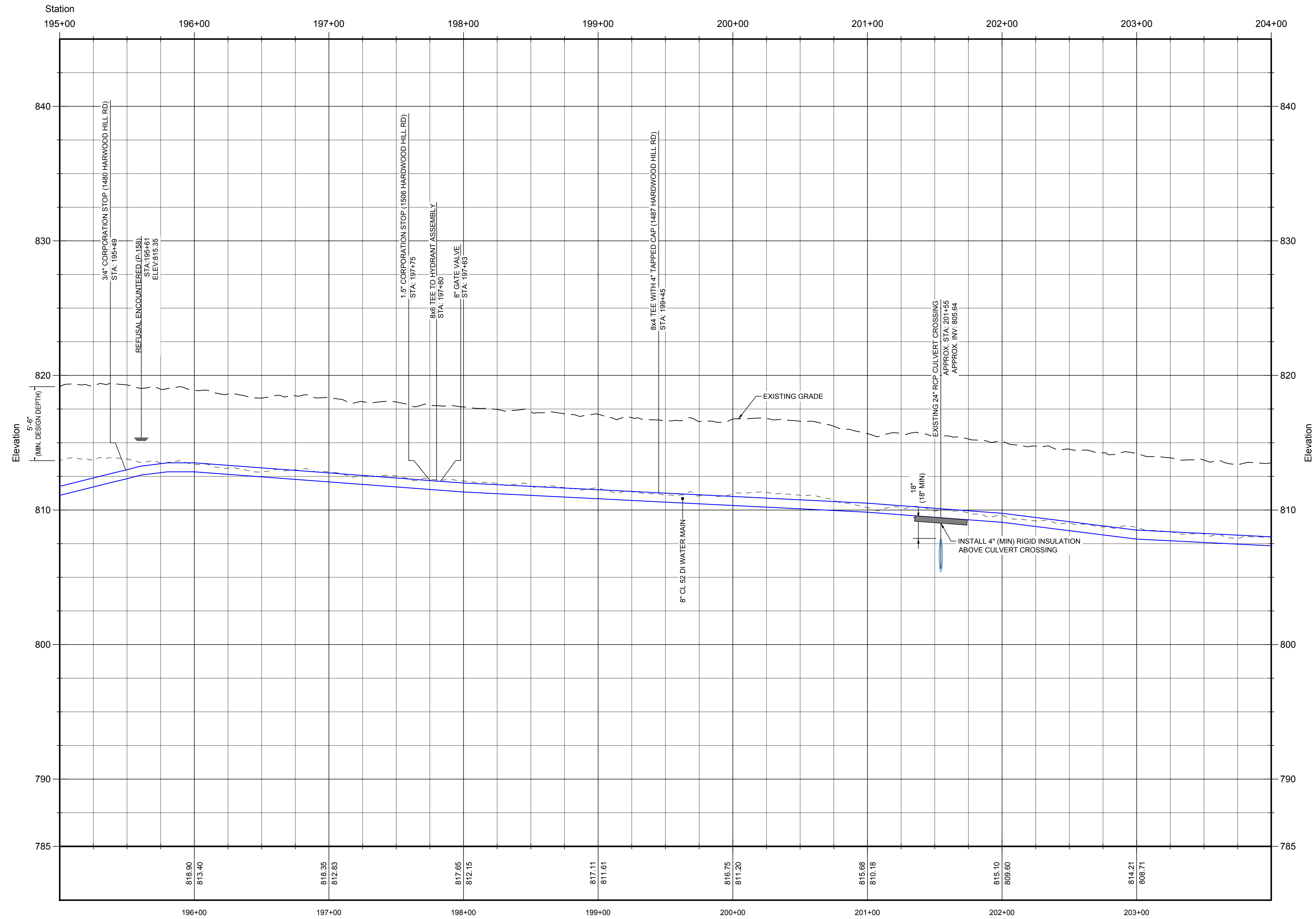
SHEET NUMBER  
**C108**



ALL DRAWING INFORMATION FROM 2017 PERIOD INFORMATION AS APPLICABLE TO DISTRICT D-2, 2018  
 2 May 2019 10:00 AM



WL - D1.2 Harwood Hill PROFILE



1 HARWOOD HILL ROAD (VT ROUTE 7A)  
(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL



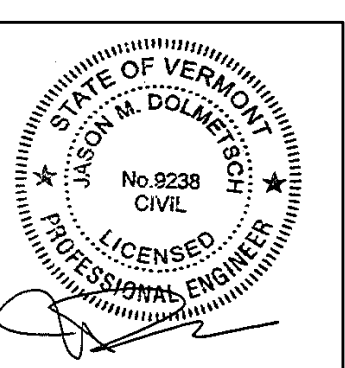
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT D  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C108A**



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 12 May 2019 12:28:00





NO.	DATE	DESCRIPTION

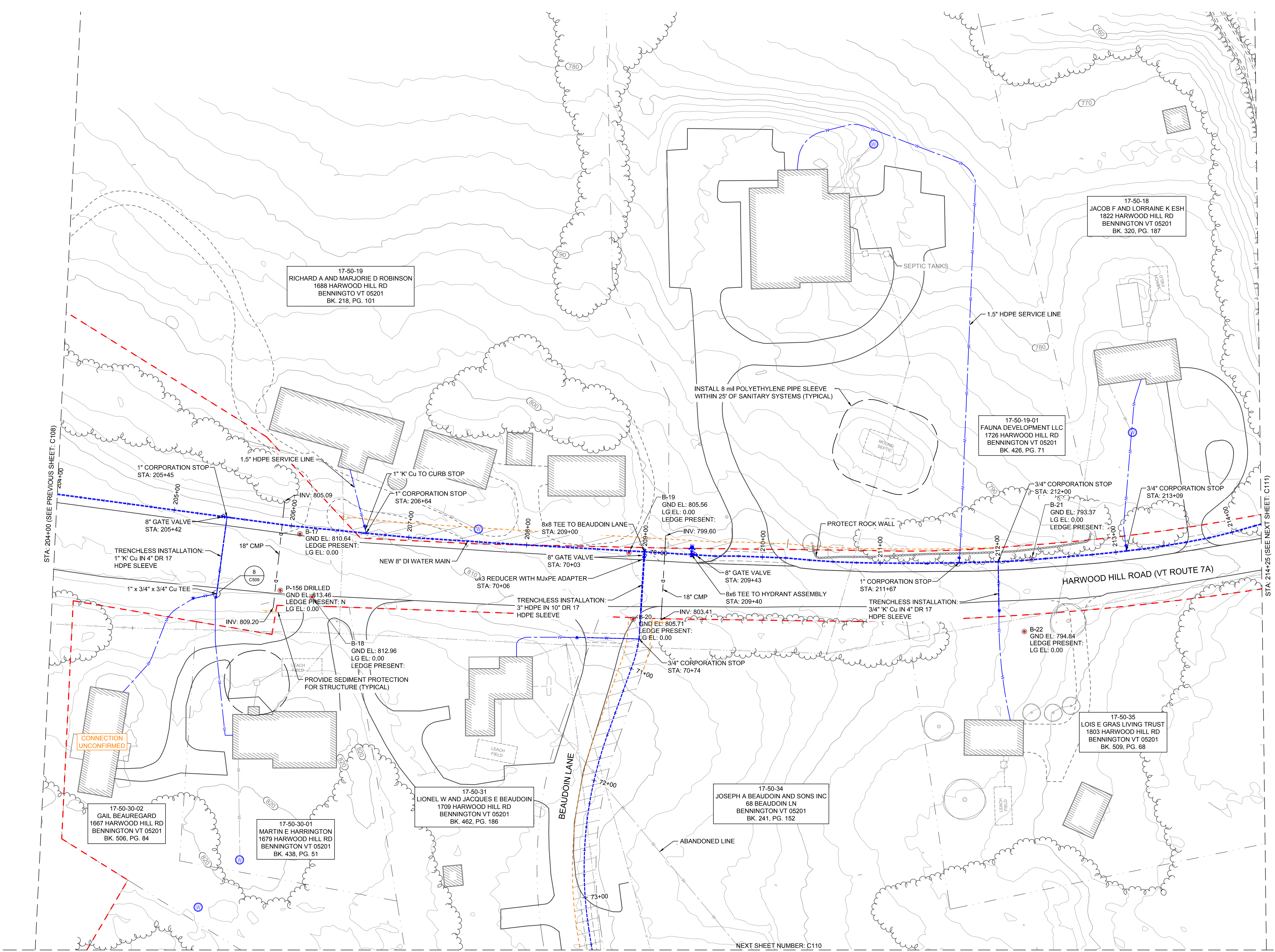
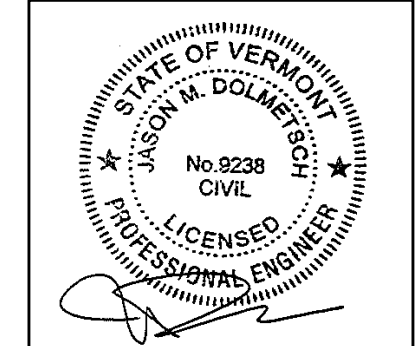
TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

SERVICE DISTRICT D  
PLAN

DRAWINGS THIS SHEET

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

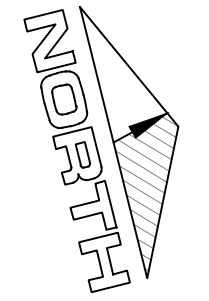
SHEET NUMBER  
**C109**



**1** HARWOOD HILL ROAD (VT ROUTE 7A)  
(CONTRACT 5)



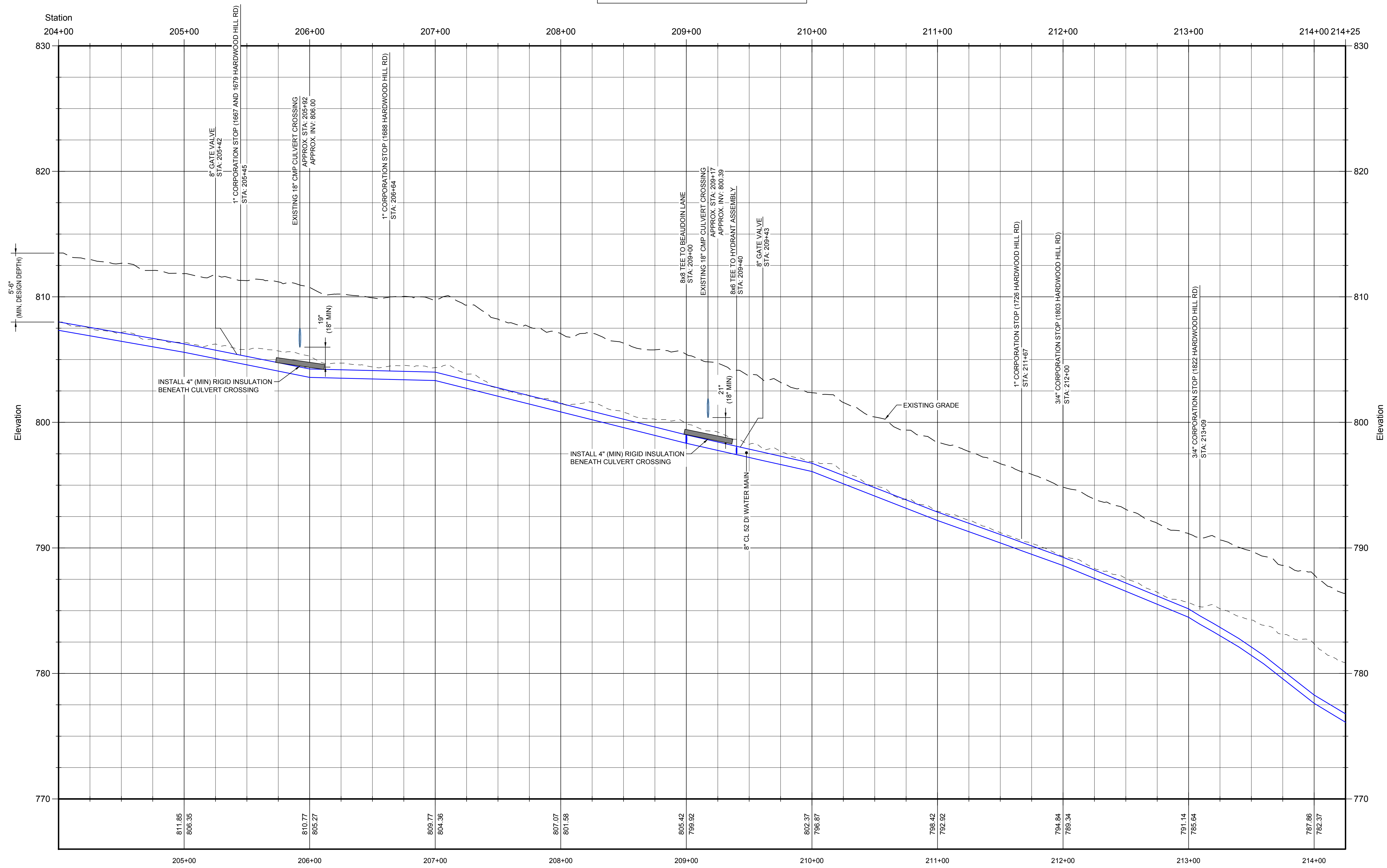
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WL - D4P Harwood Hill PROFILE



P:\DRAWING DATABASE\1001-019.7\1001-019.7.dwg HARWOOD HILL PROFILE (CONTRACT 5) DATE: 05/14/2019

1 HARWOOD HILL ROAD (VT ROUTE 7A)  
(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1201

REVISIONS	
NO.	DESCRIPTION

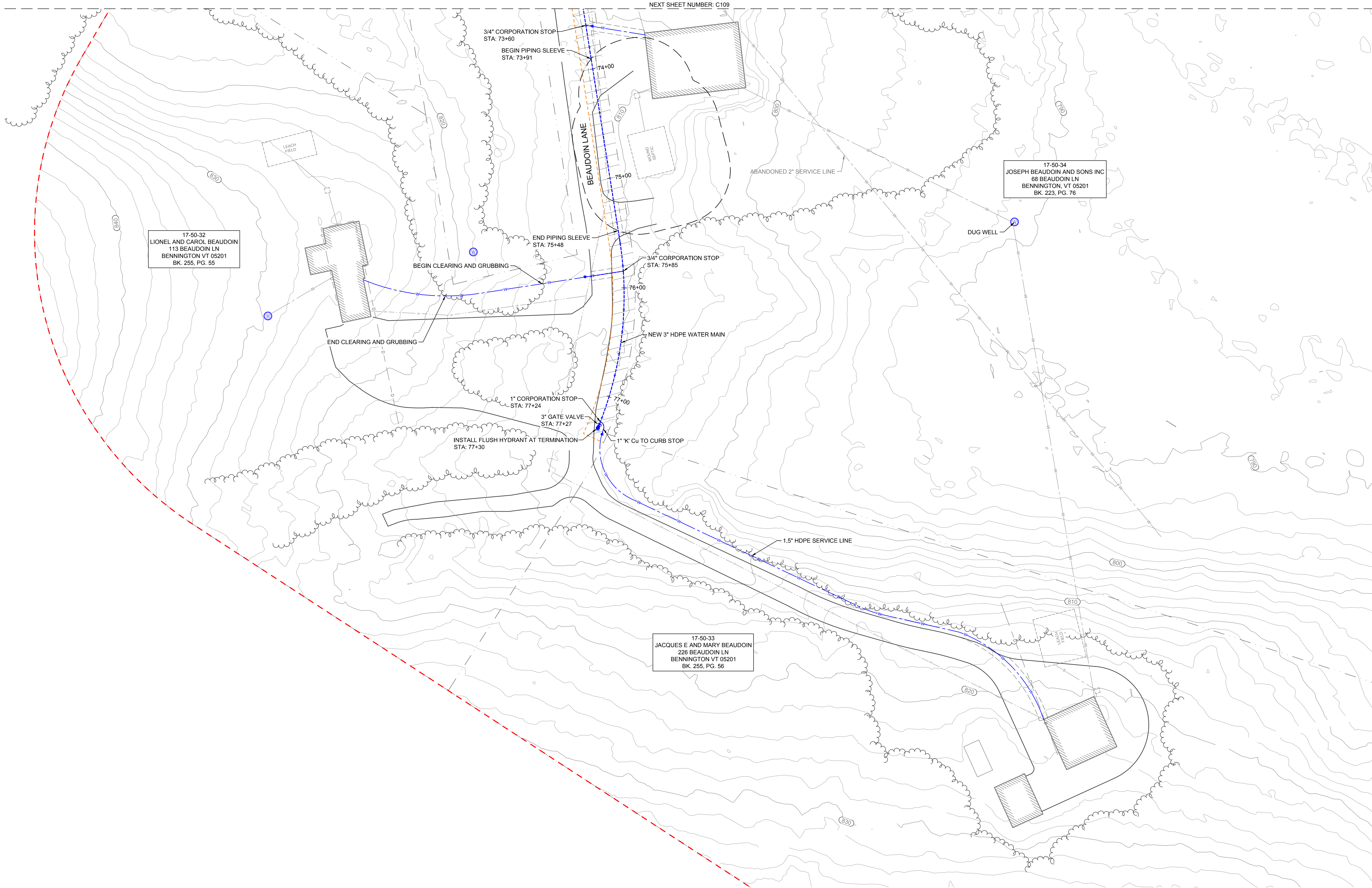
TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**SERVICE DISTRICT D  
PROFILE**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C109A**





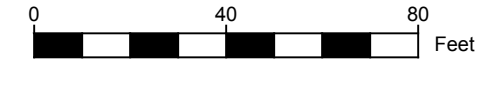
NEXT SHEET NUMBER: C109

17-50-32  
LIONEL AND CAROL BEAUDOIN  
113 BEAUDOIN LN  
BENNINGTON VT 05201  
BK. 255, PG. 55

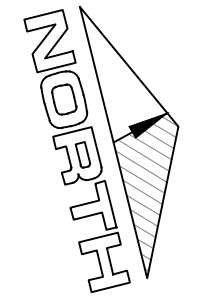
17-50-34  
JOSEPH BEAUDOIN AND SONS INC  
68 BEAUDOIN LN  
BENNINGTON, VT 05201  
BK. 223, PG. 76

17-50-33  
JACQUES E AND MARY BEAUDOIN  
226 BEAUDOIN LN  
BENNINGTON VT 05201  
BK. 255, PG. 56

**1 BEAUDOIN LANE**  
(CONTRACT 5)



Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1287



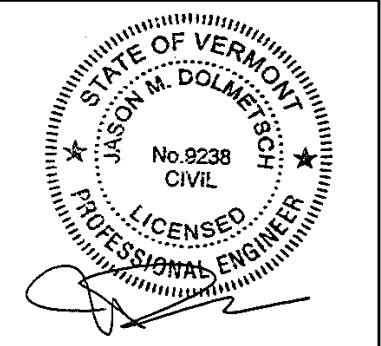
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**SERVICE DISTRICT D  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

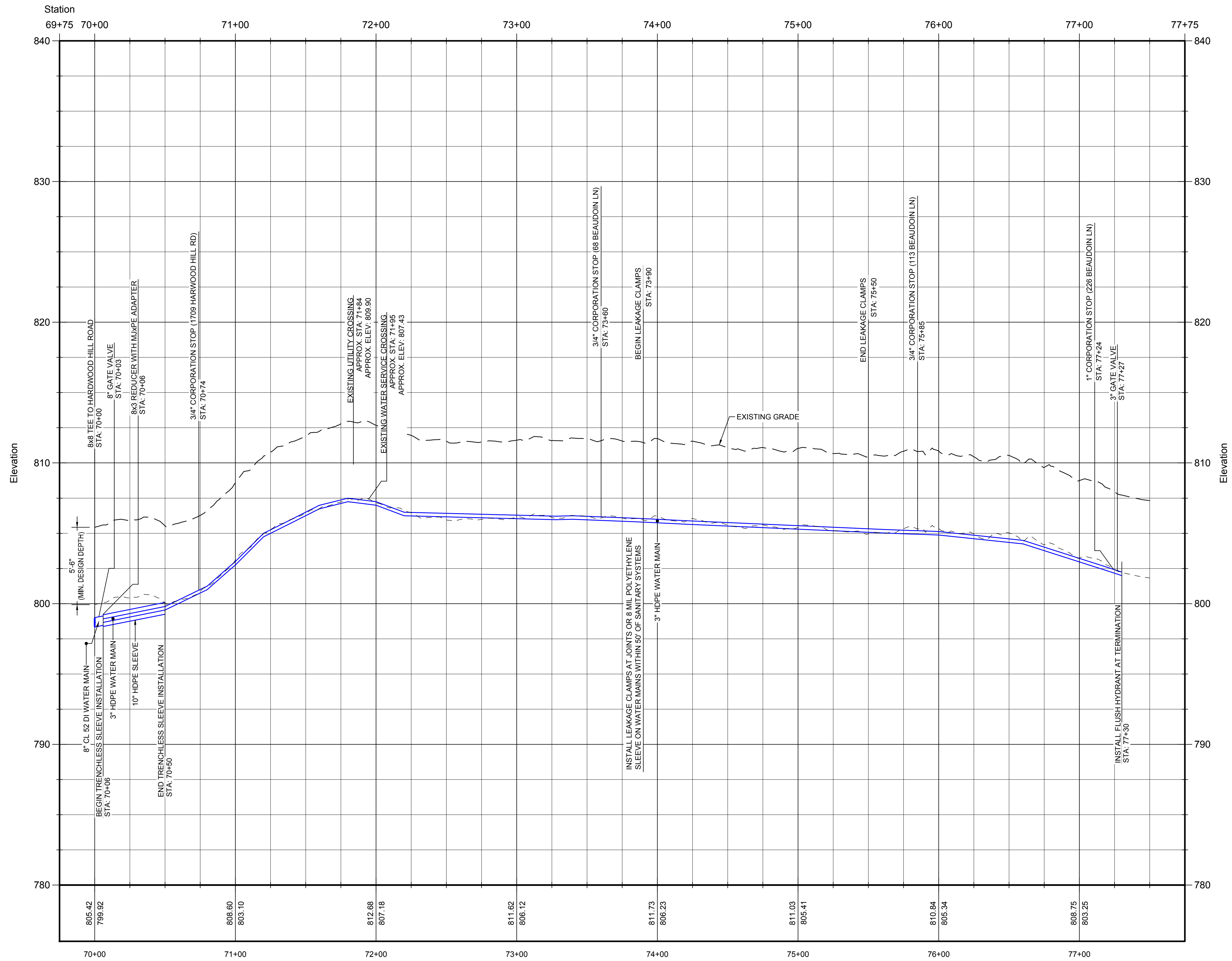
SHEET NUMBER  
**C110**



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WL - D4P Beaudoin Ln PROFILE



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 PLOT: 1701-2183.dwg  
 PLOT DATE: 05-14-2019 10:52:00 AM

1 BEAUDOIN LANE  
(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL



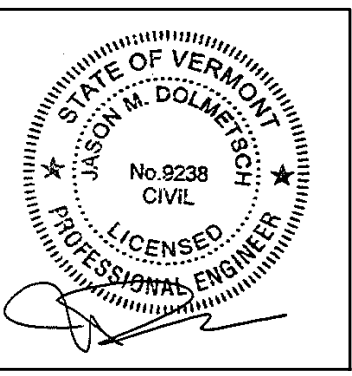
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TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

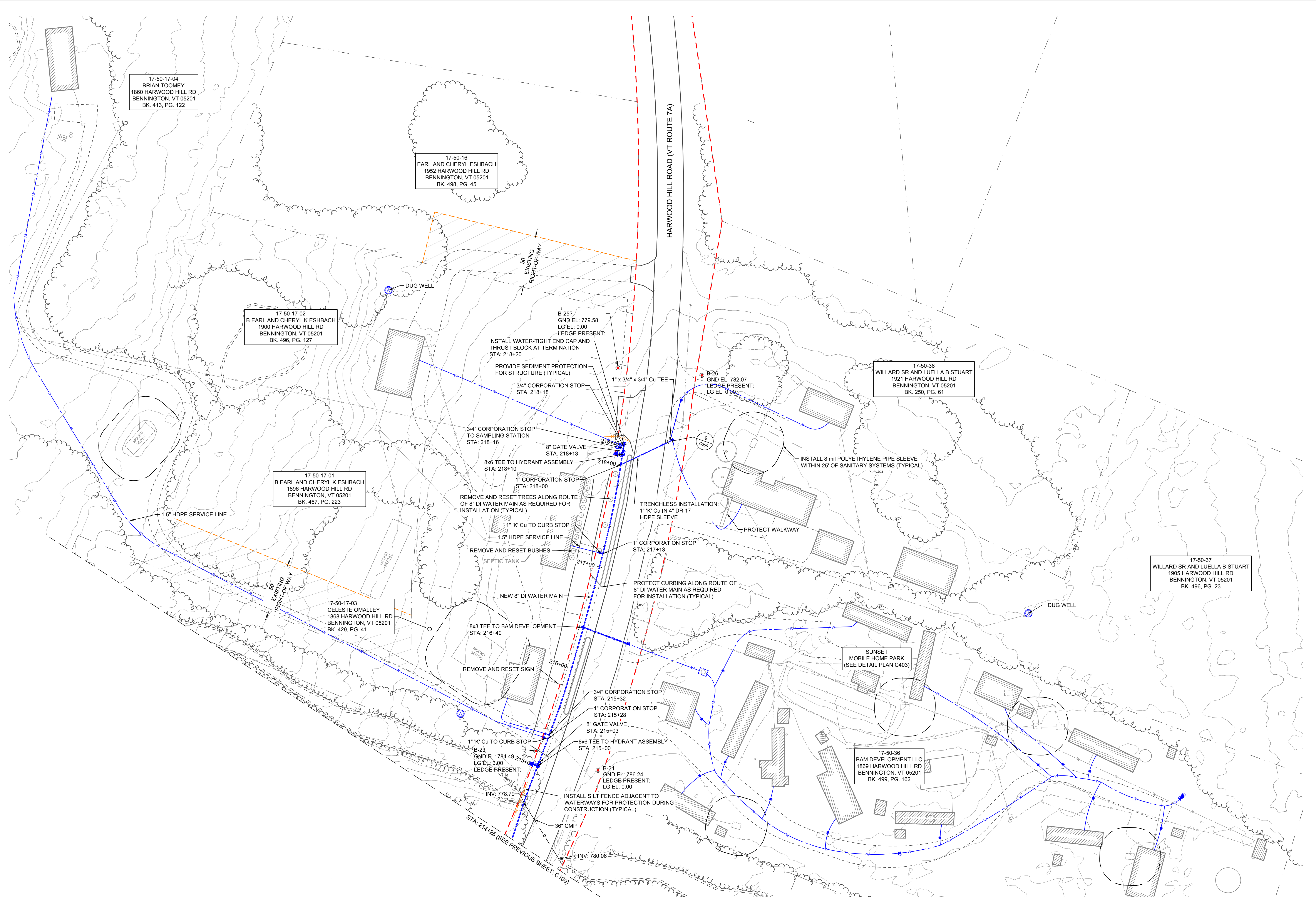
DRAWINGS THIS SHEET  
SERVICE DISTRICT D  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
C110A







17-50-17-04  
BRIAN TOOMEY  
1860 HARWOOD HILL RD  
BENNINGTON, VT 05201  
BK. 413, PG. 122

17-50-16  
EARL AND CHERYL ESHBACH  
1952 HARWOOD HILL RD  
BENNINGTON, VT 05201  
BK. 498, PG. 45

17-50-17-02  
B EARL AND CHERYL K ESHBACH  
1900 HARWOOD HILL RD  
BENNINGTON, VT 05201  
BK. 496, PG. 127

17-50-17-01  
B EARL AND CHERYL K ESHBACH  
1896 HARWOOD HILL RD  
BENNINGTON, VT 05201  
BK. 467, PG. 223

17-50-17-03  
CELESTE O'MALLEY  
1868 HARWOOD HILL RD  
BENNINGTON, VT 05201  
BK. 429, PG. 41

B-257  
GND EL: 779.58  
LG EL: 0.00  
LEDGE PRESENT:  
INSTALL WATER-TIGHT END CAP AND  
THRUST BLOCK AT TERMINATION  
STA: 218+20

3/4" CORPORATION STOP  
STA: 218+18

3/4" CORPORATION STOP  
TO SAMPLING STATION  
STA: 218+16

1" CORPORATION STOP  
STA: 218+00

1" CORPORATION STOP  
STA: 217+13

8x3 TEE TO BAM DEVELOPMENT  
STA: 216+40

3/4" CORPORATION STOP  
STA: 215+32

1" CORPORATION STOP  
STA: 215+28

8" GATE VALVE  
STA: 215+03

B-24  
GND EL: 786.24  
LG EL: 0.00  
LEDGE PRESENT:  
INSTALL SILT FENCE ADJACENT TO  
WATERWAYS FOR PROTECTION DURING  
CONSTRUCTION (TYPICAL)

B-26  
GND EL: 782.07  
LEDGE PRESENT:  
LG EL: 0.00

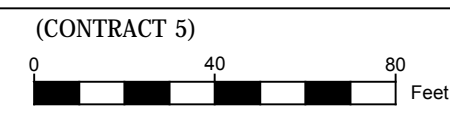
17-50-38  
WILLARD SR AND LUELLA B STUART  
1921 HARWOOD HILL RD  
BENNINGTON, VT 05201  
BK. 250, PG. 61

17-50-37  
WILLARD SR AND LUELLA B STUART  
1905 HARWOOD HILL RD  
BENNINGTON, VT 05201  
BK. 496, PG. 23

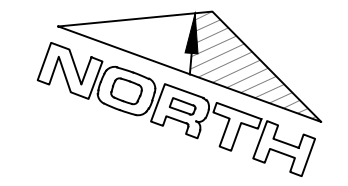
SUNSET  
MOBILE HOME PARK  
(SEE DETAIL PLAN C403)

17-50-36  
BAM DEVELOPMENT LLC  
1869 HARWOOD HILL RD  
BENNINGTON, VT 05201  
BK. 499, PG. 162

**1 HARWOOD HILL ROAD (VT ROUTE 7A)**



Scale: 1:40



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NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT D  
PLAN**

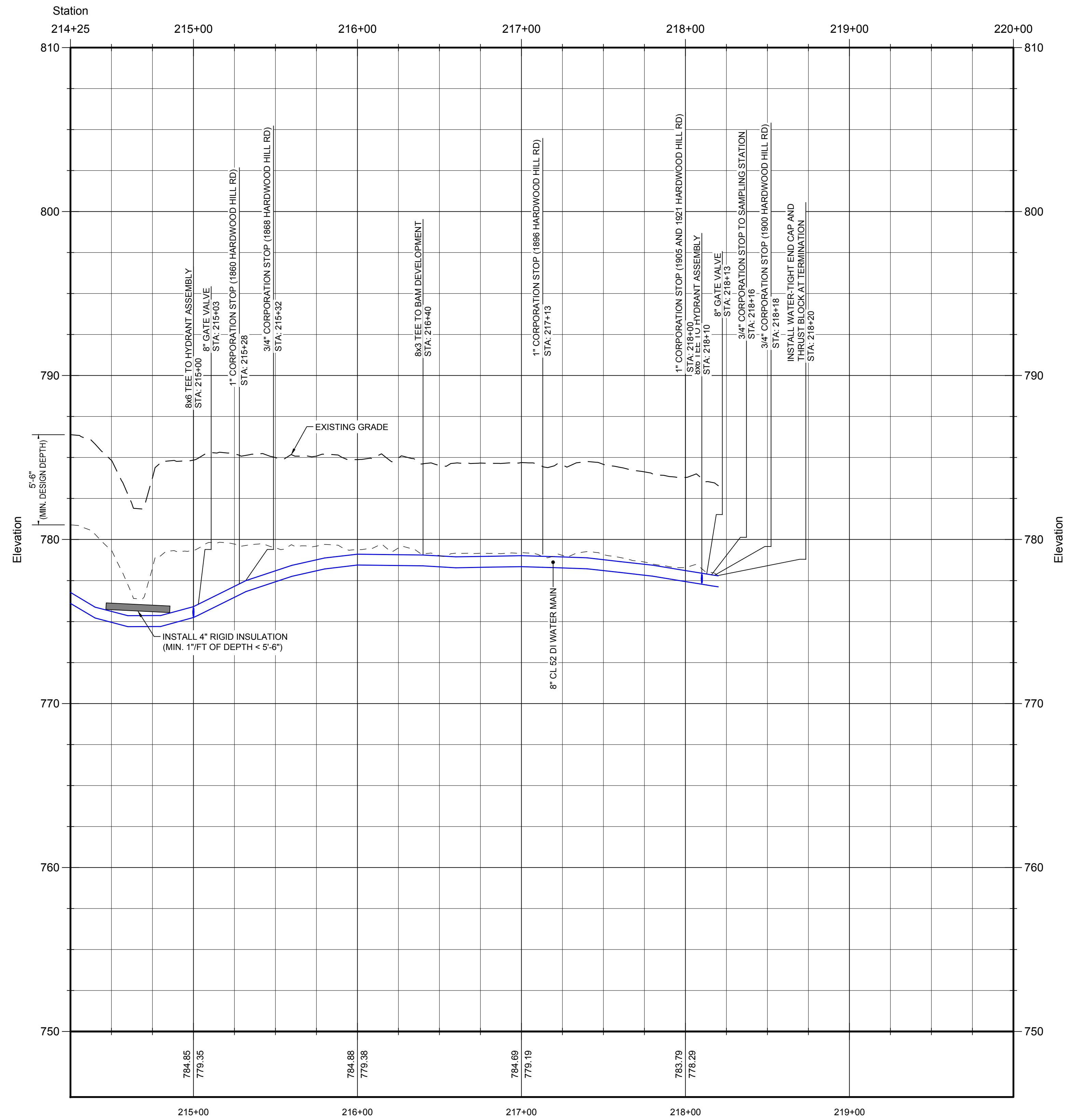
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WL - D4P Harwood Hill PROFILE



1 HARWOOD HILL ROAD (VT ROUTE 7A)  
(CONTRACT 5)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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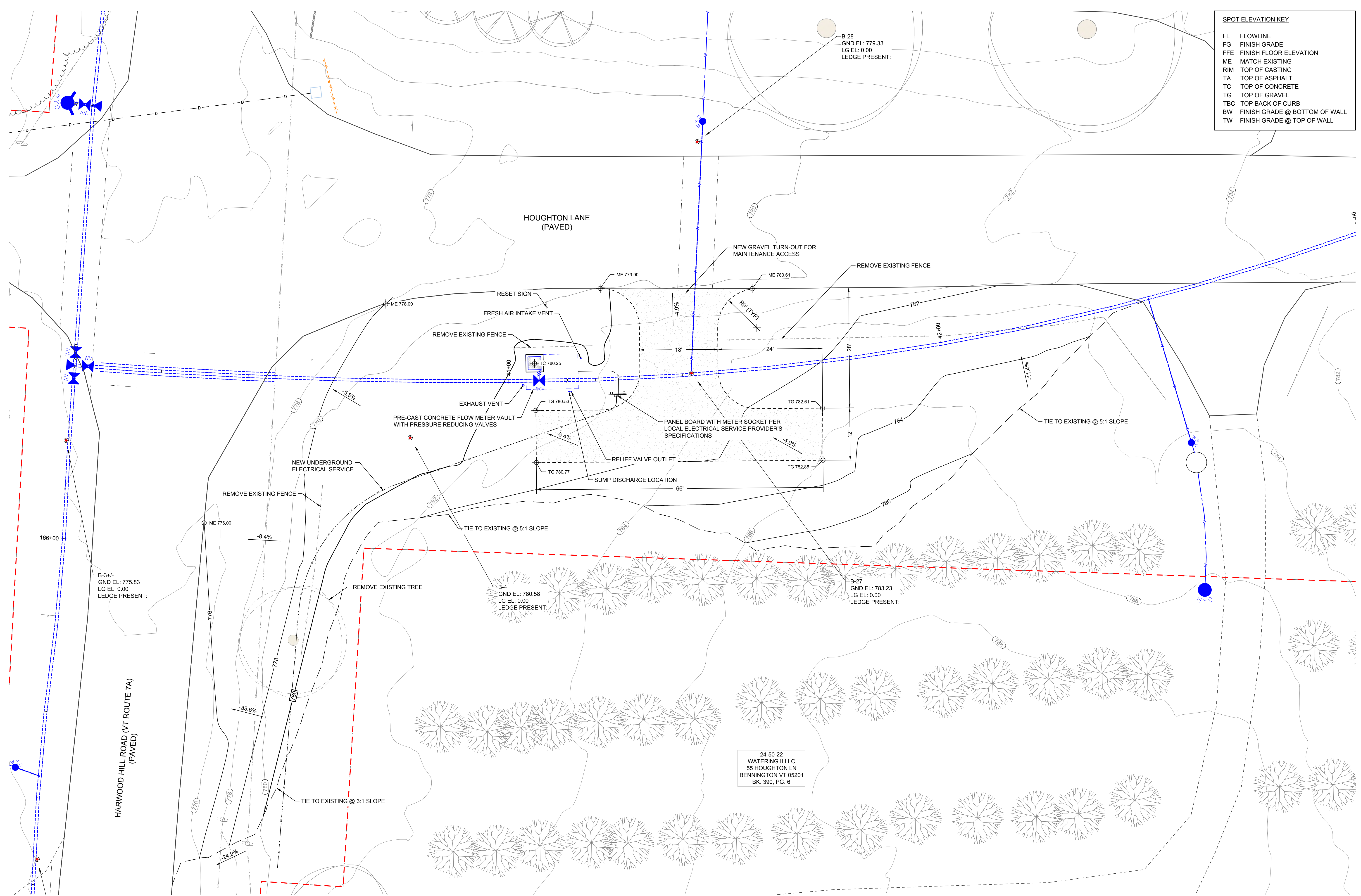
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PROFILE

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**SPOT ELEVATION KEY**

- FL FLOWLINE
- FG FINISH GRADE
- FFE FINISH FLOOR ELEVATION
- ME MATCH EXISTING
- RIM TOP OF CASTING
- TA TOP OF ASPHALT
- TC TOP OF CONCRETE
- TG TOP OF GRAVEL
- TBC TOP BACK OF CURB
- BW FINISH GRADE @ BOTTOM OF WALL
- TW FINISH GRADE @ TOP OF WALL

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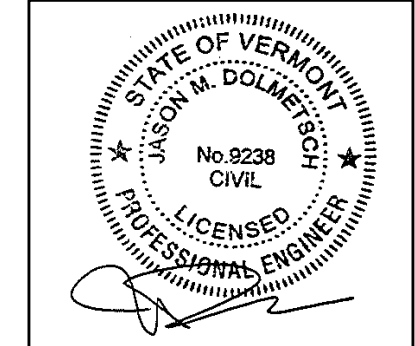
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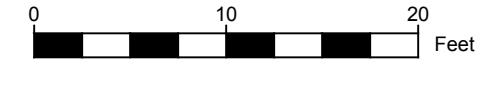
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 PRV SITE PLAN**

NUMBER	DATE
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MSK	JMD

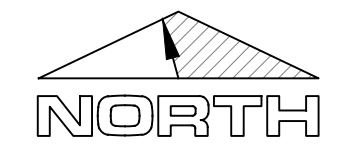
SHEET NUMBER  
**C401**



**1 PRV SITE PLAN AT HARWOOD HILL ROAD (VT ROUTE 7A) AND HOUGHTON LANE**  
 (CONTRACT 5)

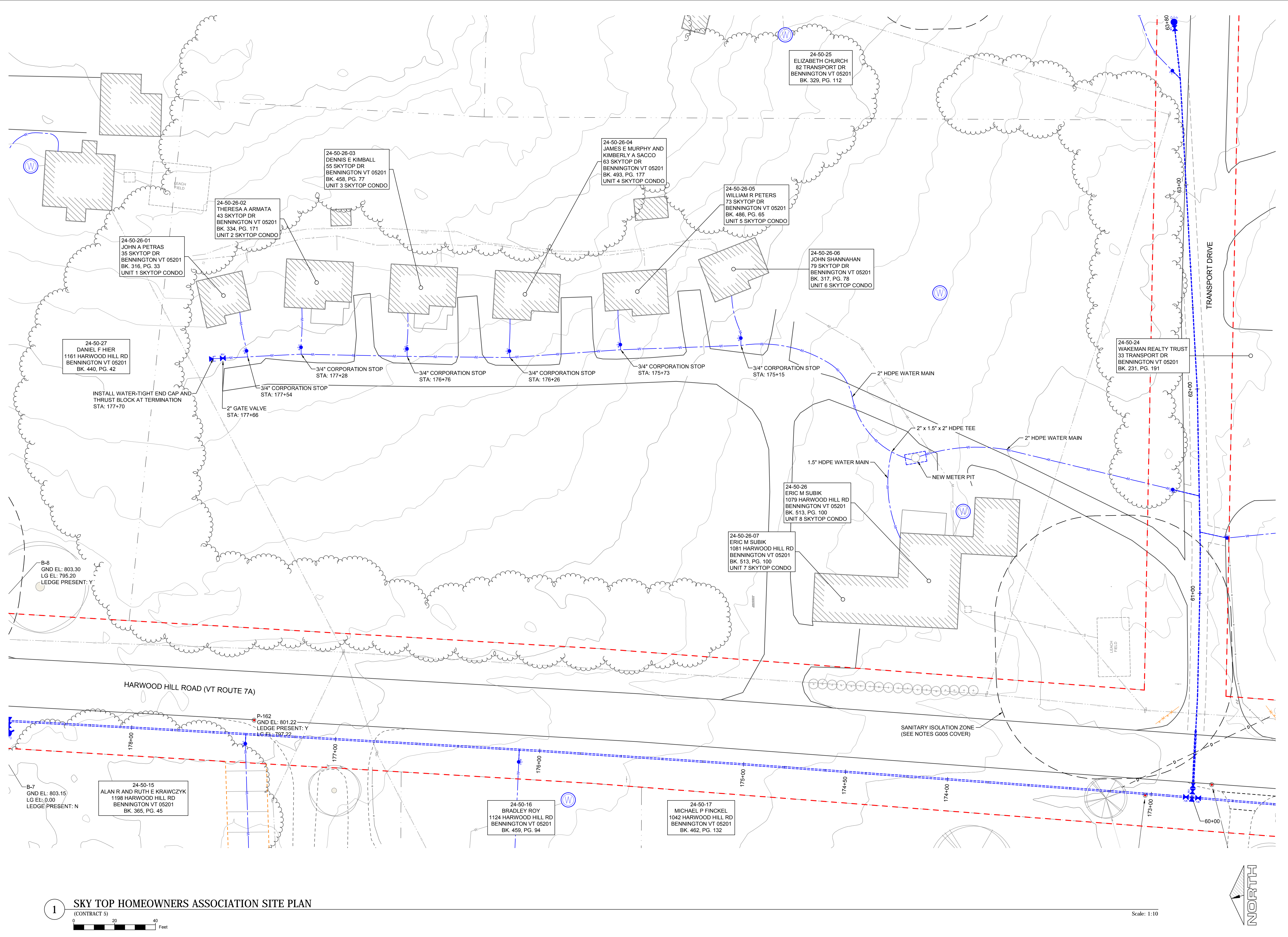


Scale: 1:10



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**1 SKY TOP HOMEOWNERS ASSOCIATION SITE PLAN**  
(CONTRACT 5)



Scale: 1:10

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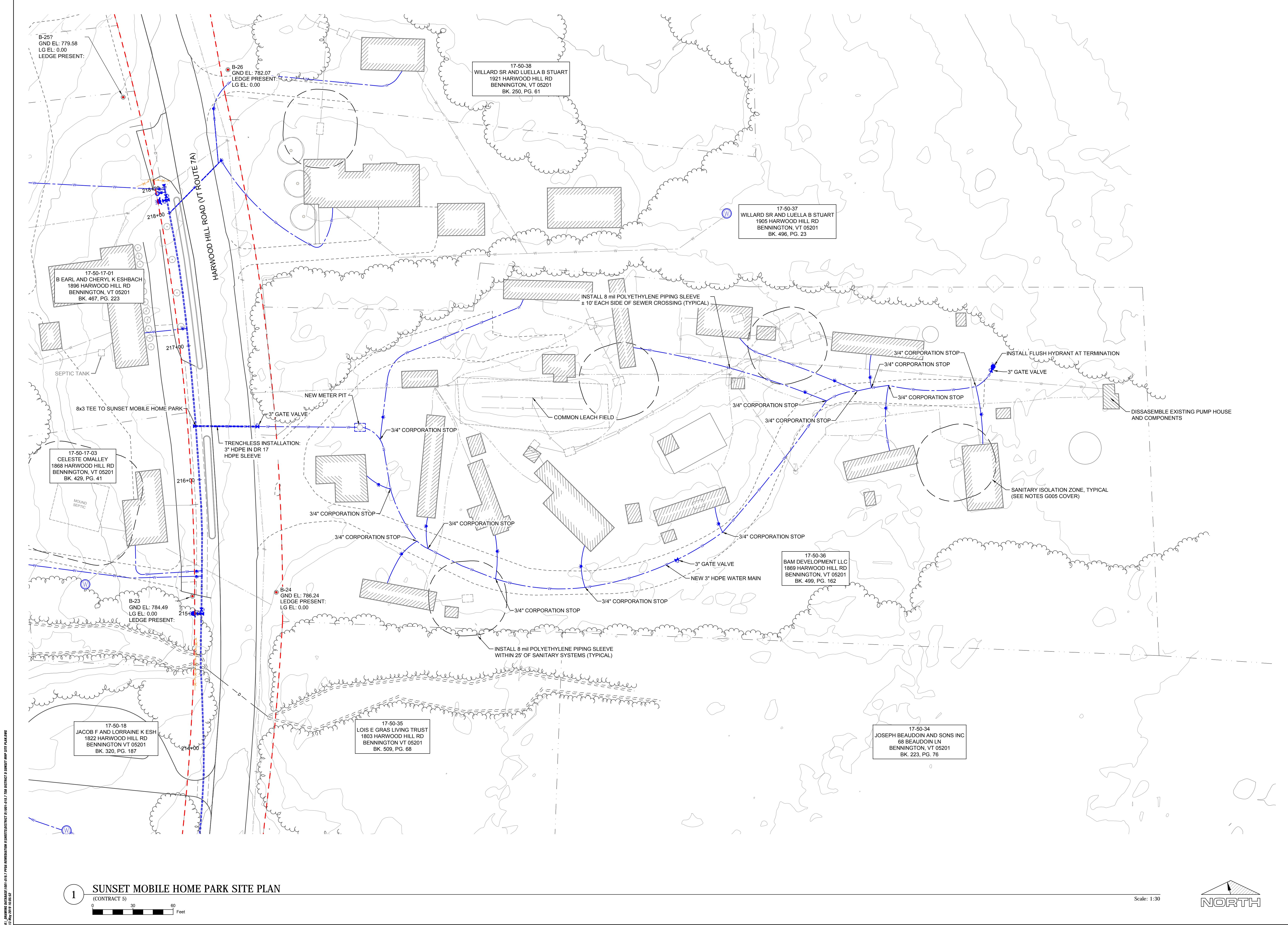
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SERVICE DISTRICT D  
SKY TOP HOA SITE  
PLAN**

NUMBER	DATE
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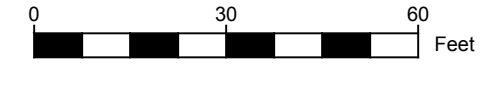
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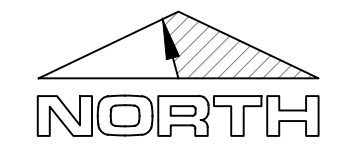


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**1 SUNSET MOBILE HOME PARK SITE PLAN**  
(CONTRACT 5)



Scale: 1:30



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**SERVICE DISTRICT D**  
**SUNSET MHP SITE**  
**PLAN**

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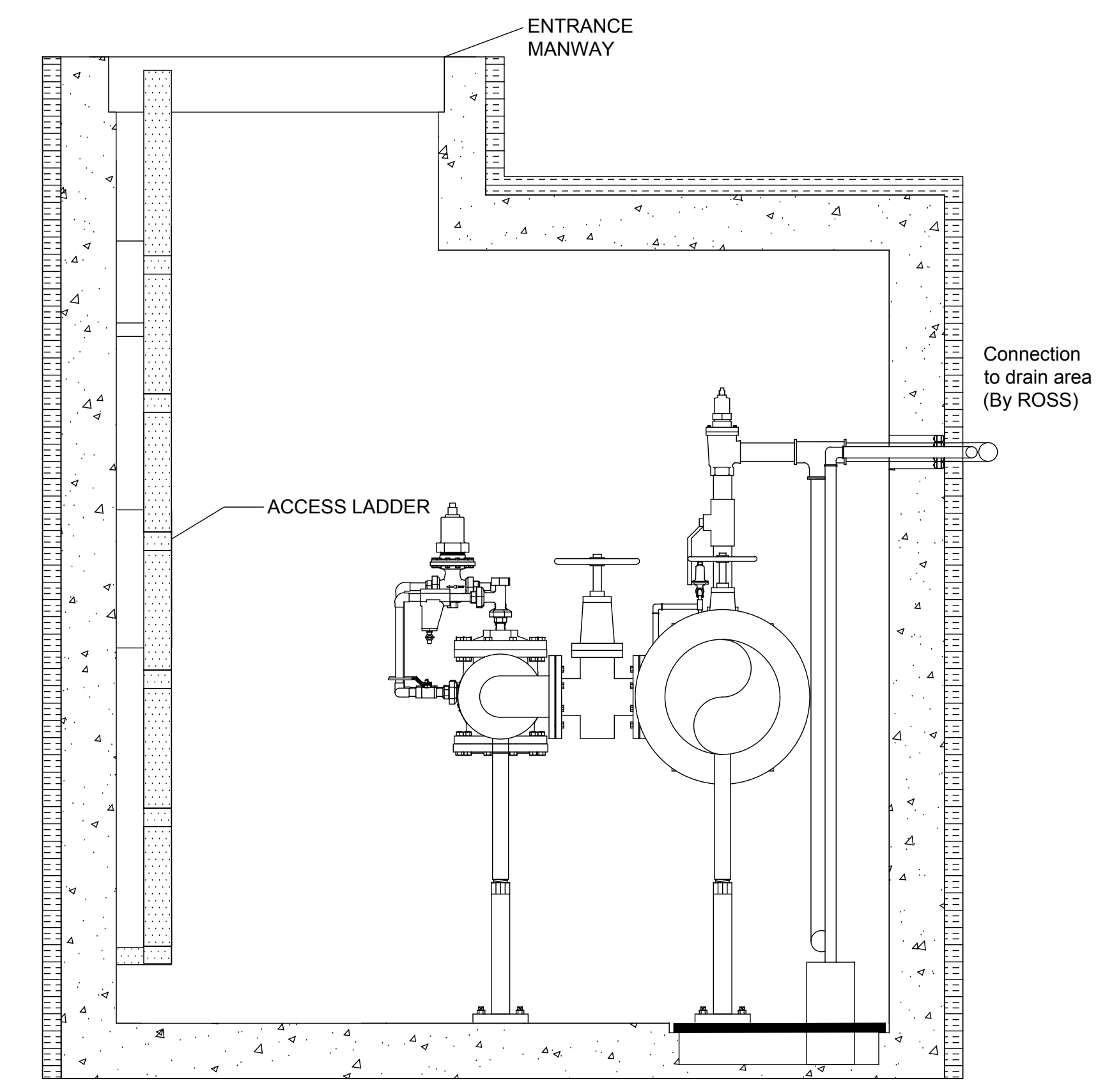
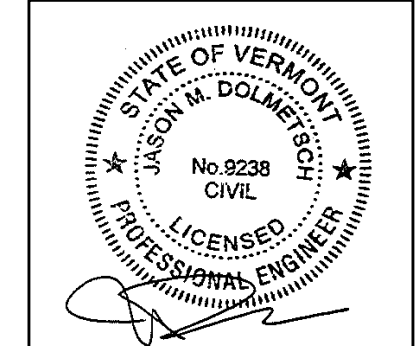
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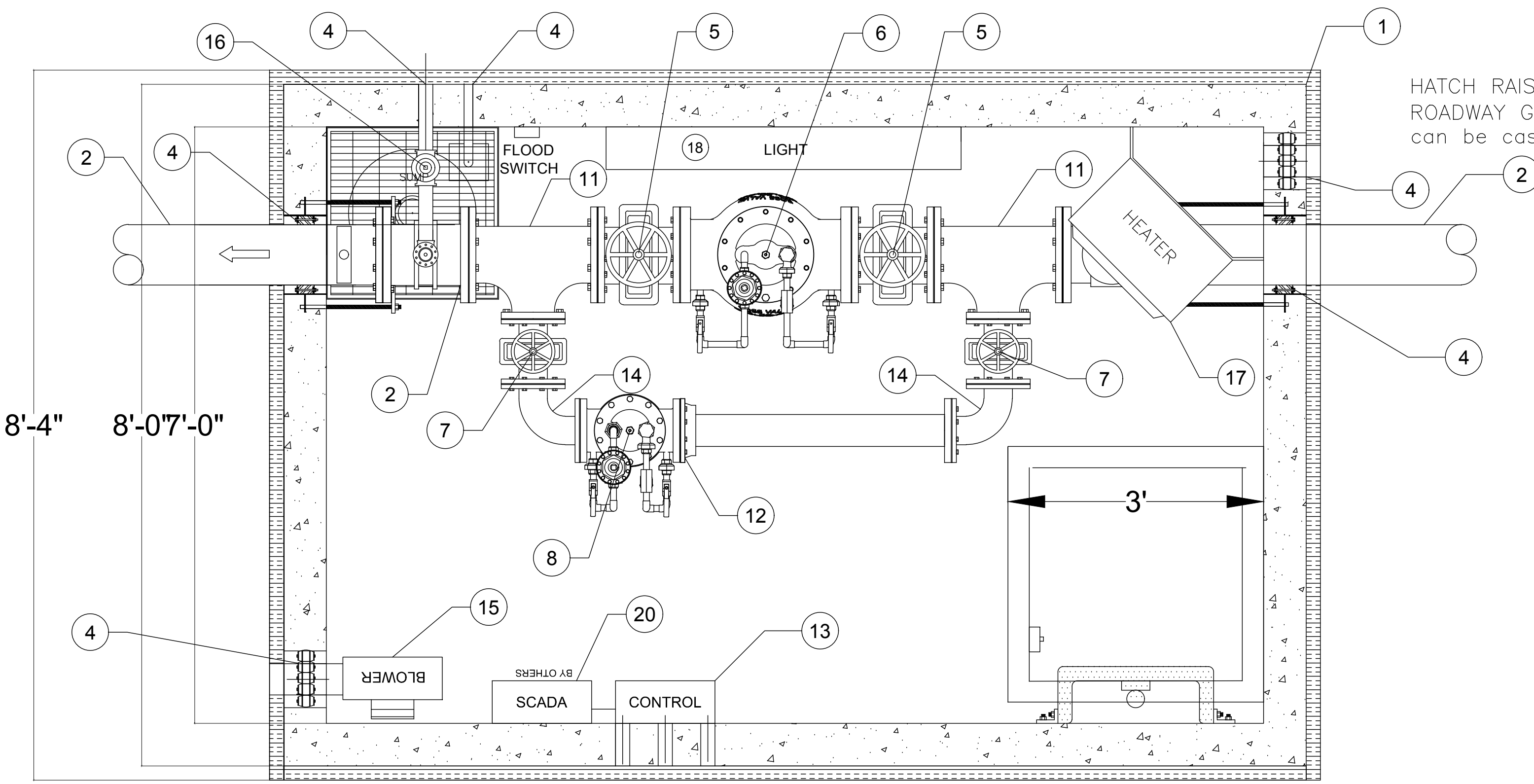
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NUMBER	DATE
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MSK	JMD

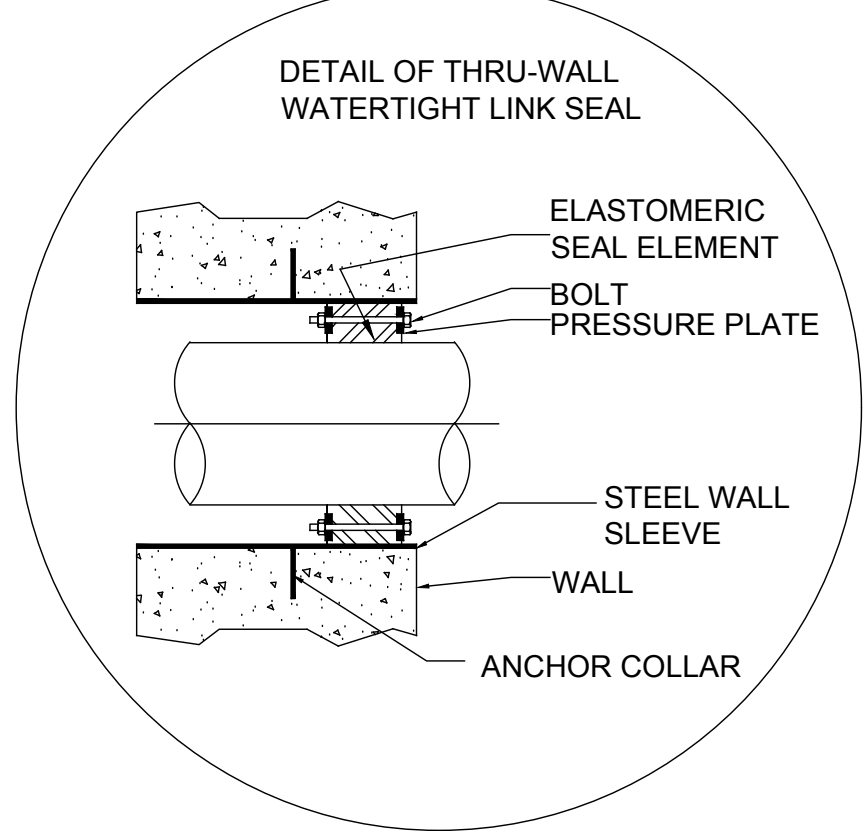
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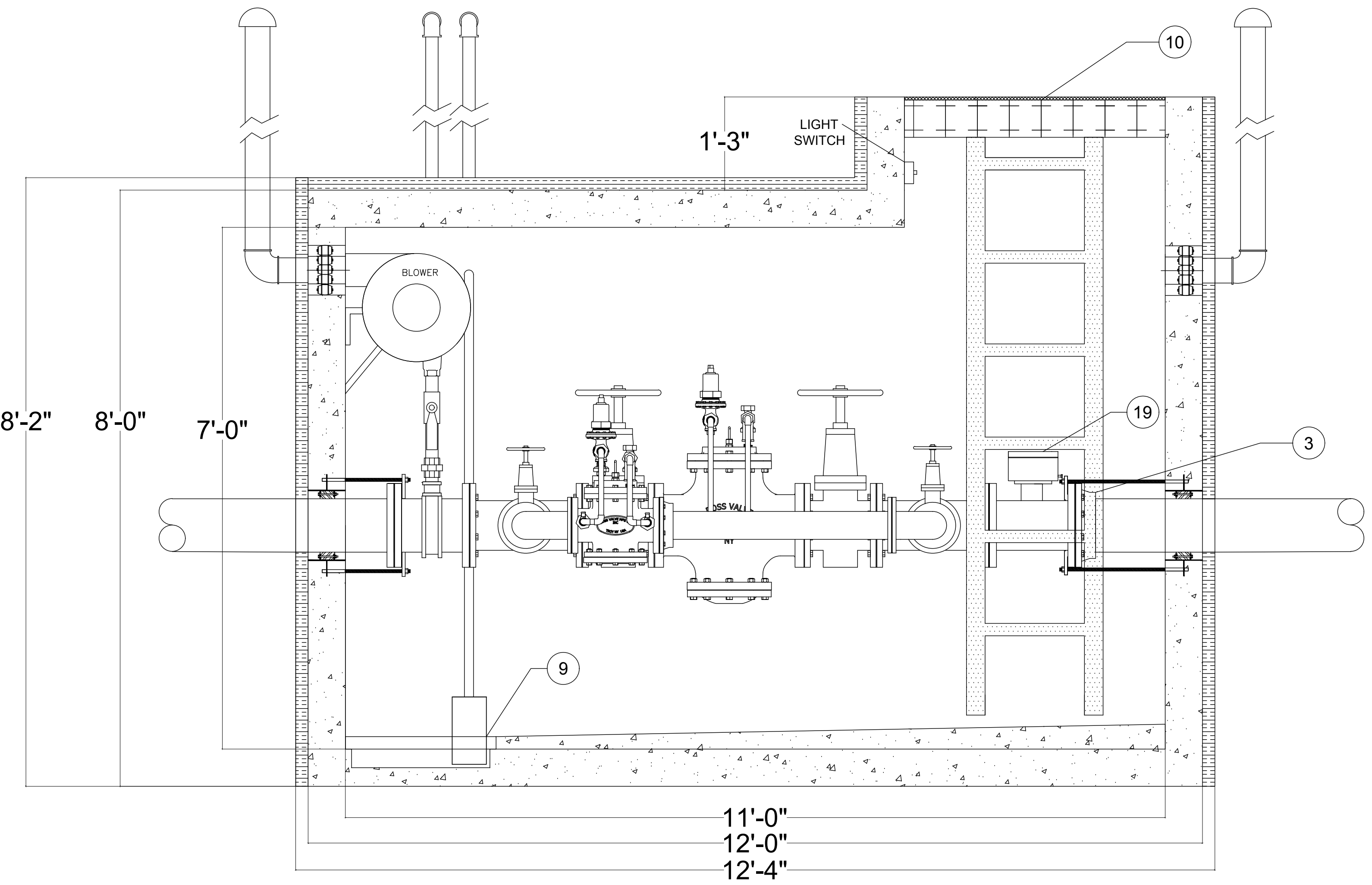
HATCH RAISED 12IN FOR ROADWAY GRADE ( IF NECESSARY )  
 can be cast as flat top if needed



ITEM	DESCRIPTION	QTY.
1	HS-20 PRECAST CONCRETE VAULT 11'X7'X7' ID WITH 15" RISER PIECE	1
2	ATLANTIC STATES CLASS 52 D.I. PIPE 8"	3
3	EBBAA IRON MEGA-FLANGE 8"	1
4	WALL PENETRATION LINK SEAL (TYP)	6
5	8" GATE VALVE RESL. SEAT N.R.S. OPEN RIGHT	2
6	8" ROSS 40WR PRV	1
7	4" GATE VALVE RESL. SEAT N.R.S. OPEN RIGHT	7
8	4" ROSS 40WR PRV	2
9	SUMP WITH SUMP PUMP THRU-WALL DRAIN 24"X24"	1
10	36 X 36 HS-20 ALUMIN SYRACUSE DTHD-7 HATCH	1
11	8" X 4" REDUCING TEE	2
12	EBBAA IRON MEGA-FLANGE 4"	1
13	ELECTRICAL CONTROL PANEL	1
14	4" ELBOW	2
15	BLOWER	1
16	2" ROSS 20WR RELIEF	2
17	HEATER SET AT 40°	1
18	FLUORESCENT LIGHT	1
19	8" FLOW METER MAG 8000	1
20	SCADA BOX	1



ALL THRU-WALL SEAL TO BE LINK-SEAL BRAND MECHANICAL SEALS-LS SERIES EDPM



**ROSS VALVE MFG. CO., INC.**  
 6 OAKWOOD AVENUE -TROY, NEW YORK, 12180 - TEL. (518) 274 - 0961  
 POST OFFICE BOX 595 - TROY, NY 12181 FAX (518) 274 - 0210  
 WEBSITE: www.rossvalve.com - E-MAIL sales@rossvalve.com

DRAWING: 08-40WR 04-40WR 02-20WRx2      DATE 4/22/19 WRH  
 BODY: VAULT      NO SCALE FIGURE -









8" FLOW METER VAULT  
 WITH 8" PRESSURE REDUCING VALVE, 4" PRESSURE REDUCING VALVE, & 2" PRESSURE RELIEF VALVE

THIS PRINT CONTAINS CONFIDENTIAL INFORMATION WHICH IS THE PROPERTY OF ROSS VALVE BY ACCEPTING THIS INFORMATION THE BORROWER AGREES THAT IT WILL NOT BE USED FOR ANY PURPOSE OTHER THAN THAT WHICH IT IS LOANED.  
 NOTE: The Ross Valve Mfg. Co., Inc., reserves the right to modify valve construction which will result in equal or superior performance to existing designs. These modifications may be made at any time and at the sole discretion of the manufacturer.

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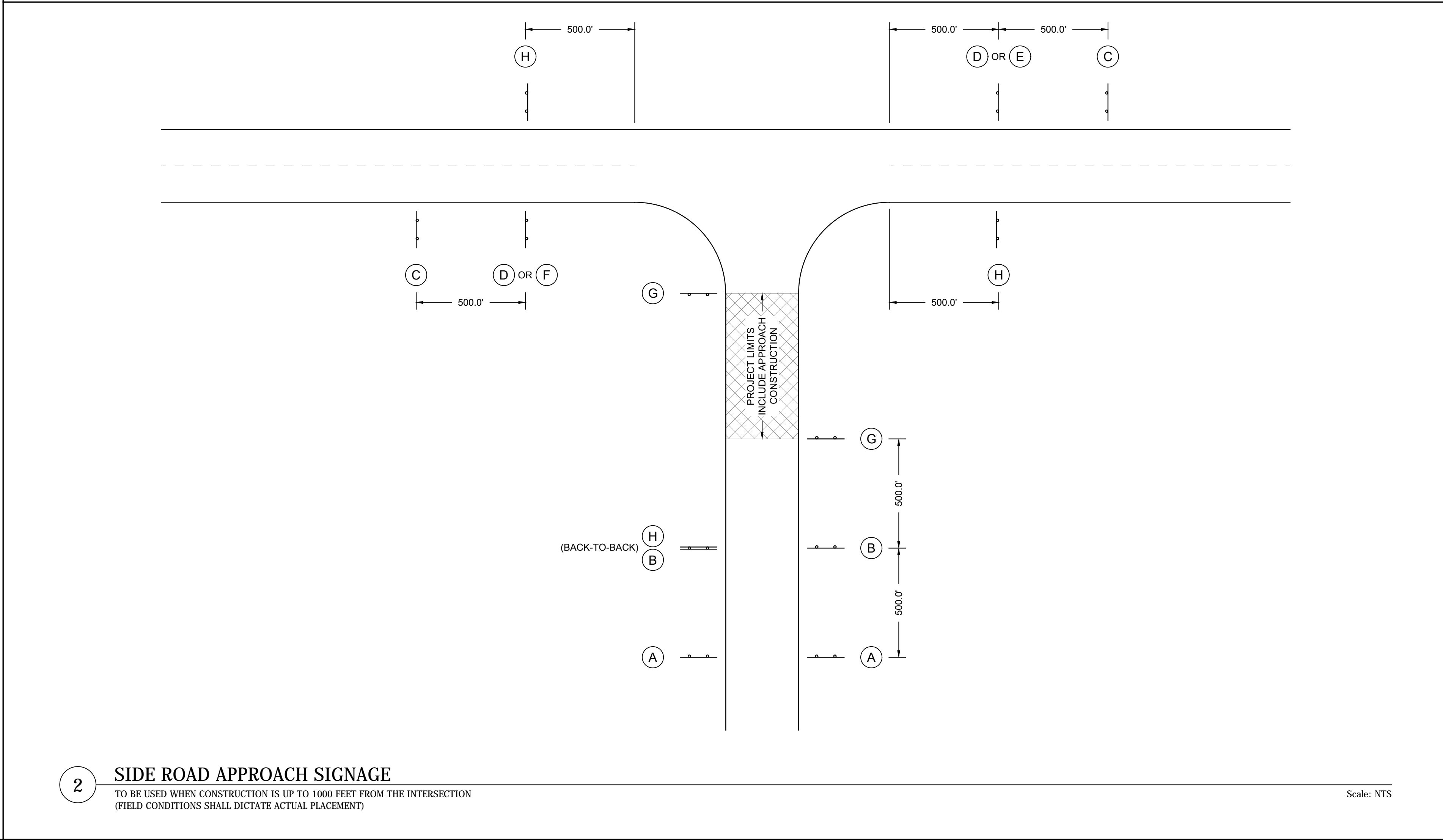
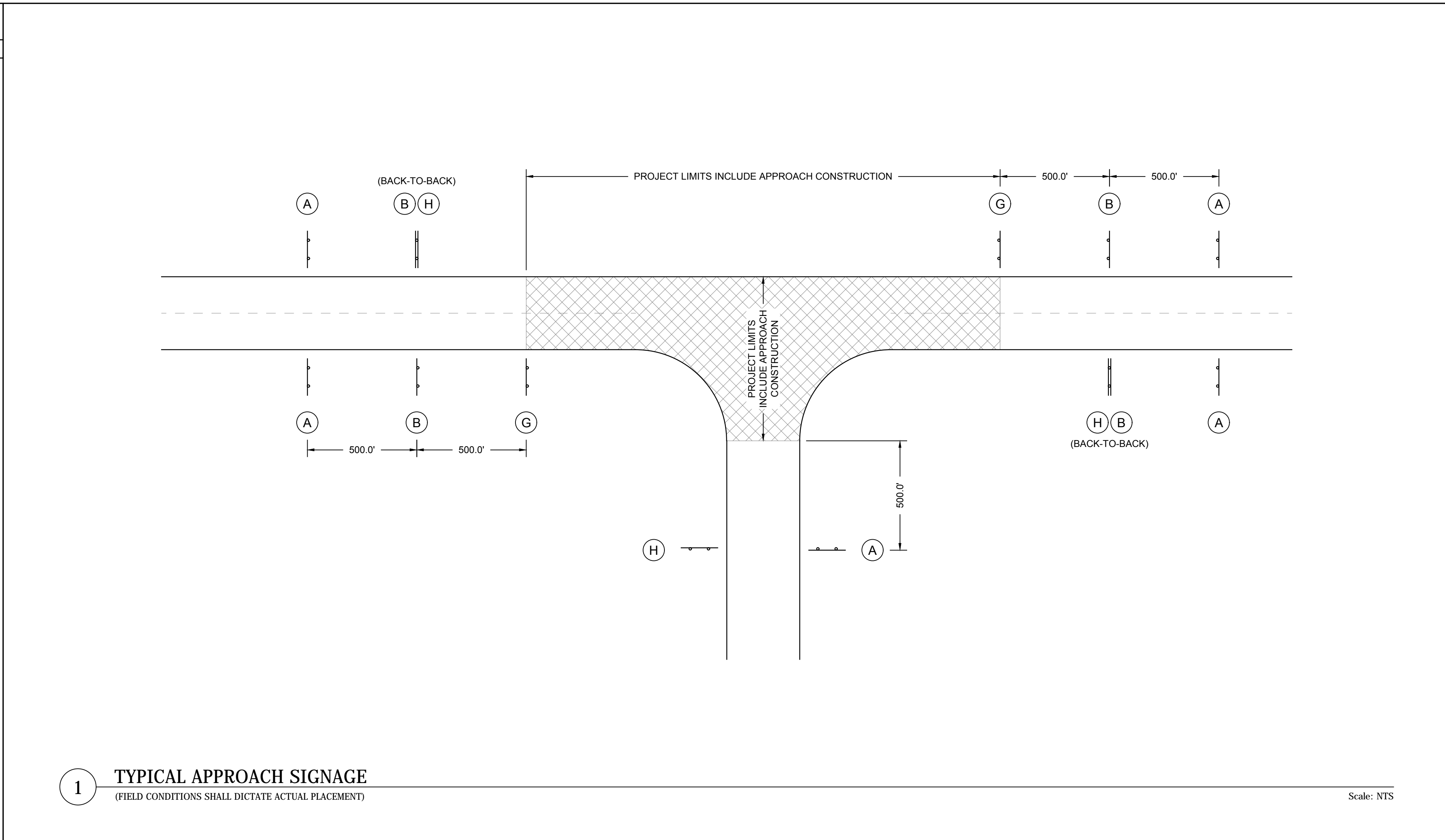


GENERAL NOTES	
TEMPORARY TRAFFIC CONTROL (VERMONT AGENCY OF TRANSPORTATION STANDARD T-1)	
1.	TRAFFIC CONTROL DEVICES NOT DETAILED IN THE VERMONT AGENCY OF TRANSPORTATION (VAOT) "STANDARD DRAWINGS" OR THE PROJECT PLANS SHALL BE IN ACCORDANCE WITH THE CURRENT "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND THE "STANDARD HIGHWAY SIGNS AND MARKINGS" BOOK (SHM), AND THEIR LATEST REVISIONS, PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION (FHWA).
2.	CONSTRUCTION SIGNS SHALL BE ERECTED BEFORE THE START OF ANY WORK AND SHALL BE COVERED UNTIL WORK COMMENCES, DURING PERIODS OF INACTIVITY, OR UPON COMPLETION OF THE WORK. EACH SIGN SHALL BE ERECTED IN A NEAT AND WORKMAN-LIKE MANNER.
3.	DIAMOND SHAPED CONSTRUCTION SIGNS SHALL BE 48 INCH BY 48 INCH.
4.	CONSTRUCTION SIGN COVERS SHALL CONSIST OF A PANEL, PAINTED FLAT BLACK, THE SAME AS THE SIGN IT COVERS. THE PANEL SHALL BE OF WOOD, PLYWOOD, HARDBOARD, OR ANY MATERIAL SATISFACTORY TO THE ENGINEER. NO MATERIAL WILL BE APPROVED THAT WILL DETERIORATE BY EXPOSURE TO THE WEATHER DURING THE PROJECT. MOUNTING OF THE PANEL SHALL BE DONE IN SUCH A WAY AS NOT TO DAMAGE THE SIGN FACE MATERIAL.
5.	SIGNS SHALL BE MAINTAINED IN A CLEAN AND LEGIBLE CONDITION SATISFACTORY TO THE ENGINEER. THEY SHALL BE KEPT PLUMB AND LEVEL, AND ALWAYS PRESENT A NEAT APPEARANCE. DAMAGED, DEFACED, OR DIRTY SIGNS SHALL BE REPAIRED, CLEANED, OR REPLACED, AS ORDERED BY THE ENGINEER.
6.	NO CROSS-BRACING OR BACK-BRACING TO KEEP POSTS PLUMB WILL BE ALLOWED. CONCRETE FOUNDATIONS, COLLARS, OR SOIL BEARING PLATES ARE NOT PERMITTED.
7.	CONSTRUCTION SIGNS INSTALLED ON POSTS SHALL BE SET SECURELY IN THE GROUND ON TWO POSTS. THE BOTTOM OF THE SIGN SHALL BE AT LEAST FIVE FEET ABOVE THE EDGE OF THE PAVEMENT, AND THE NEAREST EDGE OF A SIGN SHALL BE AT LEAST SIX FEET OUTSIDE THE SHOULDER POINT. FOUR FEET OUTSIDE OF GUARDRAIL, OR TWO FEET OUTSIDE CURBING OR SIDEWALK. THE INSTALLATION OF SIGNS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER. IN URBAN AREAS, THE BOTTOM OF THE SIGN SHALL BE AT LEAST SEVEN FEET ABOVE THE SIDEWALK OR EDGE OF PAVEMENT, WHICHEVER IS HIGHER.
8.	PORTABLE SIGNS SHALL BE PLACED ON THE EDGE OF THE ROADWAY AND A MINIMUM OF ONE FOOT ABOVE THE TRAVELED WAY. ALL VEGETATION WHICH INTERFERES WITH THE VISIBILITY OF THE SIGNS SHALL BE REMOVED. WHEN PLACED BEHIND GUARDRAIL, THE BOTTOM OF THE SIGN SHALL BE ABOVE THE TOP OF THE GUARDRAIL.
9.	SIGNS SHALL BE REMOVED UPON THE COMPLETION OF THE WORK AT THE DISCRETION OF THE ENGINEER.
10.	ROLL UP CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ("AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956) TYPE VII, UNLESS OTHERWISE NOTED.
11.	SOLID SUBSTRATE CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ("AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956) TYPE VIII OR IX REQUIREMENTS, UNLESS OTHERWISE NOTED.
12.	WHERE CONSTRUCTION SIGN INSTALLATIONS ARE NOT PROTECTED BY GUARDRAIL OR OTHER APPROVED TRAFFIC BARRIERS, ALL SIGN STANDS AND POST INSTALLATIONS SHALL MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE AASHTO "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION. NO SIGN POSTS SHALL EXTEND OVER THE TOP OF THE SIGN INSTALLED ON SAID POSTS. WHEN ANCHORS ARE INSTALLED, STUBS SHALL NOT BE GREATER THAN FOUR INCHES ABOVE THE EXISTING GROUND.
13.	ROADWAY AND SHOULDER WIDTHS DEPICTED ON THE STANDARD DRAWINGS MAY VARY.
14.	THESE STANDARD DRAWINGS ARE INTENDED TO SERVE AS VTRANS STANDARD OPERATING PROCEDURE. IT IS NOTED THAT COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL WORK ZONE MAY BE MODIFIED, DUE TO FIELD CONDITIONS, AT THE DISCRETION OF THE ENGINEER.

SIGN LEGEND	
(VTRANS STANDARD T-1)	
(A)	 W20-1
(B)	 W20-1
(C)	 VC-869
(D)	 VC-869
(E)	 VC-869
(F)	 VC-869
(G)	 G20-1
(H)	 G20-2


GENERAL NOTES	
CONVENTIONAL ROADS CONSTRUCTION APPROACH SIGNING (VERMONT AGENCY OF TRANSPORTATION STANDARD T-10)	
1.	SIGNS SHOWN ON THIS SHEET ARE INTENDED FOR USE IN PROVIDING ADVANCED WARNING AND INFORMATION ON CONSTRUCTION PROJECTS OVER WHICH TRAFFIC WILL BE MAINTAINED. WHEN ADDITIONAL APPROACH SIGNS OR OTHER TYPES OF ADVANCED SIGNING OR CONTROL ARE NECESSARY, THE PLANS AND/OR SPECIFICATIONS FOR THAT PROJECT WILL GIVE THE DETAILS OF THE SIGNS AND DEVICES REQUIRED. FOR ON-PROJECT CONSTRUCTION SIGNS, REFER TO THE APPROPRIATE STANDARDS SHEETS.
2.	THE "ROAD WORK NEXT xx MILES" SIGN (G20-1) SHALL BE INSTALLED IN ADVANCE OF TEMPORARY TRAFFIC CONTROL ZONES THAT ARE MORE THAN TWO MILES IN LENGTH, OR AS DIRECTED BY THE ENGINEER. DISTANCES SHALL BE STATED TO THE NEAREST WHOLE MILE.
3.	SIGNS SHALL BE LOCATED AS DETAILED ON THIS SHEET, OR AS OTHERWISE SHOWN ON THE PLANS. THE SIGNS SHALL APPEAR AT EACH END OF THE HIGHWAY UNDER CONSTRUCTION, AND ON ALL INTERSECTING PUBLIC HIGHWAYS. THE ENGINEER SHALL DETERMINE THE EXACT LOCATIONS

GENERAL NOTES	
CONSTRUCTION SIGN DETAILS (VERMONT AGENCY OF TRANSPORTATION STANDARD T-28)	
1.	COLORS FOR SIGNS SHALL BE BLACK LEGEND AND BORDER ON FLUORESCENT ORANGE BACKGROUND.
2.	CONSTRUCTION SIGNS SHALL BE 48 INCH BY 48 INCH. IF SOLID SUBSTRATE SIGNS ARE USED, SIGNS SHALL HAVE CORNERS ROUNDED TO A THREE INCH RADIUS.
3.	SIGNS SHALL HAVE 1/4 INCH WIDE BORDERS THAT ARE INDENTED 3/4 INCH FROM THE EDGE OF THE SIGN.
4.	SIGNS SHALL HAVE THE LEGEND CENTERED HORIZONTALLY AND VERTICALLY ON THE SIGN, UNLESS OTHERWISE NOTED.
5.	ALL SIGN DIMENSIONS ARE SHOWN IN INCHES.



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# LEGEND

MUTCD TABLE 6H-2: MEANING OF SYMBOLS ON TYPICAL APPLICATION DIAGRAMS

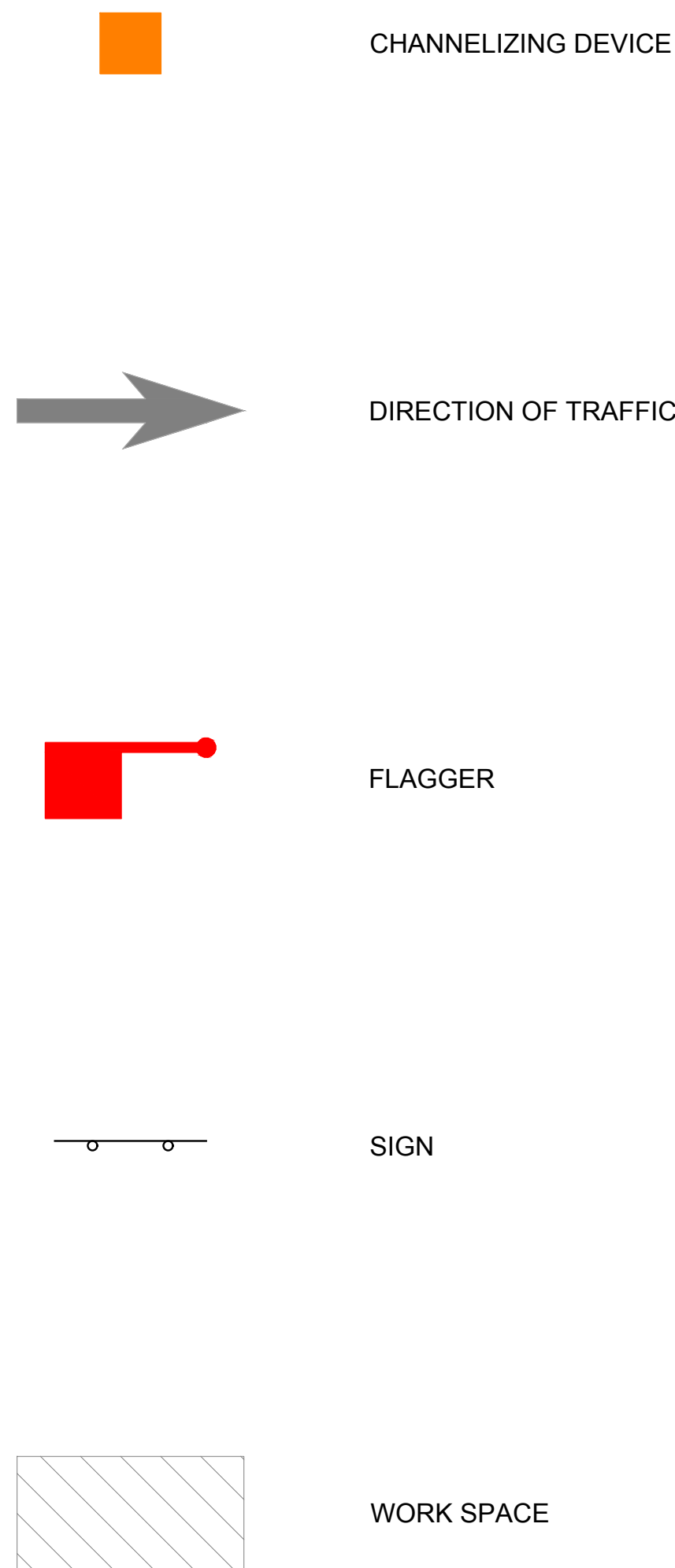


TABLE 6H-3: MEANING OF LETTER CODES ON TYPICAL APPLICATION DIAGRAMS

ROADWAY TYPE	DISTANCE BETWEEN SIGNS **		
	A	B	C
URBAN (LOW SPEED) *	100 FEET	100 FEET	100 FEET
URBAN (HIGH SPEED) *	350 FEET	350 FEET	350 FEET
RURAL	500 FEET	500 FEET	500 FEET
EXPRESSWAY/FREEWAY	1,000 FEET	1,500 FEET	2,640 FEET

\* SPEED CATEGORY TO BE DETERMINED BY HIGHWAY AGENCY  
 \*\* THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN FIGURES 6H-3 AND 6H-10. THE DIMENSION A 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 "FIRST SIGN" IS THE SIGN IN A THREE-SIGN SERIES THAT IS CLOSEST TO THE TEMPORARY TRAFFIC CONTROL (TTC) ZONE. THE "THIRD SIGN" IS THE SIGN THAT IS LOCATED THE FURTHEST UPSTREAM FROM THE TTC ZONE.]

NOTES FOR FIGURE 6H-3: TYPICAL APPLICATION 3 "WORK ON THE SHOULDERS":

GUIDANCE

1. A "SHOULDER WORK" SIGN SHOULD BE PLACED ON THE LEFT SIDE OF THE ROADWAY FOR A DIVIDED OR ONE-WAY STREET ONLY IF THE LEFT SHOULDER IS AFFECTED.

OPTION

2. THE "WORKERS" SYMBOL SIGN MAY BE USED INSTEAD OF "SHOULDER WORK" SIGNS.
3. THE "SHOULDER WORK AHEAD" SIGN ON AN INTERSECTING ROADWAY MAY BE OMITTED WHERE DRIVERS EMERGING FROM THAT ROADWAY WILL ENCOUNTER ANOTHER ADVANCED WARNING SIGN PRIOR TO THIS ACTIVITY AREA.
4. FOR SHORT DURATION OPERATIONS OF 60 MINUTES OR LESS, ALL SIGNS AND CHANNELIZING DEVICES MAY BE ELIMINATED IF A VEHICLE WITH ACTIVATED HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS IS USED.
5. VEHICLE HAZARD WARNING SIGNALS MAY BE USED TO SUPPLEMENT HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS.

STANDARD

6. VEHICLE HAZARD WARNING SIGNALS SHALL NOT BE USED INSTEAD OF THE VEHICLE'S HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS.
7. WHEN PAVED SHOULDERS HAVING A WIDTH OF 8 FEET OR MORE ARE CLOSED, AT LEAST ONE ADVANCED WARNING SIGN SHALL BE USED. IN ADDITION, CHANNELIZING DEVICES SHALL BE USED TO CLOSE THE SHOULDER IN ADVANCE TO DELINEATE THE BEGINNING OF THE WORK SPACE AND DIRECT VEHICULAR TRAFFIC TO REMAIN WITHIN THE TRAVELED WAY.

TABLE 6H-4: FORMULAS FOR DETERMINING TAPER LENGTH

SPEED (S)	TAPER LENGTH (L) IN FEET
40 MPH OR LESS	$L = \frac{WS^2}{50}$
45 MPH OR MORE	$L = WS$

WHERE: L = TAPER LENGTH IN FEET  
 W = WIDTH OF OFFSET IN FEET  
 S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH

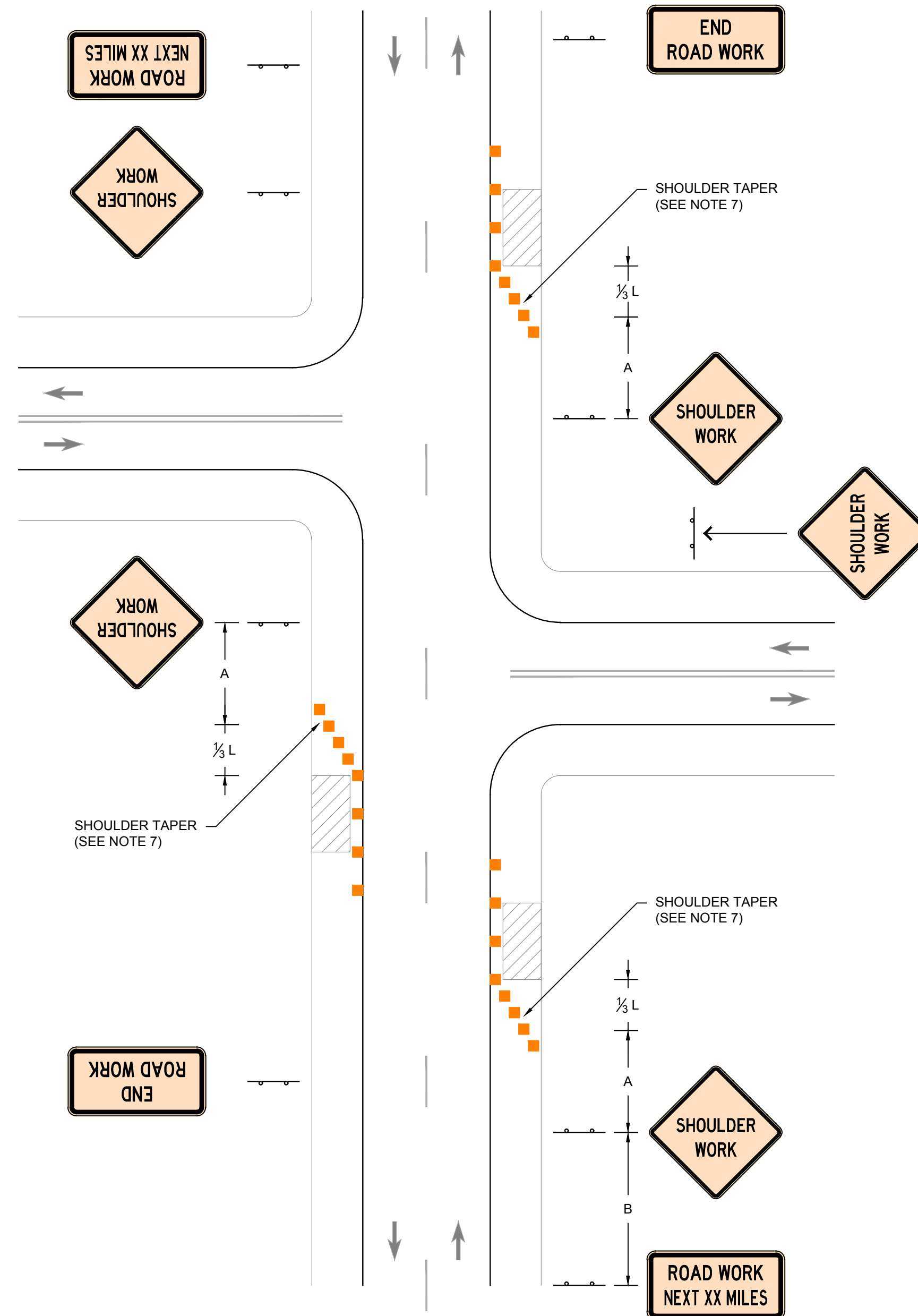
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## WORK ON THE SHOULDERS (TA-3)

MUTCD FIGURE 6H-3: TYPICAL APPLICATION 3

Scale: NTS

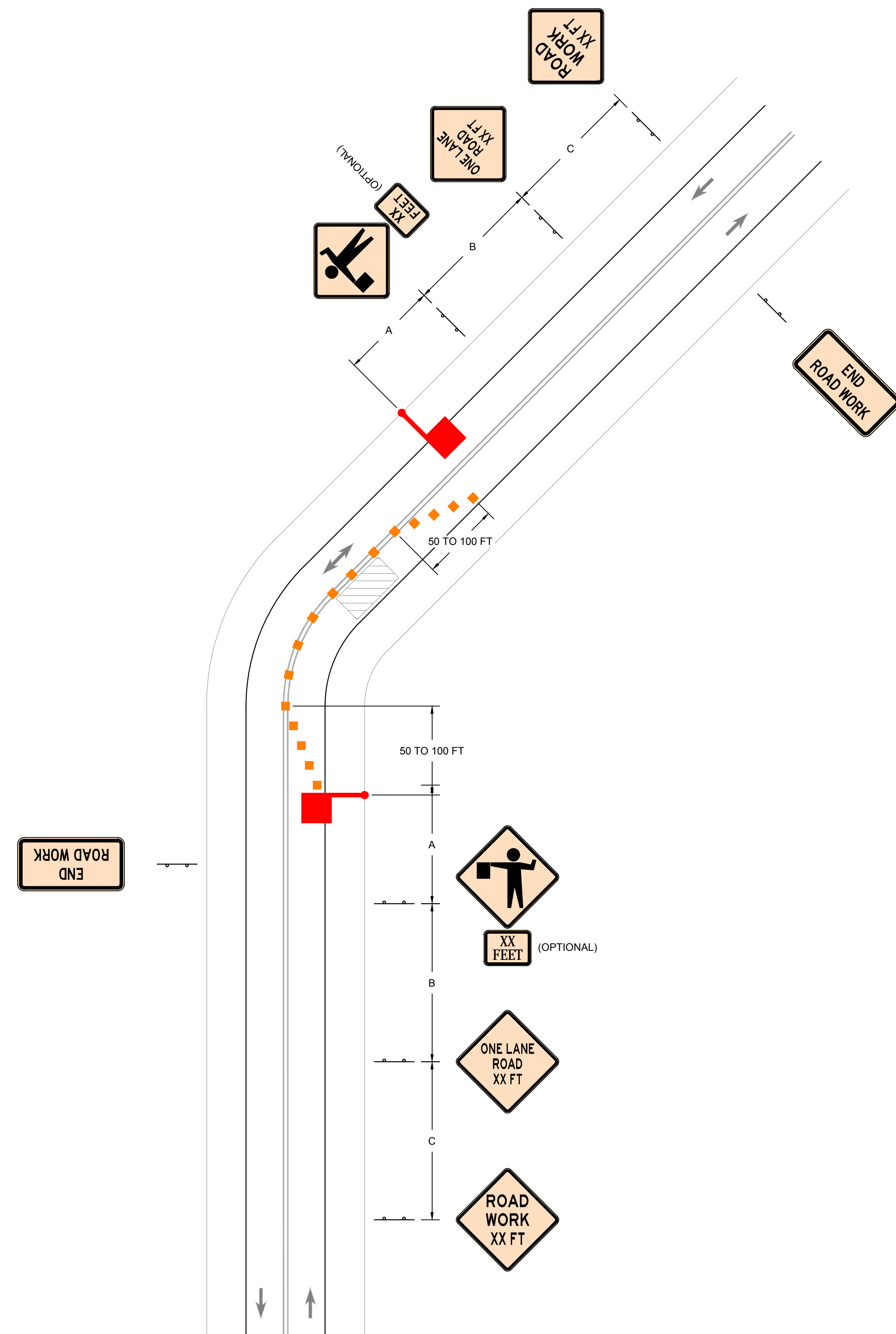


2

## LANE CLOSURE ON TWO-LANE ROAD USING FLAGGERS (TA-10)

MUTCD FIGURE 6H-10: TYPICAL APPLICATION 10

Scale: NTS



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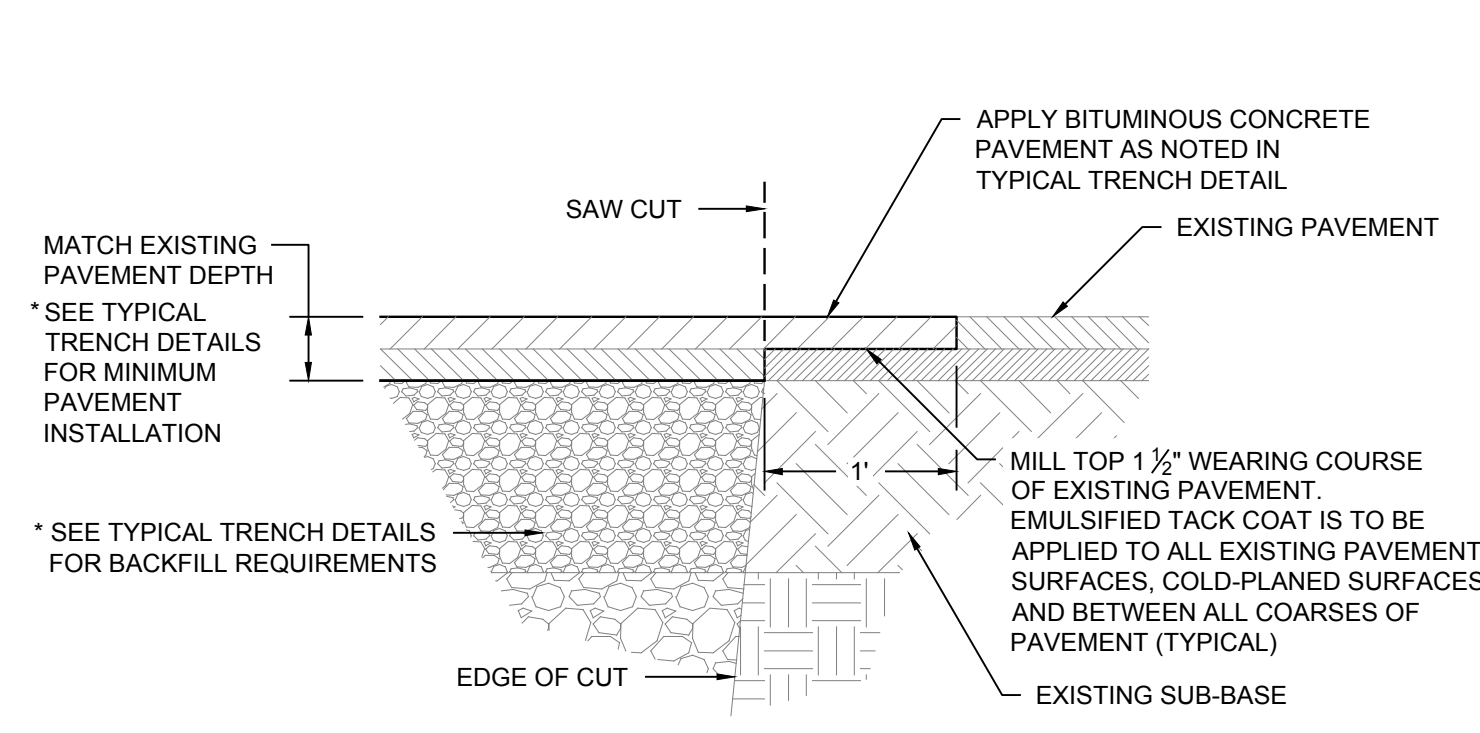
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 DETAILS

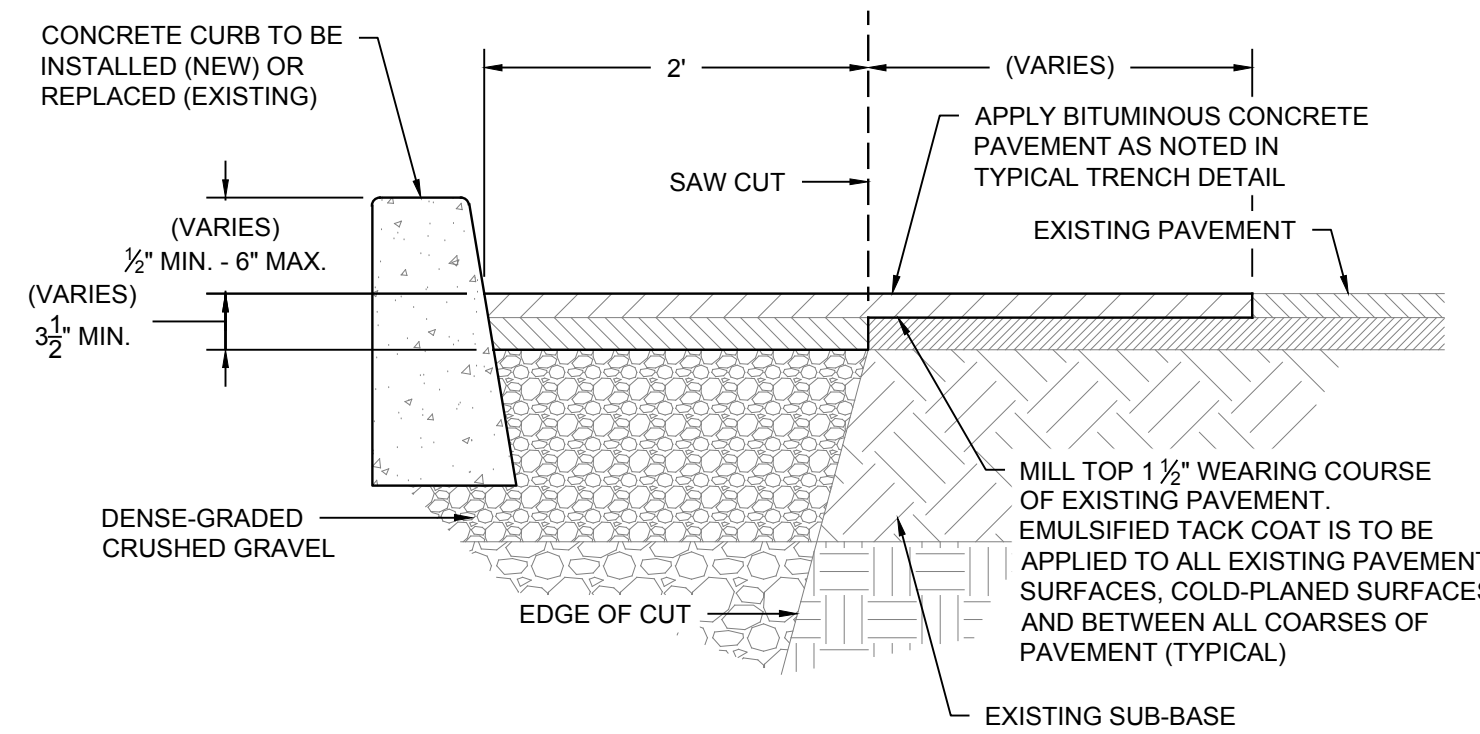
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SHEET NUMBER  
**C502**

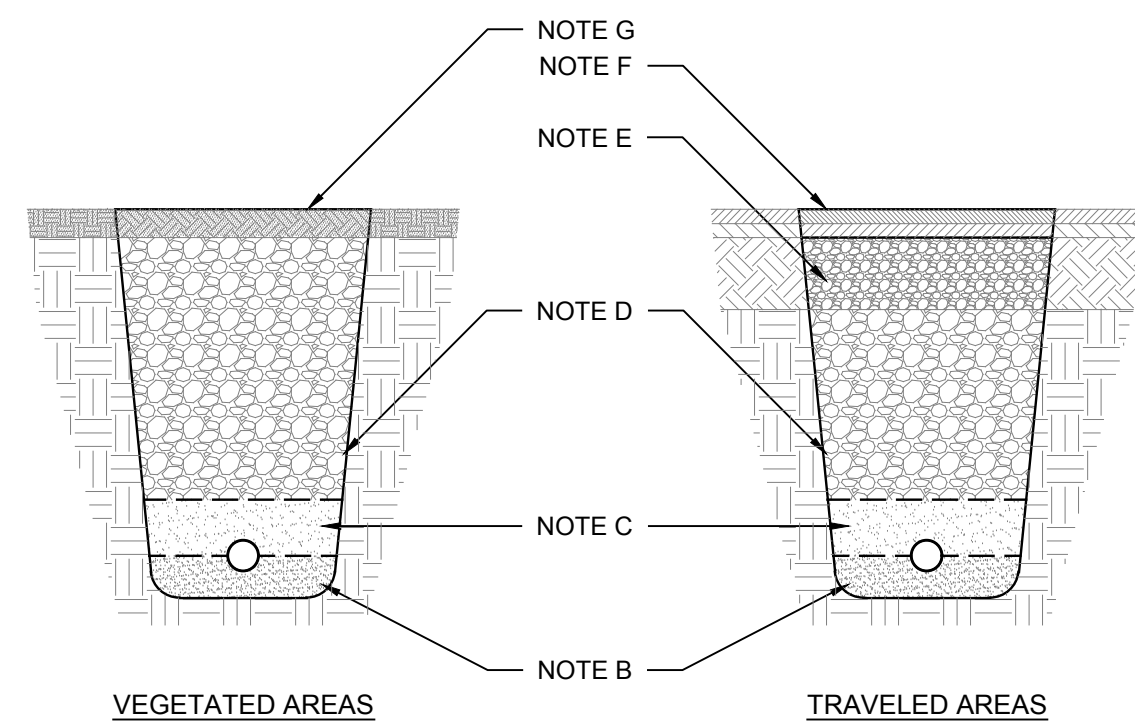




**1 PAVEMENT REPAIR DETAIL**  
Scale: NTS



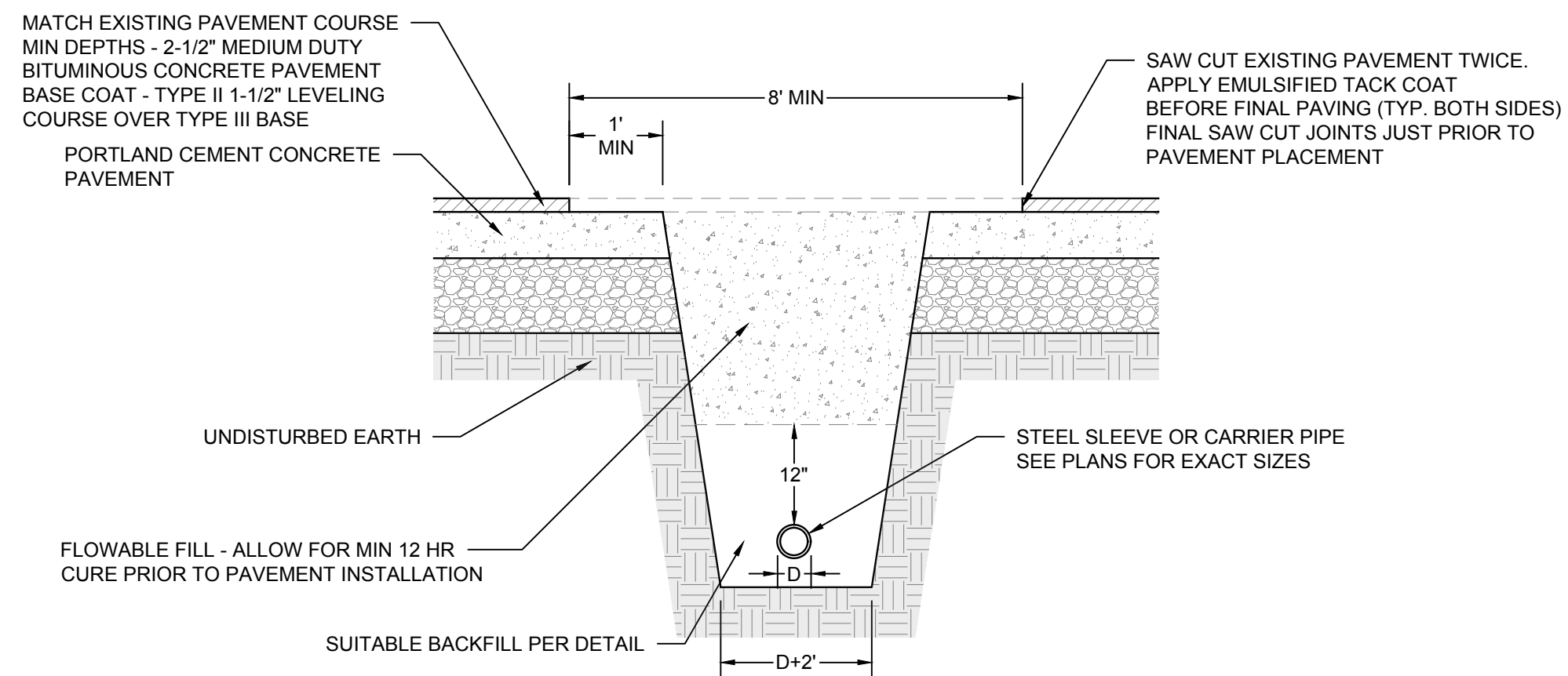
**2 PAVEMENT REPAIR DETAIL (AT CURB)**  
Scale: NTS



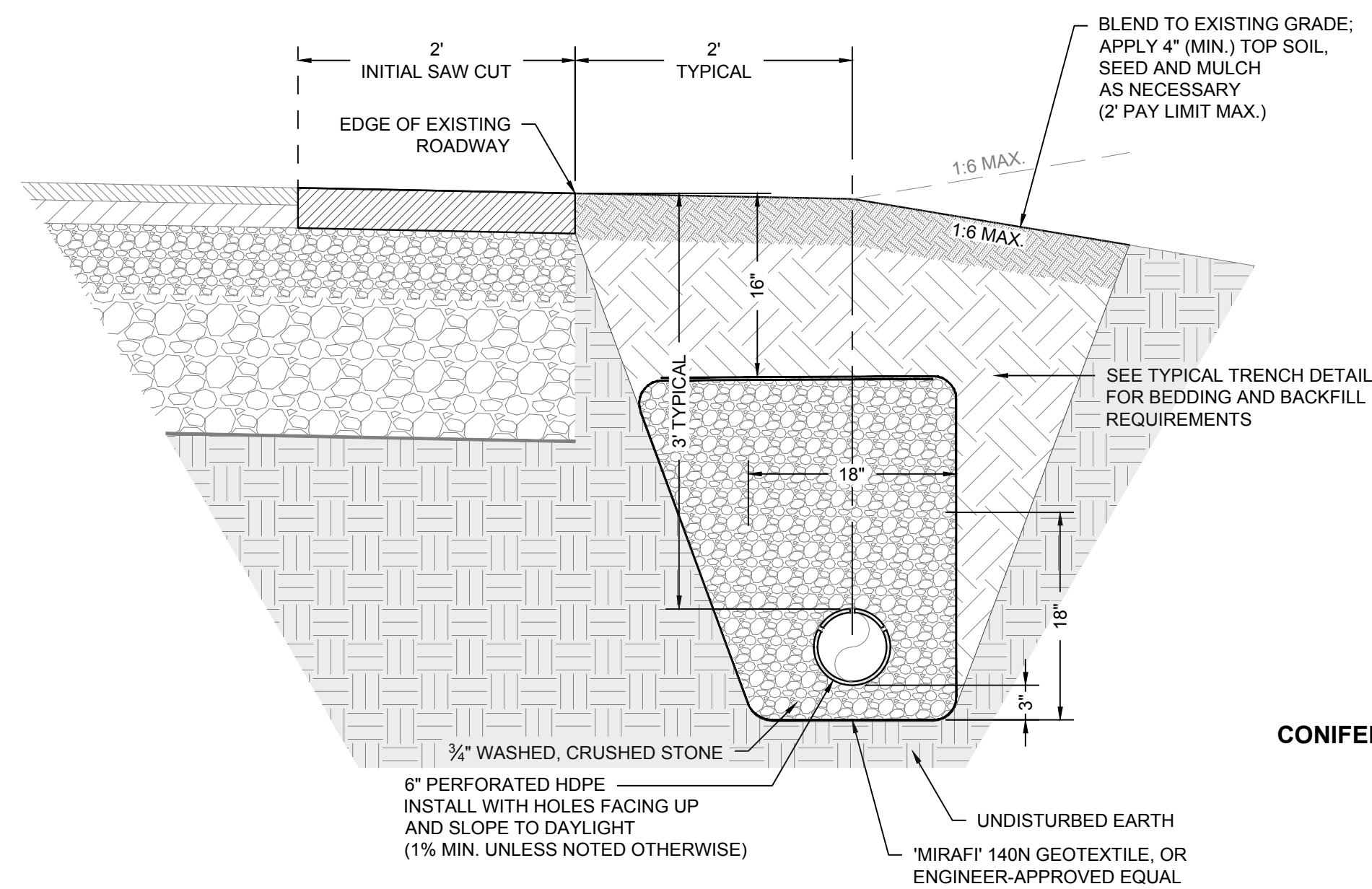
**3 TYPICAL TRENCH DETAIL**  
Scale: NTS

INSTALLATION SPECIFICATIONS

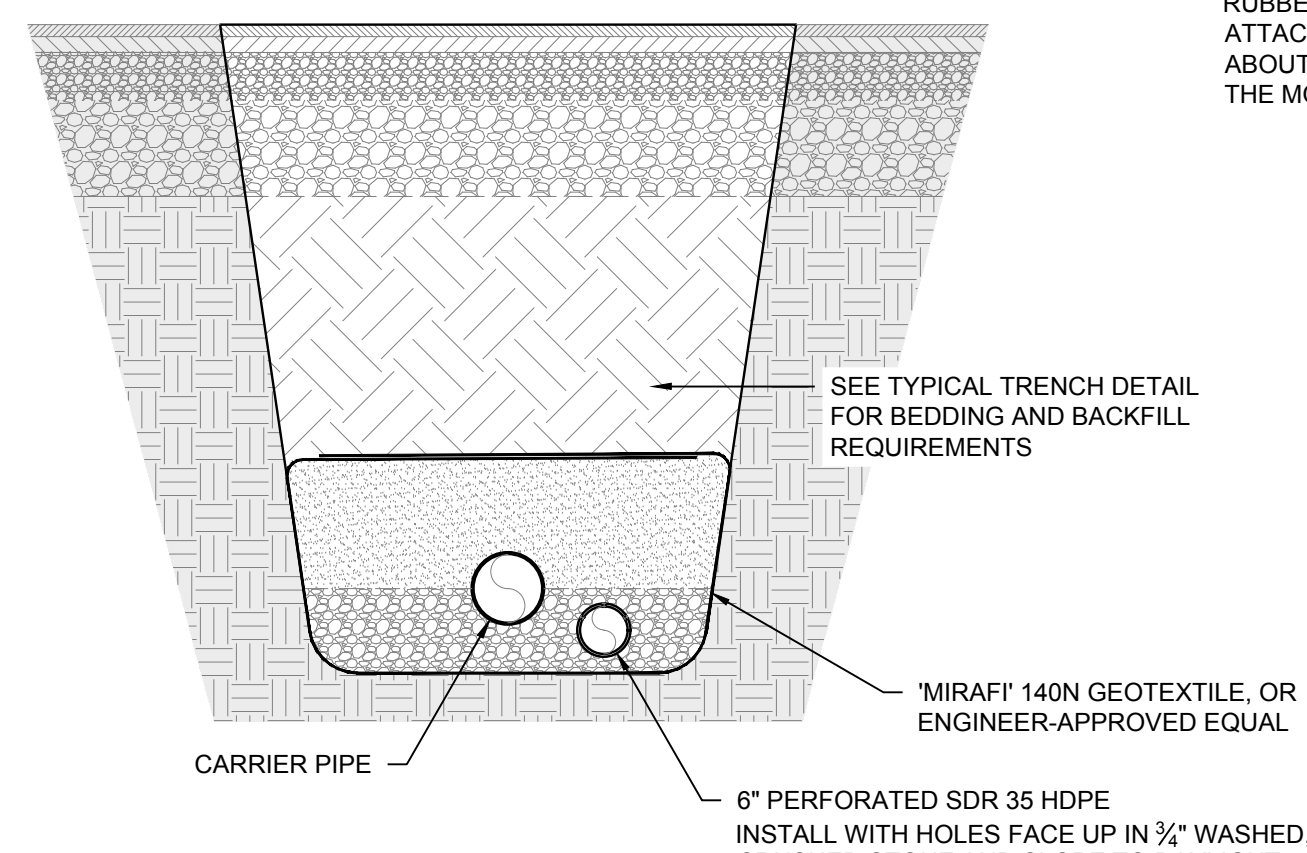
- A. MINIMUM BURIAL DEPTH 5'-6" (4'-0" FOR SEWER), IF CONDITIONS PREVENT MINIMUM BURIAL DEPTH, ALL SECTIONS OF LINE LESS THAN MINIMUM DEPTH IS TO BE INSULATED WITH 1" THICKNESS RIGID FOAM INSULATION PER FOOT LESS THAN MINIMUM (MIN. 2" THICKNESS).
- B. BED PIPE IN 6" OF BEDDING MATERIAL. PIPE IS NOT TO BE LAID IN UNCOMPACTED SOIL OR IN WATER. IF IN LEDGE CONDITIONS, BED PIPE IN A MINIMUM OF 6" OF SAND. DO NOT REST PIPE ON LEDGE ROCK.
- C. BACKFILL OVER PIPE WITH 12" MINIMUM SAND BEDDING MATERIAL, COMPACTED ENTIRE WIDTH OF TRENCH. BACKFILL WITH 3/4" STONE TO 12" DEPTH IF IN WATER.
- D. BACKFILL WITH SATISFACTORY SOIL MATERIAL COMPACTED IN 6" LIFTS TO 95% MAXIMUM DRY DENSITY IN ROADS AND PAVED AREAS, 85% MAXIMUM DRY DENSITY IN LAWN AND GRASSED AREAS.
- E. MINIMUM SUB-BASE INSTALLATION:  
 MUNICIPAL ROADWAYS: 12" COARSE-GRADED, CRUSHED GRAVEL  
 6" FINE-GRADED, CRUSHED GRAVEL  
 STATE ROADWAY: 18" COARSE-GRADED, CRUSHED GRAVEL  
 6" FINE-GRADED, CRUSHED GRAVEL  
 DRIVEWAY: 8" COARSE-GRADED, CRUSHED GRAVEL  
 6" FINE-GRADED, CRUSHED GRAVEL
- F. EDGES OF PAVEMENT MUST BE CUT PRIOR TO EXCAVATION TO PREVENT LIFTING OF REMAINING PAVEMENT, AND FOLLOWING EXCAVATION PRIOR TO PAVEMENT REPAIR, APPLY EMULSION TO EDGE OF EXISTING PAVEMENT PRIOR TO PAVING.  
 MUNICIPAL PAVEMENT INSTALLATION:  
 MUNICIPAL ROADWAY: TOP: 1.5" TYPE 4  
 BASE: 2.5" TYPE 2  
 STATE ROADWAY: TOP: 1.5" TYPE 3  
 BASE: 2.5" TYPE 2  
 PAVED DRIVEWAYS: TOP: 1" TYPE 4  
 BASE: 2" TYPE 2
- G. 4" MINIMUM TOPSOIL, SEEDED AND MULCHED.



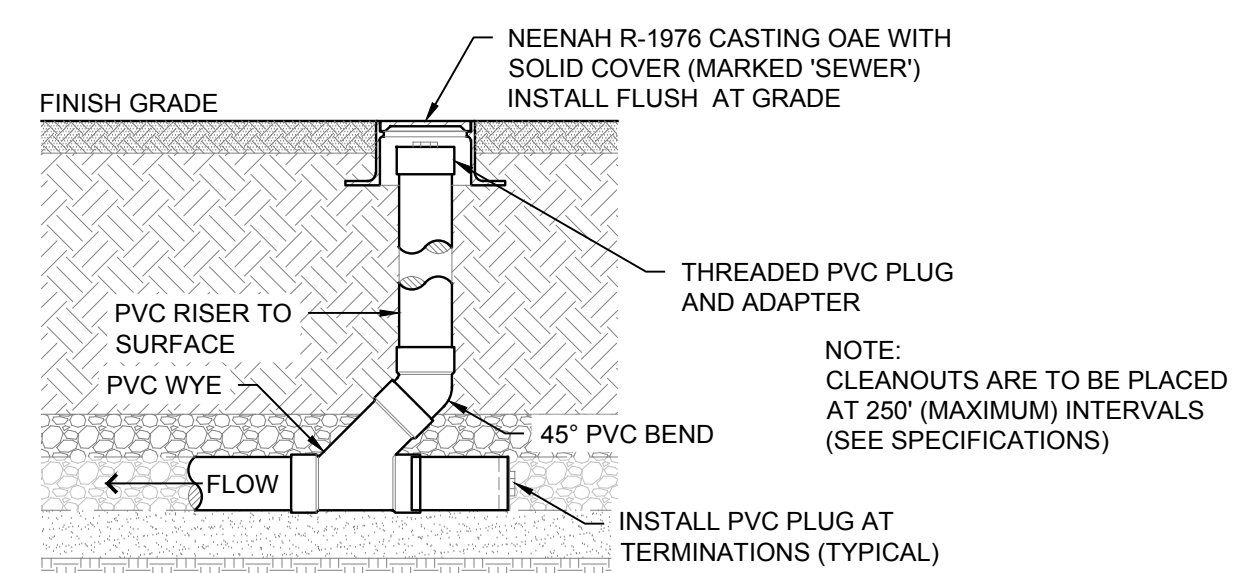
**4 OPEN CUT PAVEMENT TRENCH DETAIL - CONCRETE ROADWAY**  
Scale: NTS



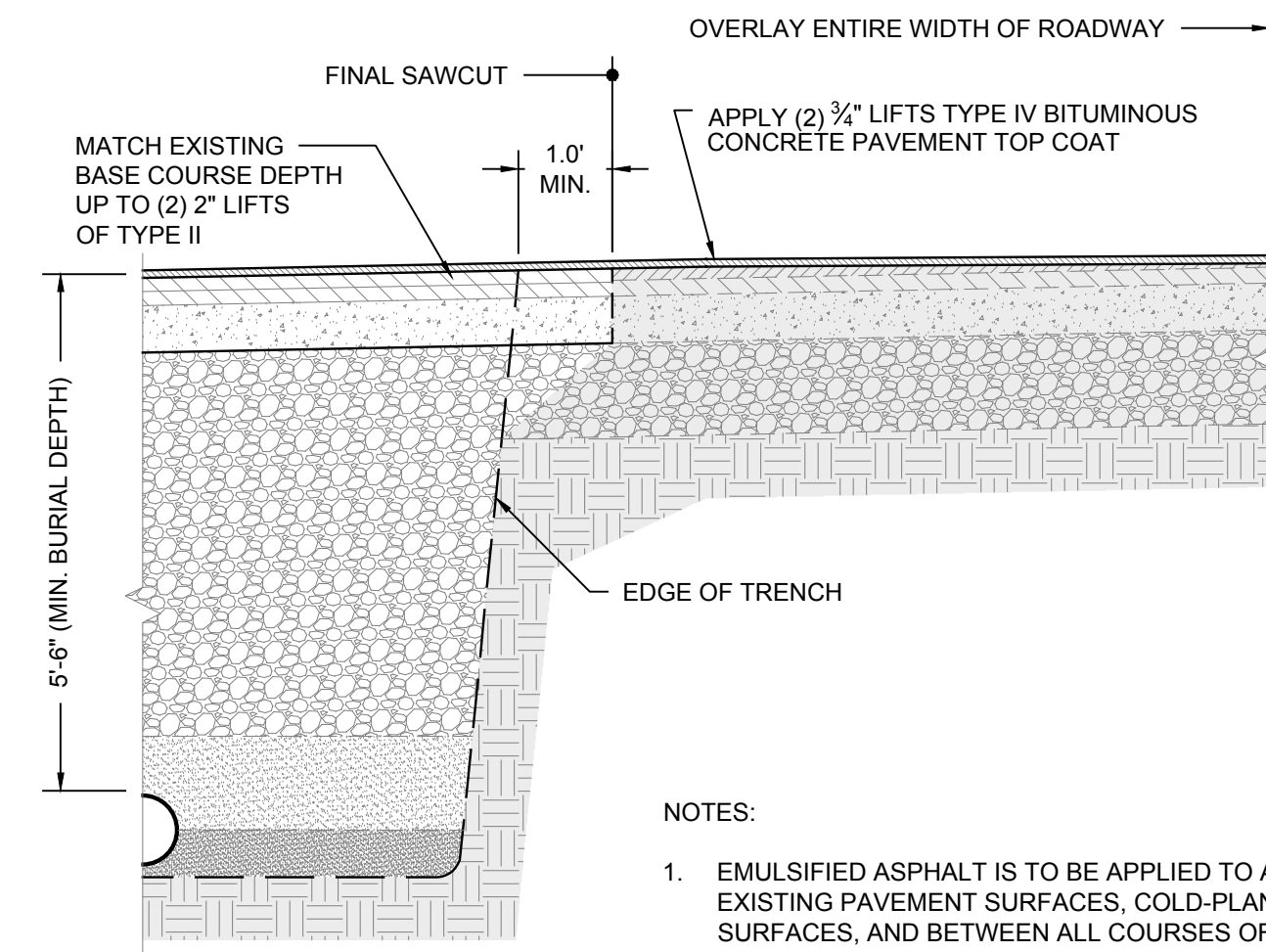
**5 FRENCH DRAIN DETAIL**  
Scale: NTS



**6 FRENCH DRAIN DETAIL**  
Scale: NTS



**7 TYPICAL IN-LINE CLEANOUT**  
Scale: NTS



**8 PAVEMENT REPAIR AND OVERLAY DETAIL**  
Scale: NTS

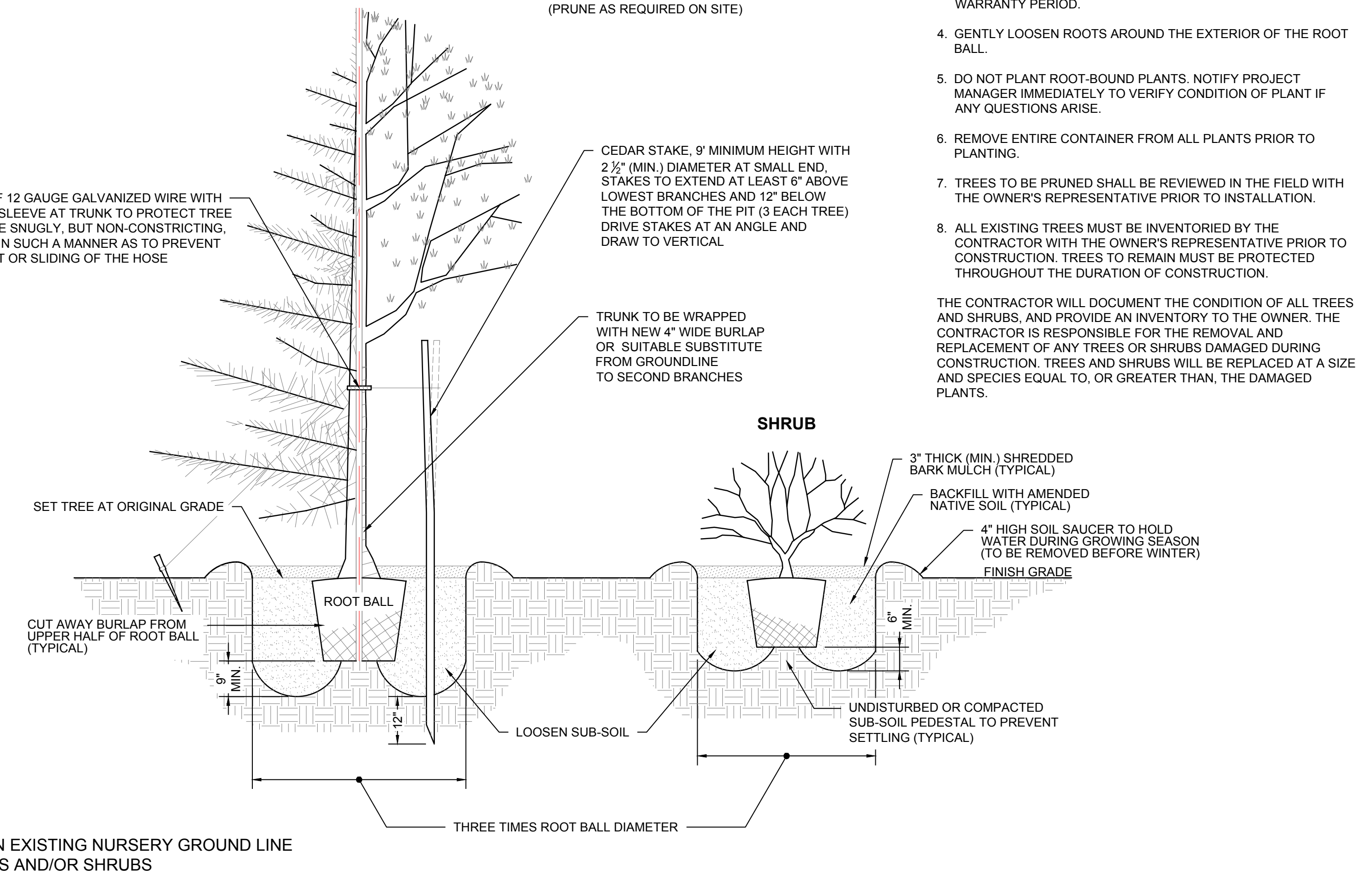
- NOTES:
- EMULSIFIED ASPHALT IS TO BE APPLIED TO ALL EXISTING PAVEMENT SURFACES, COLD-PLANED SURFACES, AND BETWEEN ALL COURSES OF PAVEMENT AT A RATE OF 0.08 TO 0.10 GAL/SY, AND 0.04 GAL/SY BETWEEN ALL SUCCESSIVE LIFTS, REGARDLESS OF WHETHER IT IS PAVED ON THE SAME DAY, OR NOT.
  - RESTORE ALL PAVEMENT MARKINGS.

NOTES:

- PLANTS ARE TO BE SET PLUMB.
  - DO NOT ALLOW AIR POCKETS TO FORM DURING BACKFILLING.
  - GUY WIRES ARE TO BE REMOVED AT THE END OF THE WARRANTY PERIOD.
  - GENTLY LOOSEN ROOTS AROUND THE EXTERIOR OF THE ROOT BALL.
  - DO NOT PLANT ROOT-BOUND PLANTS. NOTIFY PROJECT MANAGER IMMEDIATELY TO VERIFY CONDITION OF PLANT IF ANY QUESTIONS ARISE.
  - REMOVE ENTIRE CONTAINER FROM ALL PLANTS PRIOR TO PLANTING.
  - TREES TO BE PRUNED SHALL BE REVIEWED IN THE FIELD WITH THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
  - ALL EXISTING TREES MUST BE INVENTORIED BY THE CONTRACTOR WITH THE OWNER'S REPRESENTATIVE PRIOR TO CONSTRUCTION. TREES TO REMAIN MUST BE PROTECTED THROUGHOUT THE DURATION OF CONSTRUCTION.
- THE CONTRACTOR WILL DOCUMENT THE CONDITION OF ALL TREES AND SHRUBS, AND PROVIDE AN INVENTORY TO THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND REPLACEMENT OF ANY TREES OR SHRUBS DAMAGED DURING CONSTRUCTION. TREES AND SHRUBS WILL BE REPLACED AT A SIZE AND SPECIES EQUAL TO, OR GREATER THAN, THE DAMAGED PLANTS.

CONIFEROUS TREE

DECIDUOUS TREE  
(PRUNE AS REQUIRED ON SITE)



**9 TYPICAL PLANTING DETAIL FOR TREES AND SHRUBS**  
Scale: NTS

\* MAINTAIN EXISTING NURSERY GROUND LINE OF TREES AND/OR SHRUBS



NO.	DATE	DESCRIPTION

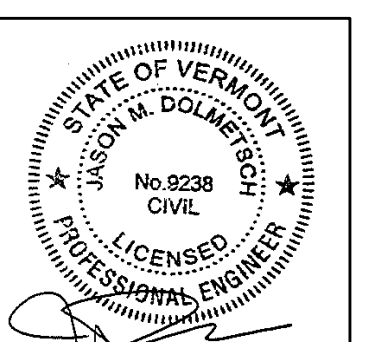
TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

CONSTRUCTION  
DETAILS

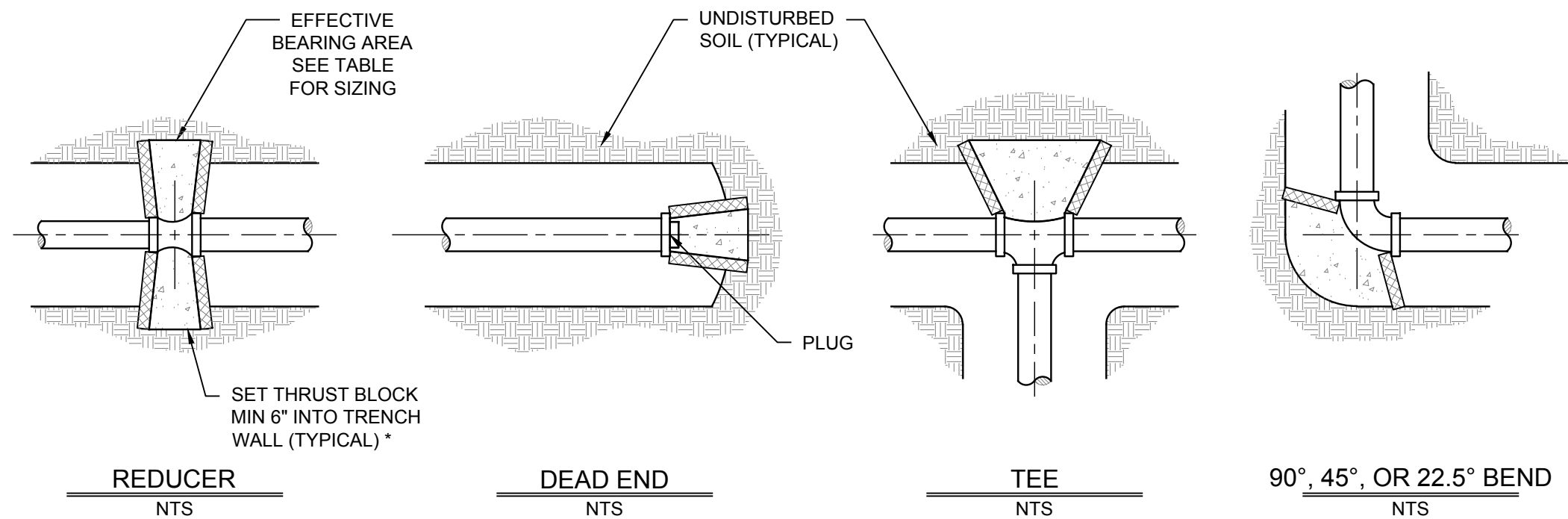
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER

C503







MINIMUM BEARING SURFACE AREA OF CONCRETE THRUST BLOCKS (IN SQUARE FEET)

REDUCERS			4-8"			10"			12"			SOIL CONDITION	SAFE BEARING LOAD (PSF)			
8x6	10x8	12x8	ENDS AND TEES	90° ELB	45° ELB	22.5° OR LESS	ENDS AND TEES	90° ELB	45° ELB	22.5° OR LESS	ENDS AND TEES			90° ELB	45° ELB	22.5° OR LESS
3.0	5.0	6.0	4.0	6.0	3.0	2.0	6.0	8.0	5.0	2.0	8.0	12.0	6.0	3.0	SOUND SHALE	10000
3.0	5.0	6.0	4.5	6.5	3.5	2.0	8.0	11.0	6.0	3.0	10.0	14.0	7.5	4.0	CEMENTED GRAVEL AND SAND	4000
7.0	7.0	11.0	7.0	9.0	5.0	3.0	10.0	14.0	7.0	4.0	14.0	19.0	11.0	5.0	COARSE AND FINE COMPACT SAND	3000
8.0	9.0	14.0	15.0	20.0	10.0	5.0	21.0	31.0	15.0	8.0	30.0	40.0	20.0	10.0	MEDIUM CLAY (CAN BE SPADED)	2000
8.0	11.0	16.0	20.0	28.0	15.0	8.0	29.0	41.0	22.0	11.0	41.0	58.0	31.0	16.0	SOFT CLAY	1000

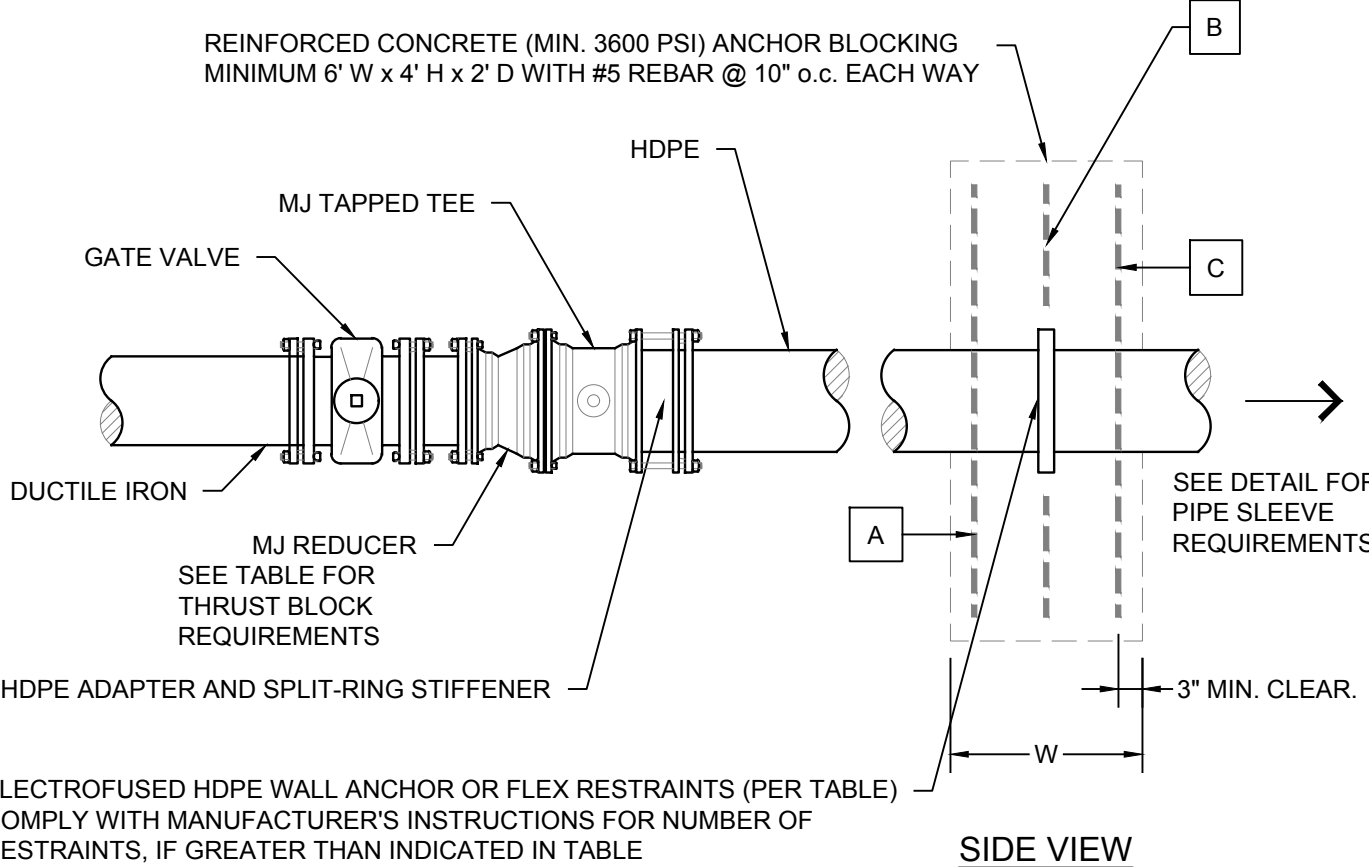
MAXIMUM WATER PRESSURE 300 PSI

\* THRUST BLOCKS ARE NOT REQUIRED AT REDUCERS OF ONE PIPE DIAMETER OR LESS  
 \*\* ALL THRUST BLOCKS ARE TO BE FORMED WITH 2" RIGID FOAM INSULATION TO MEET MINIMUM BEARING SURFACE AREA.  
 NON-FORMED THRUST BLOCKS WILL NOT BE PERMITTED.

**1 TYPICAL CONCRETE THRUST BLOCK DETAIL**

Scale: NTS

NOTES:  
 1. PLACE 3 MIL MINIMUM POLYETHYLENE SHEETING BETWEEN ALL CONCRETE THRUST BLOCKS AND PIPE AND/OR FITTINGS TO PREVENT BONDING



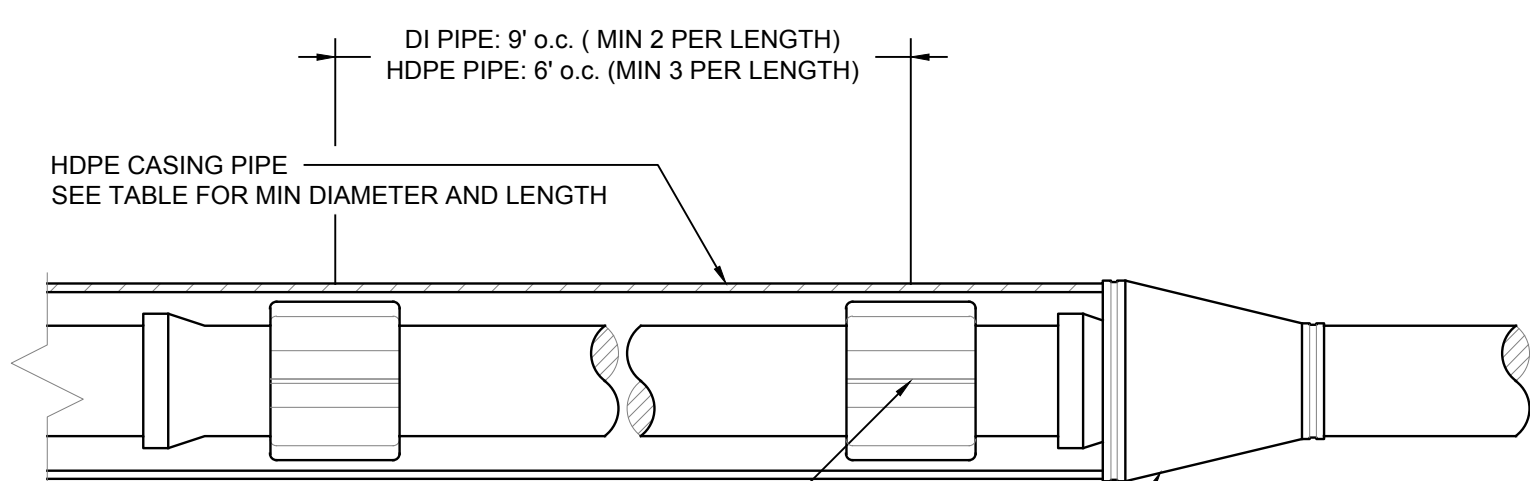
NOTES:

- INSTALL (2) EXTRA HIGH-STRENGTH # 12 - 14 AWG SOLID COPPER TRACER WIRE WITH BLUE 30 mil INSULATION. CONNECT AT DUCTILE IRON PIPE. RUN ABOVE HDPE, AND IN SLEEVE. TRACER WIRE TO BE ELECTRICALLY CONTINUOUS TO BOTH ENDS OF HDPE, AND BONDED TO DUCTILE IRON.
- FLEX RESTRAINTS MUST BE RATED AT 8,000 LBS OF FORCE OR HIGHER
- WHEN DIRECTED BY THE ENGINEER, THE CONCRETE ANCHOR BLOCK SIZE MAY BE ADJUSTED, BASED ON SOIL CLASSIFICATION AND PIPE DIAMETER
- ENGINEER TO CONFIRM ADEQUATE SOIL PRESSURE BEARING CAPACITY FOR CONCRETE ANCHOR BLOCKING
- REINFORCEMENT NOTES
  - FOR 4 TO 10 INCH PIPE, PLACE ONE MAT OF #5 REBAR AT LOCATION "B" AS SHOWN ON DIAGRAM
  - FOR 12 INCH PIPE, PLACE TWO MATS OF #5 REBAR, ONE AT LOCATION "A" AND ONE AT LOCATION "C" AS SHOWN ON THE DIAGRAM

HDPE NOMINAL PIPE SIZE (INCHES)	APPROX. DEAD END THRUST AT 200 PSI WATER PRESSURE (LBS)	UNDISTURBED SOIL BEARING AREA (SQ FT)	APPROX. SOIL PRESSURE BEARING LOAD (LB/ SQ FT)	MINIMUM WIDTH "W" (INCHES)	APPROXIMATE CONCRETE VOLUME	
					CUBIC FT	CUBIC YARDS
4	2,130	15	142	10	20	0.74
6	4,616	15	308	10	20	0.74
8	7,823	15	522	12	24	0.89
10	12,153	15	810	12	24	0.89
12	17,094	15	1,140	14	28	1.04

**2 TYPICAL HDPE TRANSITION DETAIL**

Scale: NTS

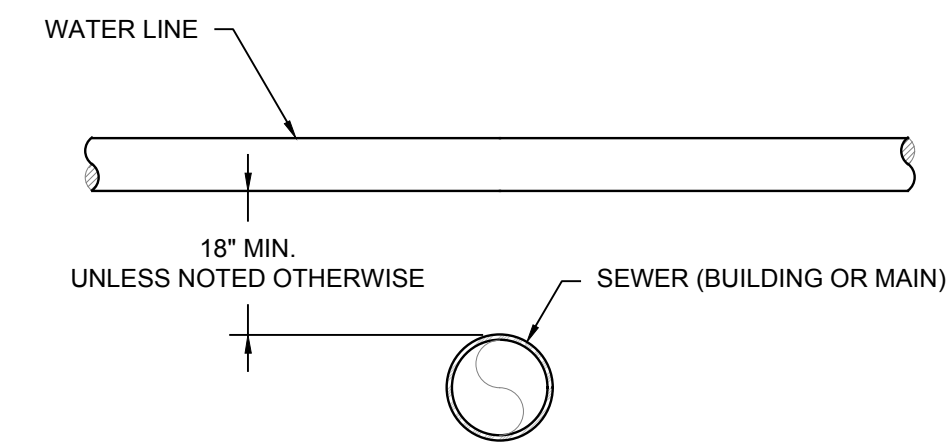


CARRIER DIA	CASING DIAM.ATL	MIN THICKNESS
3/4"-1" K' CU	4" HDPE	N/A
2" K' Cu	6" HDPE	DR 17
3" HDPE	10" HDPE	DR 17
4" DI	14" HDPE	DR 17
6" DI	16" HDPE	DR 17
8" DI	18" HDPE	DR 17
10" HDPE	18" HDPE	DR 17
10" HDPE *	24" HDPE	DR 17

\* BENEATH U.S. ROUTE 7 (SEE PLANS)

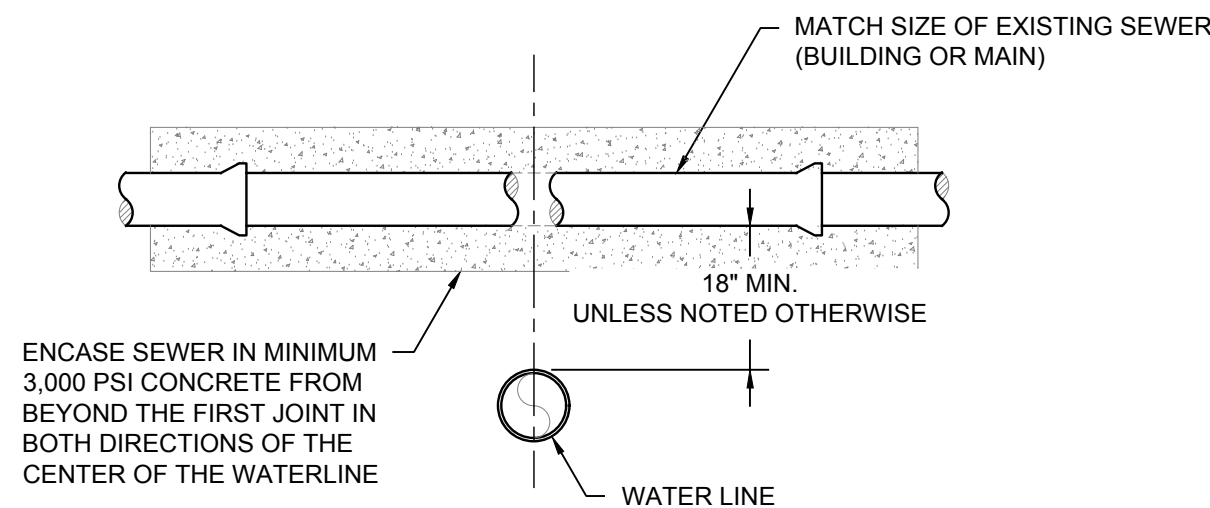
**3 SLEEVE PIPE DETAIL**

Scale: NTS



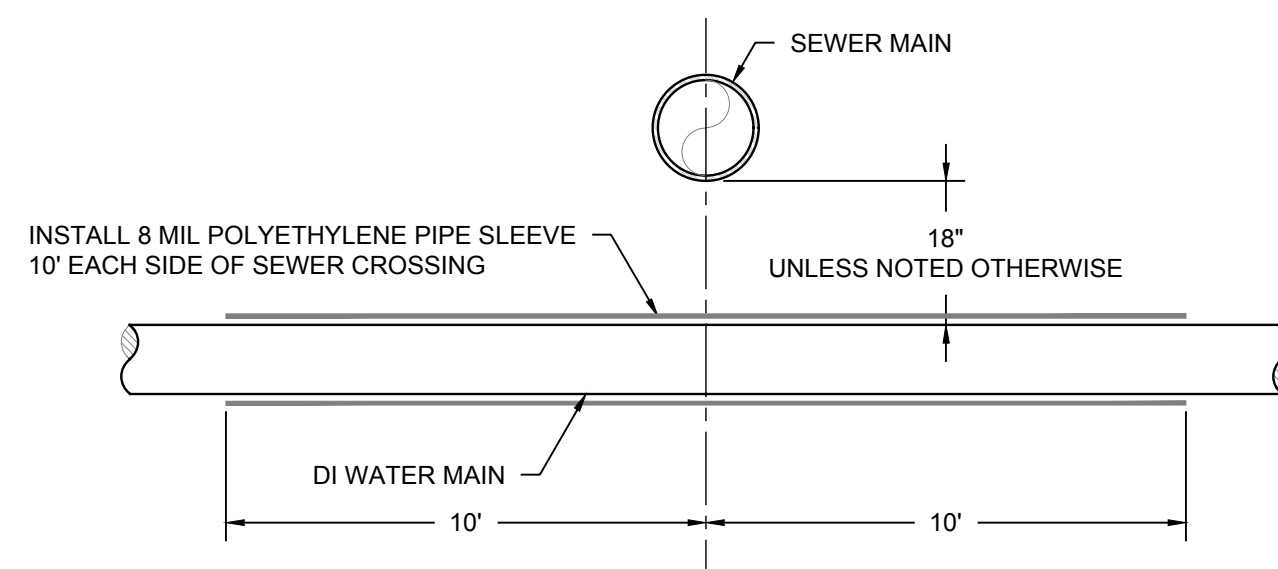
**4 WATER CROSSING SEWER - ABOVE**

Scale: NTS



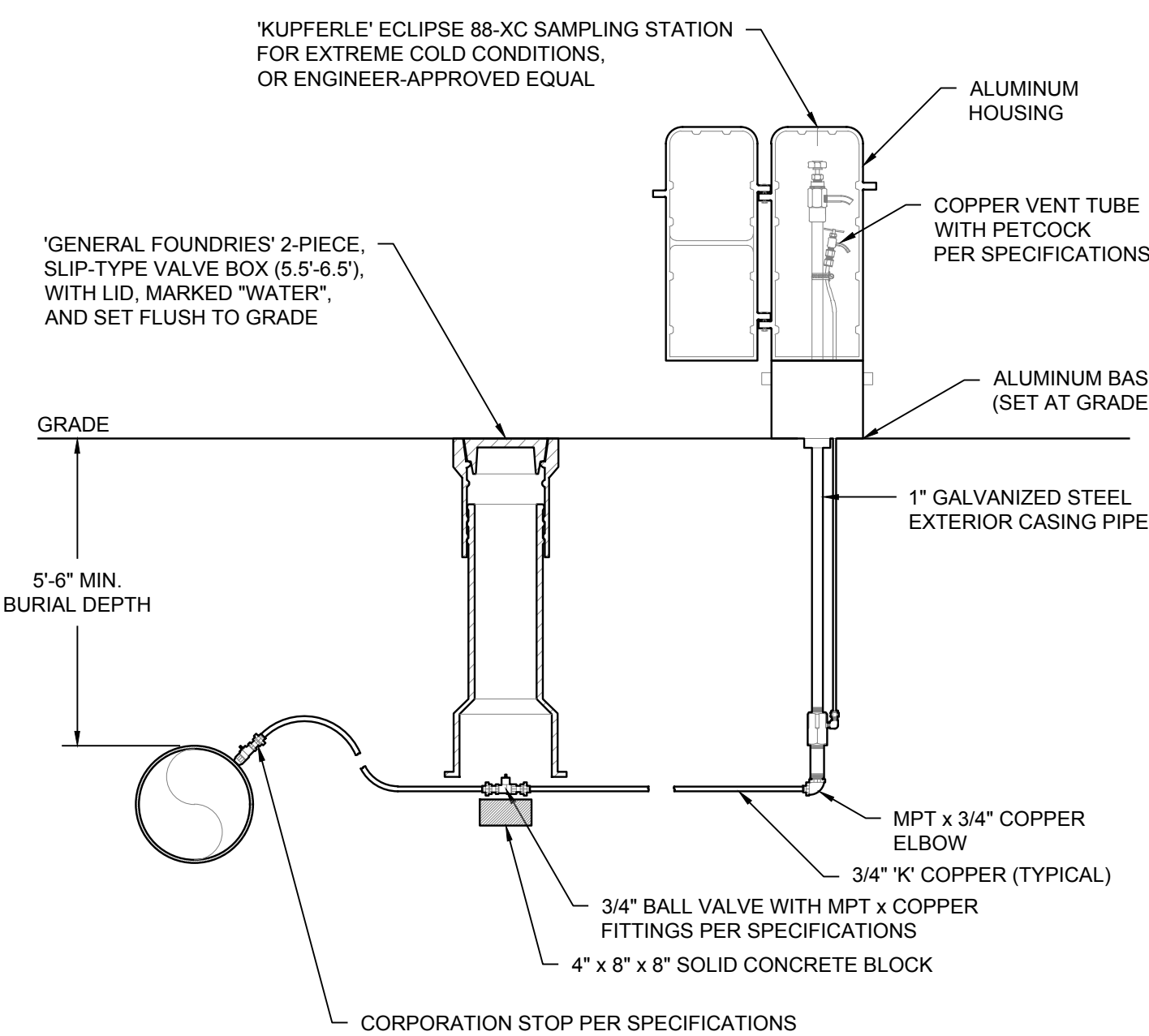
**5 WATER CROSSING SEWER - BELOW**

Scale: NTS



**6 WATER CROSSING SEWER - BELOW**

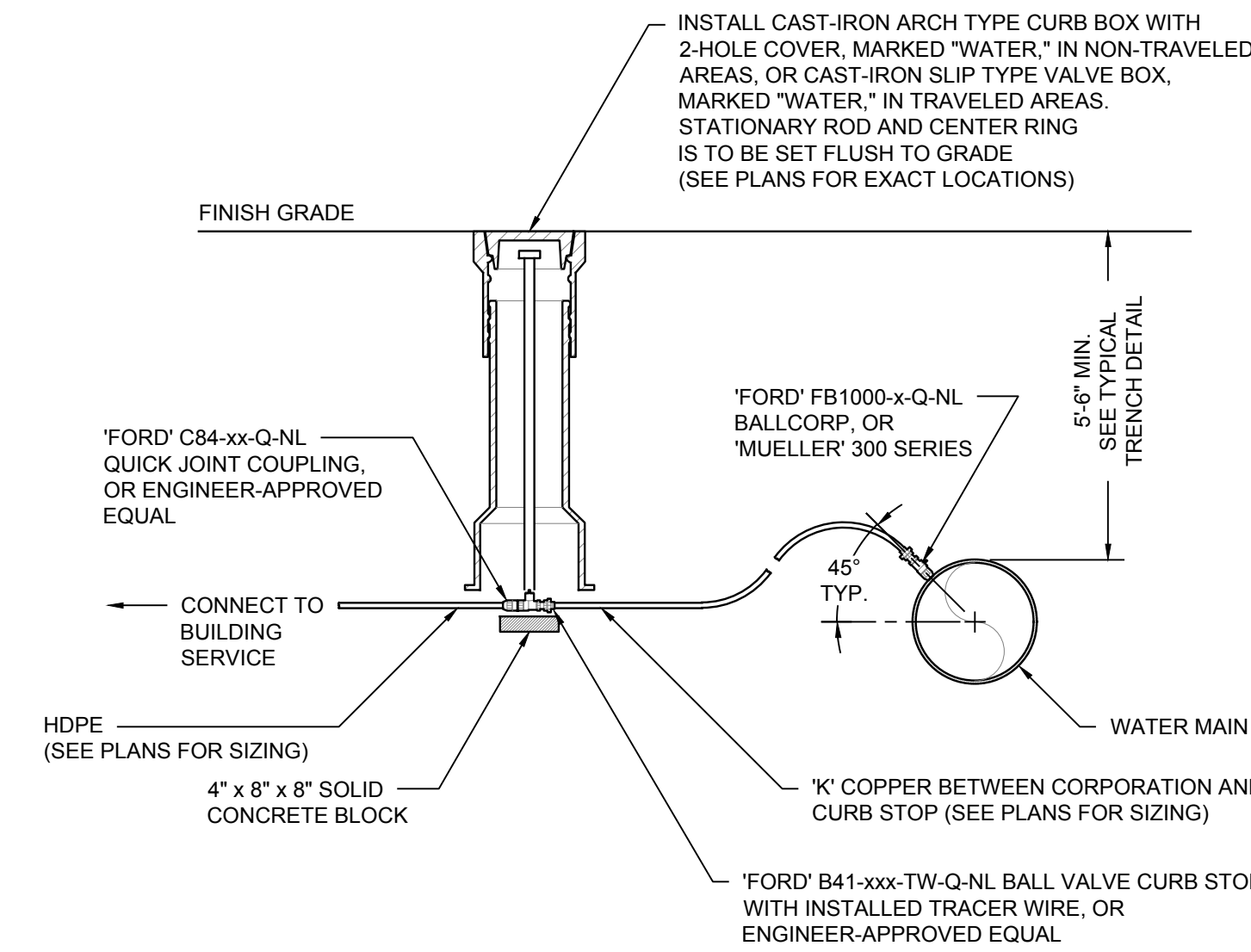
Scale: NTS



**7 TYPICAL SAMPLING STATION DETAIL**

Scale: NTS

- SAMPLING STATIONS ARE TO HAVE A 5'-6" MINIMUM BURIAL DEPTH, WITH 3/4" FIP INLET AND 3/4" HOSE OR UNTHREADED NOZZLE
- ALL STATIONS ARE TO BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE ALUMINUM-CAST HOUSING, AND ARE TO INCLUDE THE MANUFACTURER'S VACUUM PUMP SYSTEM
- WHEN OPENED, THE STATION MUST REQUIRE NO KEY FOR OPERATION, AND THE WATER WILL FLOW IN AN ALL BRASS WATERWAY
- ALL WORKING PARTS WILL ALSO BE OF BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING
- EXTERIOR PIPING ARE TO BE BRASS OR GALVANIZED
- A COPPER VENT TUBE WILL ENABLE EACH STATION TO BE PUMPED FREE OF STANDING WATER TO PREVENT FREEZING AND TO MINIMIZE THE GROWTH OF BACTERIA
- THE ECLIPSE No. 88-XC SAMPLING STATION, FOR EXTREME COLD CONDITIONS, WILL BE MANUFACTURED BY KUPFERLE FOUNDRY, ST. LOUIS, MO 63102

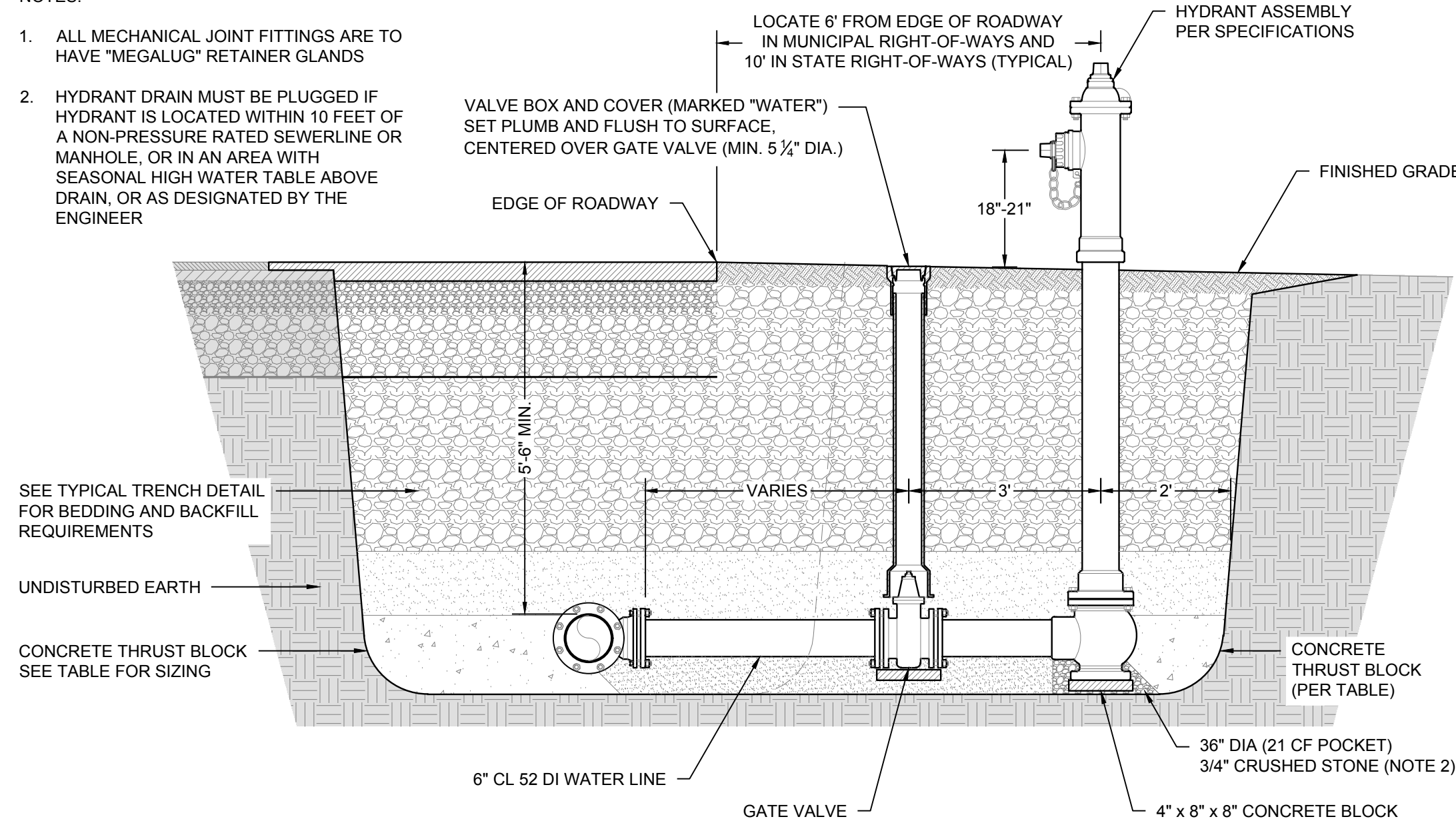


**8 TYPICAL CURB STOP**

Scale: NTS

NOTES:

- ALL MECHANICAL JOINT FITTINGS ARE TO HAVE "MEGALUG" RETAINER GLANDS
- HYDRANT DRAIN MUST BE PLUGGED IF HYDRANT IS LOCATED WITHIN 10 FEET OF A NON-PRESSURE RATED SEWERLINE OR MANHOLE, OR IN AN AREA WITH SEASONAL HIGH WATER TABLE ABOVE DRAIN, OR AS DESIGNATED BY THE ENGINEER

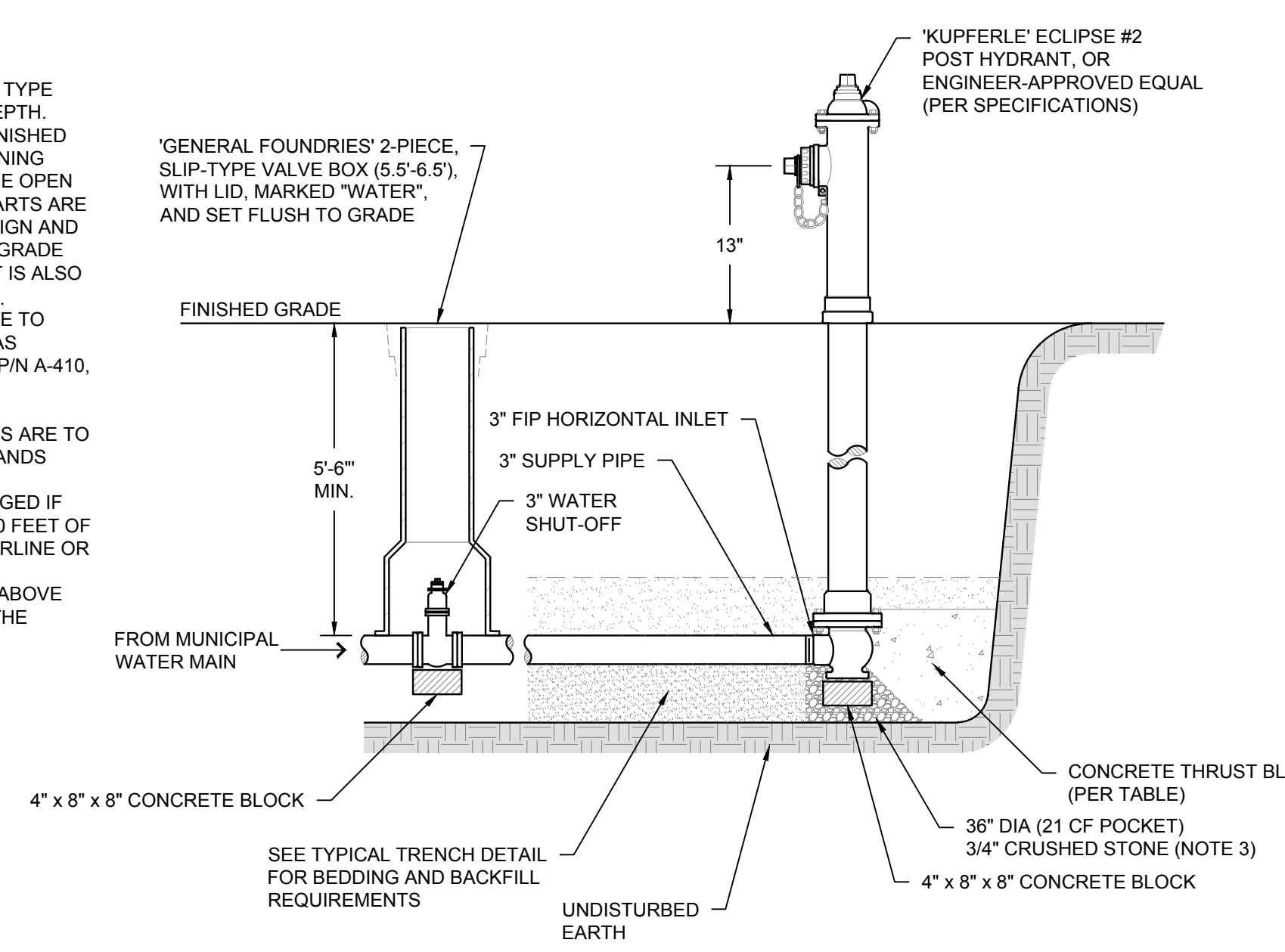


**9 HYDRANT ASSEMBLY DETAIL**

Scale: NTS

NOTES:

- POST HYDRANTS ARE TO BE NON-FREEZING, SELF-DRAINING TYPE WITH A 5'-6" MINIMUM BURIAL DEPTH. THESE HYDRANTS WILL BE FURNISHED WITH A 3" FIP INLET, A NON-TURNING OPERATING ROD, AND ARE TO BE OPEN TO THE RIGHT. ALL WORKING PARTS ARE TO BE BRONZE TO BRONZE DESIGN AND BE SERVICEABLE FROM ABOVE GRADE WITHOUT DIGGING. THE OUTLET IS ALSO TO BE BRONZE AND BE 2 1/2" NST. HYDRANTS ARE TO BE LOCKABLE TO PREVENT UNAUTHORIZED USE AS MANUFACTURED BY MUELLER, P/N A-410, OR APPROVED EQUAL.
- ALL MECHANICAL JOINT FITTINGS ARE TO HAVE "MEGALUG" RETAINER GLANDS
- HYDRANT DRAIN MUST BE PLUGGED IF HYDRANT IS LOCATED WITHIN 10 FEET OF A NON-PRESSURE RATED SEWERLINE OR MANHOLE, OR IN AN AREA WITH SEASONAL HIGH WATER TABLE ABOVE DRAIN, OR AS DESIGNATED BY THE ENGINEER



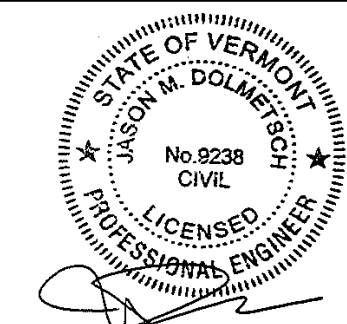
**10 FLUSH HYDRANT DETAIL**

Scale: NTS

NO.	DATE	DESCRIPTION

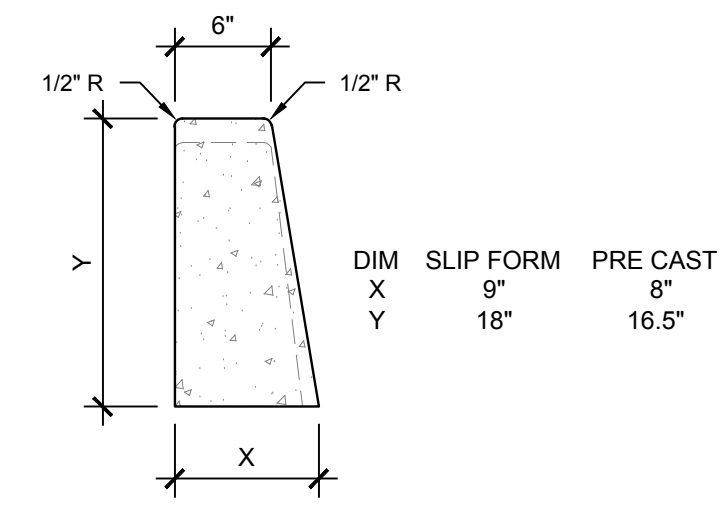
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DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
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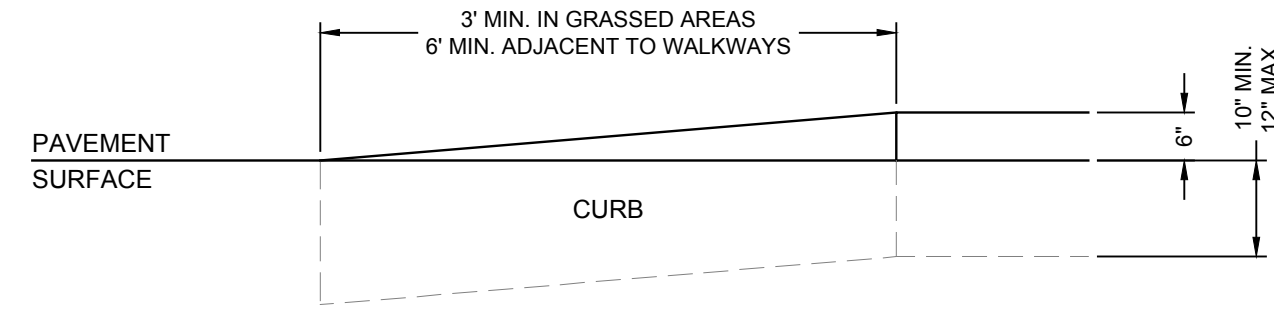


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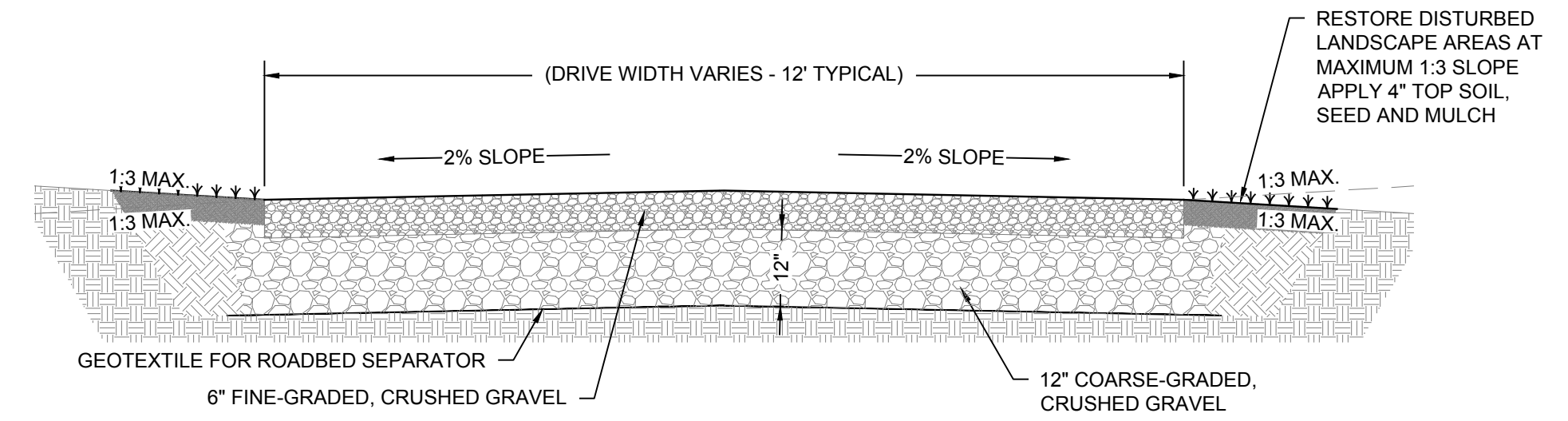




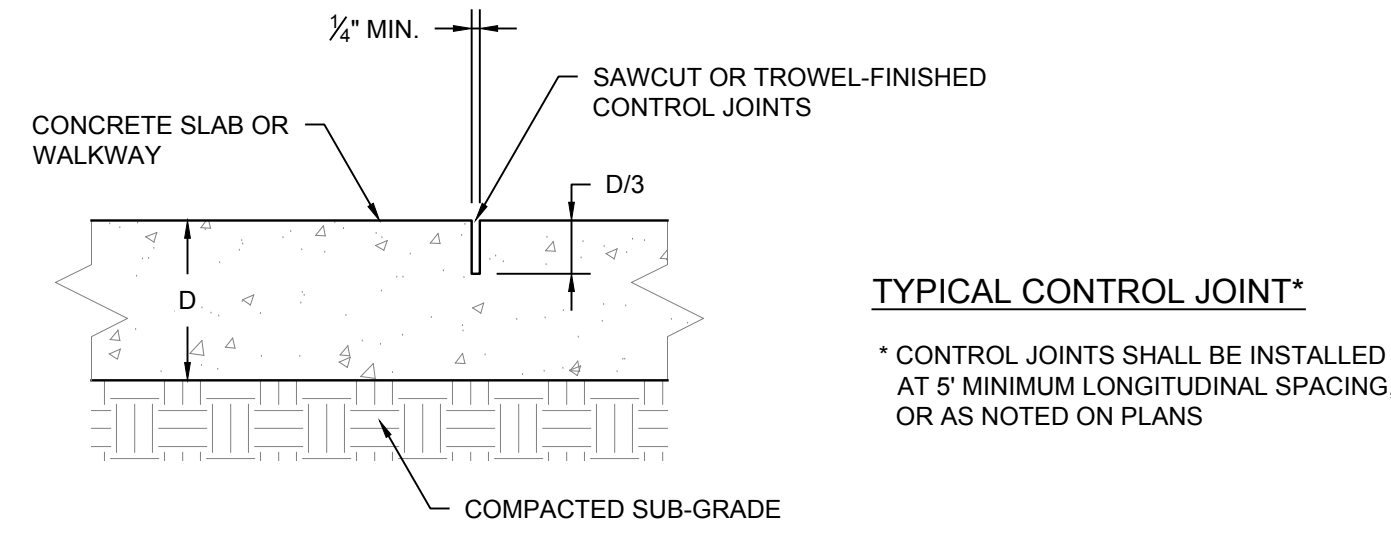
**1 TYPICAL CURB**  
TYPE B NTS



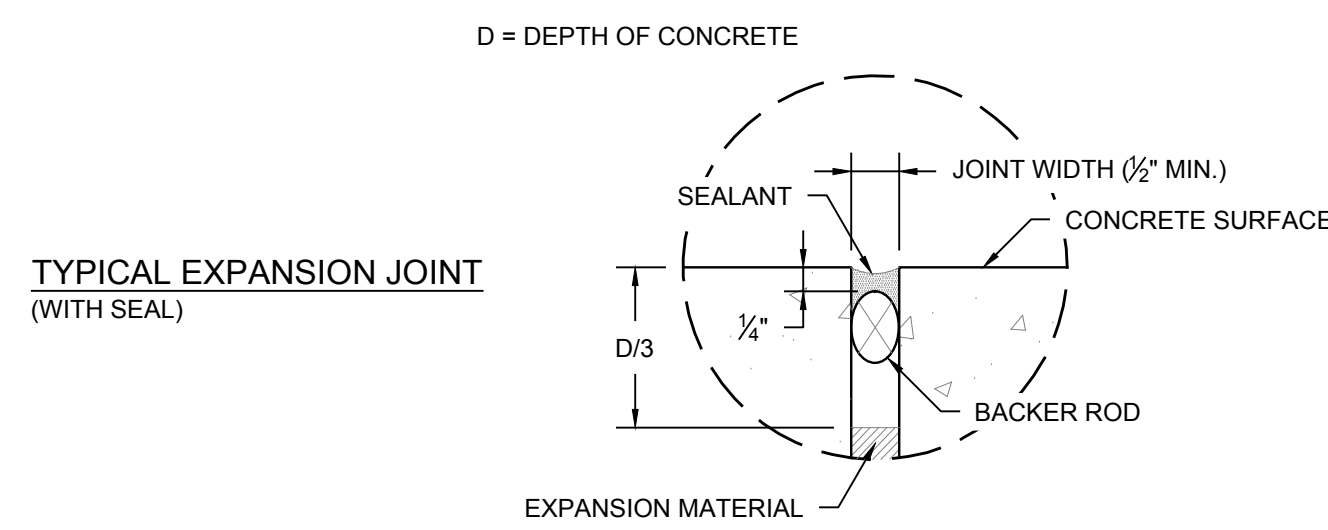
**2 CURB - TAPERED END DETAIL**  
NTS



**9 TYPICAL GRAVEL DRIVE**  
Scale: NTS



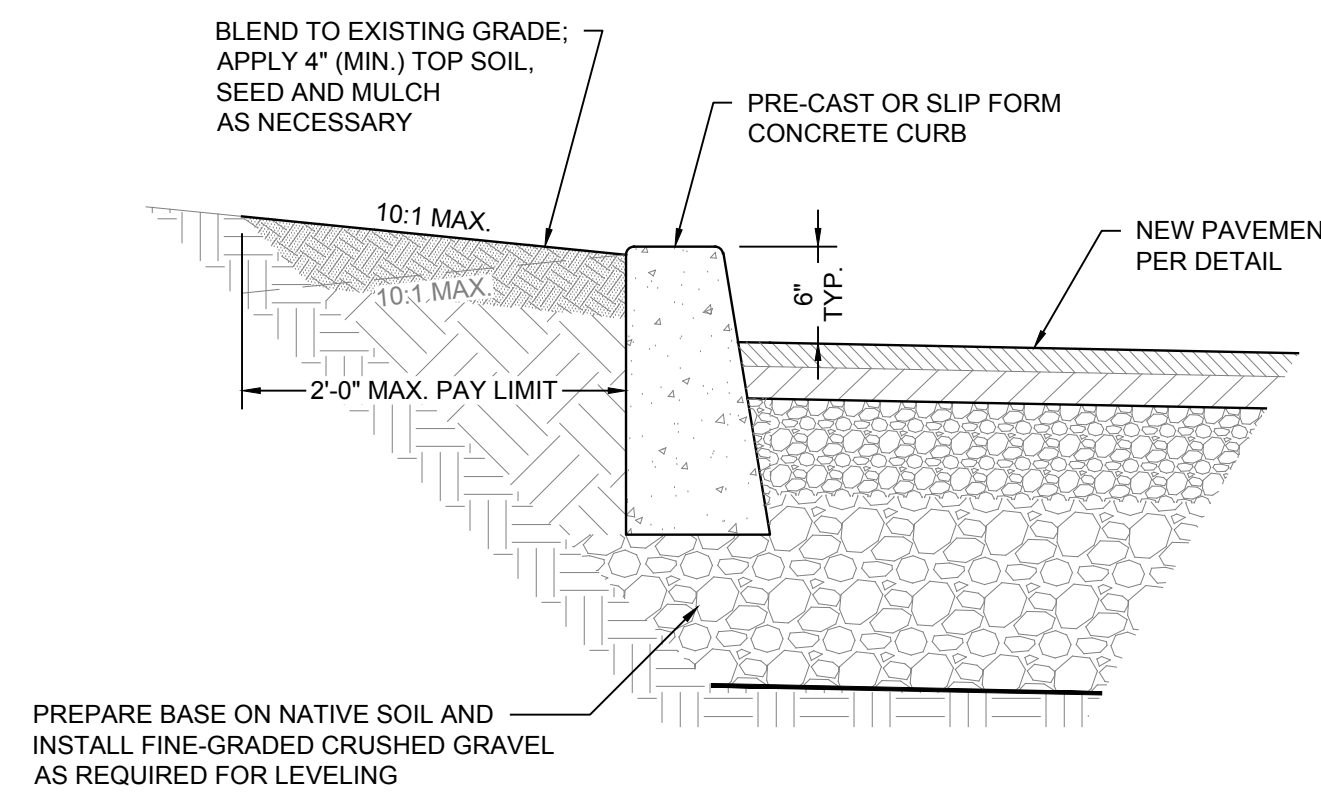
**TYPICAL CONTROL JOINT\***  
\* CONTROL JOINTS SHALL BE INSTALLED AT 5' MINIMUM LONGITUDINAL SPACING, OR AS NOTED ON PLANS



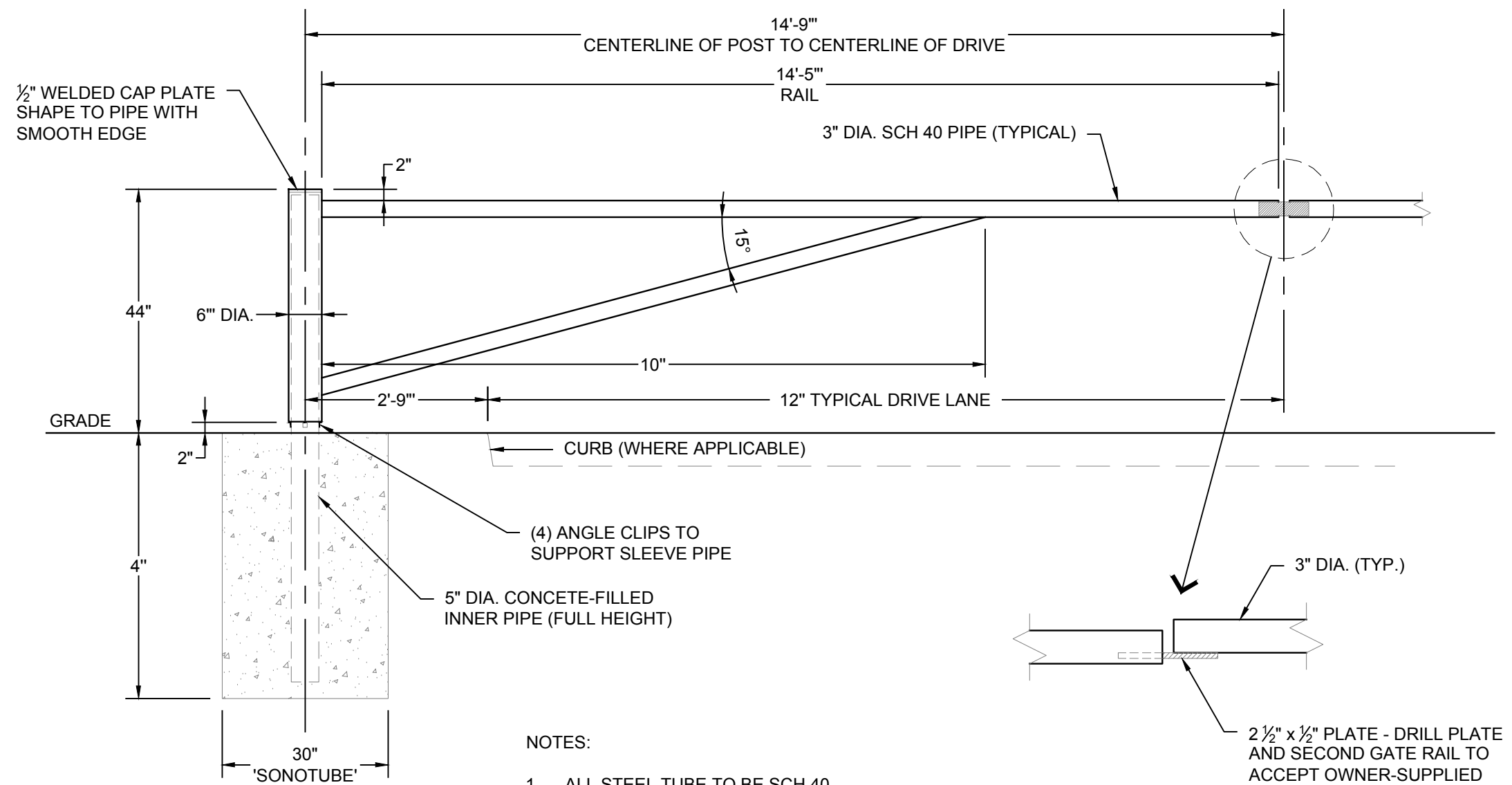
**TYPICAL EXPANSION JOINT (WITH SEAL)**

PRE-FORMED EXPANSION JOINT FILLER SHALL BE INSTALLED FOR THE FULL THICKNESS OF THE WALKWAY AND SHALL BE USED AT ALL JOINTS BETWEEN NEW WALKWAYS, EXISTING WALKWAYS, AND OTHER CONCRETE APPURTENANCES. EXPANSION JOINT SPACING SHALL NOT EXCEED 25' IN NEW CONSTRUCTION.

**3 TYPICAL CONCRETE JOINT DETAILS**  
Scale: NTS

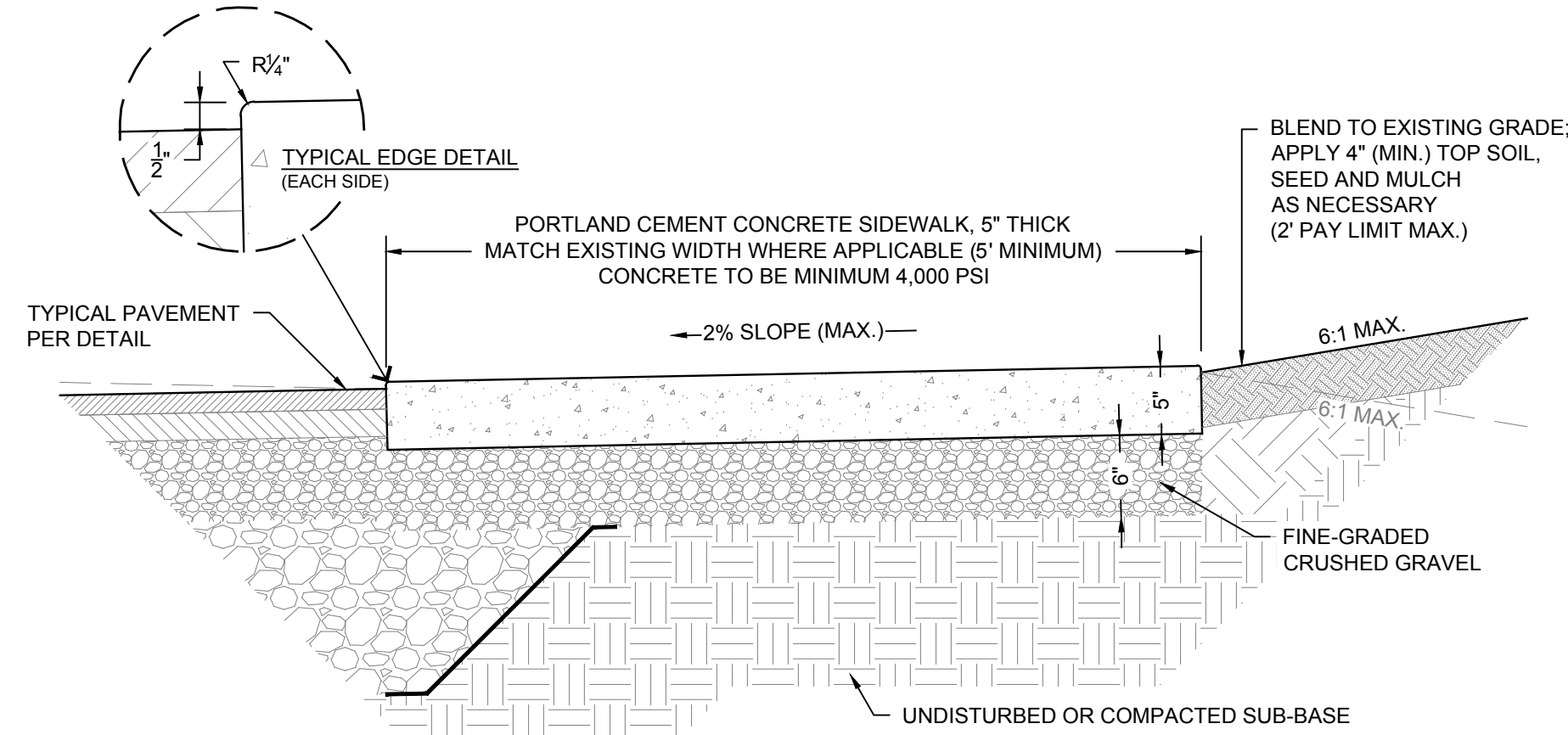


**4 TYPICAL CURB DETAIL**  
TYPE B Scale: NTS

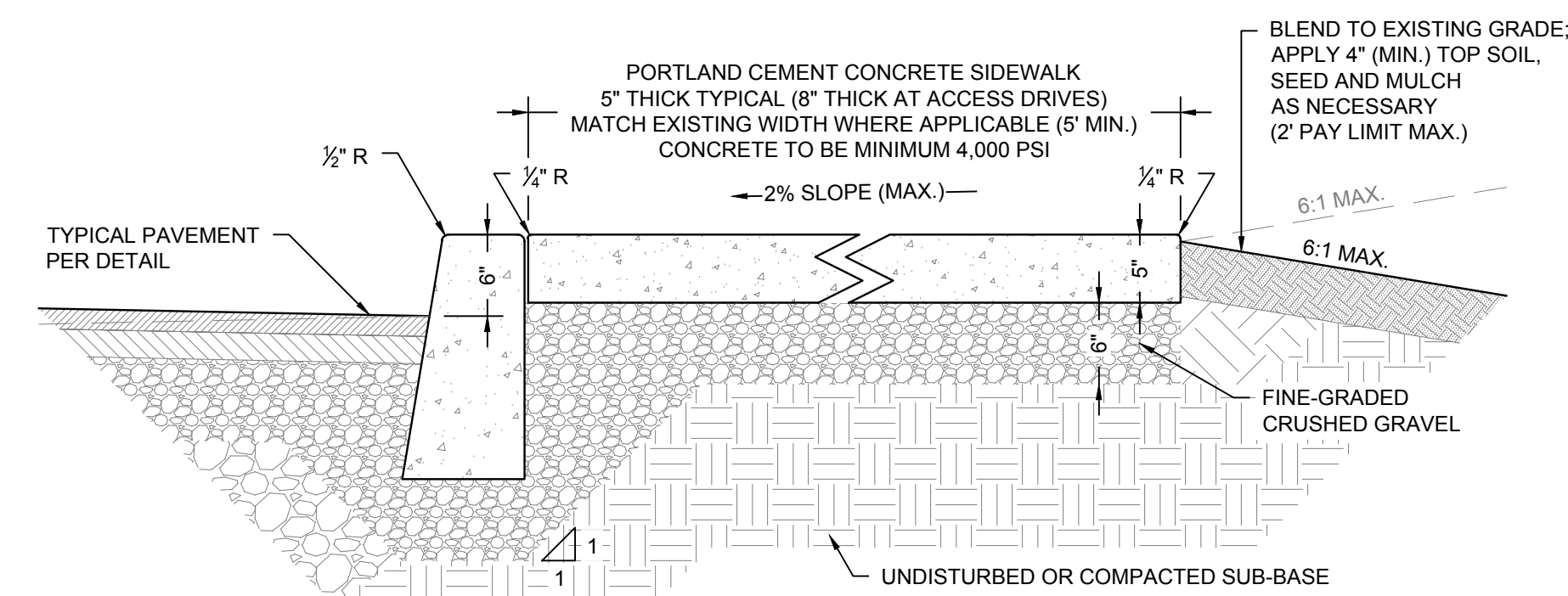


**10 TYPICAL STEEL GATE DETAIL**  
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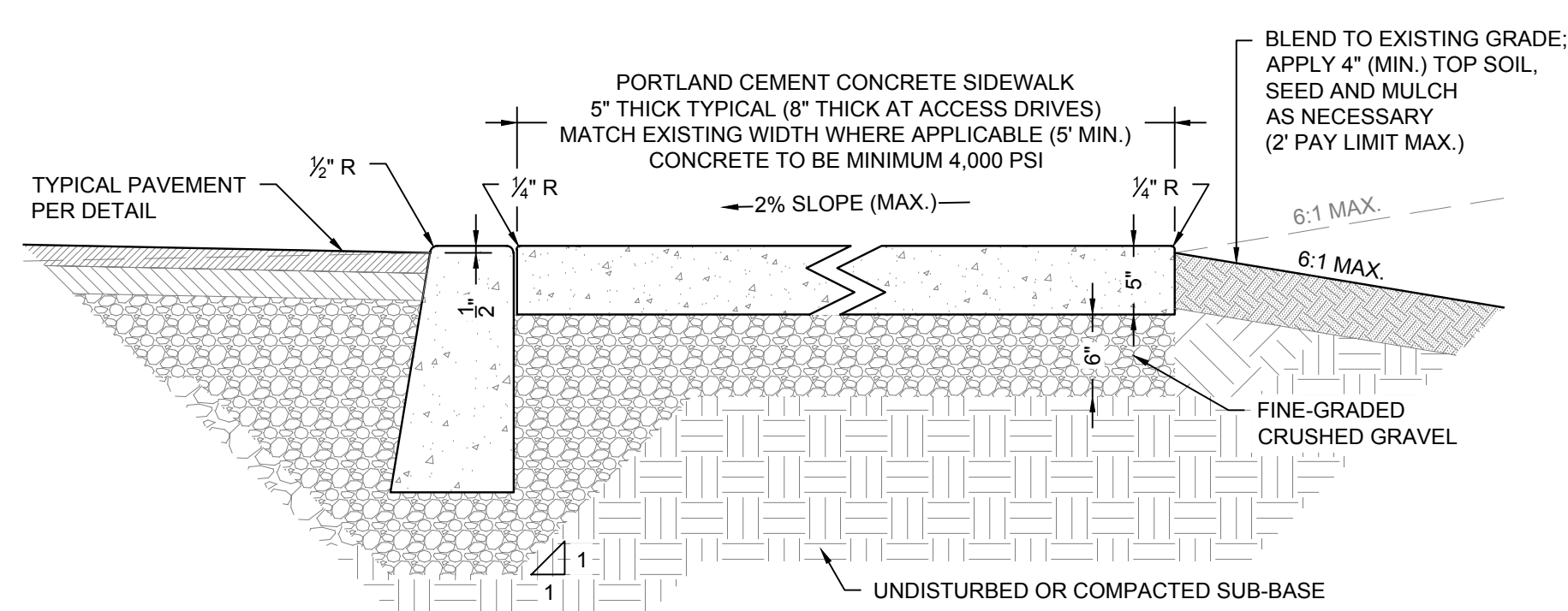
- NOTES:
1. ALL STEEL TUBE TO BE SCH 40
  2. APPLY PRIMER AND (2) COATS ENAMEL PAINT (COLOR TO BE SELECTED BY OWNER)



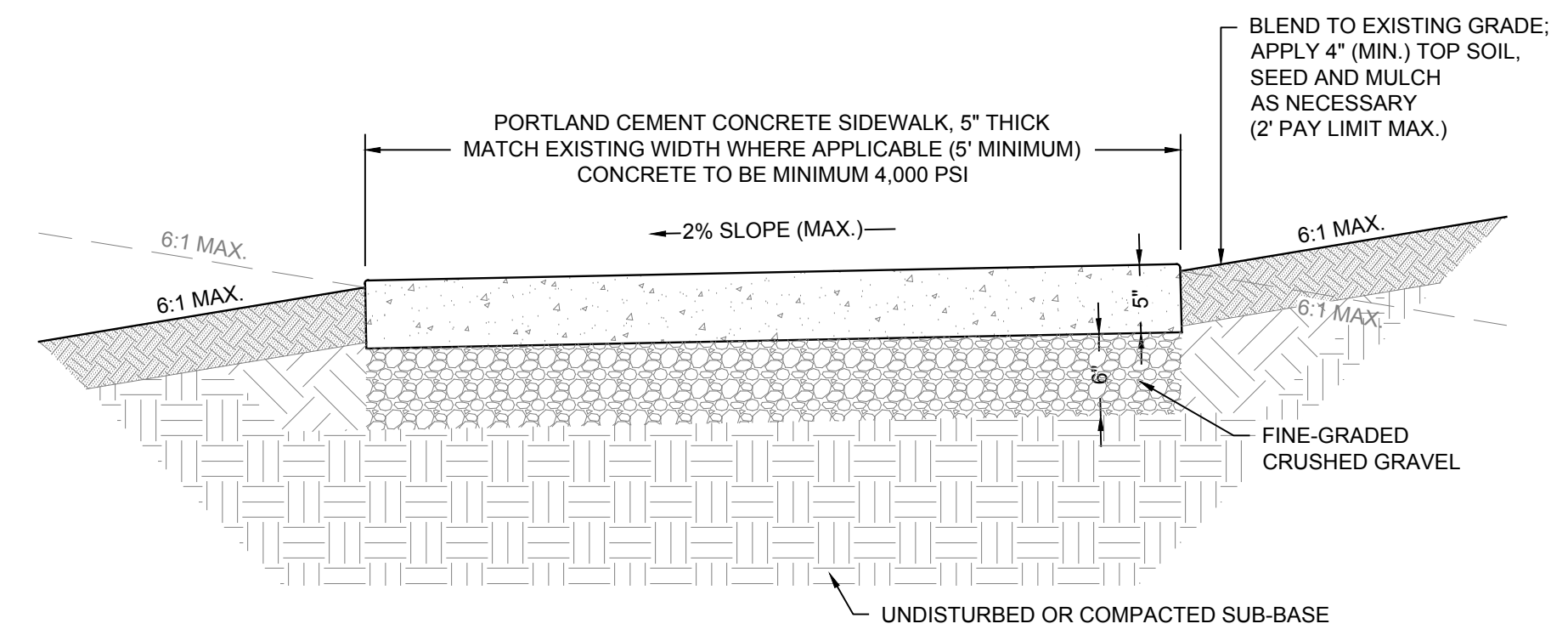
**5 TYPICAL CONCRETE WALKWAY DETAIL**  
Scale: NTS



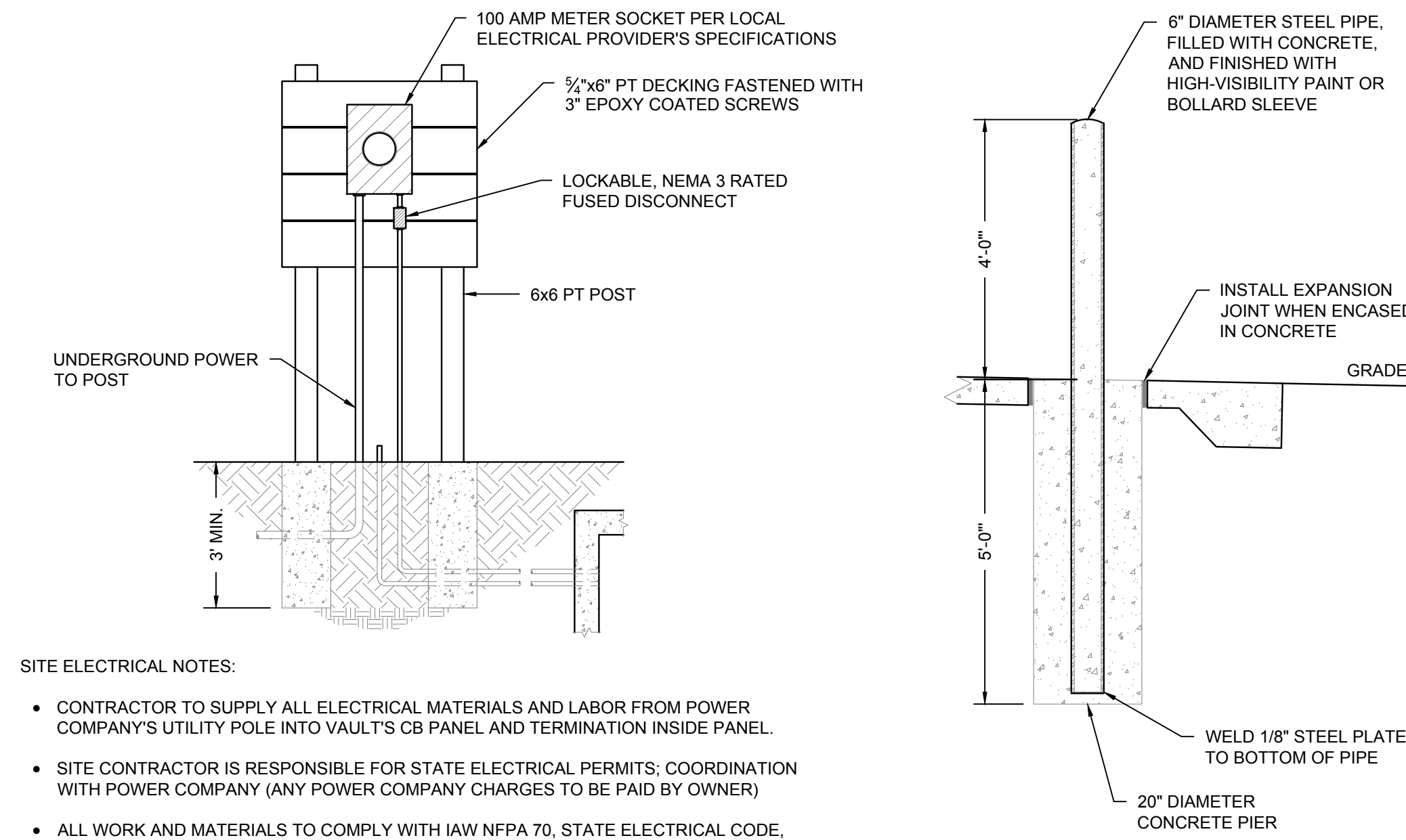
**6 TYPICAL CONCRETE WALKWAY DETAIL (WITH CURB)**  
Scale: NTS



**7 TYPICAL CONCRETE WALKWAY DETAIL (WITH FLUSH CURB)**  
Scale: NTS

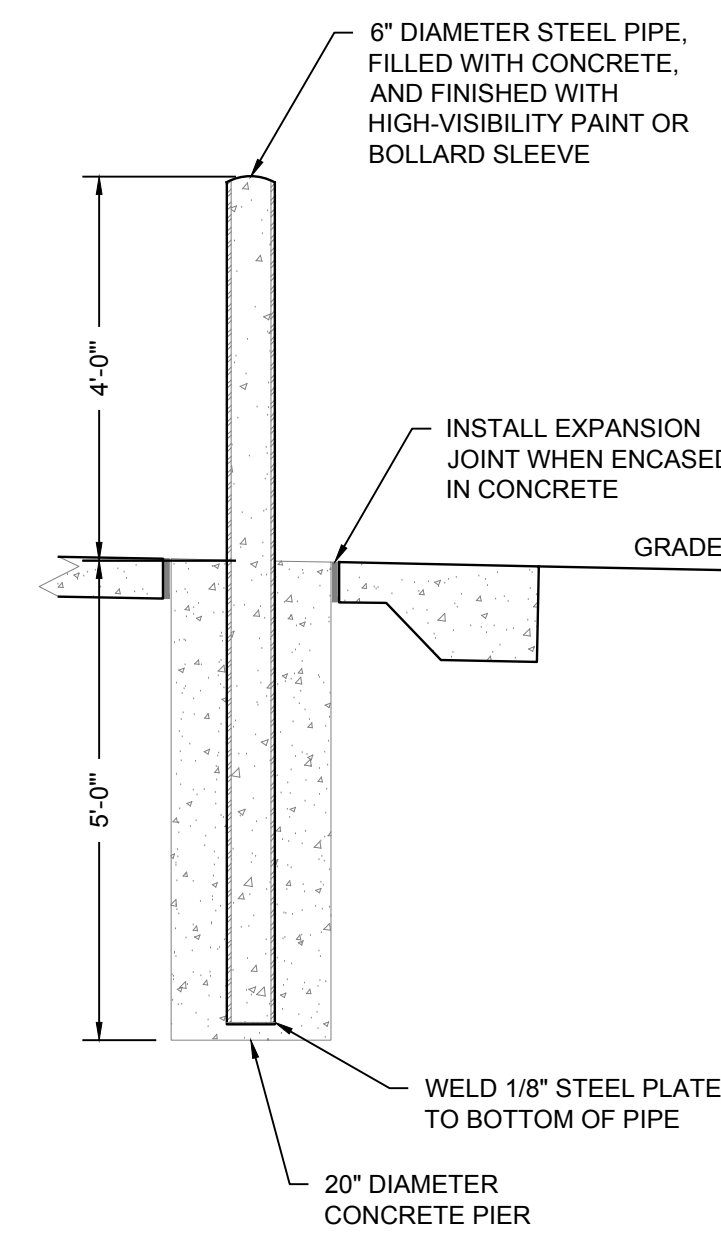


**8 TYPICAL CONCRETE WALKWAY DETAIL**  
Scale: NTS



**11 ELECTRIC SERVICE PANEL DETAIL**  
Scale: NTS

- SITE ELECTRICAL NOTES:
- CONTRACTOR TO SUPPLY ALL ELECTRICAL MATERIALS AND LABOR FROM POWER COMPANY'S UTILITY POLE INTO VAULT'S CB PANEL AND TERMINATION INSIDE PANEL.
  - SITE CONTRACTOR IS RESPONSIBLE FOR STATE ELECTRICAL PERMITS, COORDINATION WITH POWER COMPANY (ANY POWER COMPANY CHARGES TO BE PAID BY OWNER)
  - ALL WORK AND MATERIALS TO COMPLY WITH IAW NFPA 70, STATE ELECTRICAL CODE, AND POWER COMPANY SPECIFICATIONS/REQUIREMENTS



**12 BOLLARD DETAIL**  
Scale: NTS

**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1281

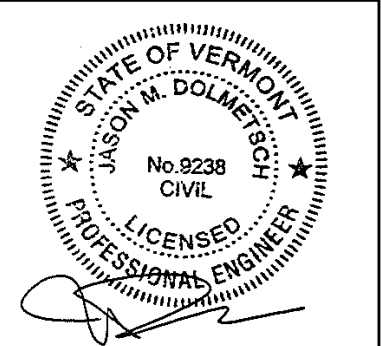
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION PHASE II  
BENNINGTON, VERMONT

CONSTRUCTION  
DETAILS

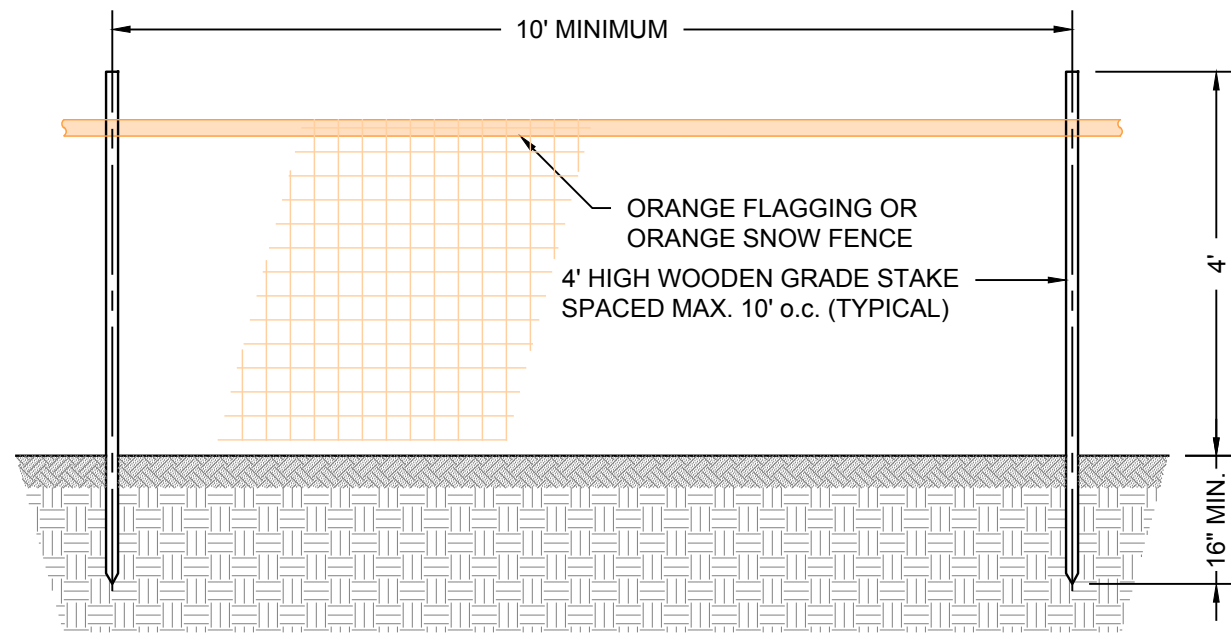
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SHEET NUMBER  
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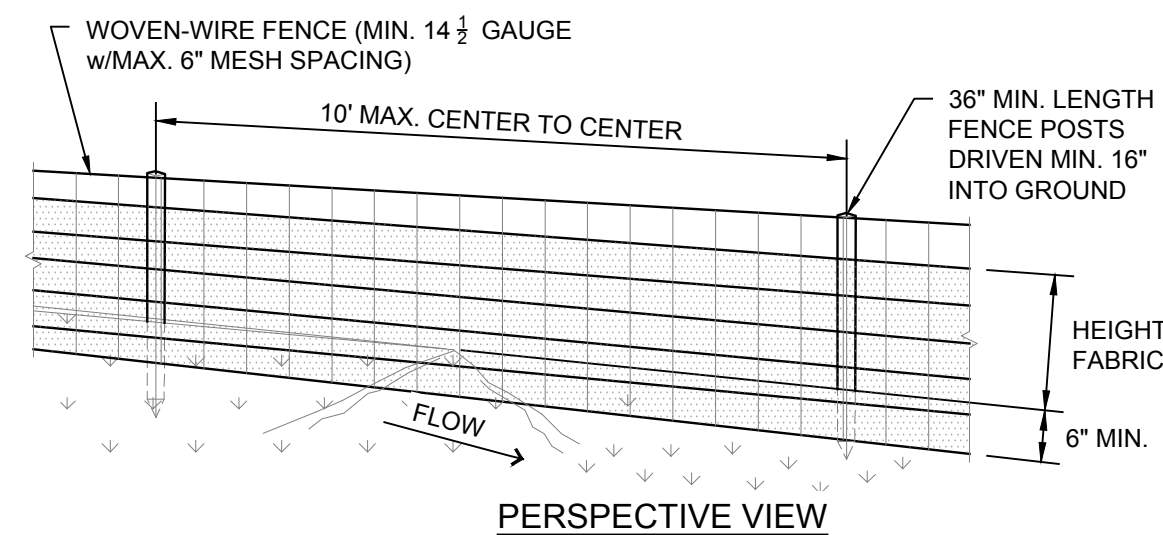


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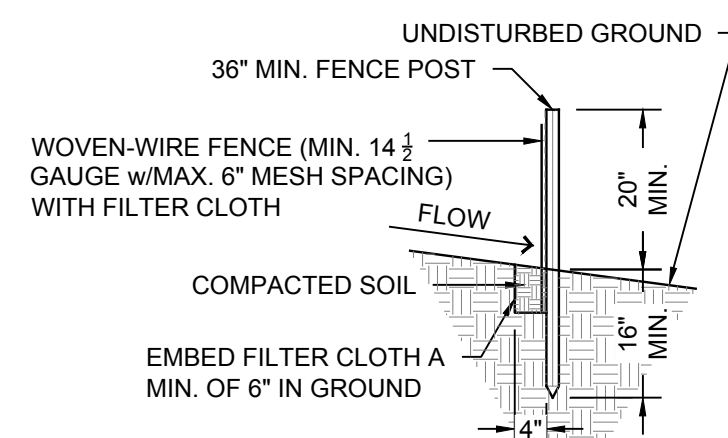
1 **TYPICAL PROJECT DEMARCATION FENCE**  
Scale: NTS



PERSPECTIVE VIEW

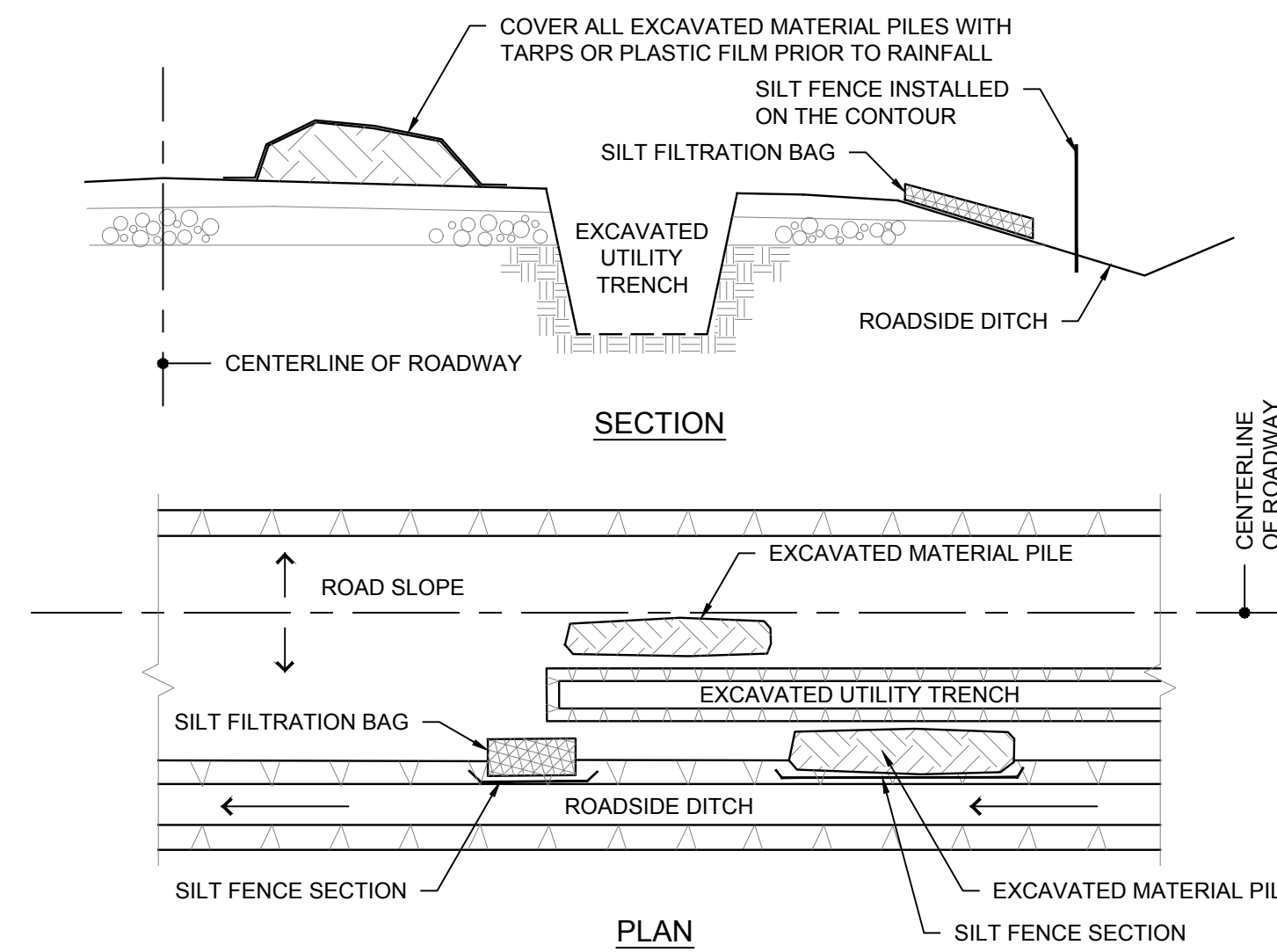
**CONSTRUCTION SPECIFICATIONS**

- WOVEN-WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL, EITHER "T" OR "U" TYPE, OR HARDWOOD.
- FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN-WIRE FENCE WITH TIES, SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN-WIRE, 6" MAXIMUM MESH OPENING.
- WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, "MIRAFI" 100X, "STABILINKA" T140N, OR APPROVED EQUIVALENT.
- PRE-FABRICATED UNITS SHALL BE "GEOFAB", "ENVIROFENCE", OR APPROVED EQUIVALENT.
- MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.



SECTION VIEW

2 **TYPICAL SILT FENCE**  
Scale: NTS



**CONSTRUCTION SPECIFICATIONS**

- UTILITY TRENCH EXCAVATION NOT TO EXCEED 500 LINEAR FEET OF OPEN TRENCH AT ANY ONE TIME.
- EXCAVATED SOIL MATERIAL SHOULD BE PLACED ON UPHILL SIDE, BUT NOT ON THE EDGE, OF THE TRENCH. ENCIRCLE PILES WITH SILT FENCE SECTIONS IF EXCAVATED MATERIAL IS ON THE DOWNHILL SIDE OF TRENCH.
- TRENCH DEWATERING ACTIVITIES MUST DISCHARGE INTO A SILT FILTRATION BAG OF WOVEN OR NON-WOVEN GEOTEXTILE. CONTRACTOR TO MONITOR BAG THROUGHOUT PUMPING OPERATIONS. SILT FENCE SECTION TO SURROUND DOWN SLOPE SIDE OF SILT FILTRATION BAG, DO NOT BLOCK FLOW OF RUNOFF WITHIN THE DITCH.
- EXCAVATED SOIL FROM TRENCH MUST BE PREVENTED FROM MIGRATING TO ADJACENT PROPERTY, CATCH BASINS, ROADSIDE DITCHES, OR RECEIVING WATERS. IF EXCAVATED SOIL MIGRATES, CLEAN UP IMMEDIATELY.
- MATERIAL STOCKPILES TO BE ENCLOSED WITH SILT FENCE SECTIONS, TO BE ACCESSED FROM PAVEMENT OVER A STONE TRACKING PAD, AND TO BE LOCATED MORE THAN 50 FEET FROM ANY RECEIVING WATERS.
- EXCAVATED SOIL FROM THE TRENCH TO BE COMPLETELY COVERED BY TARPS OR PLASTIC FILM DURING ALL RAINFALL EVENTS AND AT ANY TIME CONSTRUCTION ACTIVITIES ARE SUSPENDED DUE TO THE WEATHER.
- ACCUMULATED SOIL ON PAVEMENT TO BE SWEEPED PRIOR TO ALL FORECASTED RAINFALL EVENTS. ROADWAY TO BE SWEEPED AT END OF THE WORK DAY IF TRENCH EXCAVATION IS WITHIN 50' OF ANY RECEIVING WATER.
- WITHIN 24 HOURS OF BACKFILLING ANY TRENCH SECTION ON EXISTING PAVEMENT, A MINIMUM 6" LAYER OF COMPACTED SUB-BASE GRAVEL SHALL BE PLACED AS THE TOP COURSE OF MATERIAL. IF TRENCH IS WITHIN AN UNPAVED AREA, HAY OR STRAW MULCH MATERIAL AND GRASS SEED SHALL BE PLACED OVER DISTURBED AREAS WITHIN 24 HOURS OF BACKFILLING TRENCH SECTION. SEEDING TO BE TEMPORARY OR PERMANENT.

3 **TYPICAL UTILITY TRENCH INSTALLATION DETAIL**  
Scale: NTS

**GENERAL NOTES**

- THIS PROJECT IS PERMITTED UNDER AN INDIVIDUAL STORMWATER CONSTRUCTION PERMIT.
- SOIL DISTURBANCE IS TO BE LIMITED TO FIVE ACRES, OR LESS, AT ANY ONE TIME.
- THE OSPC IS RESPONSIBLE FOR ALL SITE INSPECTIONS AND AMENDING THE EROSION PROTECTION AND SEDIMENT CONTROL (EPSC) PLAN.
- INSPECTIONS TO BE CONDUCTED EVERY 7 DAYS AND WITHIN 24 HOURS OF STORM EVENTS RESULTING IN STORMWATER DISCHARGE FROM THE PROJECT SITE.
- THE OSPC MUST COMPLETE THE VTDEC FORM "CGP-9020 INSPECTION REPORT."
- AT THE END OF EACH WORK DAY:
  - GRADED AREAS ARE TO DRAIN TOWARD SWALES.
  - EXCAVATED AREAS SHALL BE SELF-CONTAINED AND BE OF A DEPTH OF TWO FEET OR GREATER.
  - MATERIAL SHALL NOT BE LEFT STOCKPILED, EXCEPT WITHIN STAGING AREAS, AND SHALL BE STABILIZED.
- ALL TRENCH DEWATERING ACTIVITIES MUST BE DISCHARGED INTO SWALES.
- ADEQUATE STABILIZATION MATERIAL IS TO BE STORED ON SITE AT ALL TIMES.
- THE WINTER CONSTRUCTION SEASON IS DEFINED AS THE PERIOD FROM OCTOBER 15 THROUGH APRIL 15.
- ALL SEEDING IS TO OCCUR BEFORE SEPTEMBER 15 OR SUITABLE ROLLED EROSION CONTROL PRODUCTS (RECP) SHALL BE USED.
- WORK PERFORMED BELOW THE ORDINARY HIGH WATER (OHW) LEVEL SHALL BE COMPLETED IN ACCORDANCE WITH THE ARMY CORP GENERAL PERMIT AND THE STATE OF VERMONT STREAM ALTERATION PERMIT AND IS NOT COVERED UNDER THE STORMWATER CONSTRUCTION PERMIT.
- ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR PERMANENT STABILIZATION WITHIN 7 DAYS OF THE INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY. THE FOLLOWING EXCEPTIONS APPLY:
  - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST WITHIN THE SAME 24 HOUR TIME PERIOD.
  - STABILIZATION NOT REQUIRED IF THE WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION WITH A DEPTH OF TWO FEET OR GREATER.

**EROSION PREVENTION/SEDIMENT CONTROL (EPSC) NOTES**

- SEDIMENT BASINS/TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS, STABILIZED CONSTRUCTION ENTRANCES, AND OTHER MEASURES CONSTRUCTED AS THE INITIAL STEP IN ANY LAND DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
- CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME, OR SLOPE DRAIN STRUCTURE.
- WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED AND SHALL CONVEY CLEAN RUNOFF IN A NON-EROSIVE MANNER TO AN OUTLET.
- BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE AND RECEIVING CHANNEL.
- UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS AND OTHER APPLICABLE CRITERIA: NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME; EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES;
- ALL SEDIMENT REMOVED FROM SEDIMENT CONTROL PRACTICES AS A PART OF MAINTENANCE SHALL BE DISPOSED OF IN AN AREA THAT IS: LESS THAN 5% IN SLOPE AND SUFFICIENTLY VEGETATED; A MIN. 100 FT FROM ANY DOWNSLOPE WATER BODY OR CONVEYANCE TO A WATER BODY (STORM DRAIN INLET OR DITCH); PERMANENTLY STABILIZED IMMEDIATELY AFTER DISPOSAL.
- DISTURBED AREAS BORDERING AND DRAINING TO ANY ROADWAY MUST HAVE AN APPROPRIATE SEDIMENT BARRIER SPANNING THE DISTURBANCE EDGE TO PREVENT MIGRATION OF SEDIMENT.
- ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR PERMANENT STABILIZATION WITHIN 14 DAYS OF THE INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY. THE FOLLOWING EXCEPTIONS APPLY:
  - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE SAME AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST FOR THE NEXT 24 HOURS.
  - STABILIZATION IS NOT REQUIRED IF THE WORK IS OCCURRING IN A SELF-CONTAINED EXCAVATION (I.E. NO OUTLET) WITH 2 FT OR GREATER DEPTH (E.G. FOUNDATION EXCAVATION, UTILITY TRENCHES).
- MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. EXCEPT AS NOTED BELOW, ALL SITES SHALL BE SEED AND STABILIZED WITH EROSION CONTROL MATERIALS, SUCH AS MULCH OR ROLLED EROSION CONTROL PRODUCTS, INCLUDING AREAS WHERE CONSTRUCTION HAS BEEN SUSPENDED OR SECTIONS COMPLETED:
  - ON THE CUT SIDE OF ROADS, DITCHES SHALL BE STABILIZED IMMEDIATELY WITH ROCK RIP-RAP OR OTHER NON-ERODIBLE LINERS (E.G. RECP), OR IF APPROPRIATE, VEGETATIVE MEASURES (SOD).
  - FOR ACTIVE CONSTRUCTION AREAS SUCH AS BORROW OR STOCKPILE AREAS, ROADWAY IMPROVEMENTS AND AREAS WITHIN 50 FT. OF A BUILDING UNDER CONSTRUCTION, A PERIMETER SEDIMENT CONTROL SYSTEM CONSISTING, FOR EXAMPLE, OF SILT FENCING, SHALL BE INSTALLED AND MAINTAINED TO CONTAIN SOIL. EXPOSED DISTURBED AREAS ADJACENT TO A CONVEYANCE THAT PROVIDES RAPID OFFSITE DISCHARGE OF SEDIMENT, SUCH AS A CUT SLOPE AT AN ENTRANCE, SHALL BE COVERED WITH PLASTIC OR GEOTEXTILE TO PREVENT SOIL LOSS UNTIL STABILIZED. STABILIZED CONSTRUCTION ENTRANCES WILL BE MAINTAINED TO CONTROL VEHICLE TRACKING MATERIAL OFF SITE.
  - PERMANENT SEEDING SHALL ONLY BE UNDERTAKEN IN THE SPRING FROM APRIL THROUGH MAY, AND IN LATE SUMMER AND EARLY FALL UNTIL SEPTEMBER 15. EXCEPT THAT PERMANENT SEEDING MAY BE UNDERTAKEN DURING THE SUMMER IF PLANS PROVIDE FOR ADEQUATE WATERING. DURING THE PEAK SUMMER MONTHS AND AFTER SEPTEMBER 15, IF SEEDING IS FOUND TO BE IMPRACTICABLE, AN APPROPRIATE TEMPORARY STABILIZATION IS STRAW/HAY MULCH OR WOODCHIPS.
  - TEMPORARY SEDIMENT TRAPPING DEVICES SHALL NOT BE REMOVED UNTIL PERMANENT STABILIZATION IS ESTABLISHED IN ALL CONTRIBUTORY DRAINAGE AREAS. SIMILARLY, STABILIZATION OF CONTRIBUTING DRAINAGE AREAS SHALL BE ESTABLISHED PRIOR TO CONVERTING SEDIMENT TRAPS/ BASINS INTO PERMANENT (POST-CONSTRUCTION) STORMWATER MANAGEMENT PRACTICES.
  - STABILIZATION MEASURES, TEMPORARY OR PERMANENT, SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
  - UPON COMPLETION, ALL SLOPES STEEPER THAN 3:1 (H:V) OR 33.3%, PERIMETER DIKE/SWALES, SEDIMENT BASINS OR TRAPS, AND EMBANKMENTS SHALL BE IMMEDIATELY STABILIZED WITH SOD, SEED & ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES (RECP). **AREAS OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM SHALL NOT BE DISTURBED.**
- IN ADVANCE OF A PREDICTED RAINFALL OR SNOWMELT EVENT, ALL MANAGEMENT PRACTICES APPROPRIATE TO CURRENT AREAS OF DISTURBANCE MUST BE INSPECTED AND REPAIRED AS NECESSARY TO ENSURE PROPER OPERATING CONDITION. IF NECESSARY TO PREVENT SEDIMENT DISCHARGE FROM THE CONSTRUCTION SITE TO WATERS OF THE STATE, THIS WILL INCLUDE TEMPORARY STABILIZATION OF ALL DISTURBED SOILS ON THE SITE IN ADVANCE OF THE ANTICIPATED RUNOFF PERIOD.
- ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER TEMPORARY MEASURES ARE NO LONGER NEEDED.

**REQUIREMENTS FOR WINTER SHUTDOWN**

FOR PROJECTS COMPLETING EARTH DISTURBANCE ACTIVITIES PRIOR TO THE BEGINNING OF THE WINTER PERIOD (OCTOBER 15), THE FOLLOWING ARE REQUIREMENTS OF THE EPSC PLAN:

- FOR AREAS TO BE STABILIZED BY VEGETATION, SEEDING TO BE COMPLETED NO LATER THAN SEPTEMBER 15TH TO ENSURE ADEQUATE GROWTH AND COVER PRIOR TO THE WINTER PERIOD.
- FOR AREAS TO BE STABILIZED BY NONVEGETATIVE METHODS, STABILIZATION OF THESE AREAS OF DISTURBANCE WITHOUT VEGETATIVE COVER MUST OCCUR NO LATER THAN OCTOBER 15TH.
- FOR AREAS TO BE STABILIZED BY MULCH, DOUBLE THE REGULAR COVERAGE RATE, OR ROUGHLY 2 INCHES OF STRAW/HAY MULCH WITH 100% COVERAGE, WILL BE APPLIED ON ALL DISTURBANCES. MULCH WILL BE ANCHORED TO PREVENT MIGRATION OF MATERIAL THROUGHOUT THE WINTER PERIOD.

**REQUIREMENTS FOR WINTER CONSTRUCTION**

FOR PROJECTS INVOLVING EARTH DISTURBANCE WITHIN THE WINTER PERIOD (AFTER OCTOBER 15 AND BEFORE APRIL 15), THE FOLLOWING ARE REQUIREMENTS OF THE EPSC PLAN:

- ENLARGE ACCESS ROUTES TO ACCOMMODATE SNOW REMOVAL ACTIVITY. STABILIZE WITH STONE.
- LIMIT OF DISTURBANCE MOVED/REPLACED TO REFLECT BOUNDARY OF ANTICIPATED WINTER WORK.
- A SNOW MANAGEMENT PLAN INCLUDING ADEQUATE STORAGE LOCATIONS AND CONTROL OF SNOWMELT, REQUIRING CLEARED SNOW TO BE STORED DOWN GRADIENT OF ALL AREAS OF EARTH DISTURBANCE AND PROHIBITING STORAGE OF SNOW WITHIN STORMWATER TREATMENT STRUCTURES.
- A MINIMUM 25 FOOT BUFFER TO BE MAINTAINED FROM PERIMETER CONTROLS SUCH AS SILT FENCE, TEMPORARY SWALES OR PERIMETER DIKES TO ALLOW FOR SNOW CLEARING/MAINTENANCE.
- IN AREAS OF DISTURBANCE WITHIN 100 FT OF A RECEIVING WATER, SILT FENCE TO BE REINFORCED OR USED WITH PERIMETER DIKES OR OTHER PRACTICES RESISTANT TO THE FORCES OF SNOW LOADS.
- DRAINAGE STRUCTURES TO BE MONITORED TO REMAIN OPEN AND FREE OF SNOW AND ICE DAMS.
- INSTALL SILT FENCE SECTIONS, HAY BALE DIKES, PERIMETER DIKE/SWALES, WATERBARS, AND OTHER PRACTICES REQUIRING AN ASSOCIATED EARTH DISTURBANCE PRIOR TO GROUND FREEZING.
- MULCH STABILIZATION MEASURES TO BE USE OF DOUBLE THE STANDARD RATE OF COVERAGE.
- ALL MULCH MUST BE ANCHORED WITH AN APPROVED METHOD TO PREVENT REMOVAL BY WIND.
- TO ENSURE COVER OF DISTURBED SOIL IN ADVANCE OF A MELT EVENT, AREAS OF DISTURBED SOIL MUST BE STABILIZED AT THE END OF EACH WORK DAY, WITH THE FOLLOWING EXCEPTIONS:
  - IF NO PRECIPITATION, RAIN OR SNOW, WITHIN 24 HOURS IS FORECASTED AND WORK WILL RESUME IN THE SAME DISTURBED AREA WITHIN 24 HOURS, DAILY STABILIZATION IS NOT NECESSARY.
  - IF THE DISTURBED AREAS WILL COLLECT AND RETAIN RUNOFF, SUCH AS HOUSE FOUNDATIONS OR OPEN UTILITY TRENCHES, DAILY STABILIZATION IS NOT NECESSARY UNTIL EXCAVATION BACKFILLING OCCURS.
  - PRIOR TO STABILIZATION, REMOVE SNOW OR ICE TO LESS THAN 1" THICKNESS ABOVE THE SOIL.
  - STONE STABILIZATION (8" THICK) AT ACCESS POINTS FOR CONSTRUCTION VEHICLE TRAFFIC, I.E. FROM THE PAVEMENT TO THE BUILDING PUT A 15' WIDE PATH ON TOP OF THE PROPOSED DRIVEWAY.

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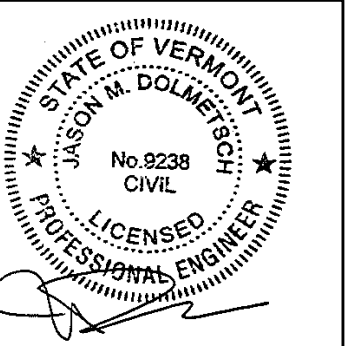
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

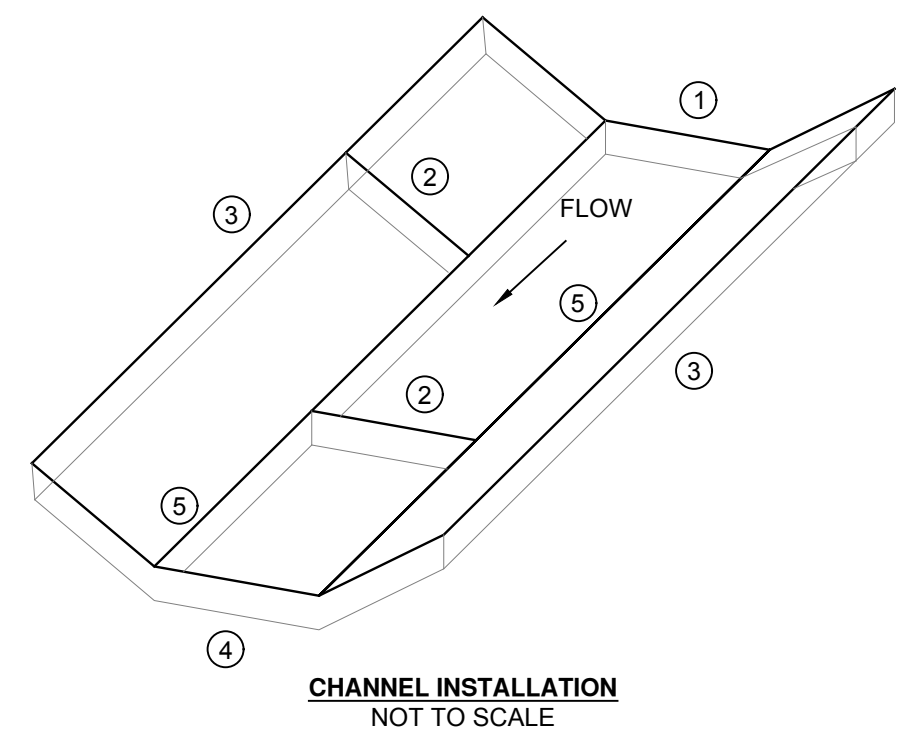
DRAWINGS THIS SHEET  
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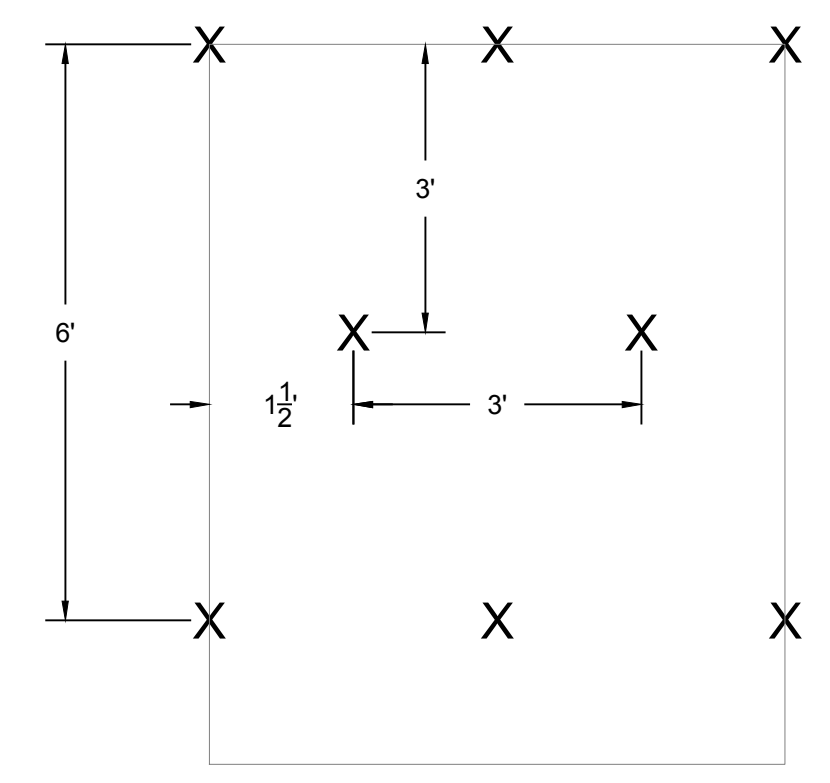




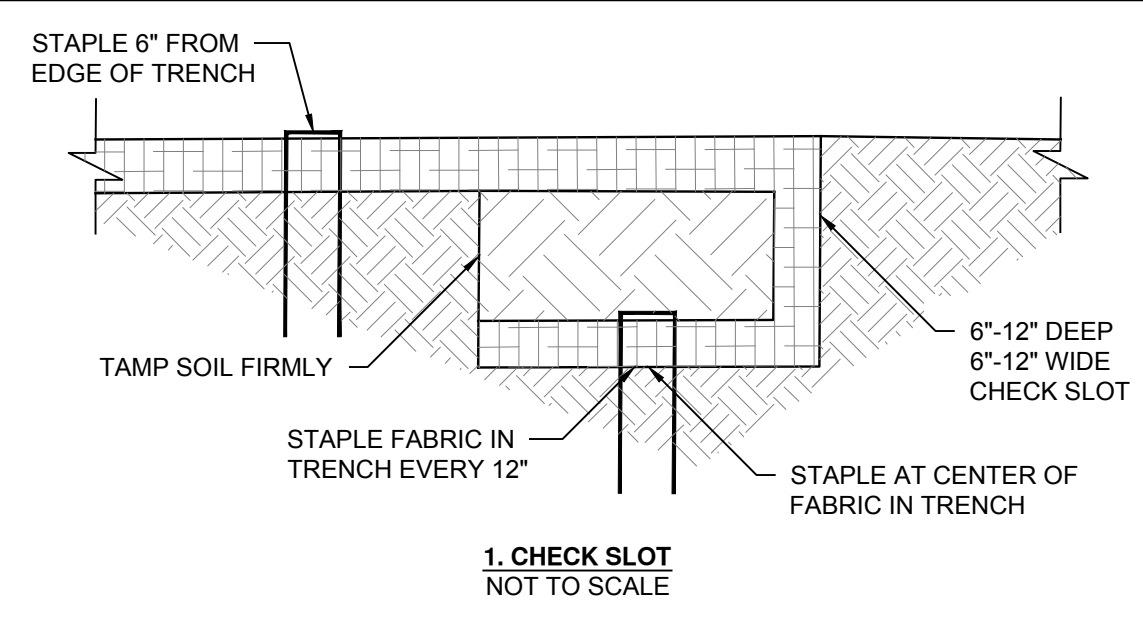


**CONSTRUCTION SPECIFICATIONS**

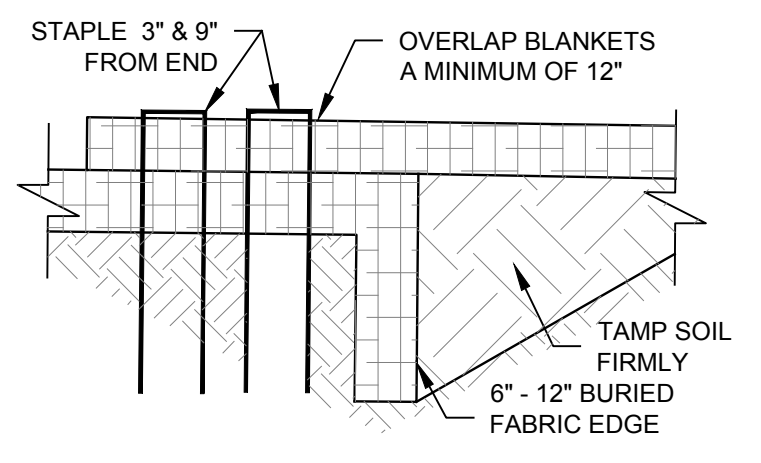
1. INSTALL RECP ON ALL SLOPES 3:1 OR GREATER AND IN CHANNELS
2. METAL STAPLES TO BE UNGALVANIZED U-SHAPED WIRE WITH 2" CROWN AND 6" TO 8" LONG LEG. SET STAPLE INTO THE FABRIC FLUSH WITH SURROUNDING SOIL. MAY BE MANUALLY OR MECHANICALLY HAMMERED DOWN.
3. METAL STAPLES ARE TO BE PLACED ALTERNATIVELY, IN COLUMNS ~ 2' APART AND IN ROWS ~ 3' APART. APPROXIMATELY 175 STAPLES ARE REQUIRED PER 4' x 225' ROLL OF MATERIAL AND ABOUT 125 STAPLES ARE REQUIRED PER 4' x 150' ROLL OF MATERIAL. ACTUAL STAPLE AMOUNTS VARY BASED UPON SOIL CONDITIONS.
4. DISTURBED AREA SHALL BE SMOOTHLY GRADED TO ENSURE CLOSE CONTACT BETWEEN RECP AND GROUND. REMOVE LARGE STONES AND WOODY DEBRIS THAT WILL PREVENT RECP FROM CONTACTING THE GROUND.
5. EROSION CONTROL MATERIAL SHALL BE PLACED LOOSELY OVER GROUND SURFACE. DO NOT STRETCH.
6. ENSURE EROSION CONTROL MATERIAL ROLLS ARE UNRAVELED DOWN SLOPE IN A CONTROLLED FASHION.
7. ALL RECP TERMINAL ENDS AND TRANSVERSE LAPS SHALL BE STAPLED AT APPROXIMATELY 12" INTERVALS.



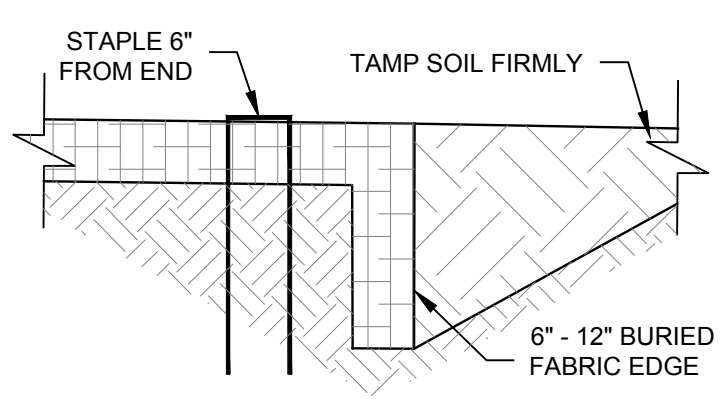
1.2 STAPLES/YD<sup>2</sup>  
3:1 SLOPES  
STAPLE PATTERN  
NOT TO SCALE



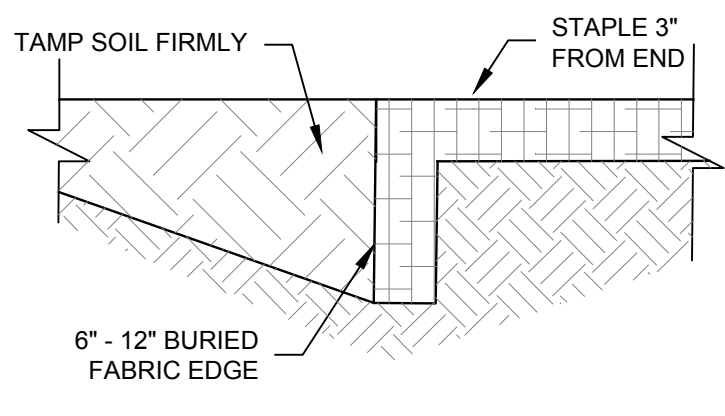
1. CHECK SLOT  
NOT TO SCALE



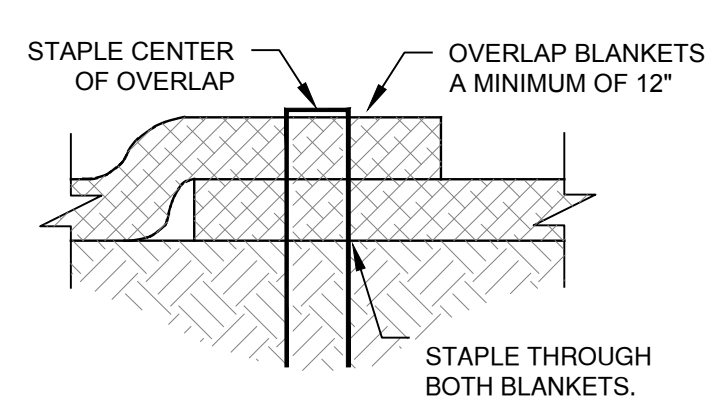
2. JUNCTION SLOT  
NOT TO SCALE



3. ANCHOR SLOT  
NOT TO SCALE

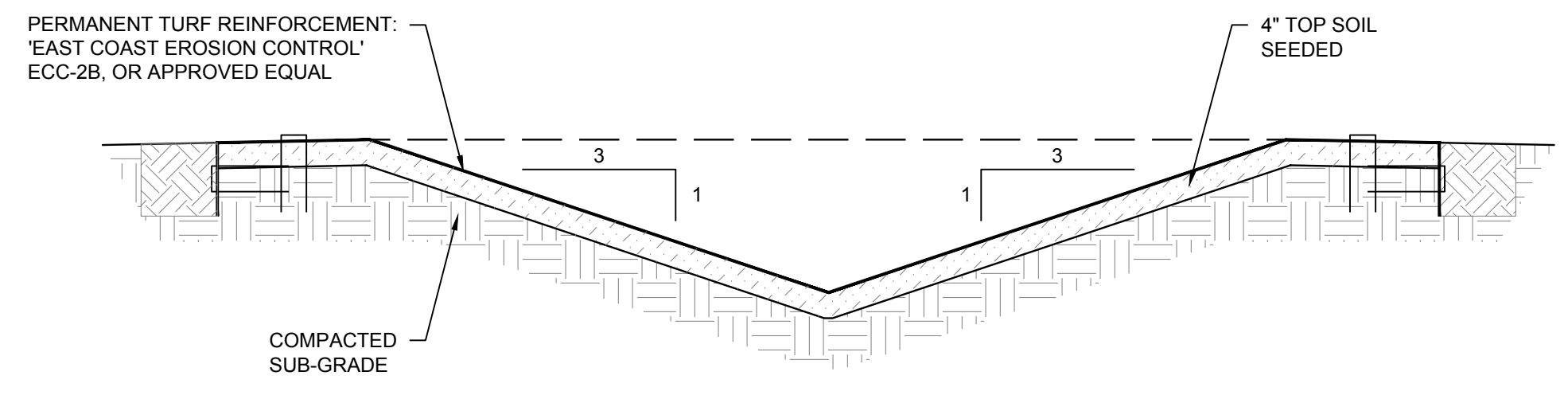


4. TERMINAL FOLD  
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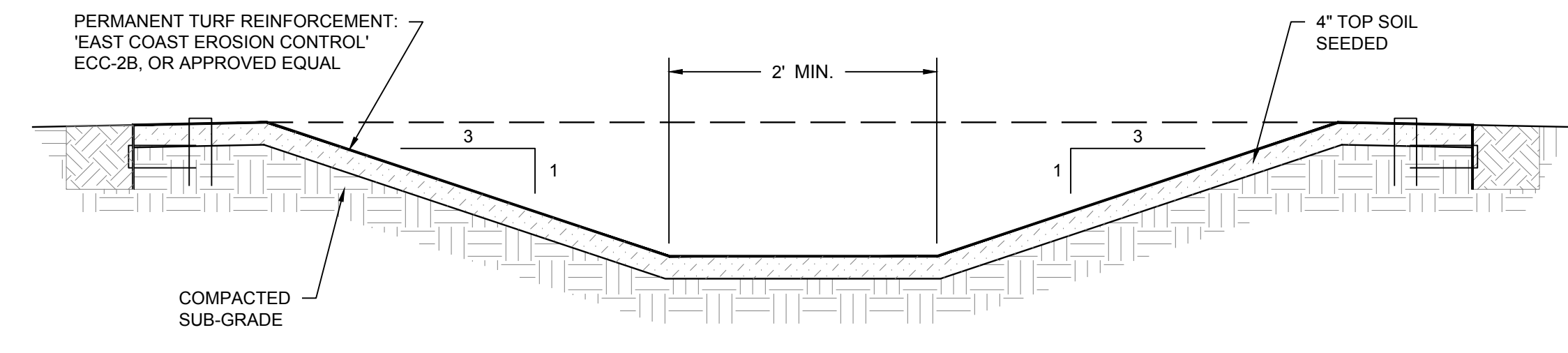


5. LAP JOINT  
NOT TO SCALE

**1 ROLLED EROSION CONTROL PRODUCT (RECP) - TYPICAL**  
Scale: NTS



**2 TURF REINFORCEMENT SWALE DETAIL**  
Scale: NTS



**3 TURF REINFORCEMENT SWALE DETAIL**  
Scale: NTS

**STABILIZATION NOTES**

**TEMPORARY SEEDING**

**PREPARATION:** RUNOFF CONTROL PRACTICES MUST BE INSTALLED PRIOR TO STABILIZATION AS APPROPRIATE FOR THE SITE CONDITIONS. THE AREA MUST BE ROUGH GRADED AND SLOPES PHYSICALLY STABLE. LARGE DEBRIS AND ROCKS SHOULD BE REMOVED. AREA MUST BE SEEDED WITHIN 24 HOURS OF PREVIOUS DISTURBANCE OR SCARIFICATION OF SOIL SURFACE WILL BE NECESSARY PRIOR TO SEEDING.

**SEED TYPE:** IF: SPRING OR SUMMER OR EARLY FALL, THEN SEED THE AREA WITH REGIONAL RYEGRASS (ANNUAL OR PERENNIAL) AT 20 LBS PER ACRE (APPROXIMATELY 0.5 LBS/1,000 SF OR USE 1 LB/1,000 SF). IF: LATE FALL OR EARLY WINTER, THEN SEED CERTIFIED 'AROSTOOK' WINTER RYE (CEREAL RYE) AT 90 LBS PER ACRE (2.0 LBS/1,000 SF).

**METHOD OF SEEDING:** ANY SEEDING METHOD MAY BE USED THAT WILL PROVIDE UNIFORM APPLICATION OF SEED ON THE AREA AND RESULT IN RELATIVELY GOOD SOIL TO SEED CONTACT. HAND SEEDING IS RECOMMENDED FOR AREAS OF THE SITE THAT CAN NOT BE ACCESSED WITH EQUIPMENT DUE TO SOIL MOISTURE.

**MULCHING:** MULCHING OVER SEED IS REQUIRED. MULCH THE AREA WITH HAY OR STRAW AT 2 TONS/ACRE (90 LBS/1,000 SF OR 2 BALES/1,000 SF). WOOD FIBER (CELLULOSE) HYDROMULCH OR SIMILAR SPRAYABLE PRODUCTS APPROVED FOR EROSION CONTROL MAY BE USED IF APPLIED ACCORDING TO THE MANUFACTURERS' SPECIFICATION BUT AT A MINIMUM OF 50 LBS/1,000 SF.

**ANCHORING:** MULCH ANCHORING WILL BE REQUIRED IN AREAS OF HIGH WIND, CONCENTRATED FLOWS OF RUNOFF, AND AREAS SEEDED BETWEEN OCTOBER 15 AND APRIL 15, I.E. DURING WINTER CONSTRUCTION.

**IRRIGATION:** WATERING OF SEED MAY BE IDEAL DURING SUMMER MONTHS TO ENSURE GERMINATION OF SEED.

**INSPECTION:** INSPECT AREAS EVERY 7 DAYS AND AFTER RAINFALL EVENTS RESULTING IN RUNOFF FROM THE SITE. DOCUMENT AREAS OF SIGNIFICANT EROSION (RILLS & GULLIES) AND/OR LOSS OF VEGETATIVE COVER.

**MAINTENANCE:** KEEP VEHICLES AND EQUIPMENT OFF OF MULCHED AND SEEDED AREAS TO PREVENT DISTURBANCE OF STABILIZED AREAS. RILLS AND GULLIES MUST BE REGARDED PRIOR TO PLACEMENT OF ADDITIONAL SEED AND MULCH. SCARIFY, SEED, AND MULCH BARE AREAS TO PREVENT CONTINUED EROSION.

**TEMPORARY MULCHING**

**PREPARATION:** SITE PREPARATION PRIOR TO MULCHING REQUIRES THE INSTALLATION OF NECESSARY EROSION CONTROL OR RUNOFF CONTROL PRACTICES AND DRAINAGE SYSTEMS. SLOPE, GRADE AND SMOOTH THE SITE TO FIT THE NEEDS OF SELECTED MULCH PRODUCTS. REMOVE ALL UNDESIRABLE STONES AND OTHER DEBRIS TO MEET THE NEEDS OF ANTICIPATED LAND USE AND EXPECTED MAINTENANCE REQUIRED.

**NOTE:** THE BEST COMBINATION FOR GRASS/LEGUME ESTABLISHMENT IS STRAW (CEREAL GRAIN) MULCH APPLIED AT 2 TON/ACRE (90 LBS/1,000 SF) AND ANCHORED IMMEDIATELY WITH WOOD FIBER MULCH (HYDROMULCH) AT 500 - 750 LBS/ACRE (11 - 17 LBS/1,000 SF).

MULCH MATERIAL	RATE PER 1,000 SF	COVERAGE	ANCHORING
WOOD CHIPS OR SHAVINGS	500-900 LBS	2" TO 7"	NONE
WOOD FIBER CELLULOSE	50 LBS BAG	100%	TACKIFIER
GRAVEL, CRUSHED STONE	9 CUBIC YARDS	3" TO 6"	COMPACTED
HAY OR STRAW	90-100 LBS, 2-3 BALES	90%	VARIOUS
JUTE/EXCELSIOR/COIR	VARIOUS SIZED ROLLS	100%	STAPLES
WELL AGED COMPOST	3-9 CUBIC YARDS	1" TO 3"	NONE

**ANCHORING METHODS:** BIODEGRADABLE NETTING - STAPLE TO GROUND AS PER MANUFACTURER'S SPECIFICATIONS. CRIMPING - USE DISKS OR TRACKS ALONG THE CONTOUR TO EMBED THE MULCH INTO THE SOIL. CELLULOSE OVERSPRAY - HYDROMULCH WOOD FIBERS AT 500 LBS PER ACRE. HAS GREEN DYE TACKIFIERS\* - USE HYDROSEEDER TO MIX AND SPRAY CHEMICALS, APPLY WITH WOOD FIBER MULCH

\*TO ALLOW FOR PROPER CURING OF THESE CHEMICALS, TACKIFIERS MAY ONLY BE APPLIED IF RAINFALL IS NOT PREDICTED WITHIN 24 HRS AND SOIL TEMPERATURES ARE HIGHER THAN 45° F. DO NOT APPLY TACKIFIERS WITHIN 50 FEET OF ANY SURFACE WATER OR UPON VEGETATION, BUILDINGS, VEHICLES, AND/OR EQUIPMENT. TACKIFIERS WITH KNOWN AQUATIC TOXICITY ARE PROHIBITED.

**PERMANENT SEEDING**

**PREPARATION:** ALL WATER CONTROL MEASURES WILL BE INSTALLED AS NEEDED PRIOR TO FINAL GRADING AND SEEDBED PREPARATION. ANY SEVERELY COMPACTED SECTIONS WILL REQUIRE CHISELING OR DISKING TO PROVIDE AN ADEQUATE ROOTING ZONE, TO A MINIMUM DEPTH OF 12". THE SEEDBED MUST BE PREPARED TO ALLOW GOOD SOIL TO SEED CONTACT, WITH THE SOIL NOT TOO SOFT AND NOT TOO COMPACT. ADEQUATE SOIL MOISTURE MUST BE PRESENT TO ACCOMPLISH THIS. IF SURFACE IS POWDER DRY OR STICKY WET, POSTPONE OPERATIONS UNTIL MOISTURE CHANGES TO A FAVORABLE CONDITION. IF SEEDING IS ACCOMPLISHED WITHIN 24 HOURS OF FINAL GRADING, ADDITIONAL SCARIFICATION IS NOT NEEDED. REMOVE ALL STONES AND OTHER DEBRIS FROM THE SURFACE THAT ARE GREATER THAN 4 INCHES, OR THAT WILL INTERFERE WITH FUTURE MOWING OR MAINTENANCE.

**AMENDMENTS:** SOIL AMENDMENTS MUST BE INCORPORATED INTO THE UPPER 2 INCHES OF SOIL. THE SOIL SHOULD BE TESTED TO DETERMINE THE AMOUNTS OF AMENDMENTS NEEDED. APPLY GROUND AGRICULTURAL LIMESTONE TO ATTAIN A PH OF 6.0 IN THE UPPER 2 INCHES OF SOIL. IF SOIL MUST BE FERTILIZED BEFORE RESULTS OF A SOIL TEST ARE OBTAINED TO DETERMINE FERTILIZER NEEDS, USE COMMERCIAL FERTILIZER AT 600 LBS PER ACRE OF 5-10-10 OR EQUIVALENT. IF MANURE IS USED, APPLY QUANTITY TO MEET THE NUTRIENTS OF THE ABOVE FERTILIZER. THIS REQUIRES AN APPROPRIATE MANURE ANALYSIS PRIOR TO APPLYING TO THE SITE. DO NOT USE IN AREAS OF CONCENTRATED WATER FLOW.

**GENERAL SEED MIXTURES:**

SEED MIXTURES MAY VARY DEPENDING ON LOCATION WITHIN THE STATE AND TIME OF SEEDING. GENERALLY, WARM SEASON GRASSES SHOULD ONLY BE SEEDED DURING EARLY SPRING, APRIL TO MAY. THESE GRASSES ARE PRIMARILY USED FOR VEGETATING EXCESSIVELY DRAINED SANDS AND GRAVELS. OTHER GRASSES MAY BE SEEDED ANY TIME OF THE YEAR WHEN THE SOIL IS NOT FROZEN AND IS WORKABLE. WHEN LEGUMES LIKE CLOVER ARE INCLUDED, SPRING SEEDING IS PREFERRED. ACTUAL GRASS SEED SPECIES USED ON THE SITE TO BE DETERMINED BY THE HOMEOWNER AND/OR LANDSCAPE PROFESSIONAL AND WILL REFLECT THE ULTIMATE LAND USE.

GRASS SPECIES	LBS/ACRE	LBS/1,000 SF	COMMENTS
COMMON WHITE CLOVER	8	0.20	ADD INOCULATES
TALL FESCUE	10	0.25	'REBEL' VARIETY
CREeping RED FESCUE	20	0.45	'PENNLAWN' VARIETY
PERENNIAL RYEGRASS	5	0.10	'PENNFINE' VARIETY

**TIME OF SEEDING:**

THE OPTIMUM TIMING FOR THE GENERAL SEED MIXTURE IS EARLY SPRING. PERMANENT SEEDINGS MAY BE MADE ANY TIME OF YEAR IF PROPERLY MULCHED AND ADEQUATE MOISTURE IS PROVIDED. LATE JUNE THROUGH EARLY AUGUST IS NOT A GOOD TIME TO SEED, BUT MAY FACILITATE COVERING THE LAND WITHOUT ADDITIONAL DISTURBANCE IF CONSTRUCTION IS COMPLETED. PORTIONS OF THE SEEDING THAT FAIL DUE TO DROUGHT/HEAT MAY BE RE-SEEDED IN LATE SUMMER, FALL, OR SPRING.

**METHOD OF SEEDING:**

BROADCASTING, DRILLING, CULTIPACK TYPE SEEDING, OR HYDROSEEDING ARE ACCEPTABLE METHODS. PROPER SOIL TO SEED CONTACT IS KEY TO SUCCESSFUL GERMINATION.

**MULCHING:**

MULCHING IS ESSENTIAL TO OBTAIN A UNIFORM STAND OF SEEDED PLANTS. OPTIMUM BENEFITS OF MULCHING NEW SEEDINGS ARE OBTAINED WITH THE USE OF SMALL GRAIN STRAW APPLIED AT A RATE OF 2 TONS PER ACRE, AND ANCHORED WITH AN OVERSPRAY OF HYDROMULCH AND/OR TACKIFIER.

**IRRIGATION:**

WATERING MAY BE ESSENTIAL TO ESTABLISH A NEW SEEDING WHEN A DROUGHT CONDITION OCCURS SHORTLY AFTER A NEW SEEDING EMERGES. IRRIGATION IS A SPECIALIZED PRACTICE AND CARE MUST BE TAKEN NOT TO EXCEED THE APPLICATION RATE FOR THE SOIL OR SUBSOIL. WHEN DISCONNECTING IRRIGATION PIPE, BE SURE PIPES DO NOT CAUSE EROSION.

**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
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NO.	DATE	REVISIONS	
		DESCRIPTION	

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET

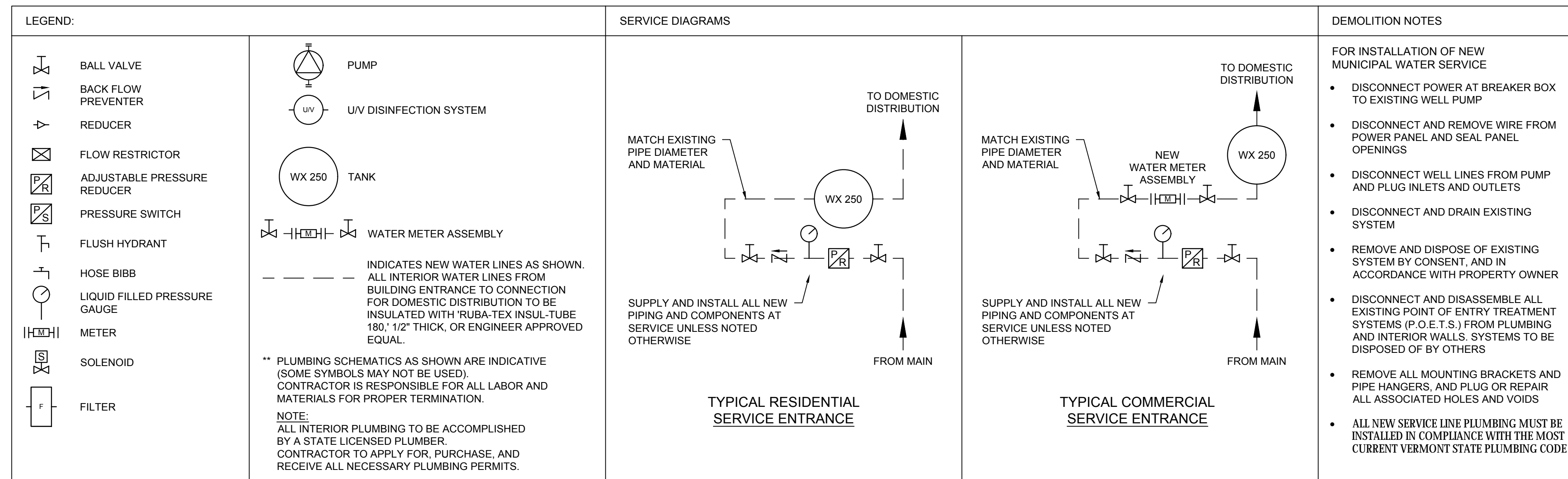
**STABILIZATION  
DETAILS**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C507**

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 2 May 2019 09:01:16





**NOTE:**

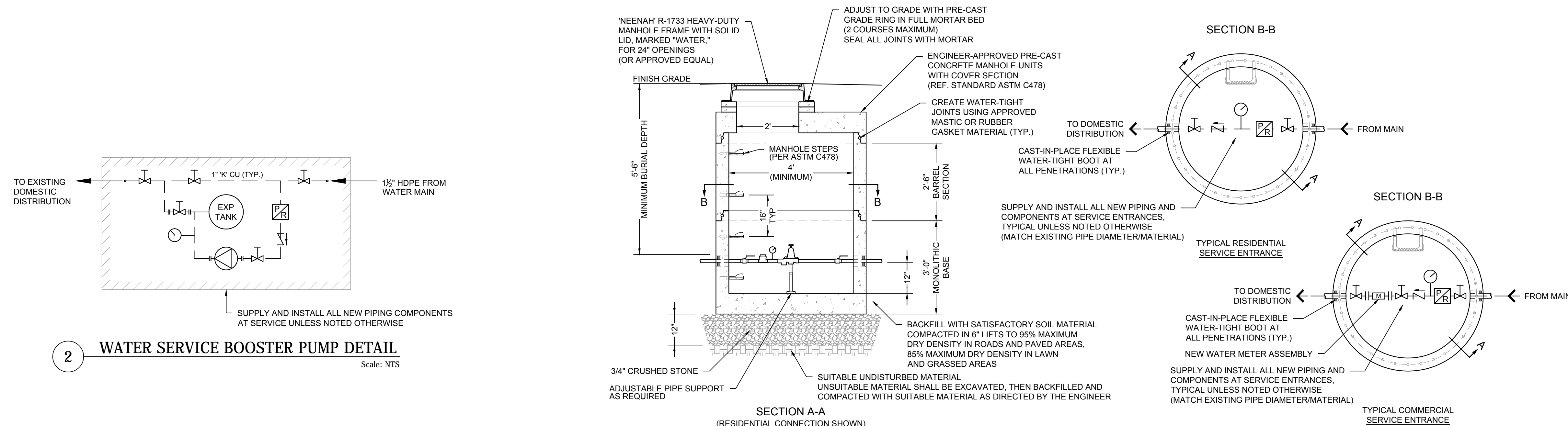
SERVICE ENTRANCE DIAGRAMS INCLUDED IN THE C600 SERIES OF THE SHEET SET ARE SCHEMATIC ONLY, AND BASED ON OBSERVATIONS MADE DURING PRELIMINARY DESIGN INSPECTIONS PERFORMED IN COOPERATION WITH THE PROPERTY OWNER. THESE DIAGRAMS ARE PROVIDED FOR GENERAL REFERENCE ONLY.

DUE TO SCHEDULING OR OTHER CIRCUMSTANCES, SOME PROPERTIES REQUIRING SERVICE CONNECTIONS WERE NOT INSPECTED, AND MAY NOT BE INCLUDED IN THE SHEET SET.

THE CONTRACTOR MUST VERIFY ALL INTERNAL PLUMBING COMPONENTS AND CONFIGURATIONS, AND COORDINATE CURB STOP AND SERVICE ENTRANCE LOCATIONS WITH THE ENGINEER AND PROPERTY OWNER PRIOR TO MAKING ANY CONNECTIONS.

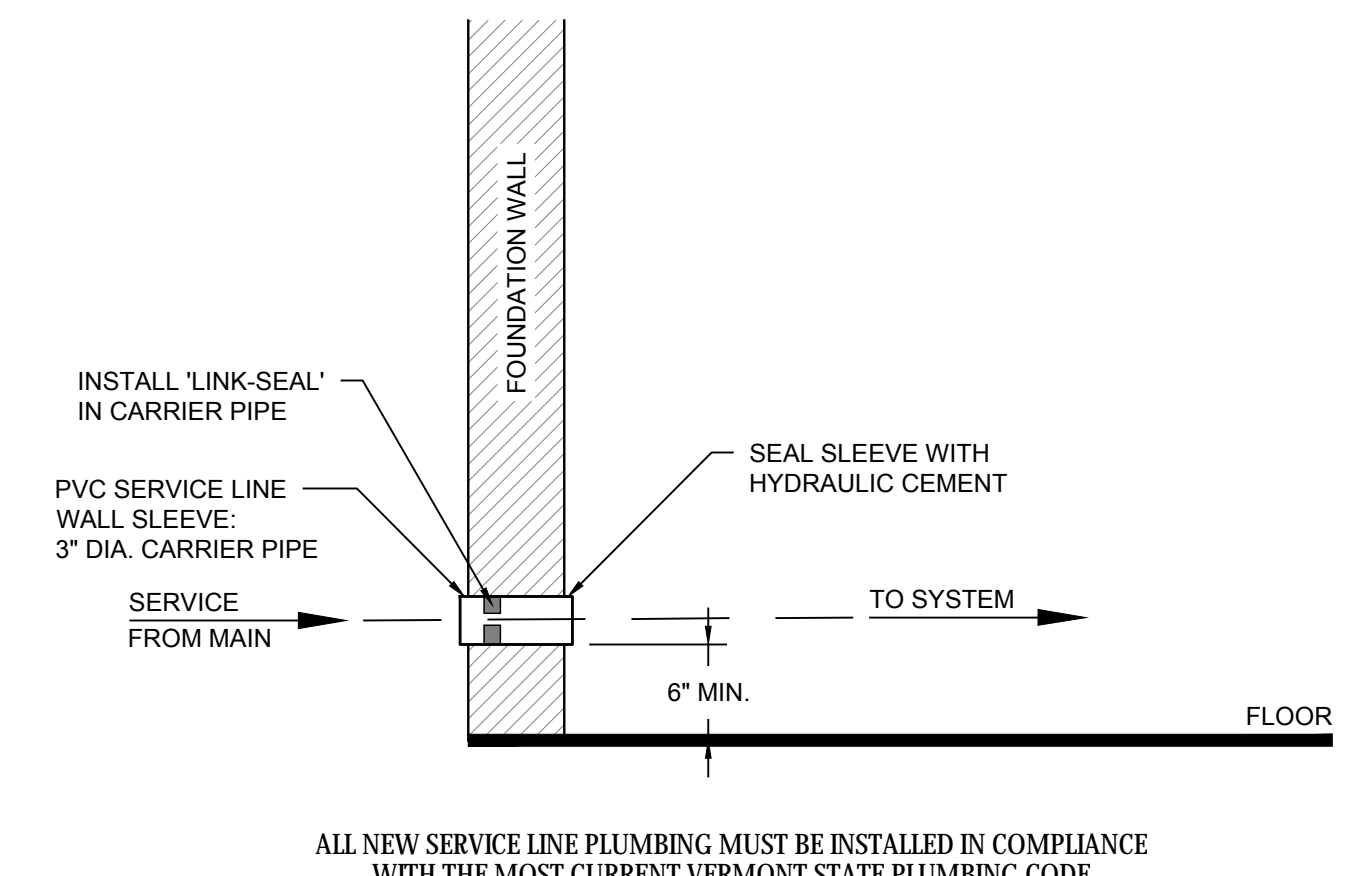
ALL NEW INTERNAL PLUMBING, PIPING AND COMPONENTS SHALL BE COMPLETED BY A QUALIFIED PLUMBER, LICENSED TO PRACTICE IN THE STATE OF VERMONT, AND ALL WORK MUST BE PERFORMED IN COMPLIANCE WITH ALL APPLICABLE CODES, REGULATIONS AND PERMITS.

**1 PLUMBING LEGEND AND TYPICAL WATER SERVICE ENTRANCE DETAILS**  
Scale: NTS

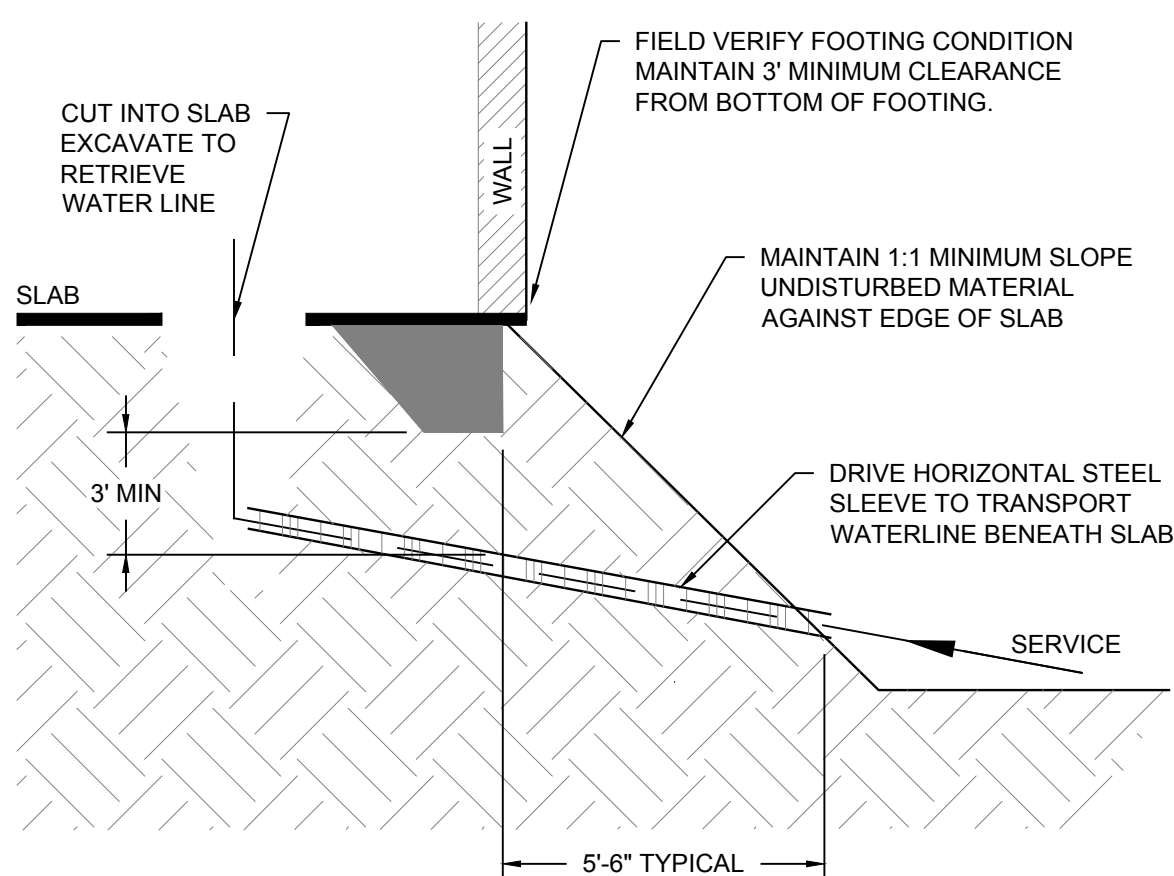


**2 WATER SERVICE BOOSTER PUMP DETAIL**  
Scale: NTS

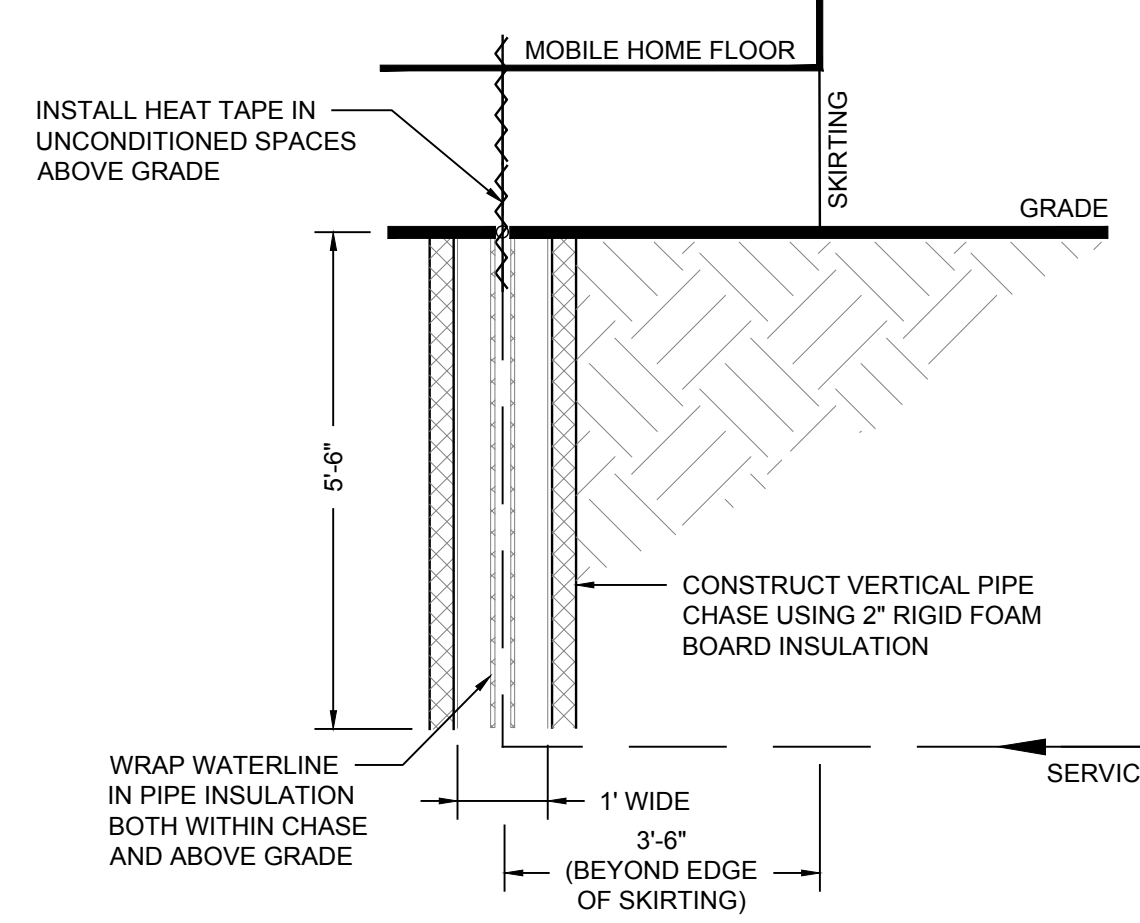
**3 PRE-CAST CONCRETE METER PIT DETAIL**  
Scale: NTS



**4 WATER SERVICE PIPE ENTRY (THROUGH FOUNDATION WALLS)**  
Scale: NTS



**5 WATER SERVICE VERTICAL PIPE ENTRY (THROUGH SLABS)**  
Scale: NTS



**6 WATER SERVICE VERTICAL PIPE ENTRY (FOR MOBILE HOMES)**  
Scale: NTS

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REVISIONS	
NO.	DESCRIPTION

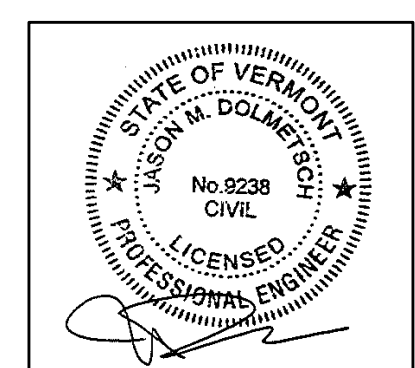
TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET

**PLUMBING DETAILS**

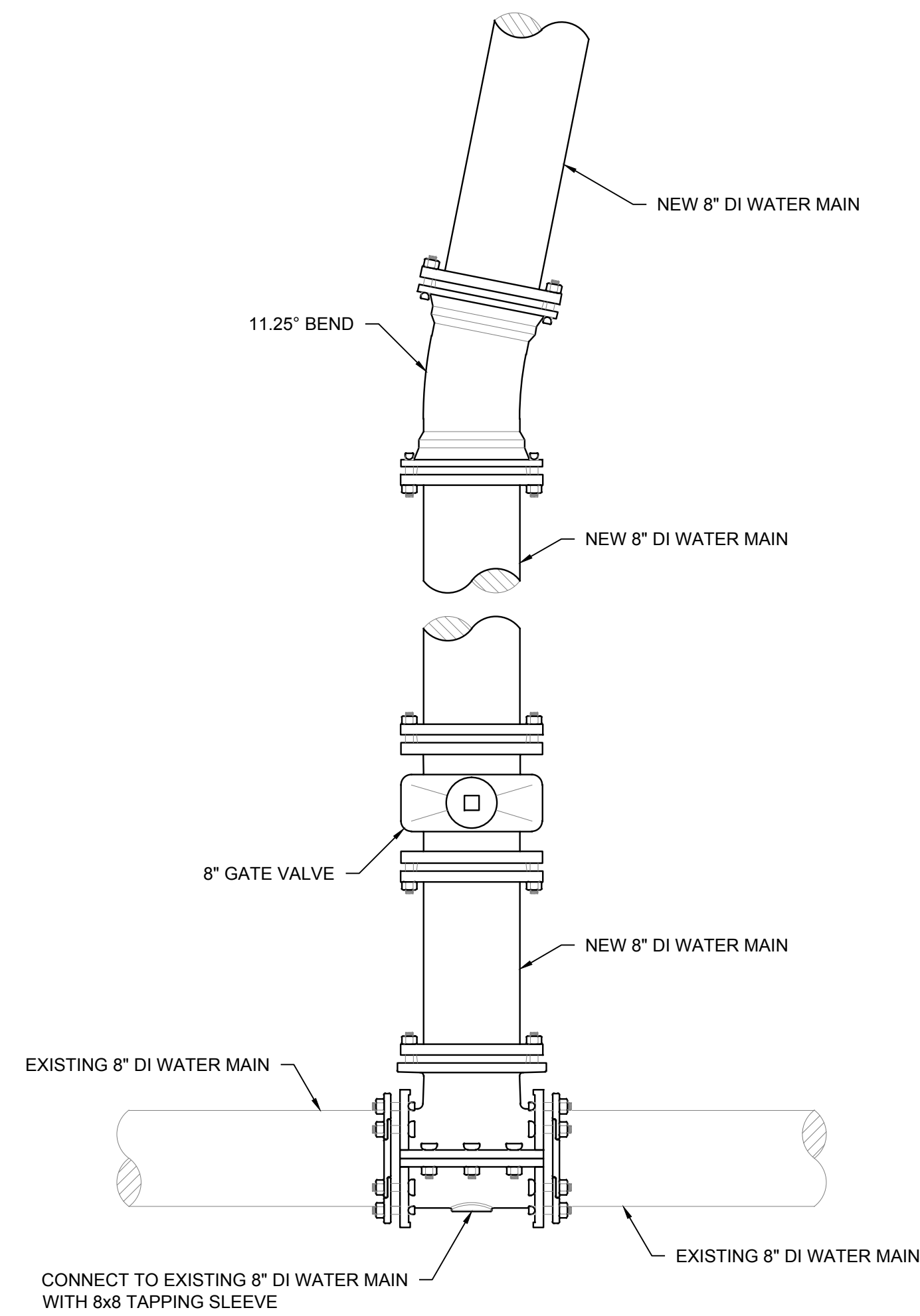
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C508**

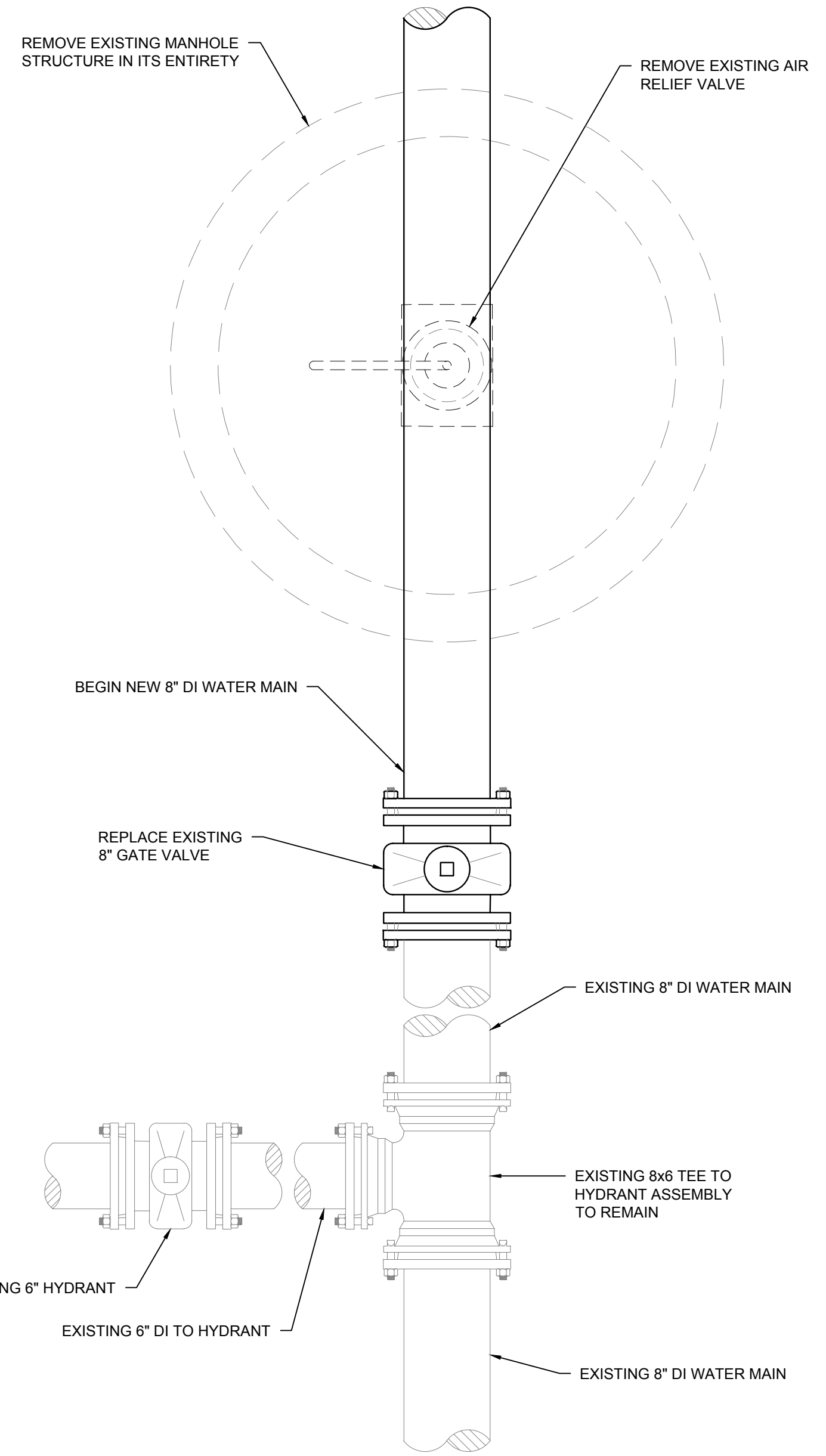


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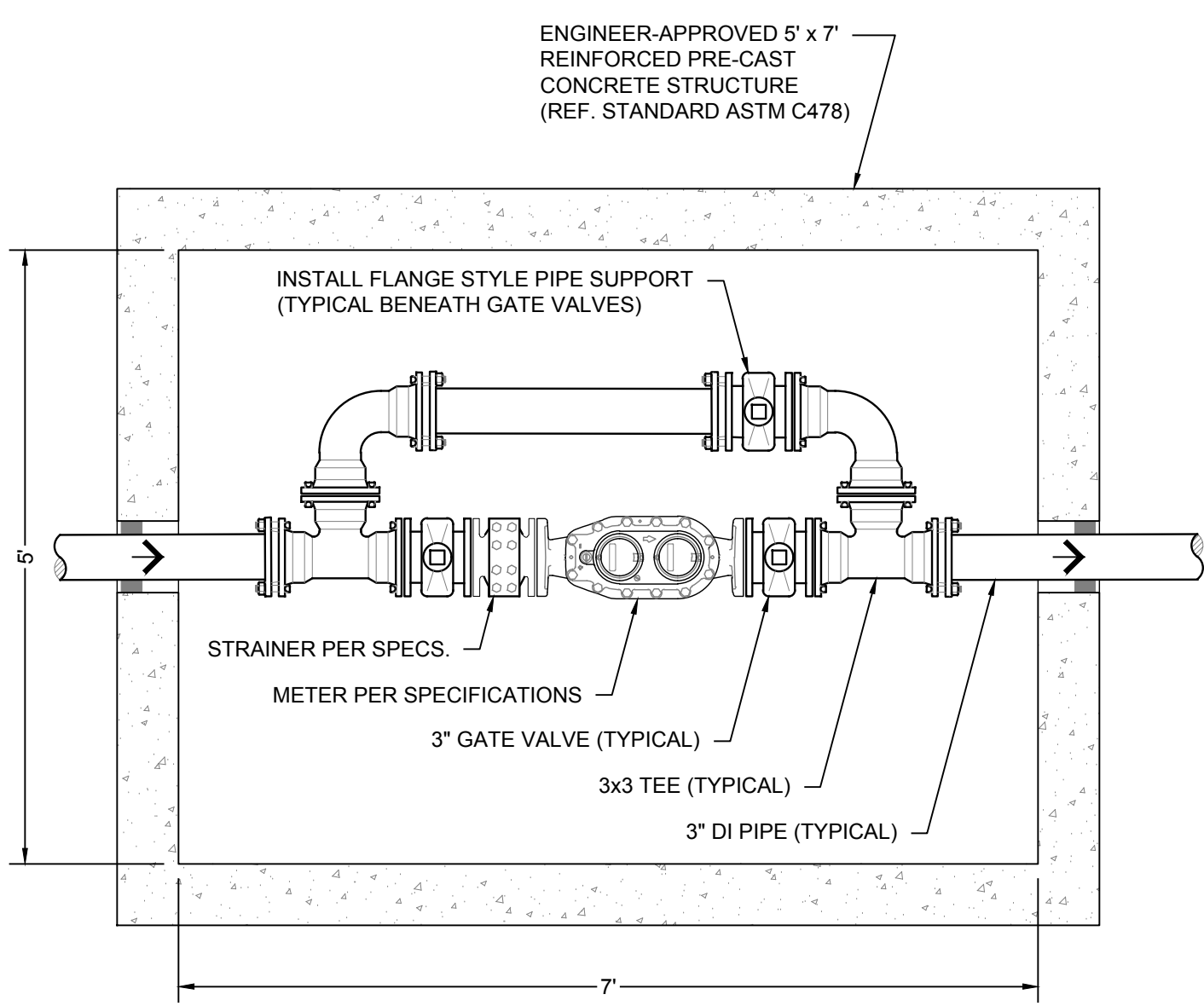




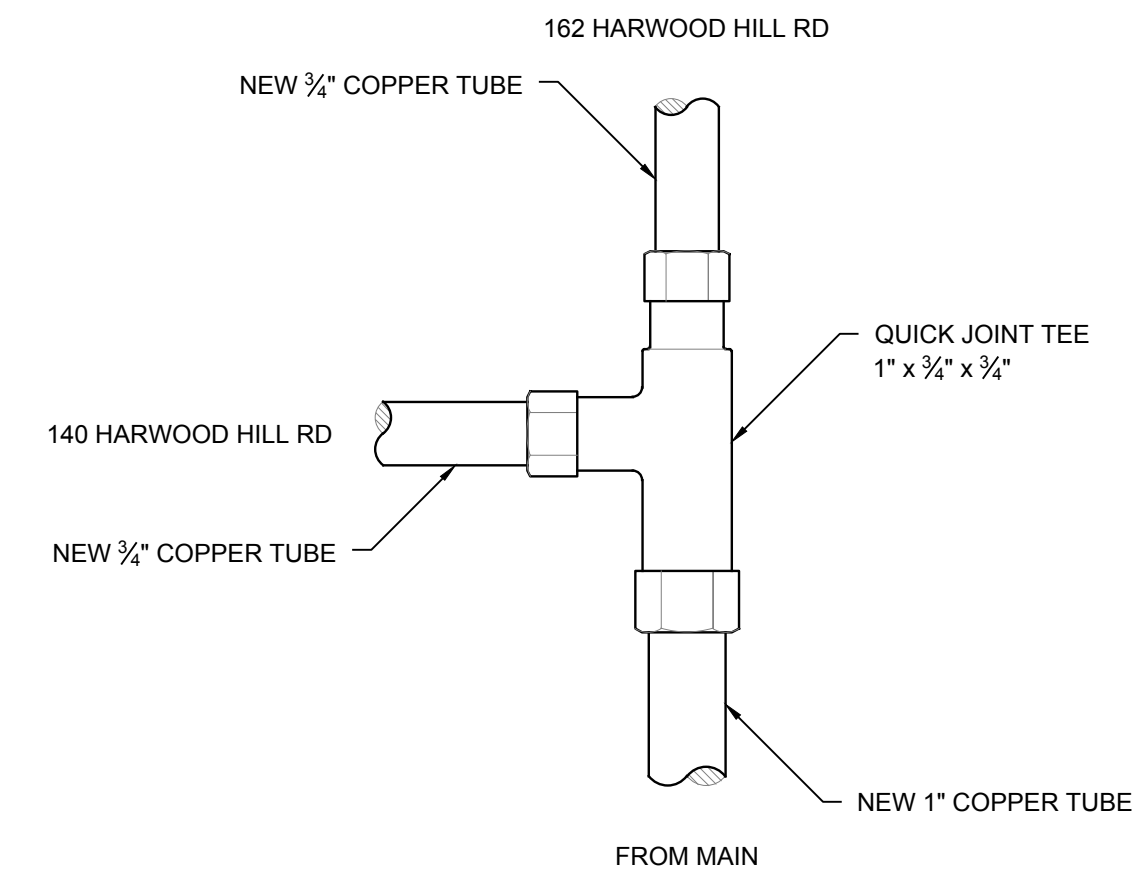
**1 CONNECTION TO EXISTING MUNICIPAL WATER MAIN**  
BERARD STREET AND VT ROUTE 67A  
Scale: NTS



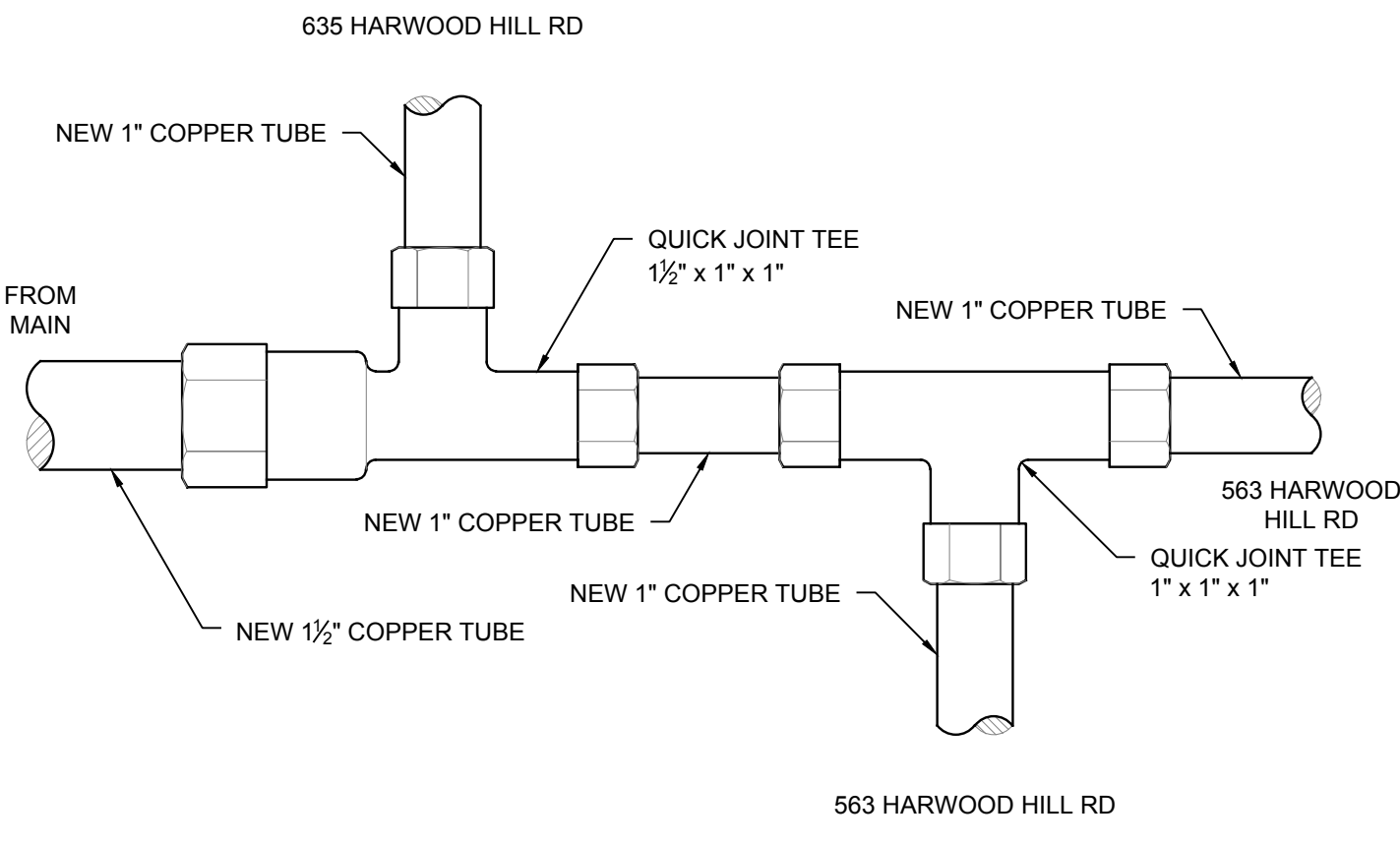
**2 CONNECTION TO EXISTING MUNICIPAL WATER MAIN**  
HARWOOD HILL ROAD  
Scale: NTS



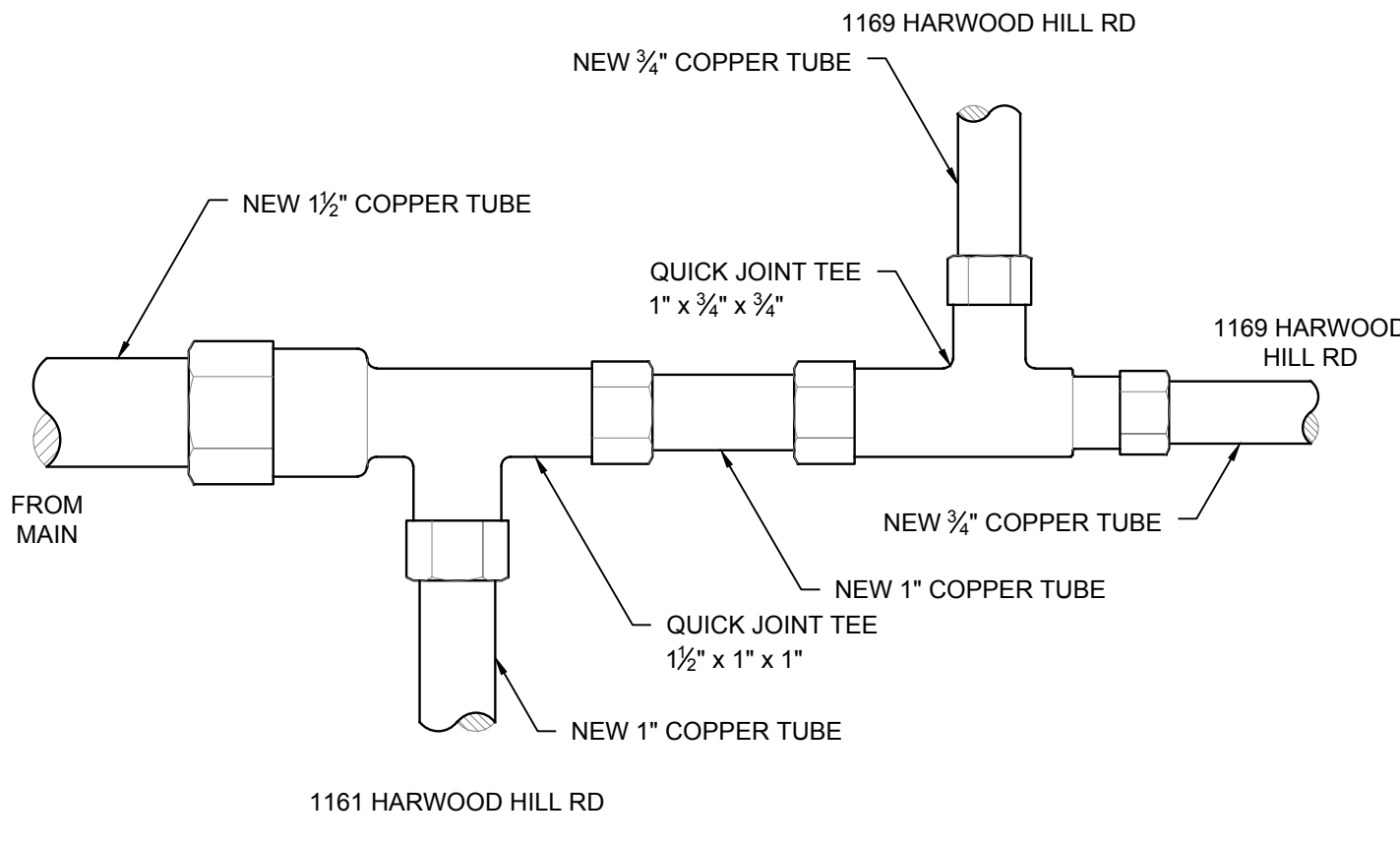
**3 METER PIT DETAIL**  
SUNSET MHP  
Scale: NTS



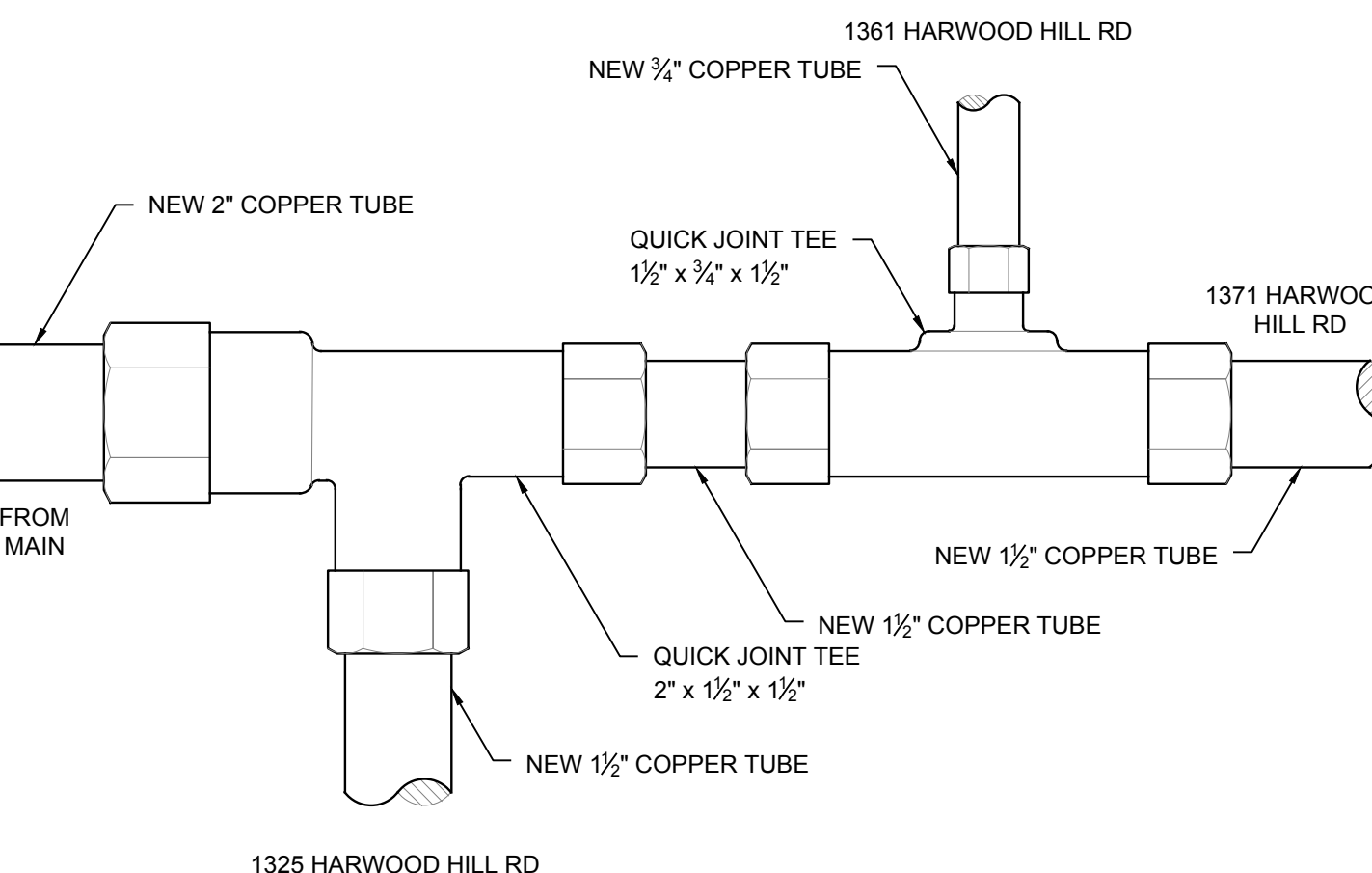
**4 SERVICE CONNECTION DETAIL**  
140 AND 162 HARWOOD HILL RD  
Scale: NTS



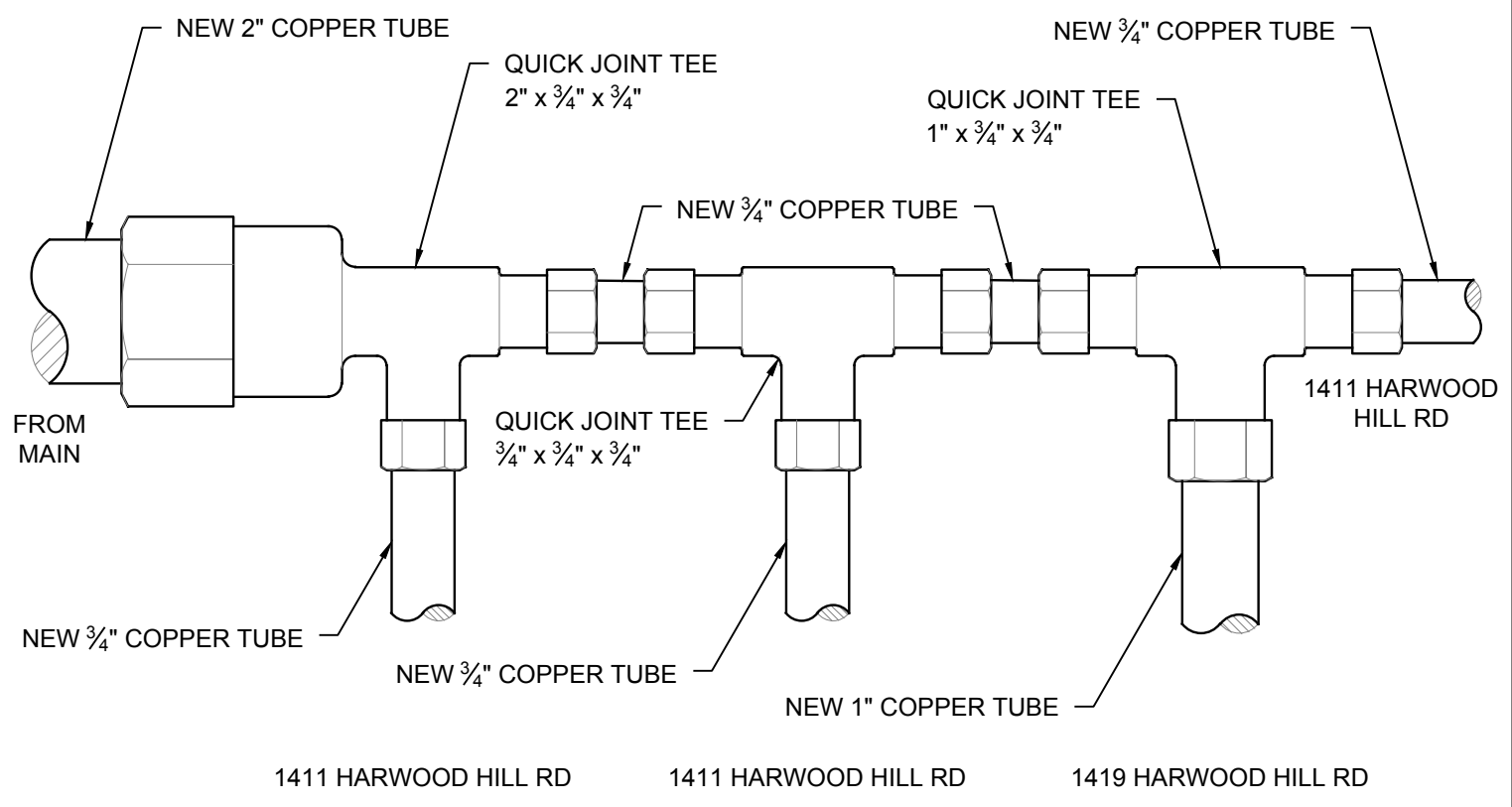
**5 SERVICE CONNECTION DETAIL**  
563 AND 635 HARWOOD HILL RD  
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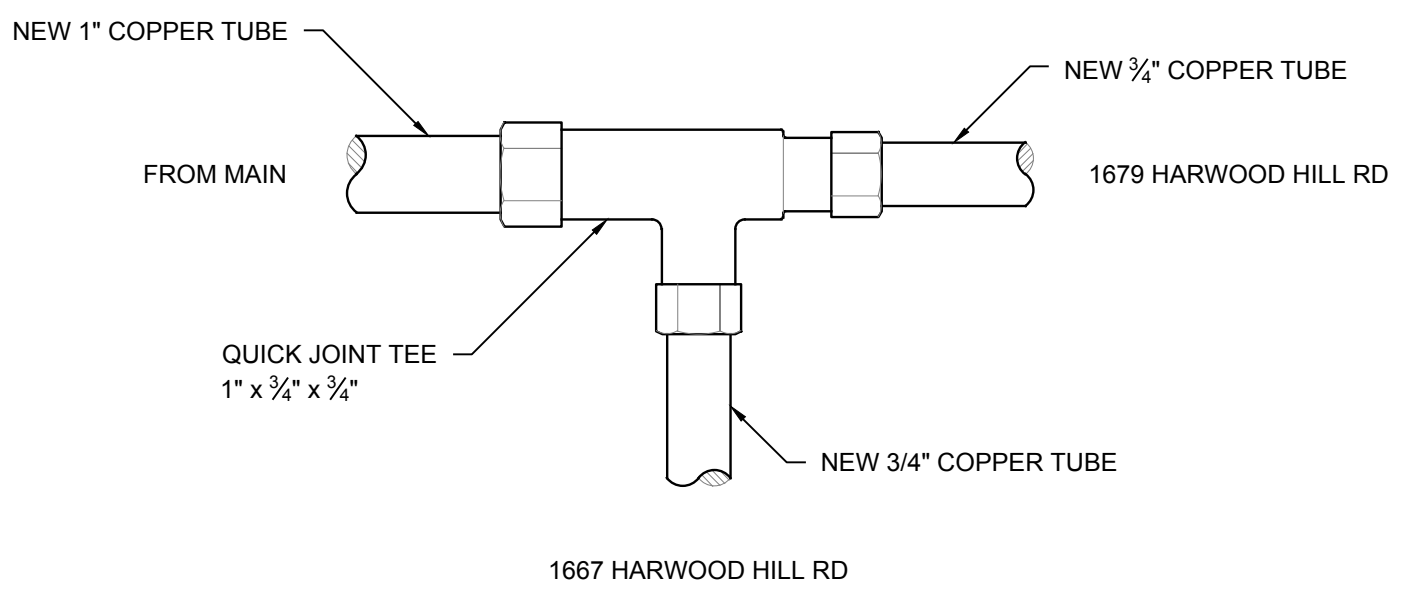
**6 SERVICE CONNECTION DETAIL**  
1161 AND 1169 HARWOOD HILL RD  
Scale: NTS



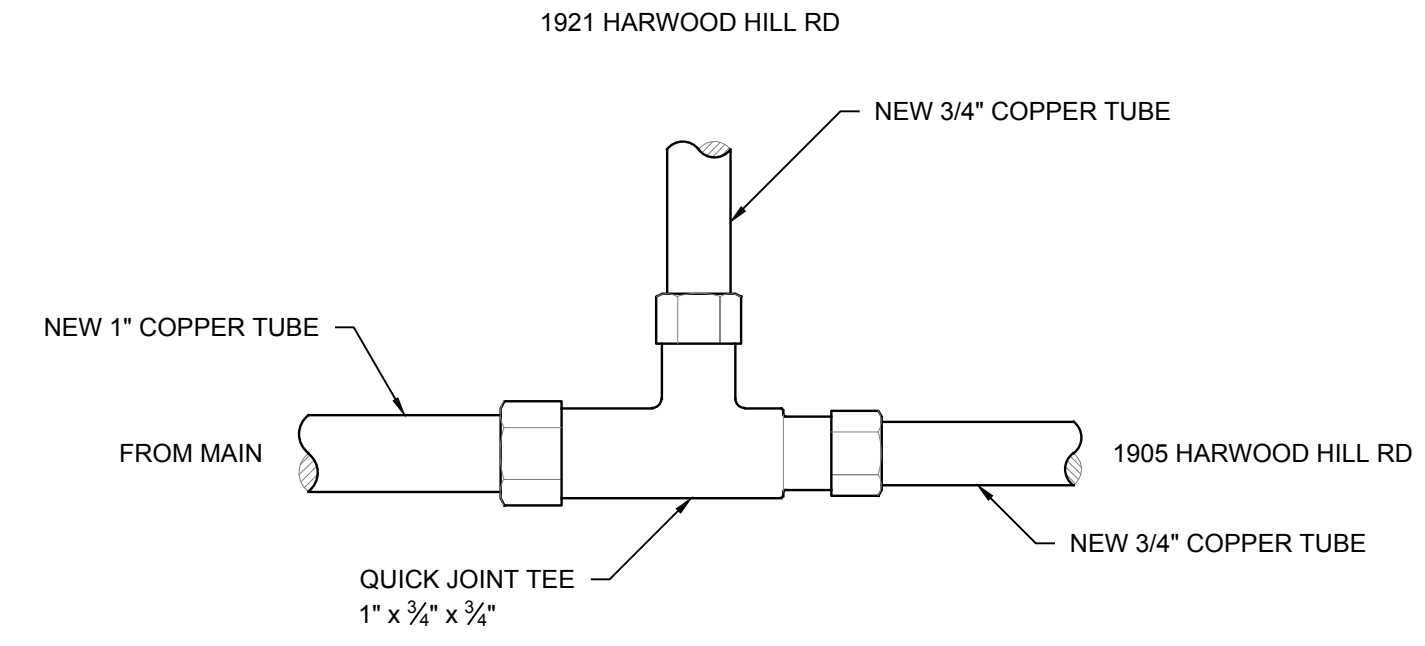
**7 SERVICE CONNECTION DETAIL**  
1325, 1361 AND 1371 HARWOOD HILL RD  
Scale: NTS



**8 SERVICE CONNECTION DETAIL**  
1411 AND 1419 HARWOOD HILL RD  
Scale: NTS



**9 SERVICE CONNECTION DETAIL**  
1667 AND 1679 HARWOOD HILL RD  
Scale: NTS



**10 SERVICE CONNECTION DETAIL**  
1905 AND 1921 HARWOOD HILL RD  
Scale: NTS

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NO.	DATE	DESCRIPTION

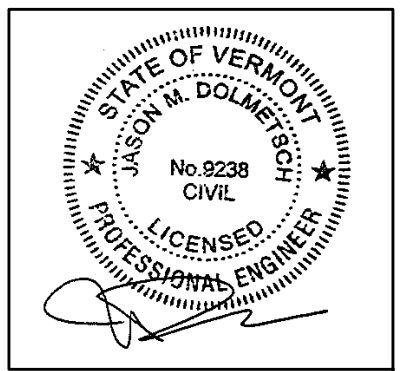
TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

CONTRACT 5  
CONNECTION DETAILS

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

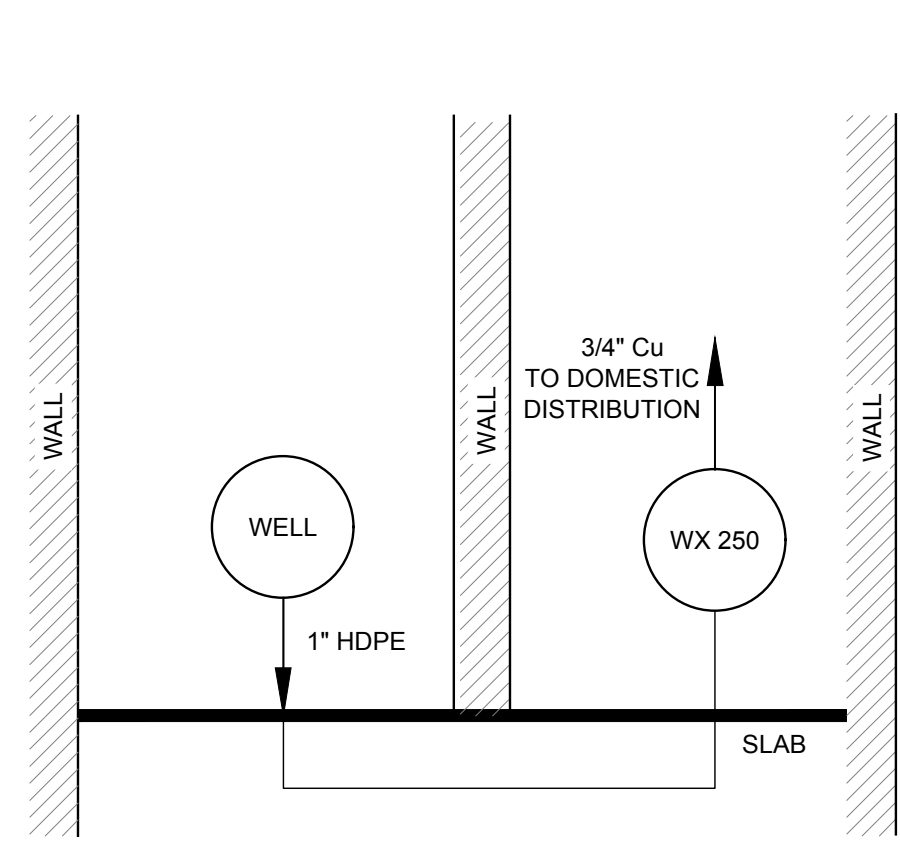
SHEET NUMBER

C509

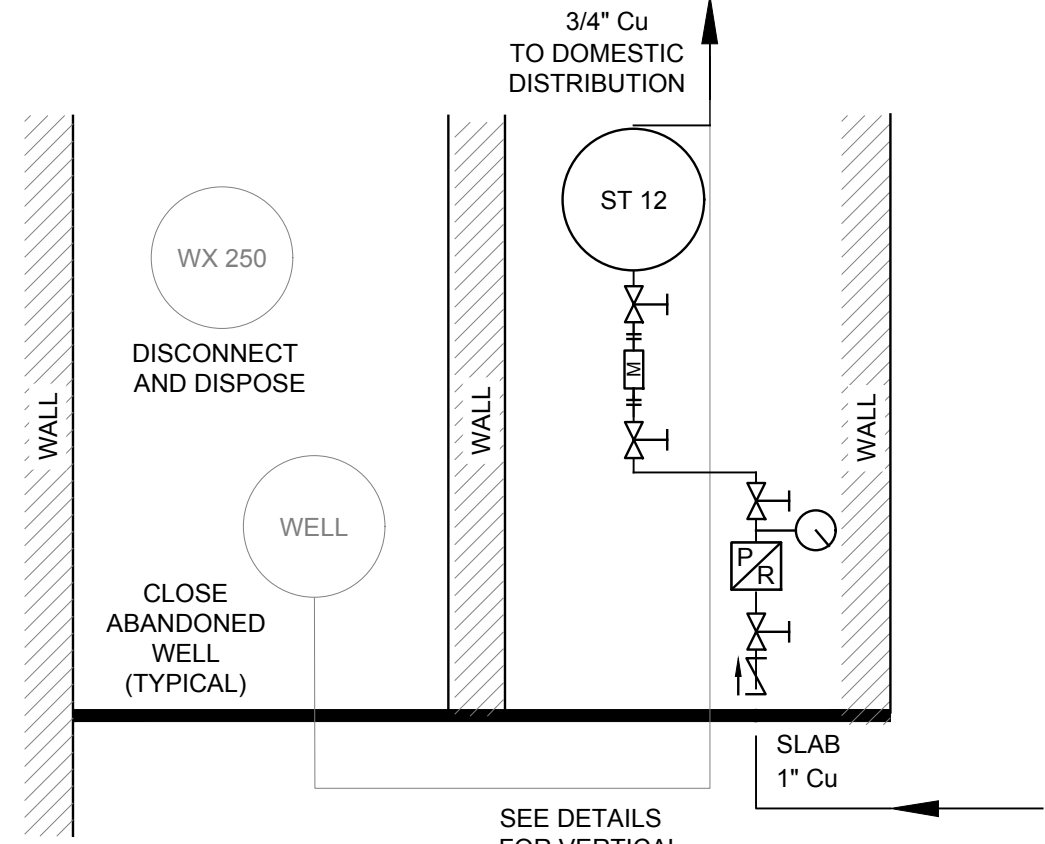


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 2 May 2019 4:00 PM

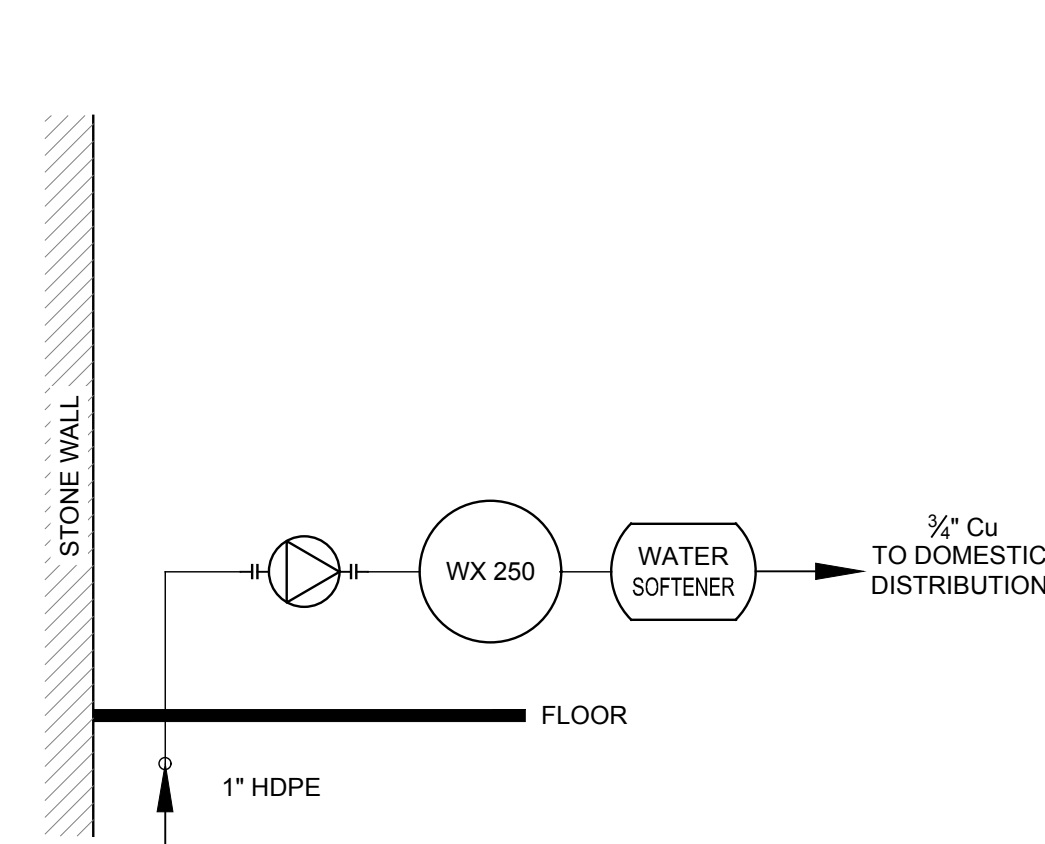




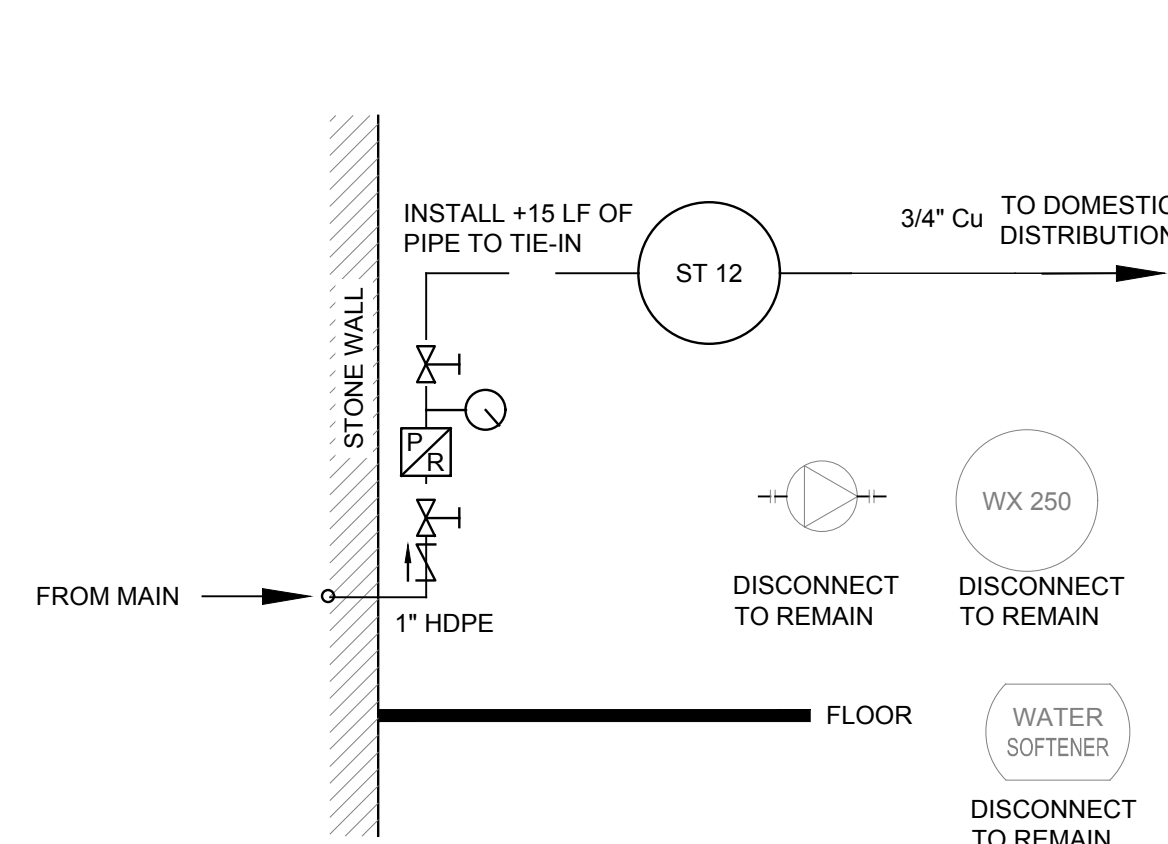
1 WATER SERVICE ENTRANCE DETAIL  
137 HARWOOD HILL RD (EXISTING) Scale: NTS



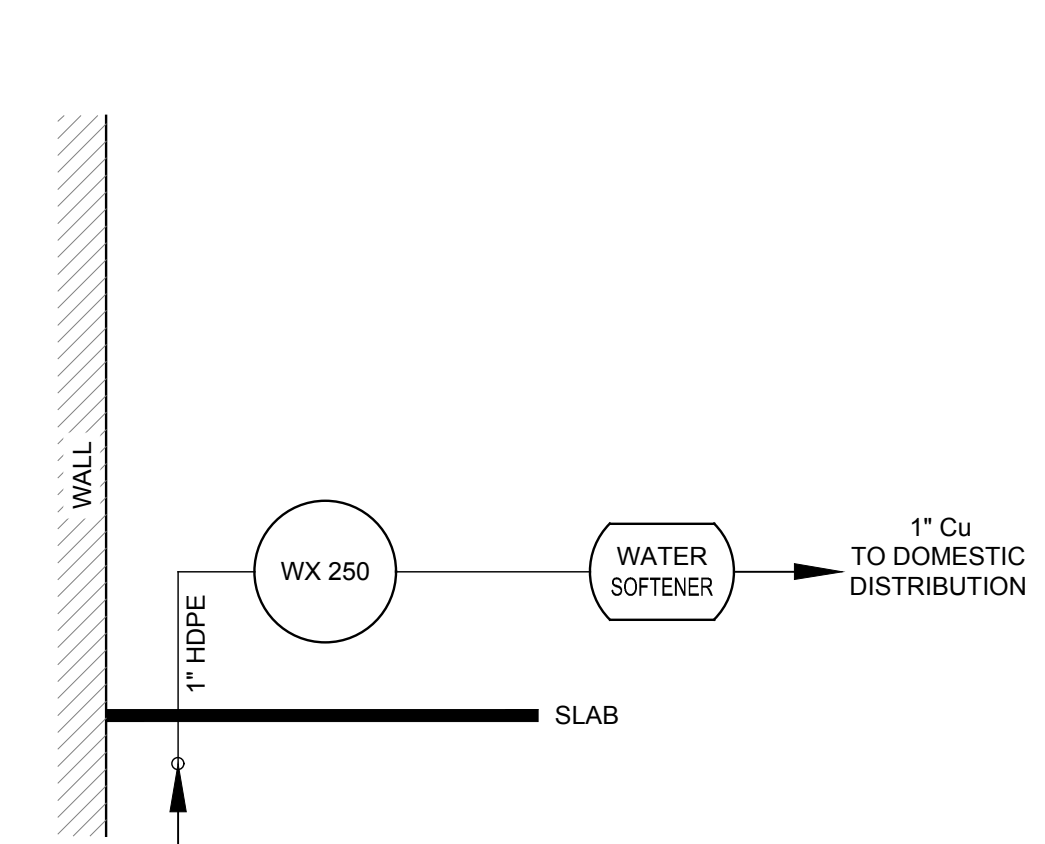
2 WATER SERVICE ENTRANCE DETAIL  
137 HARWOOD HILL RD (PROPOSED) Scale: NTS



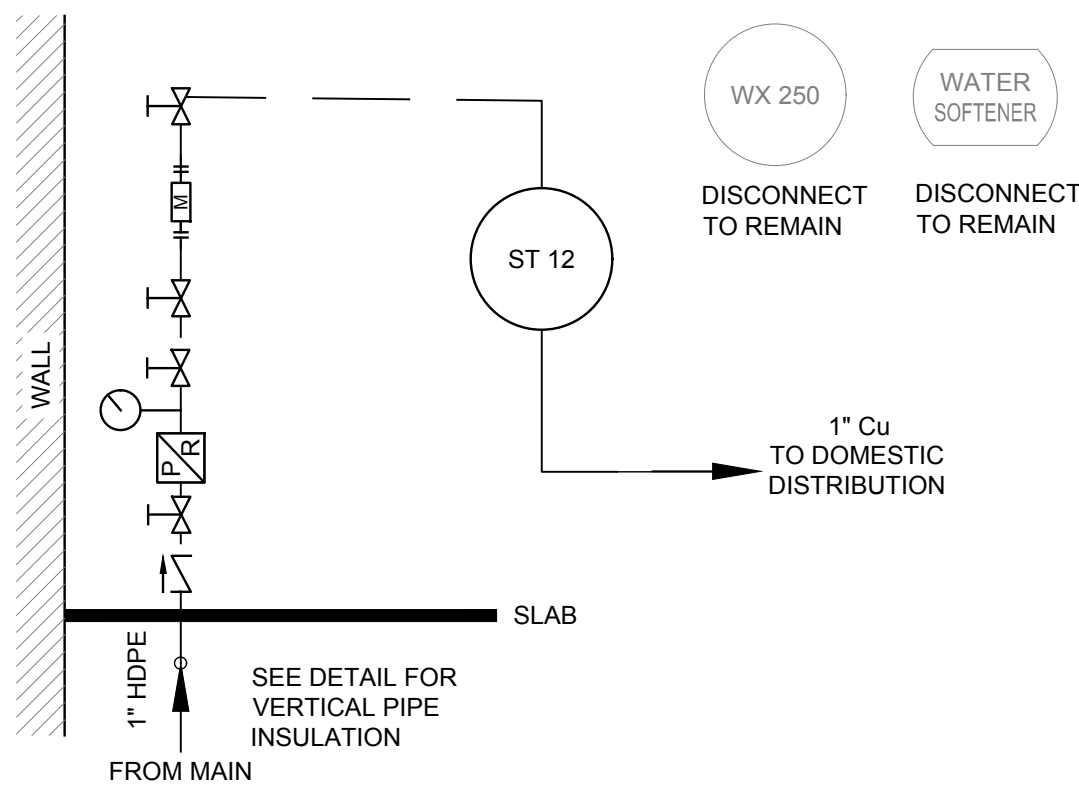
3 WATER SERVICE ENTRANCE DETAIL  
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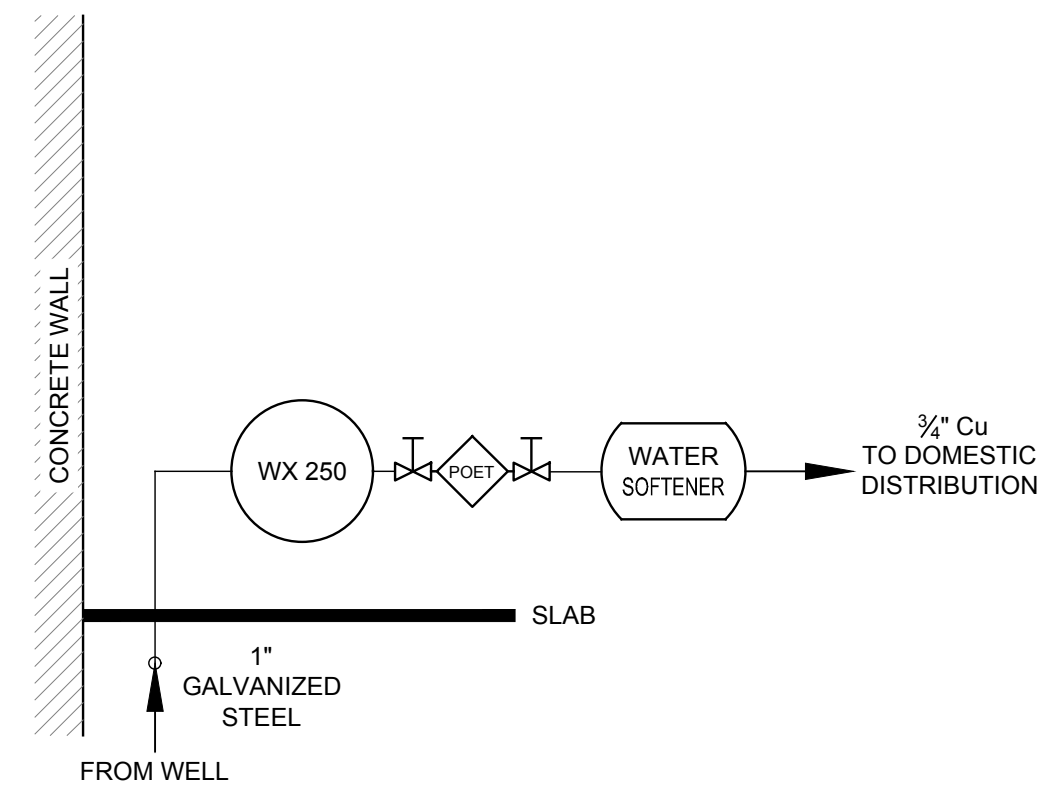
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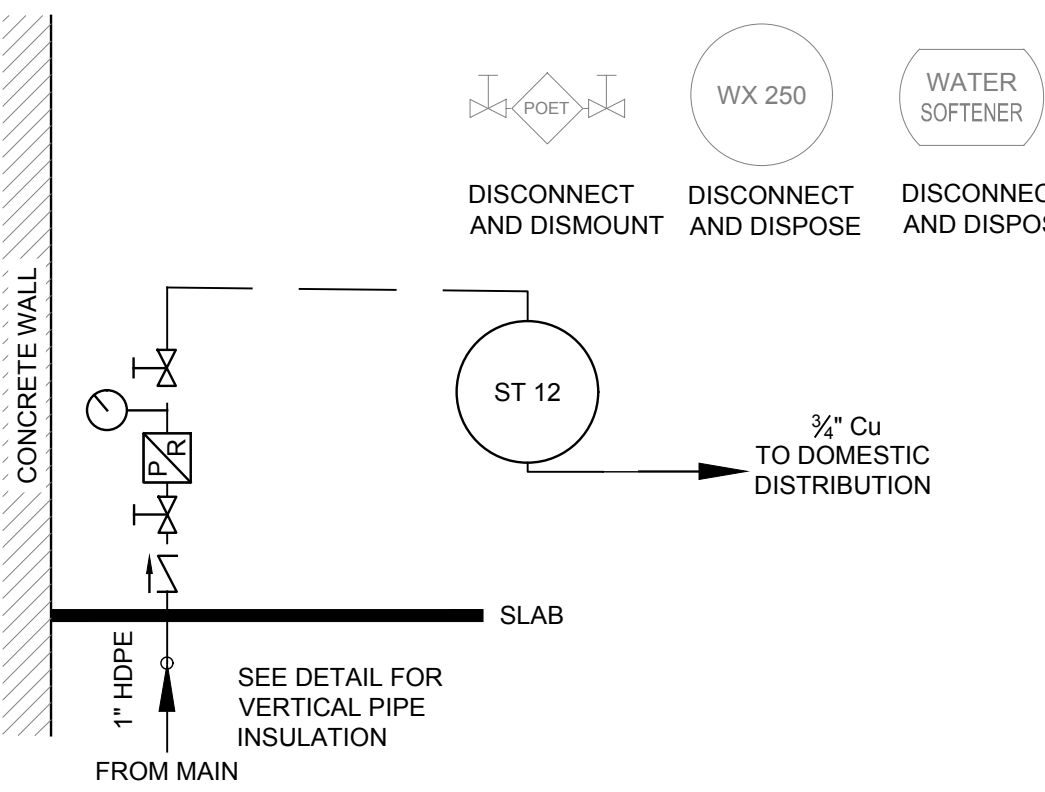
5 WATER SERVICE ENTRANCE DETAIL  
155 HARWOOD HILL RD (EXISTING) Scale: NTS



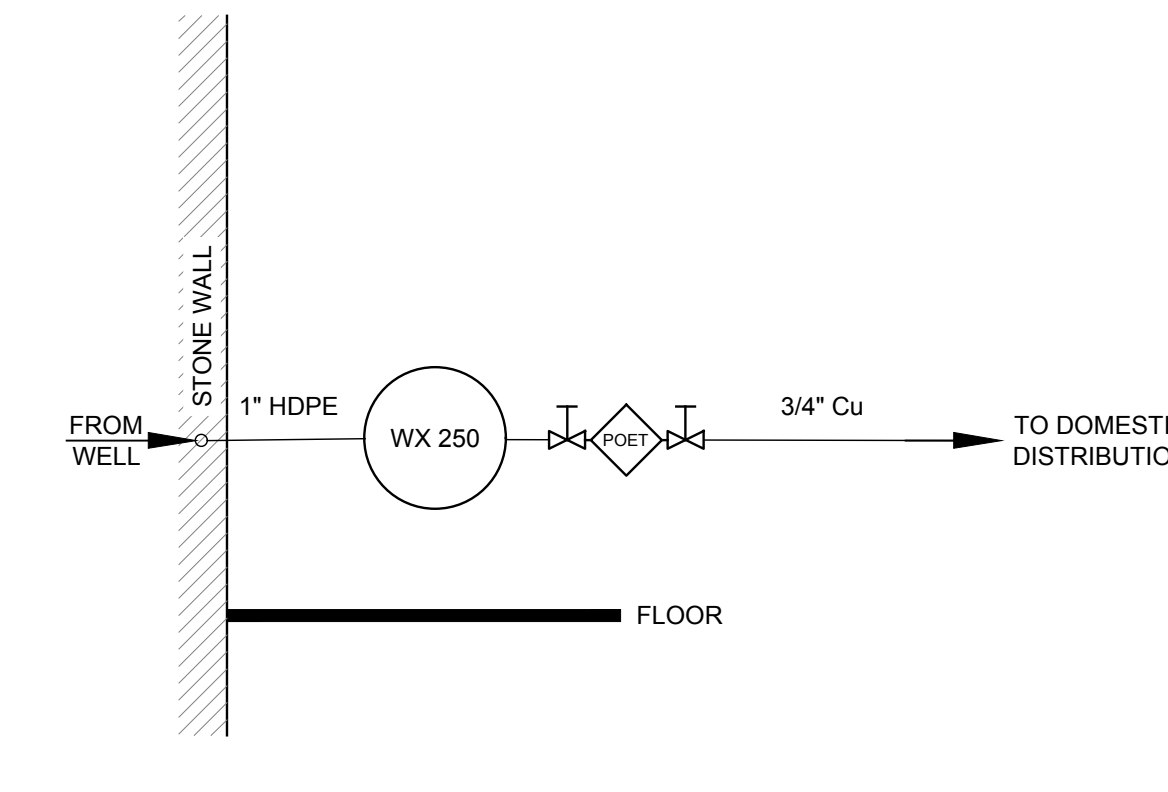
6 WATER SERVICE ENTRANCE DETAIL  
155 HARWOOD HILL RD (PROPOSED) Scale: NTS



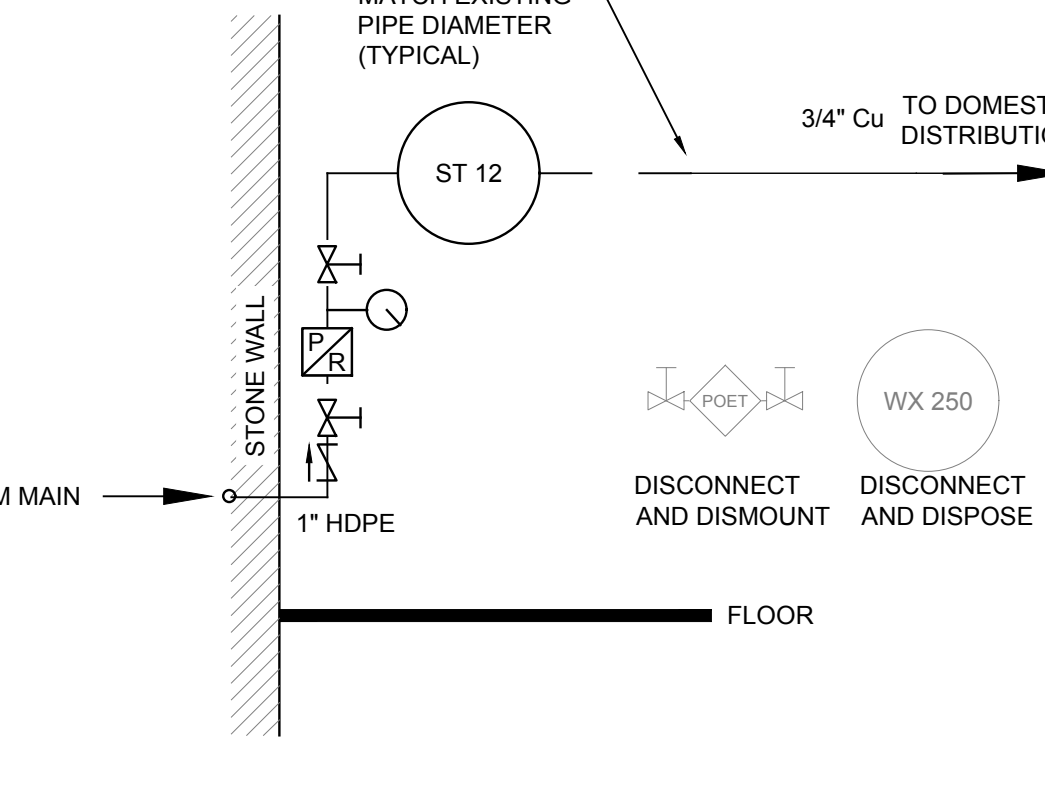
7 WATER SERVICE ENTRANCE DETAIL  
162 HARWOOD HILL RD (EXISTING) Scale: NTS



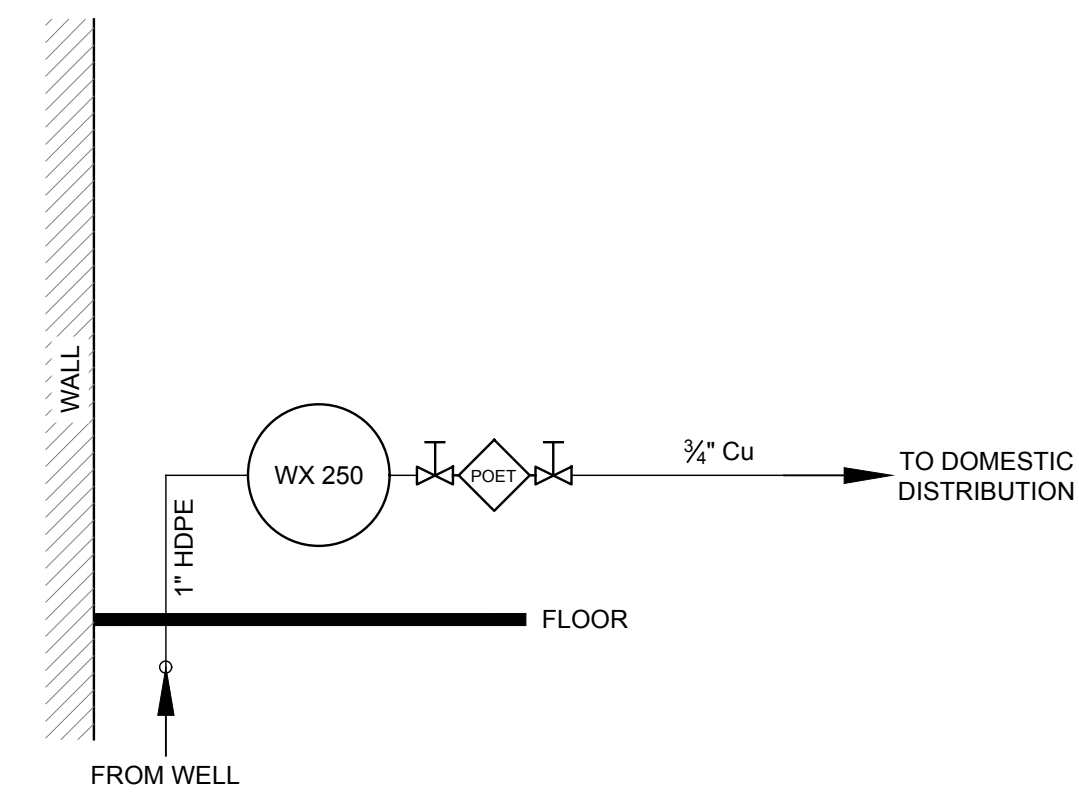
8 WATER SERVICE ENTRANCE DETAIL  
162 HARWOOD HILL RD (PROPOSED) Scale: NTS



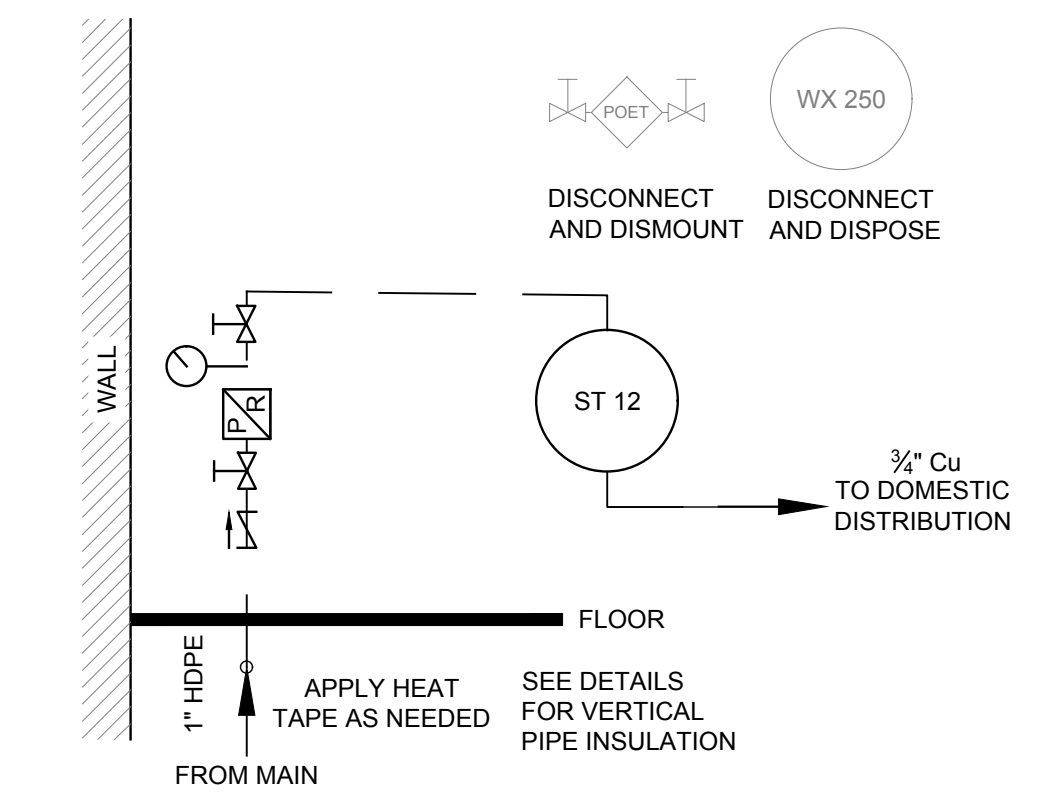
9 WATER SERVICE ENTRANCE DETAIL  
563 HARWOOD HILL RD (EXISTING) Scale: NTS



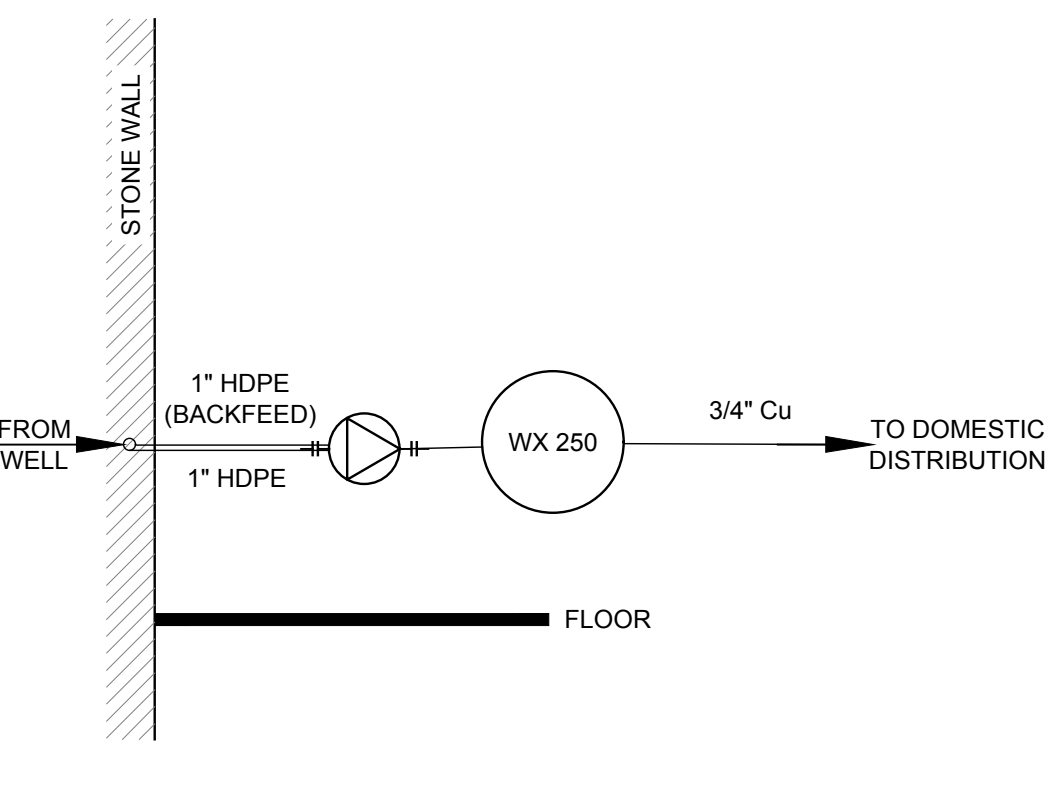
10 WATER SERVICE ENTRANCE DETAIL  
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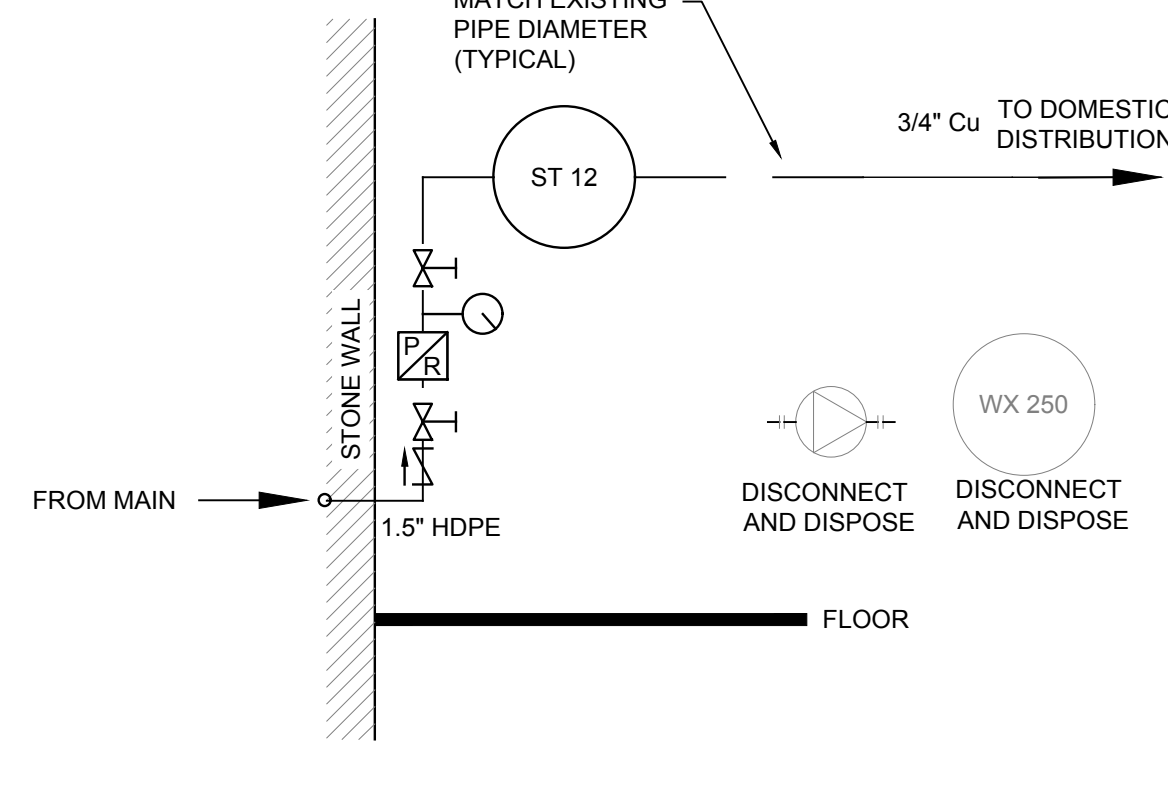
11 WATER SERVICE ENTRANCE DETAIL  
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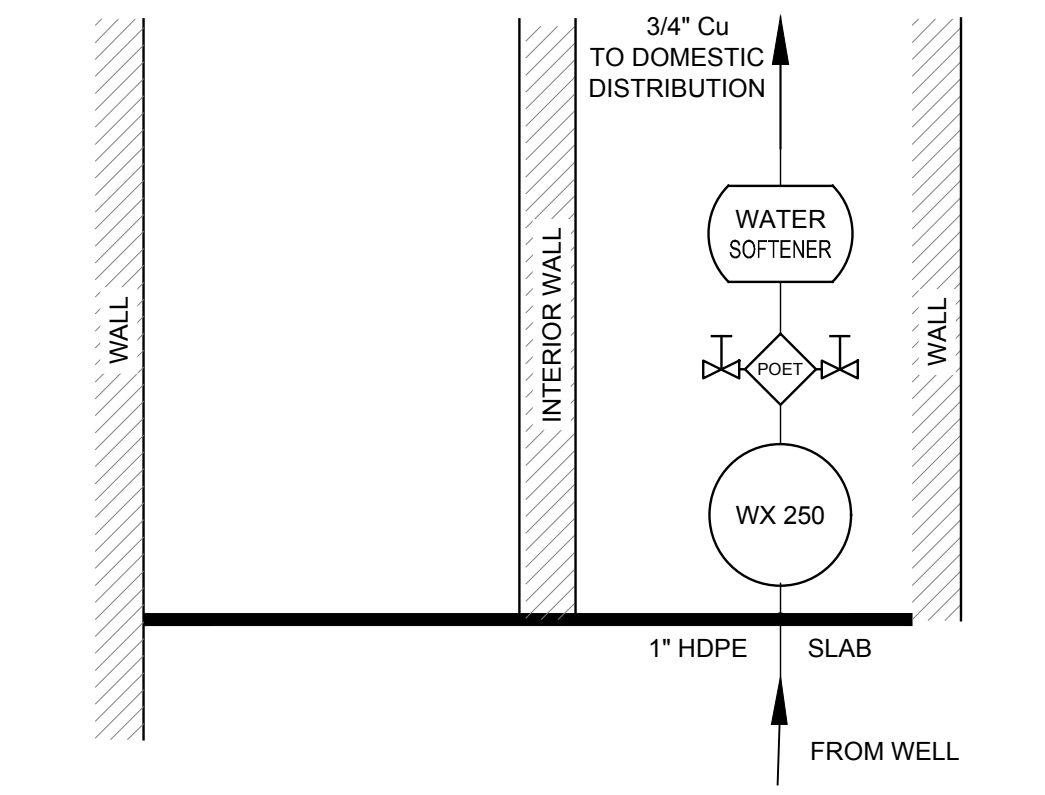
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583 HARWOOD HILL RD (PROPOSED) Scale: NTS



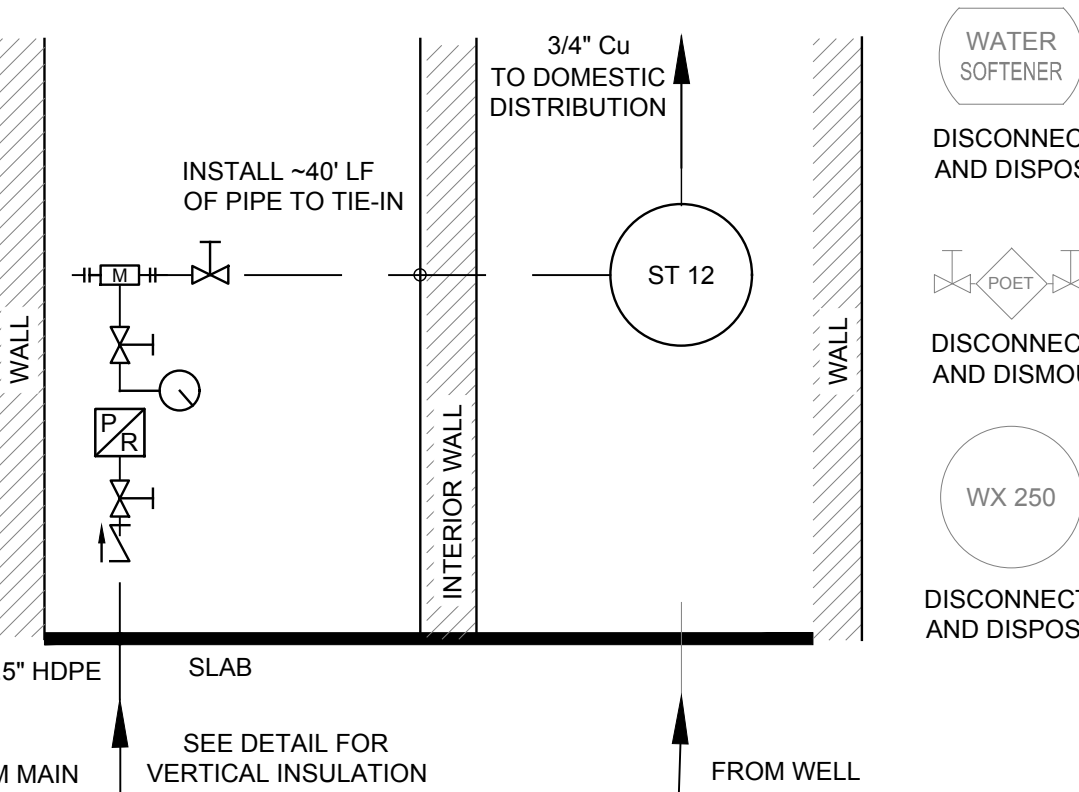
13 WATER SERVICE ENTRANCE DETAIL  
635 HARWOOD HILL RD (EXISTING) Scale: NTS



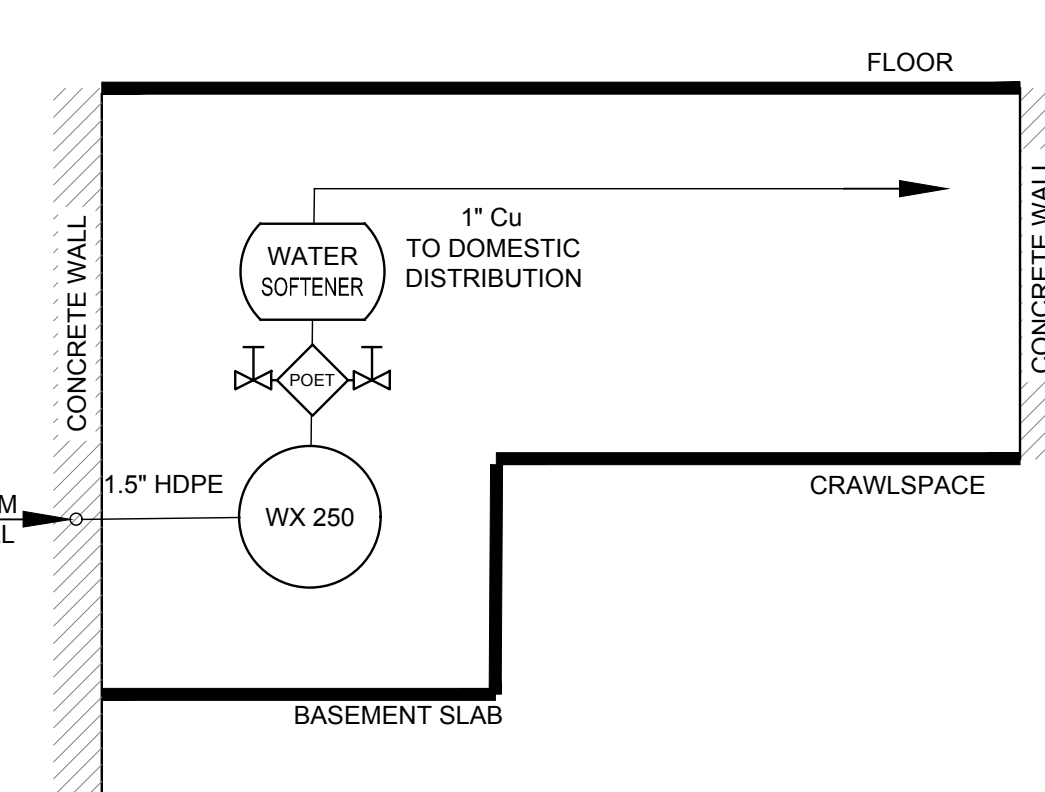
14 WATER SERVICE ENTRANCE DETAIL  
635 HARWOOD HILL RD (PROPOSED) Scale: NTS



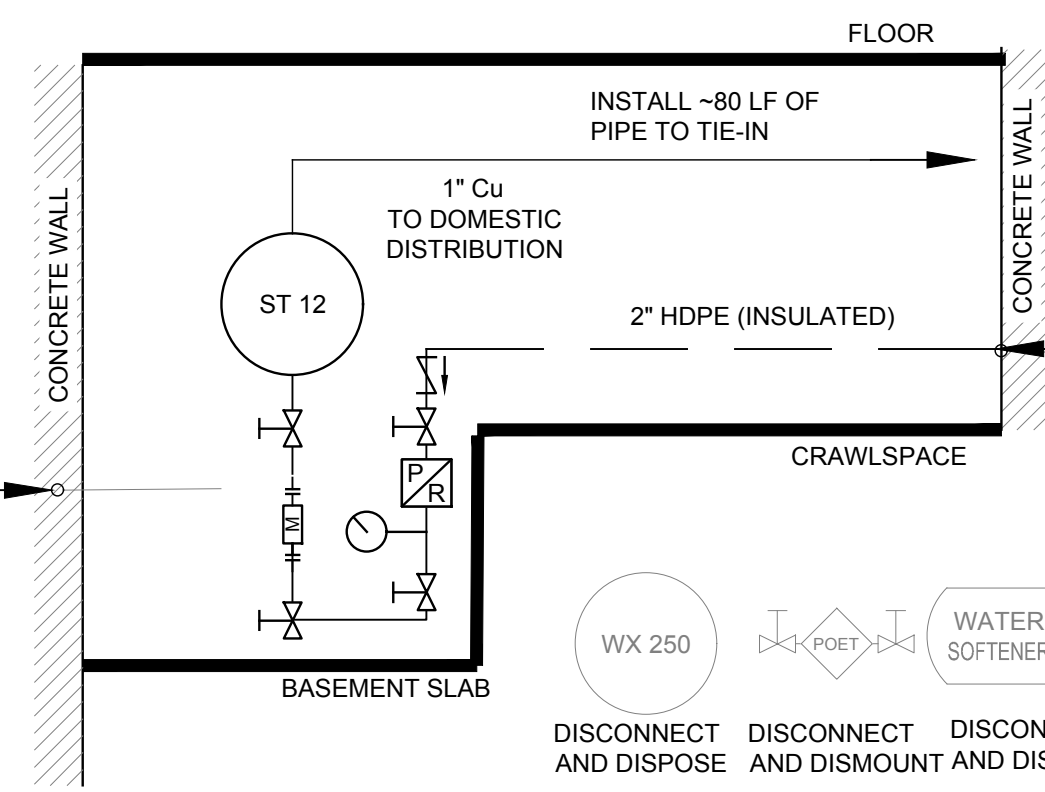
15 WATER SERVICE ENTRANCE DETAIL  
782 HARWOOD HILL RD (EXISTING) Scale: NTS



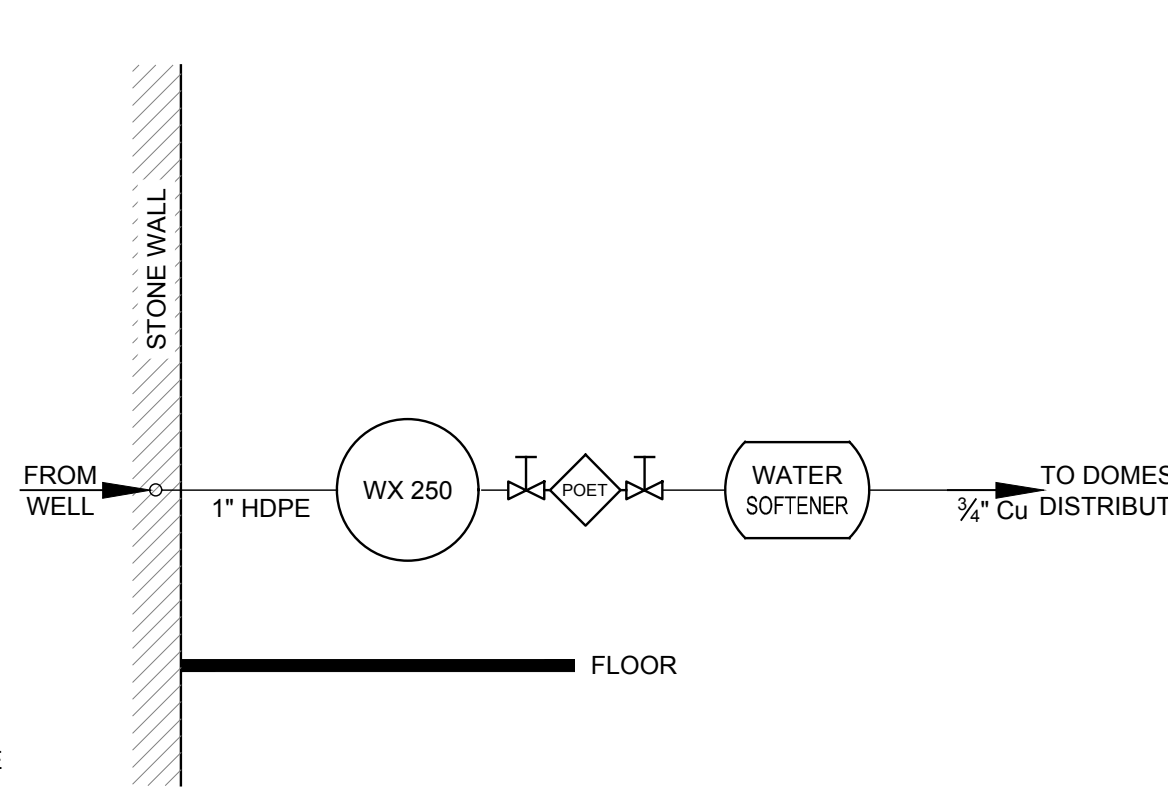
16 WATER SERVICE ENTRANCE DETAIL  
782 HARWOOD HILL RD (PROPOSED) Scale: NTS



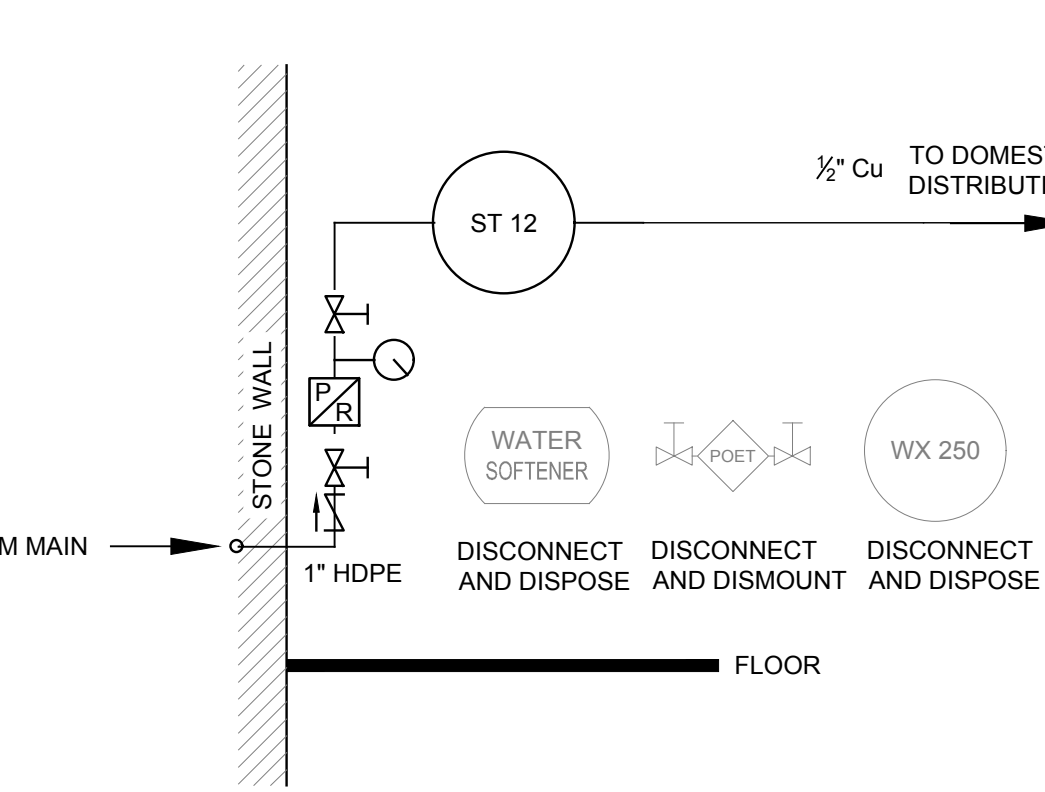
17 WATER SERVICE ENTRANCE DETAIL  
864 HARWOOD HILL RD (EXISTING) Scale: NTS



18 WATER SERVICE ENTRANCE DETAIL  
864 HARWOOD HILL RD (PROPOSED) Scale: NTS



19 WATER SERVICE ENTRANCE DETAIL  
1042 HARWOOD HILL RD (EXISTING) Scale: NTS



20 WATER SERVICE ENTRANCE DETAIL  
1042 HARWOOD HILL RD (PROPOSED) Scale: NTS

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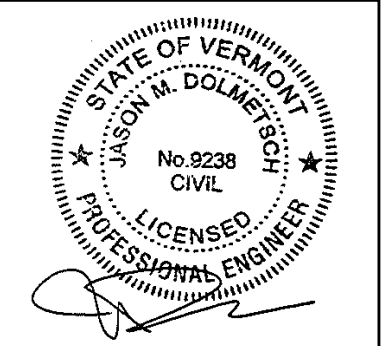
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
CONTRACT 5  
SERVICE ENTRANCE  
DIAGRAMS

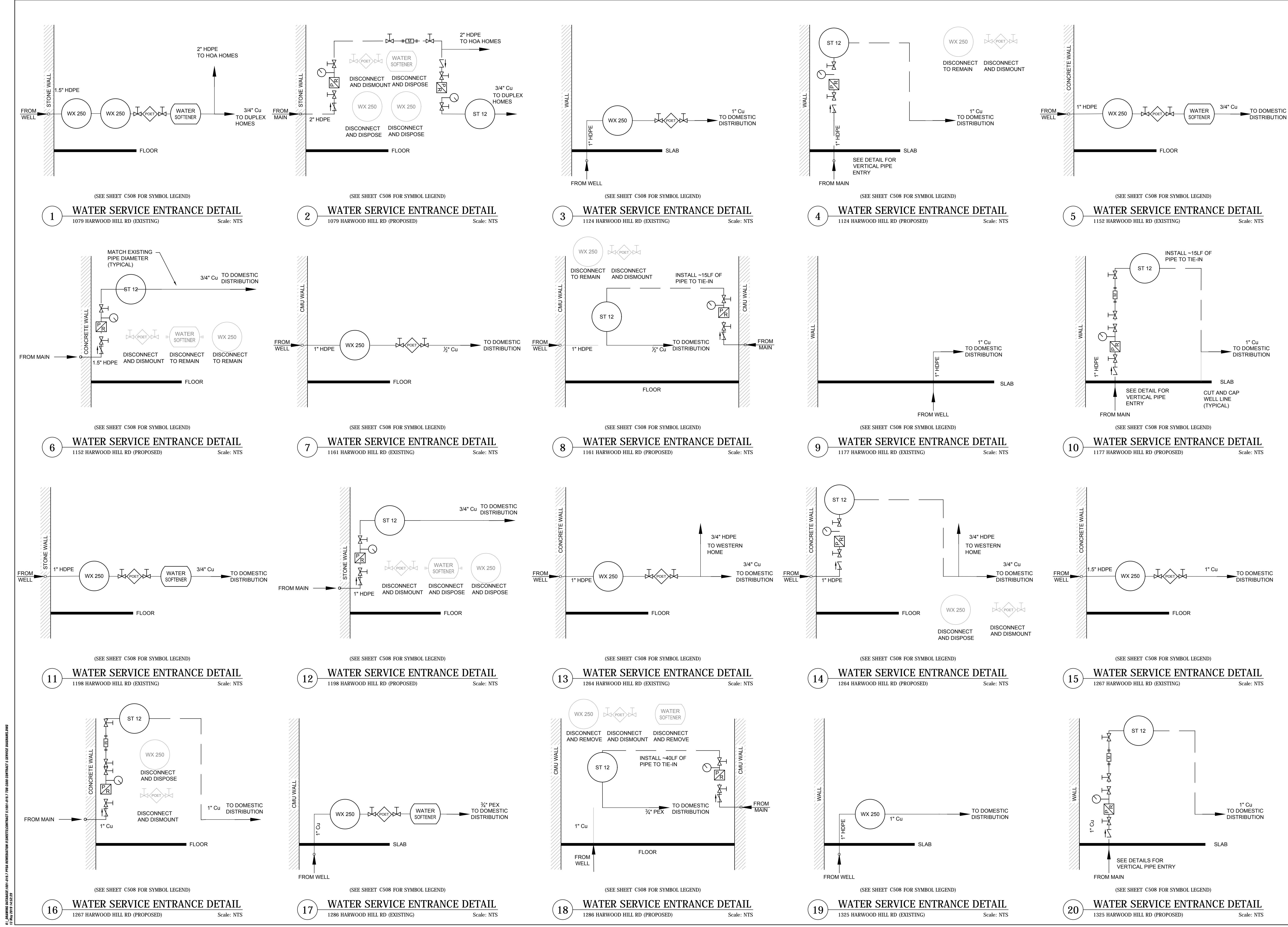
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C601**



ALL DRAWING INFORMATION FROM 2018-2019 VERMONT REMEDIATION MARKET CONTRACT 51001-019.7 FROM CONTRACT 5 SERVICE DIAGRAM.DWG  
 2 May 2019 14:02:50





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BENNINGTON, VERMONT 05201  
PH: (802) 441-1402 FAX: (802) 445-1291

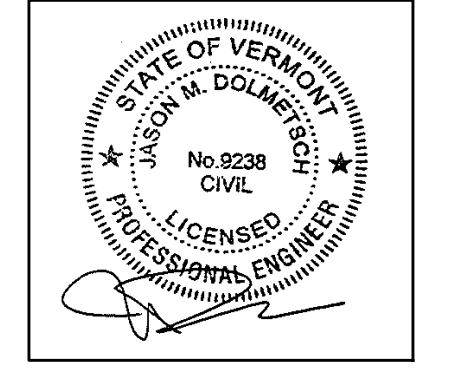
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
CONTRACT 5  
SERVICE ENTRANCE  
DIAGRAMS

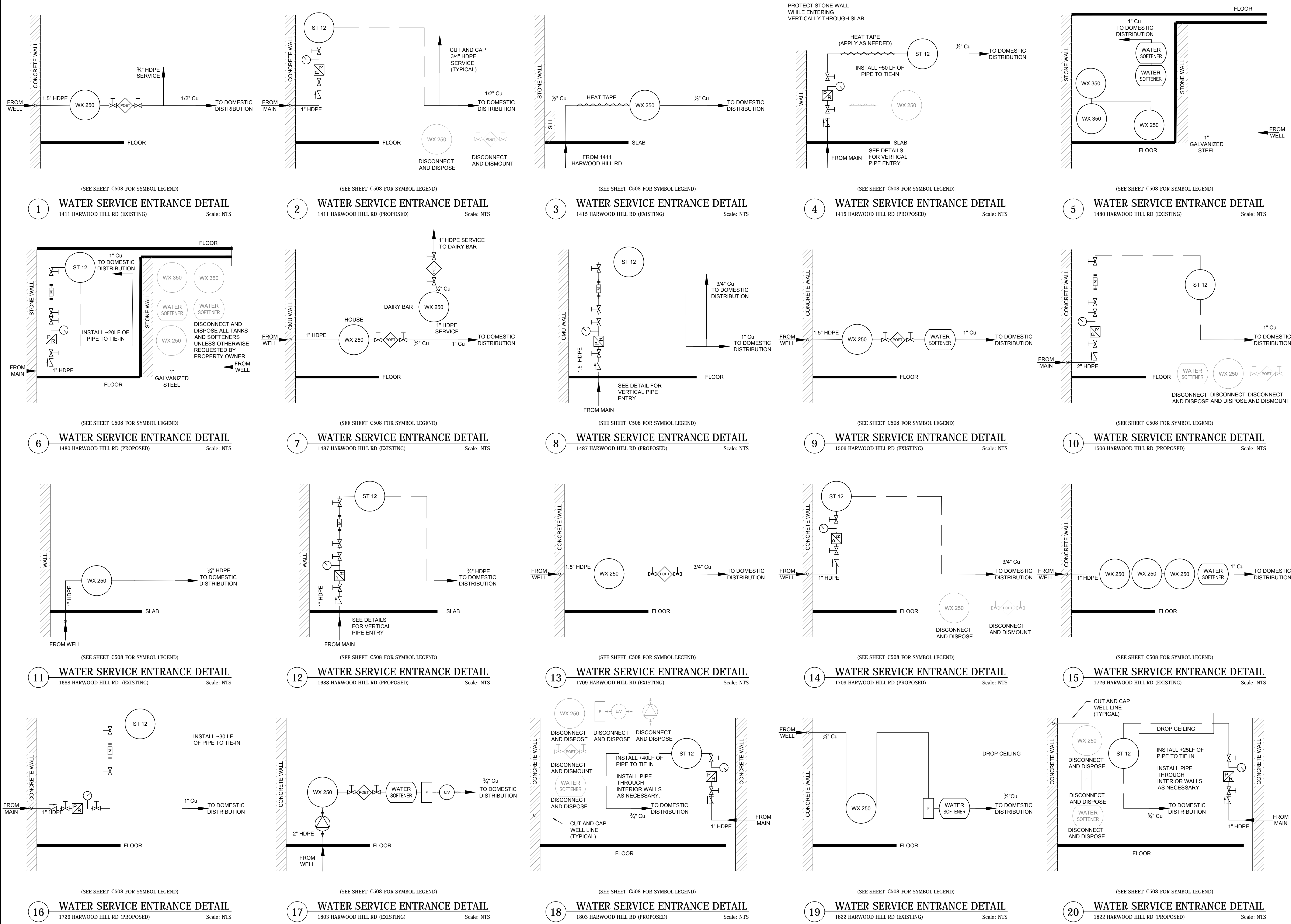
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DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C602**



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P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

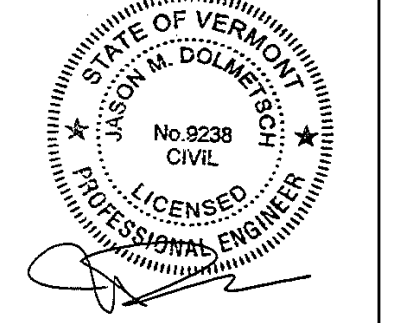
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

CONTRACT 5  
SERVICE ENTRANCE  
DIAGRAMS

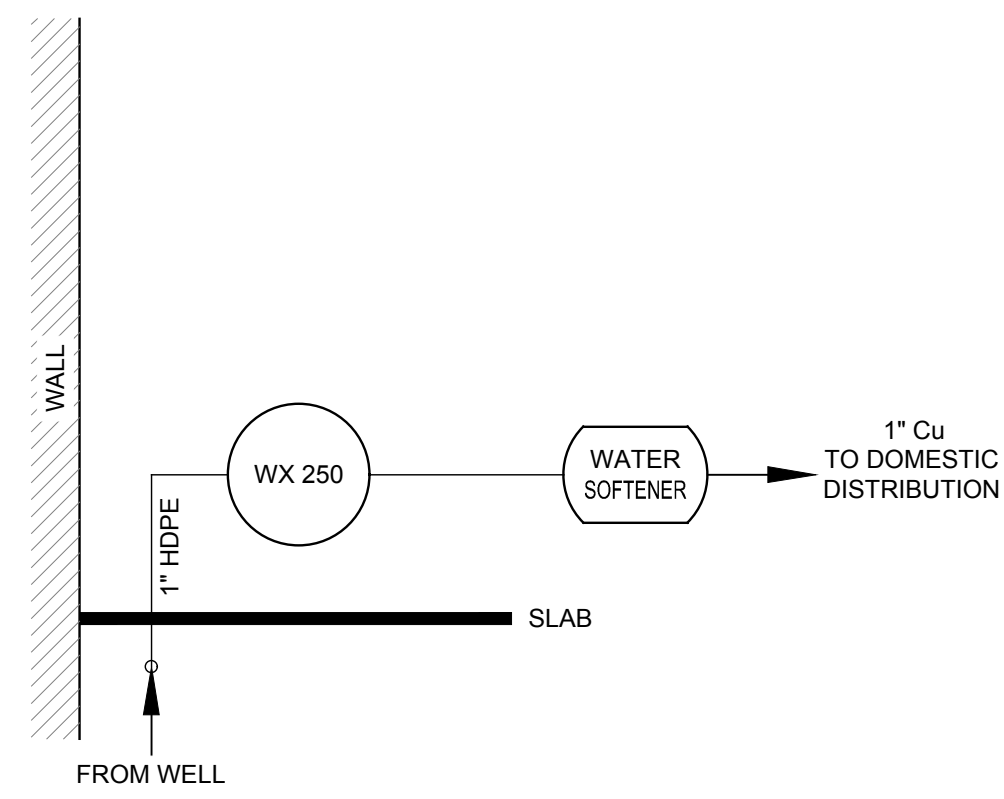
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DRAWN	CHECKED
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SHEET NUMBER  
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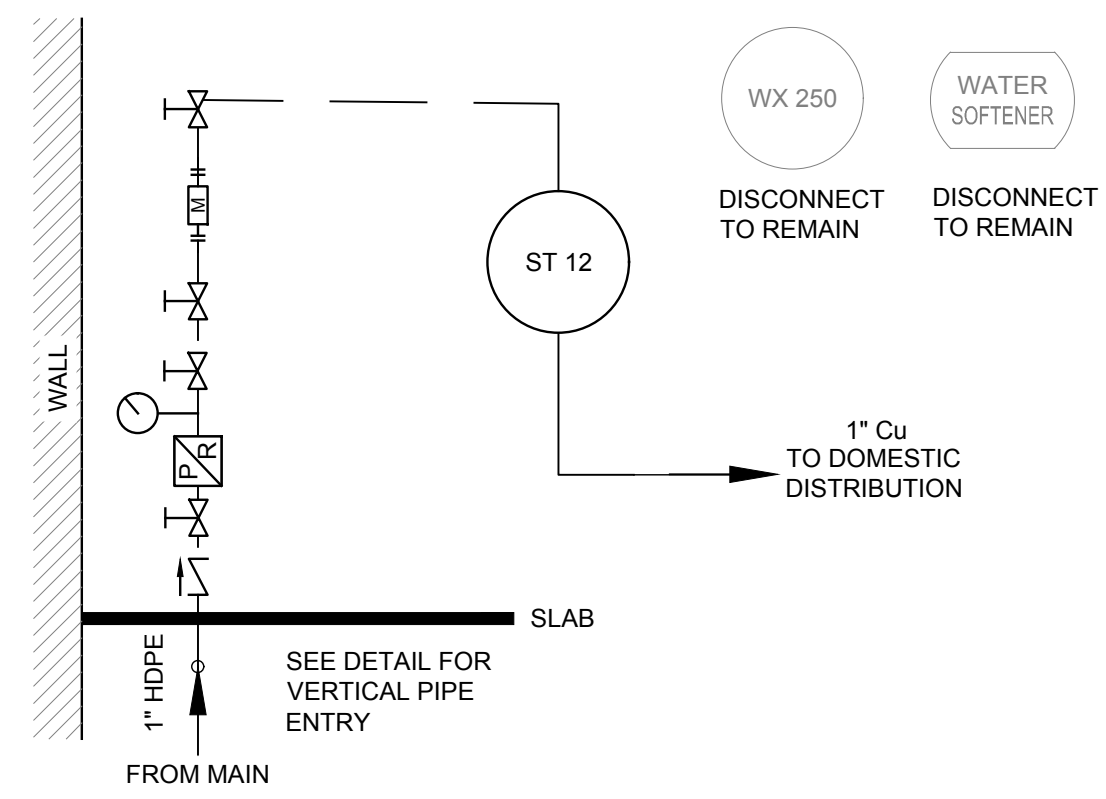


1. DRAWING DATE: 05/14/2019 2. PLOTTED DATE: 05/14/2019 3. PLOTTER: HP DesignJet T1100 4. PLOT SCALE: 1/8" = 1'-0" 5. PLOT SHEET: C603 6. PLOT SHEET COUNT: 20 7. PLOT SHEET TOTAL: 20 8. PLOT SHEET ORDER: 1-20 9. PLOT SHEET SIZE: 36" x 48" 10. PLOT SHEET ORIENTATION: Landscape 11. PLOT SHEET MARGIN: 1/2" 12. PLOT SHEET TITLE: CONTRACT 5 SERVICE ENTRANCE DIAGRAMS 13. PLOT SHEET NUMBER: C603 14. PLOT SHEET TOTAL: 20 15. PLOT SHEET ORDER: 1-20 16. PLOT SHEET SIZE: 36" x 48" 17. PLOT SHEET ORIENTATION: Landscape 18. PLOT SHEET MARGIN: 1/2"

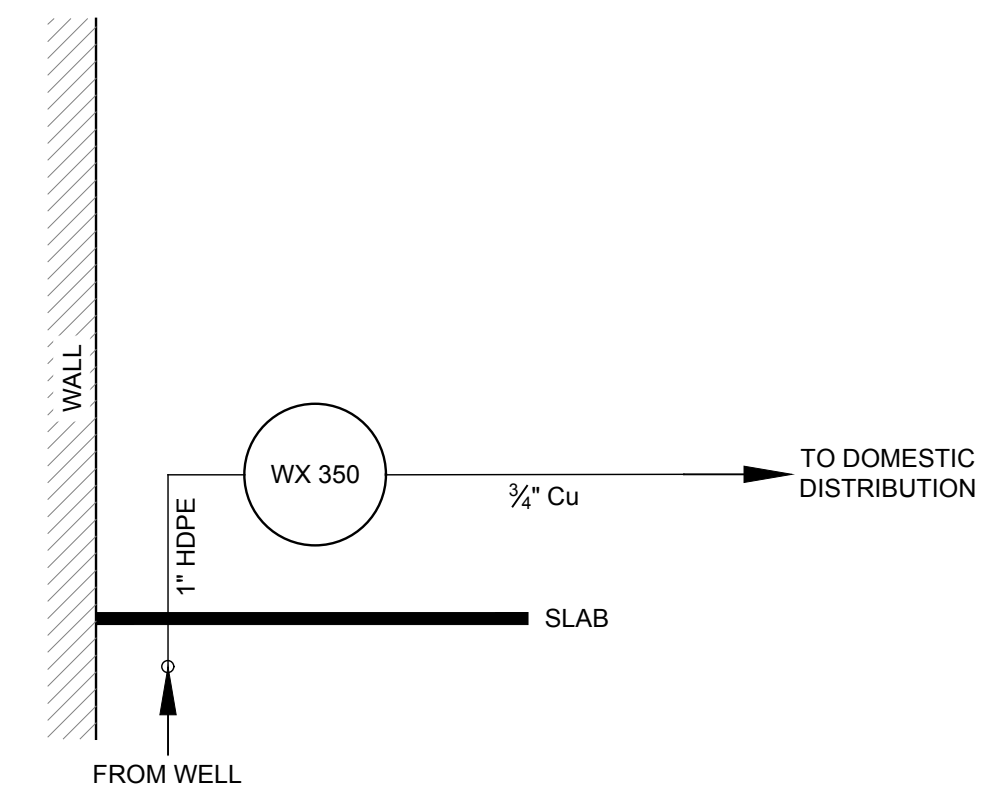




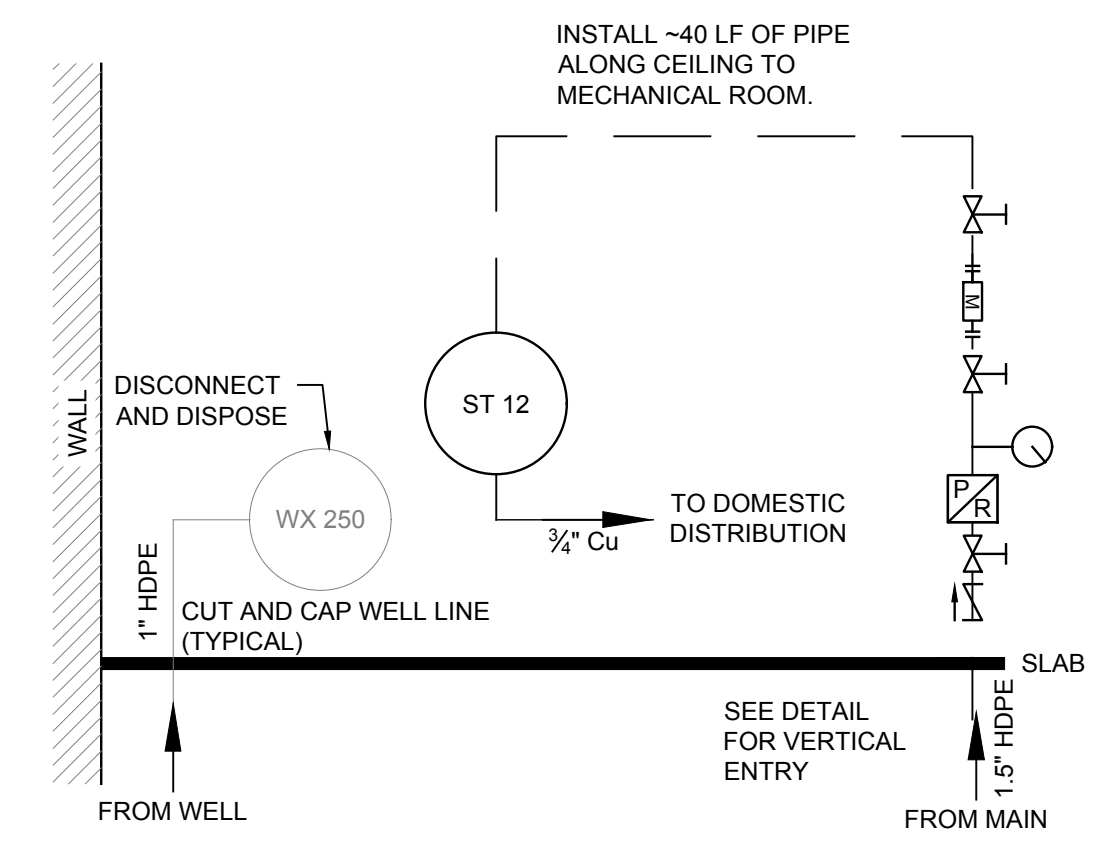
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1868 HARWOOD HILL RD (EXISTING) Scale: NTS



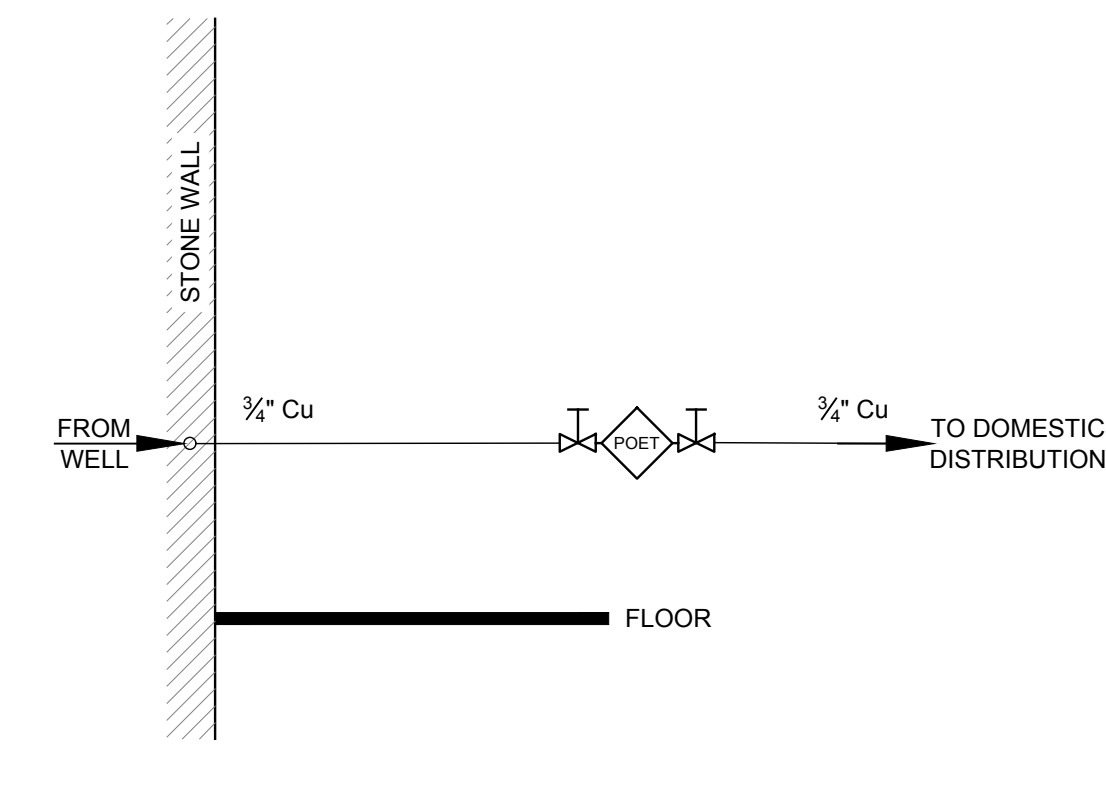
2 WATER SERVICE ENTRANCE DETAIL  
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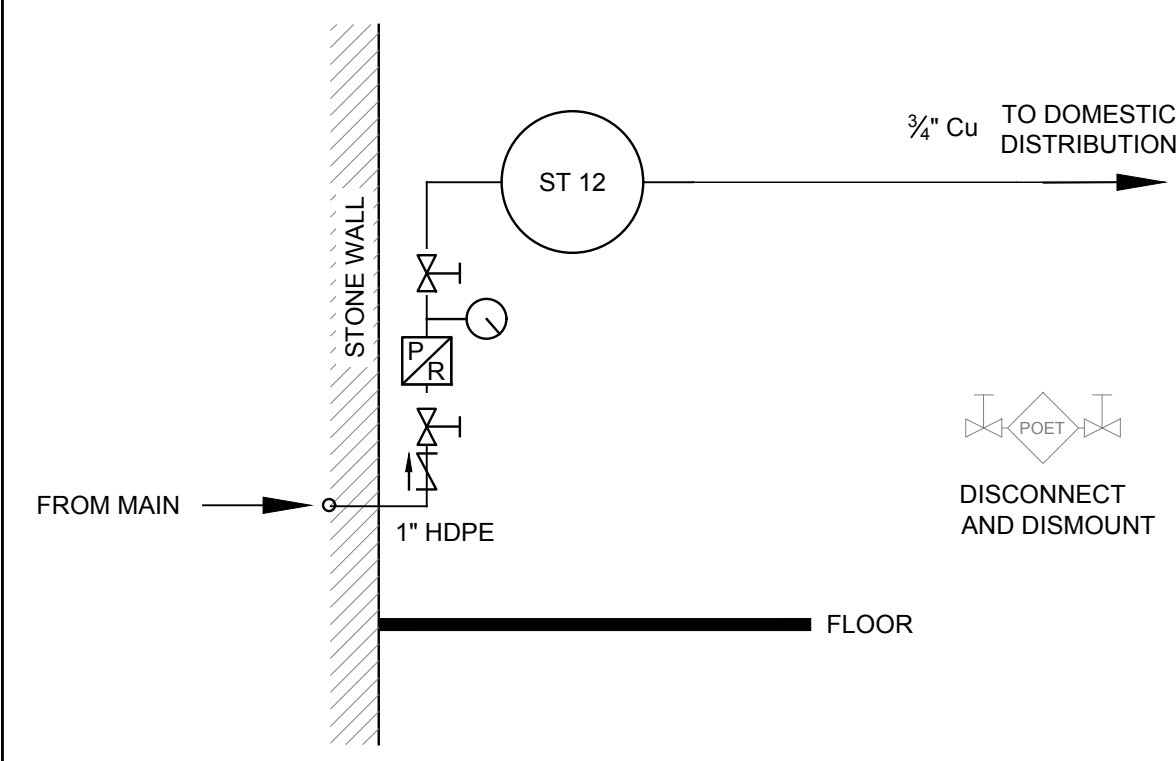
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1896 HARWOOD HILL RD (EXISTING) Scale: NTS



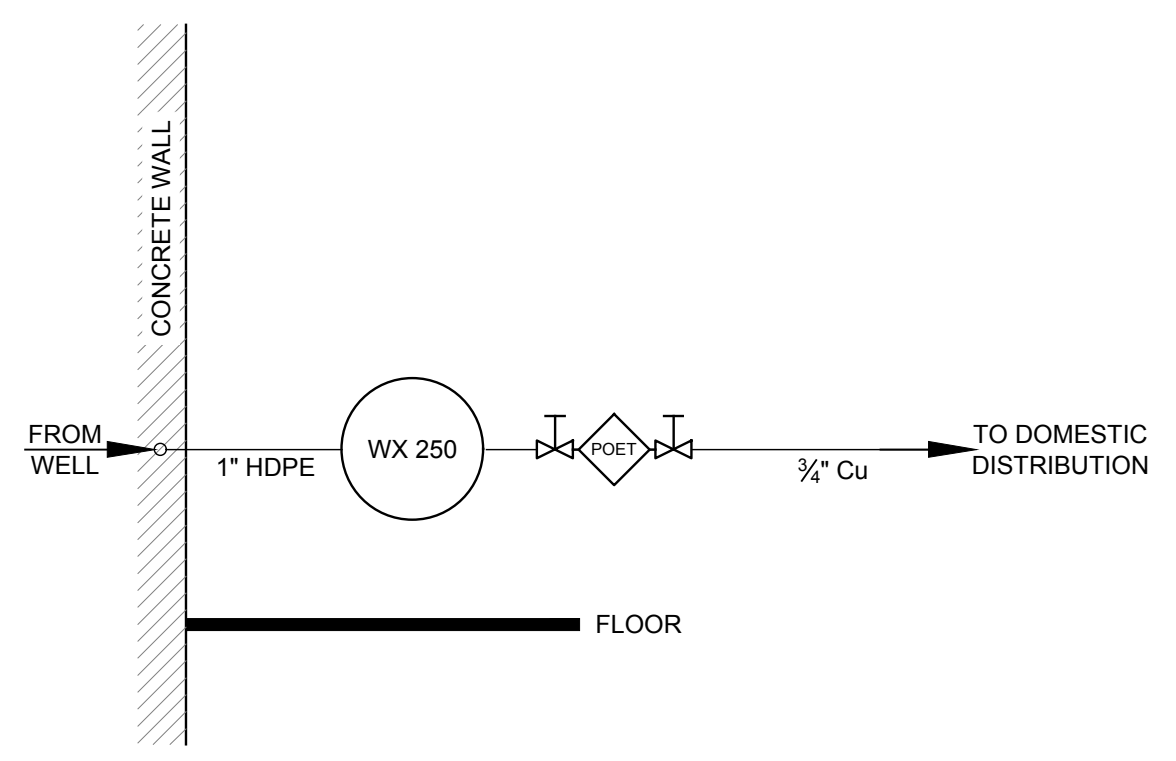
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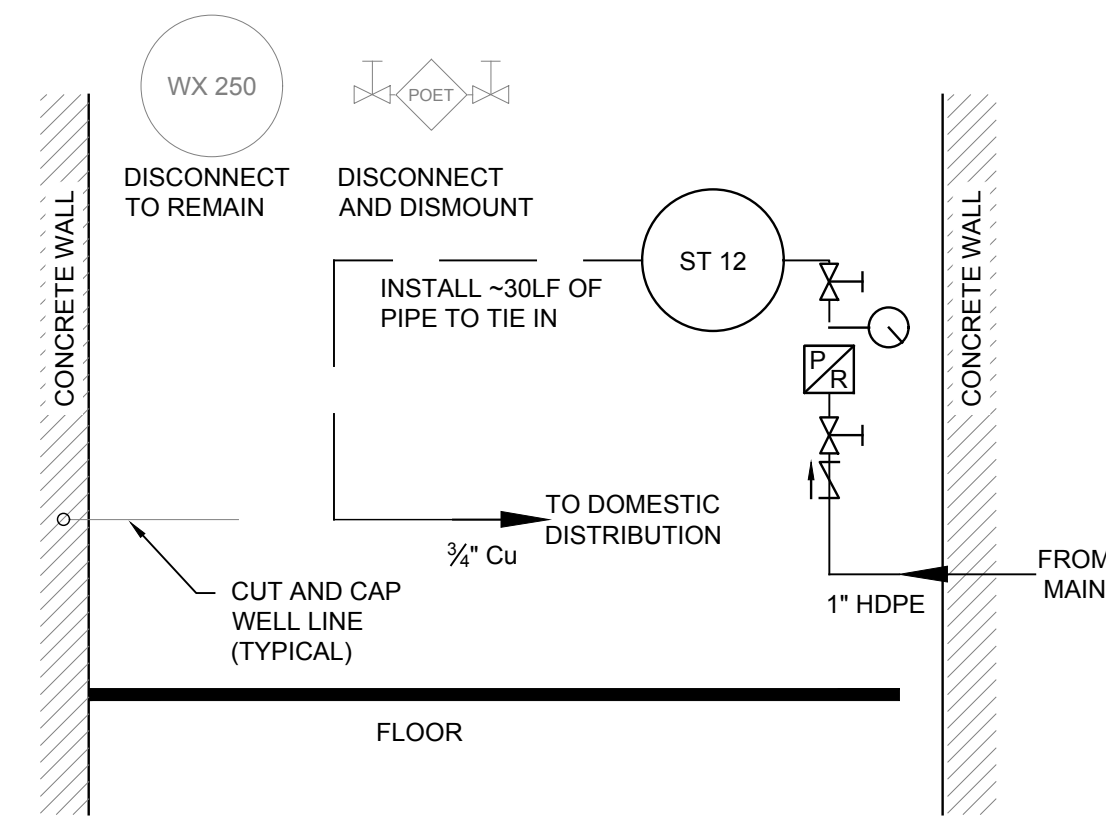
5 WATER SERVICE ENTRANCE DETAIL  
1905 HARWOOD HILL RD (EXISTING) Scale: NTS



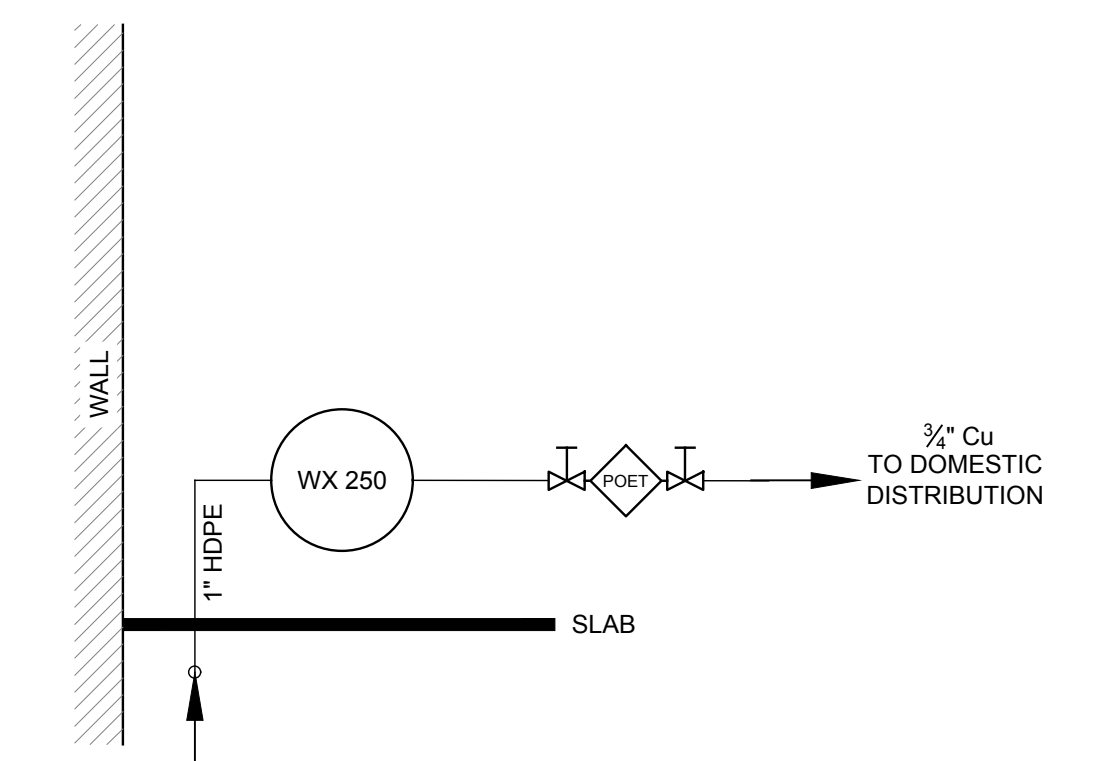
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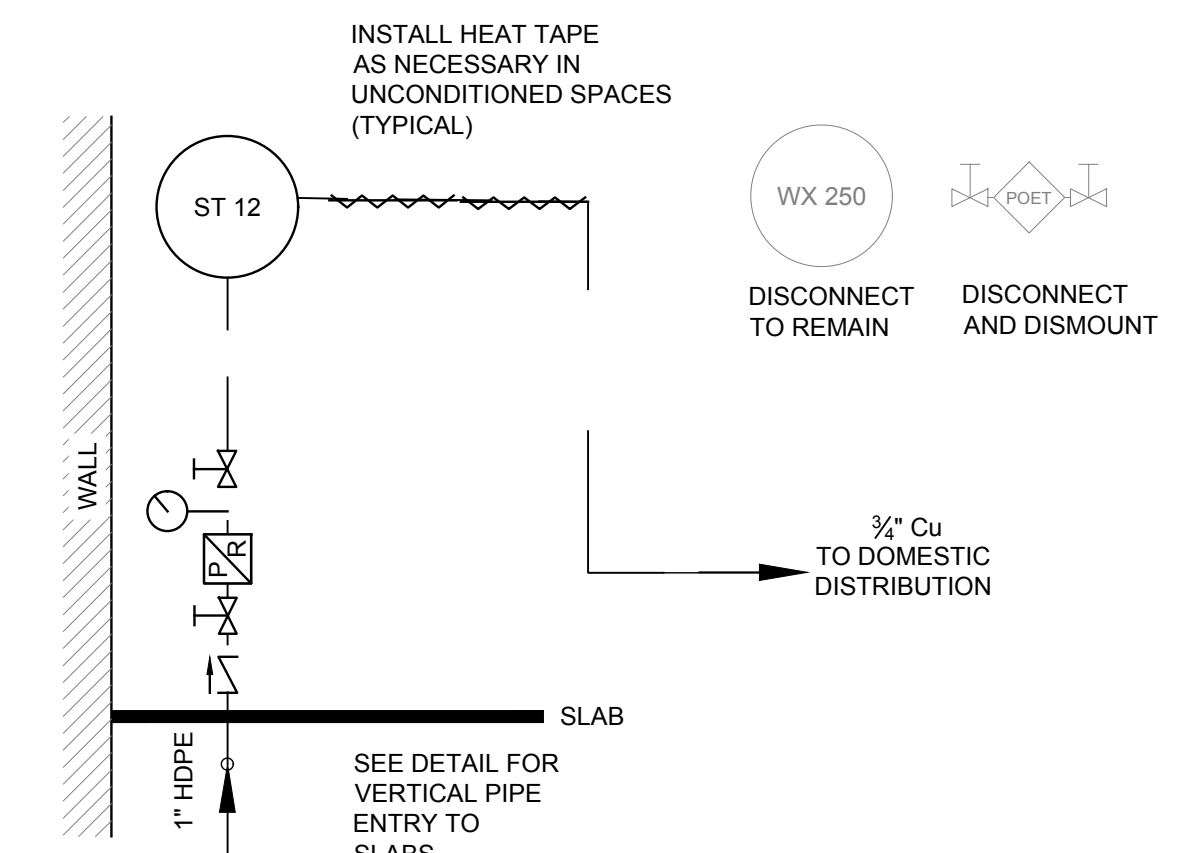
7 WATER SERVICE ENTRANCE DETAIL  
82 TRANSPORT DR (EXISTING) Scale: NTS



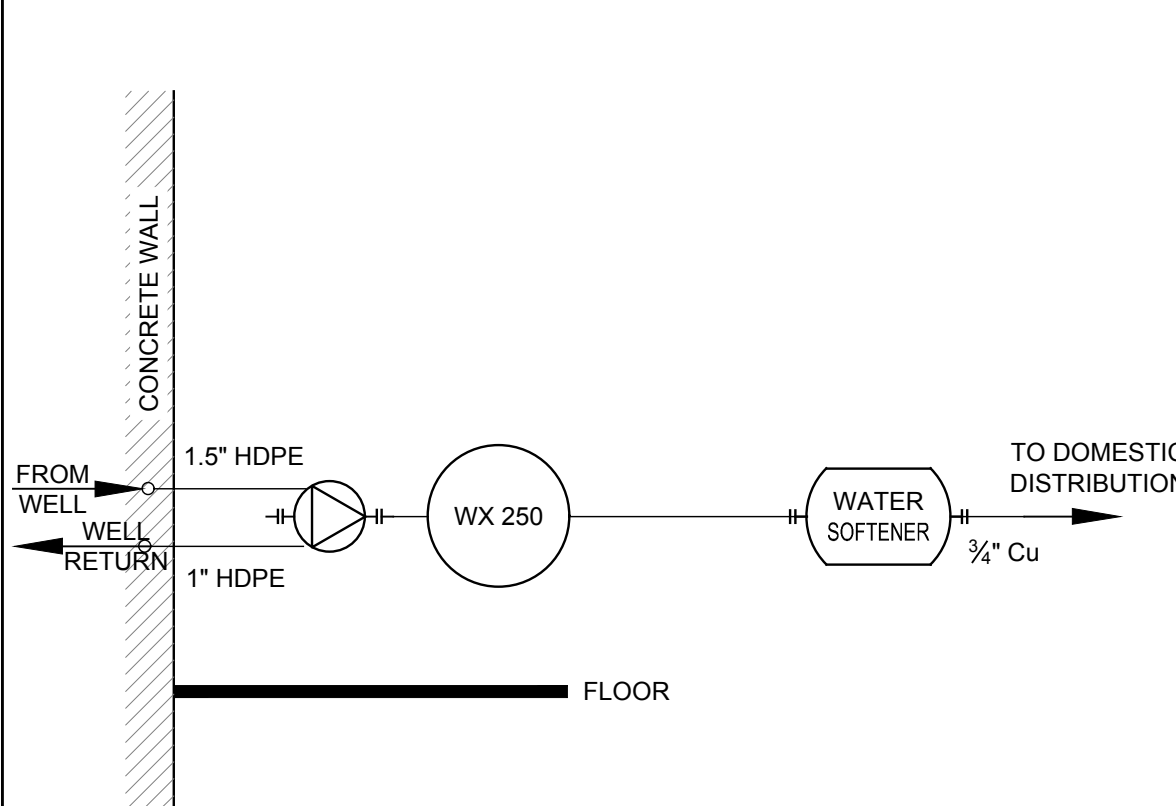
8 WATER SERVICE ENTRANCE DETAIL  
82 TRANSPORT DR (PROPOSED) Scale: NTS



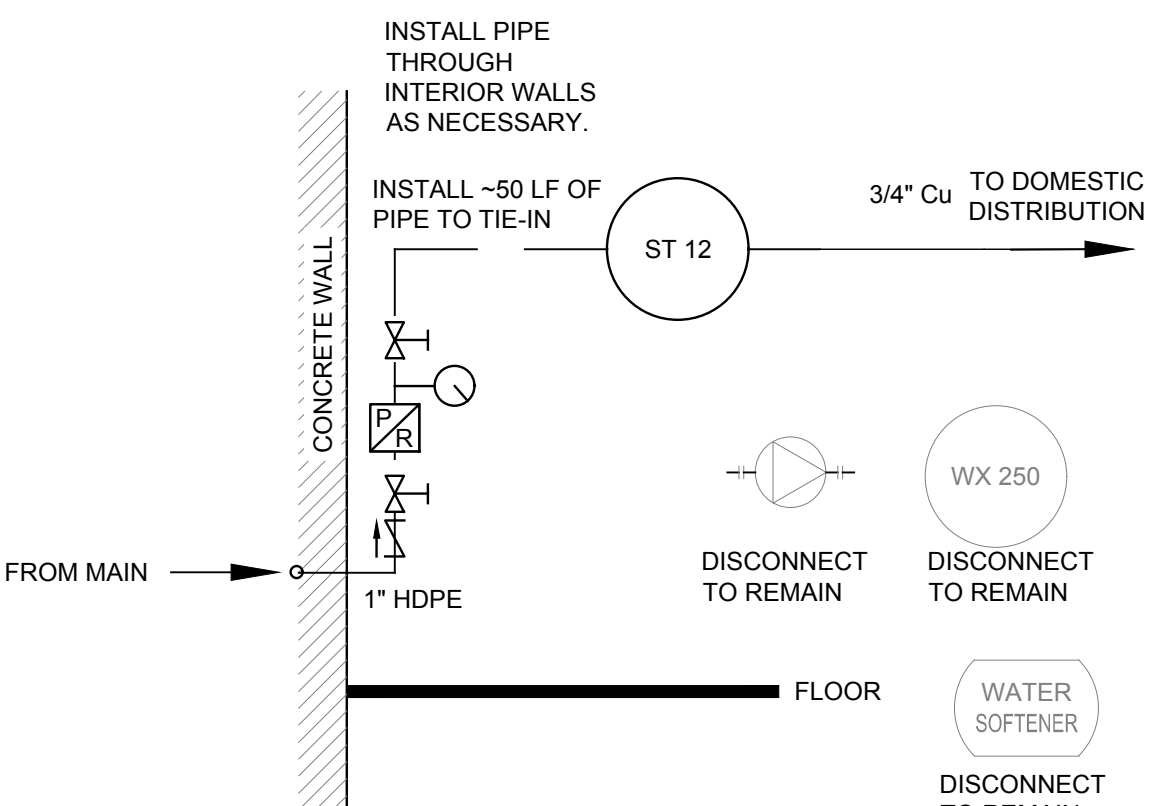
9 WATER SERVICE ENTRANCE DETAIL  
13 SETTLERS RD (EXISTING) Scale: NTS



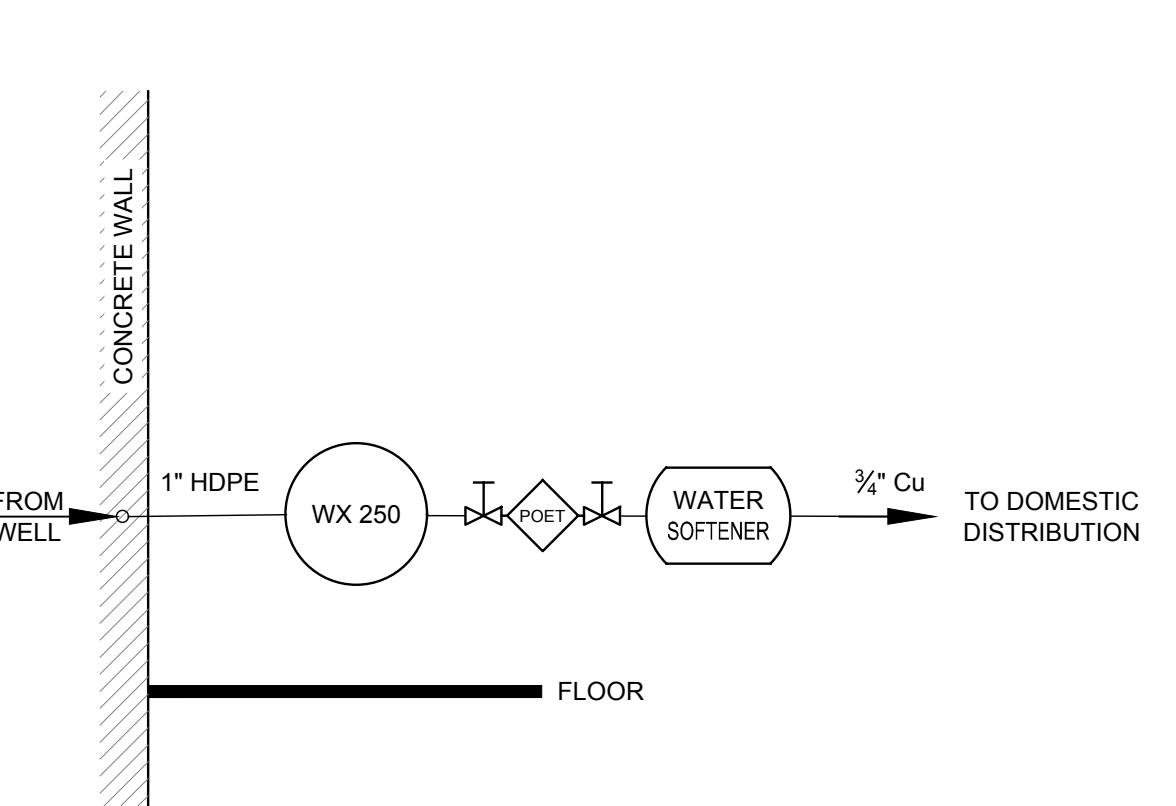
10 WATER SERVICE ENTRANCE DETAIL  
13 SETTLERS RD (PROPOSED) Scale: NTS



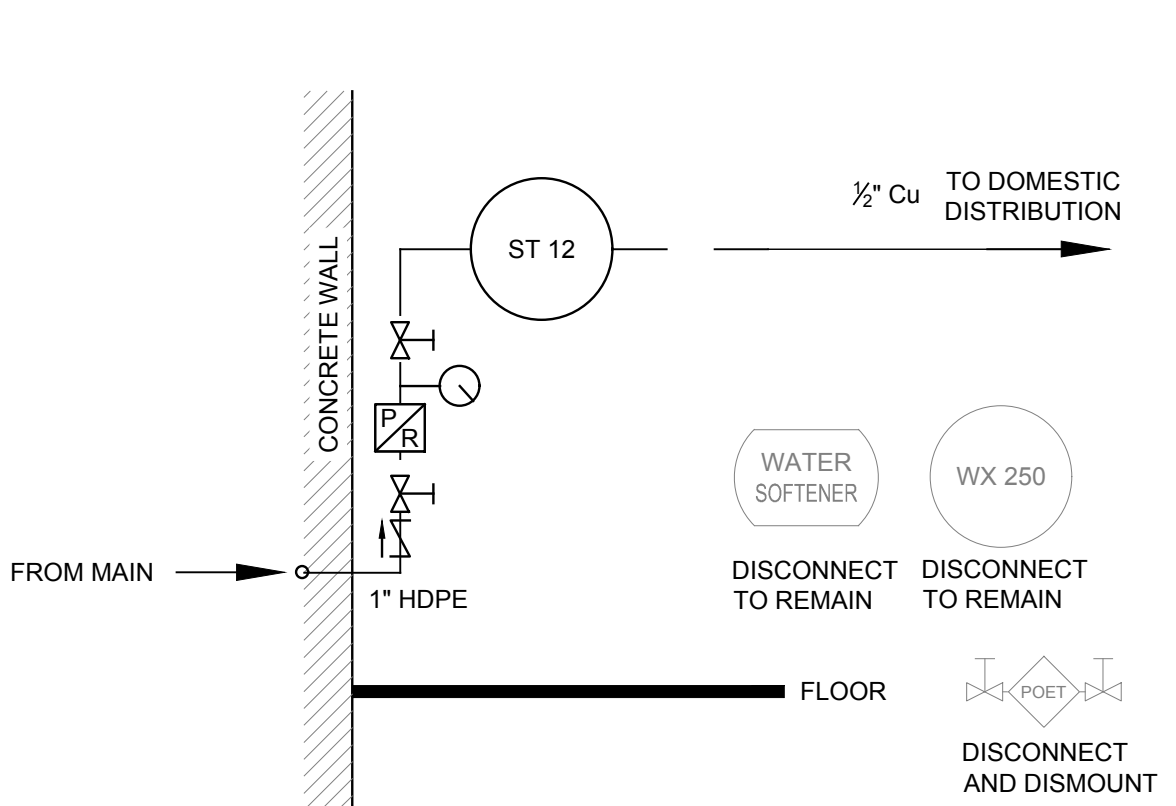
11 WATER SERVICE ENTRANCE DETAIL  
24 SETTLERS RD (EXISTING) Scale: NTS



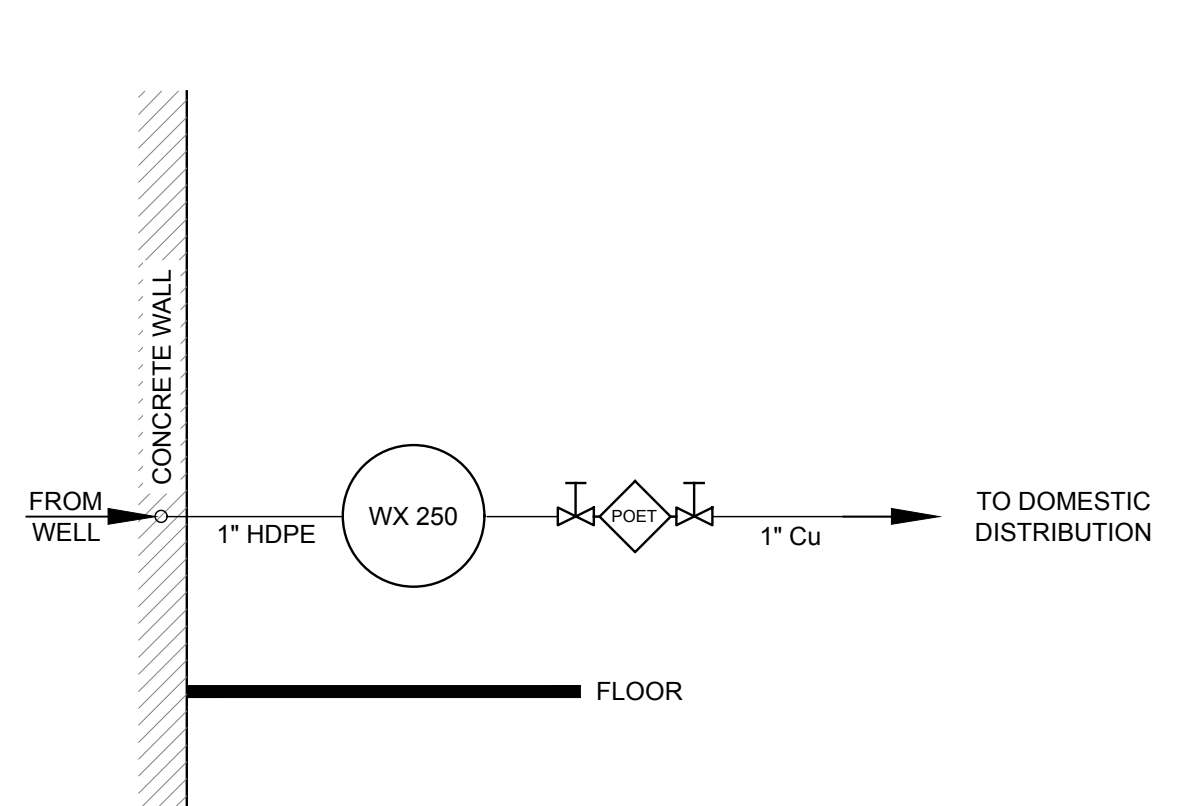
12 WATER SERVICE ENTRANCE DETAIL  
24 SETTLERS RD (PROPOSED) Scale: NTS



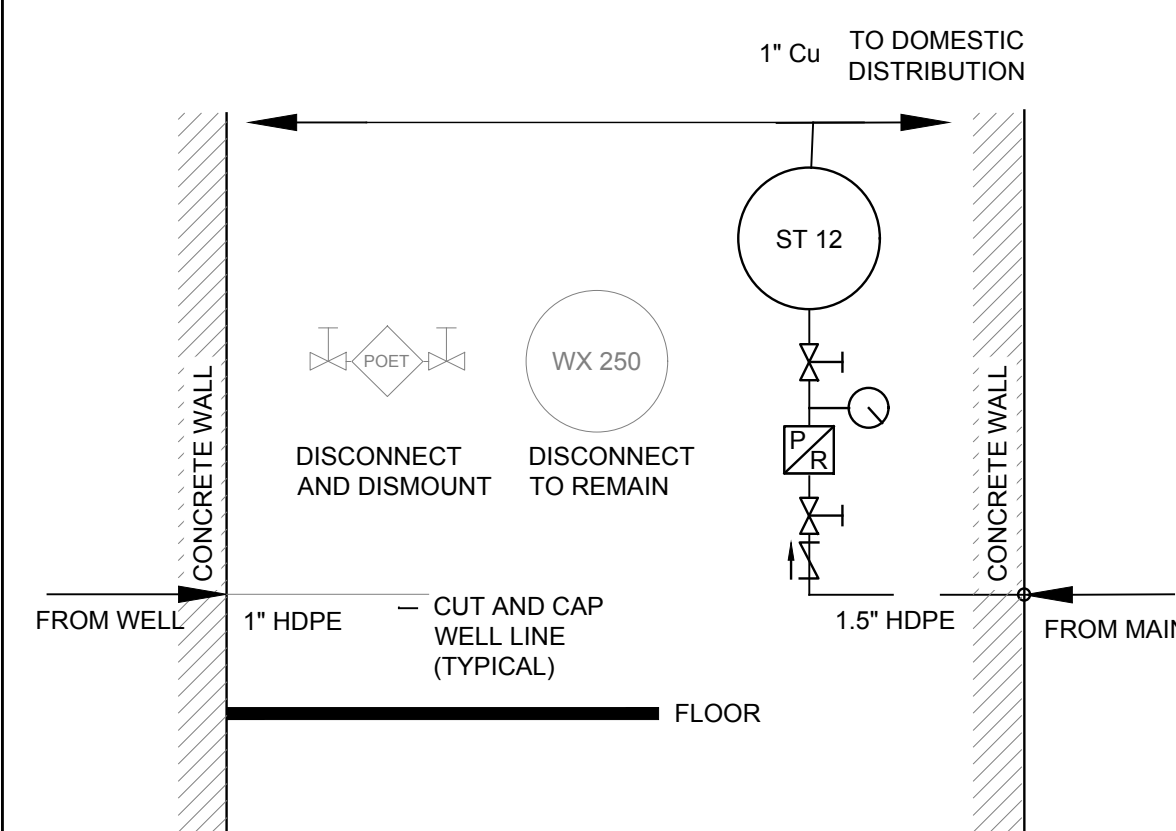
13 WATER SERVICE ENTRANCE DETAIL  
59 SETTLERS RD (EXISTING) Scale: NTS



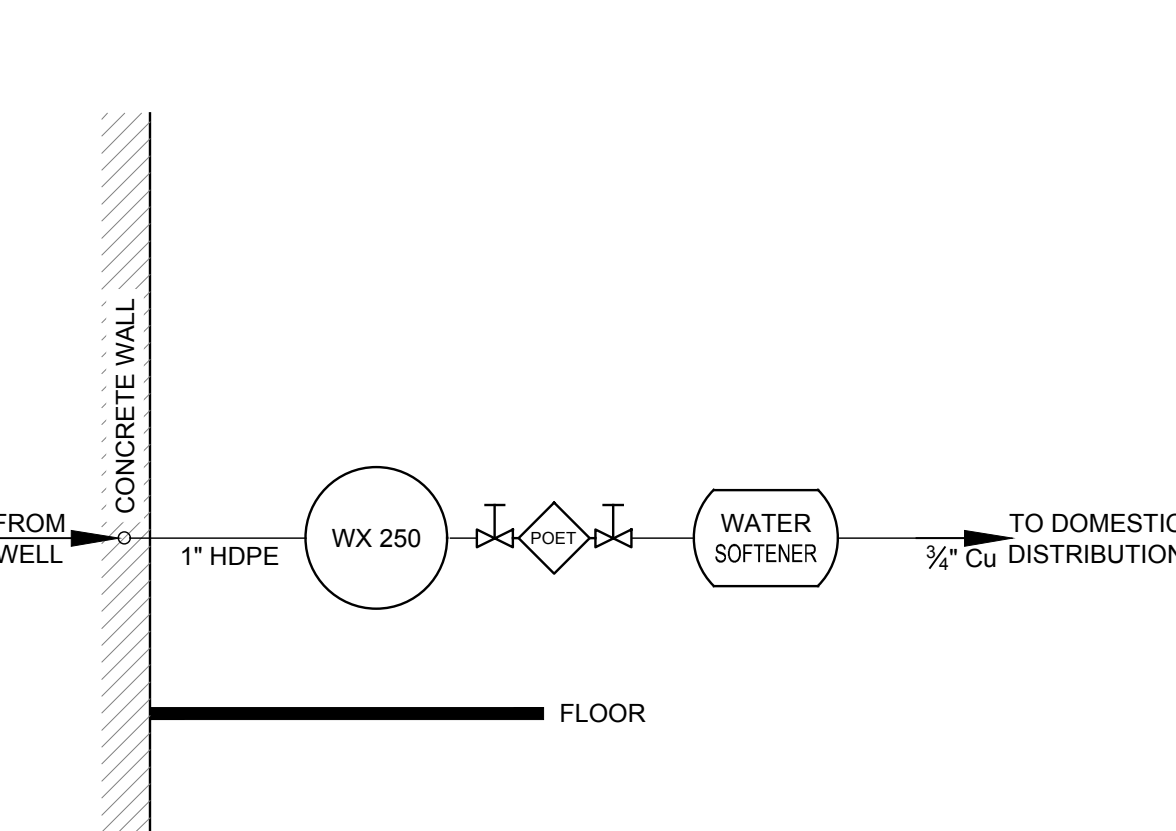
14 WATER SERVICE ENTRANCE DETAIL  
59 SETTLERS RD (PROPOSED) Scale: NTS



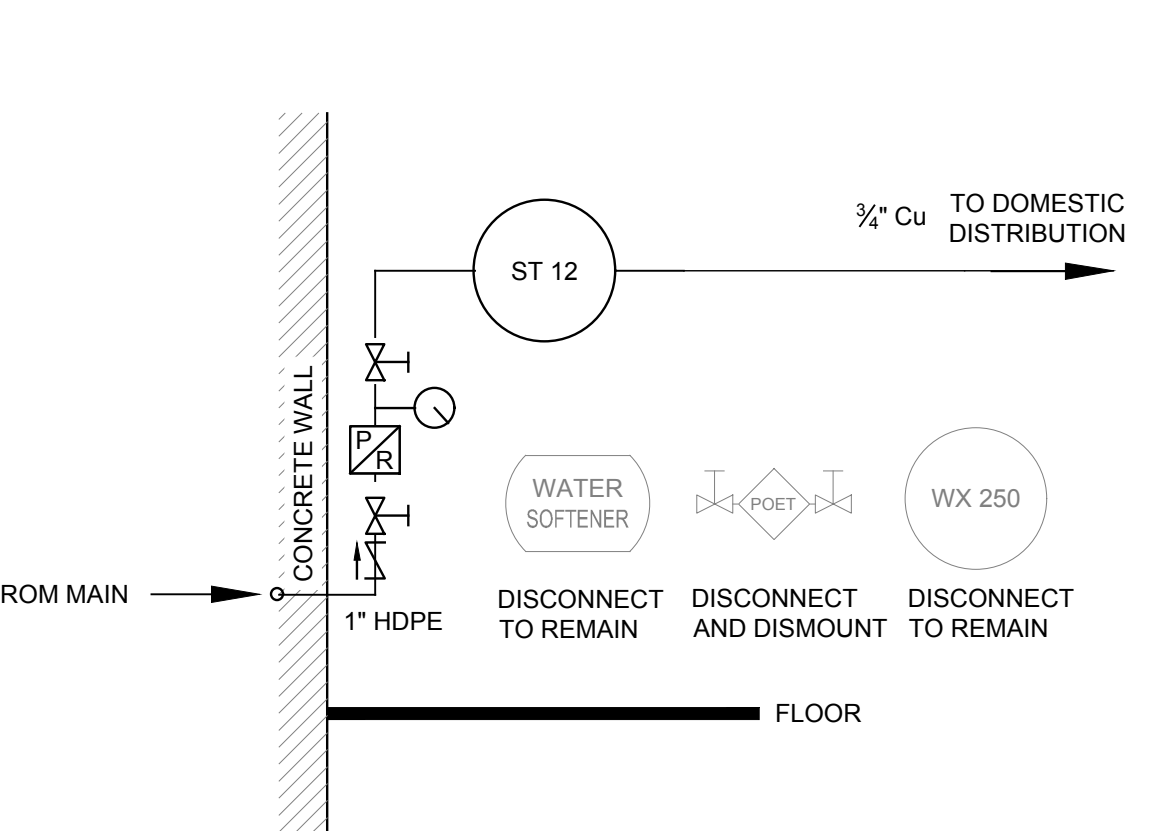
15 WATER SERVICE ENTRANCE DETAIL  
68 BEAUDOIN LN (EXISTING) Scale: NTS



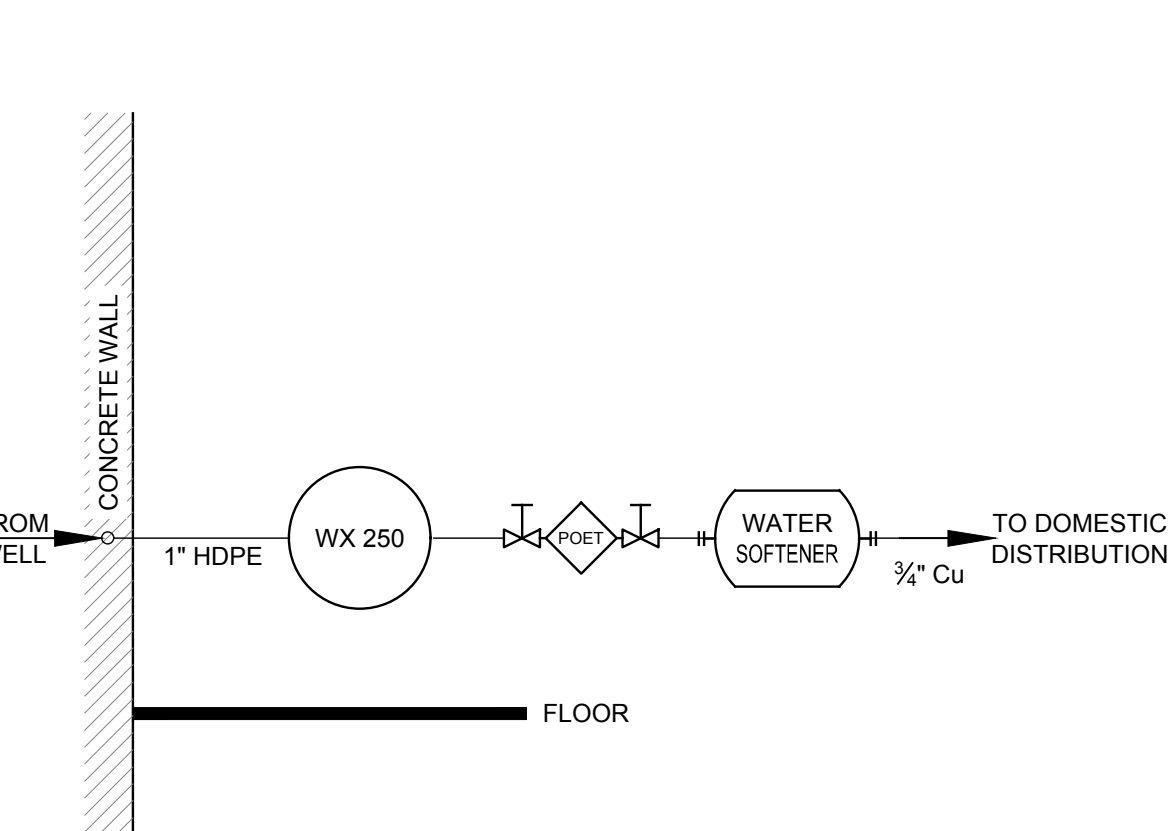
16 WATER SERVICE ENTRANCE DETAIL  
68 BEAUDOIN LN (PROPOSED) Scale: NTS



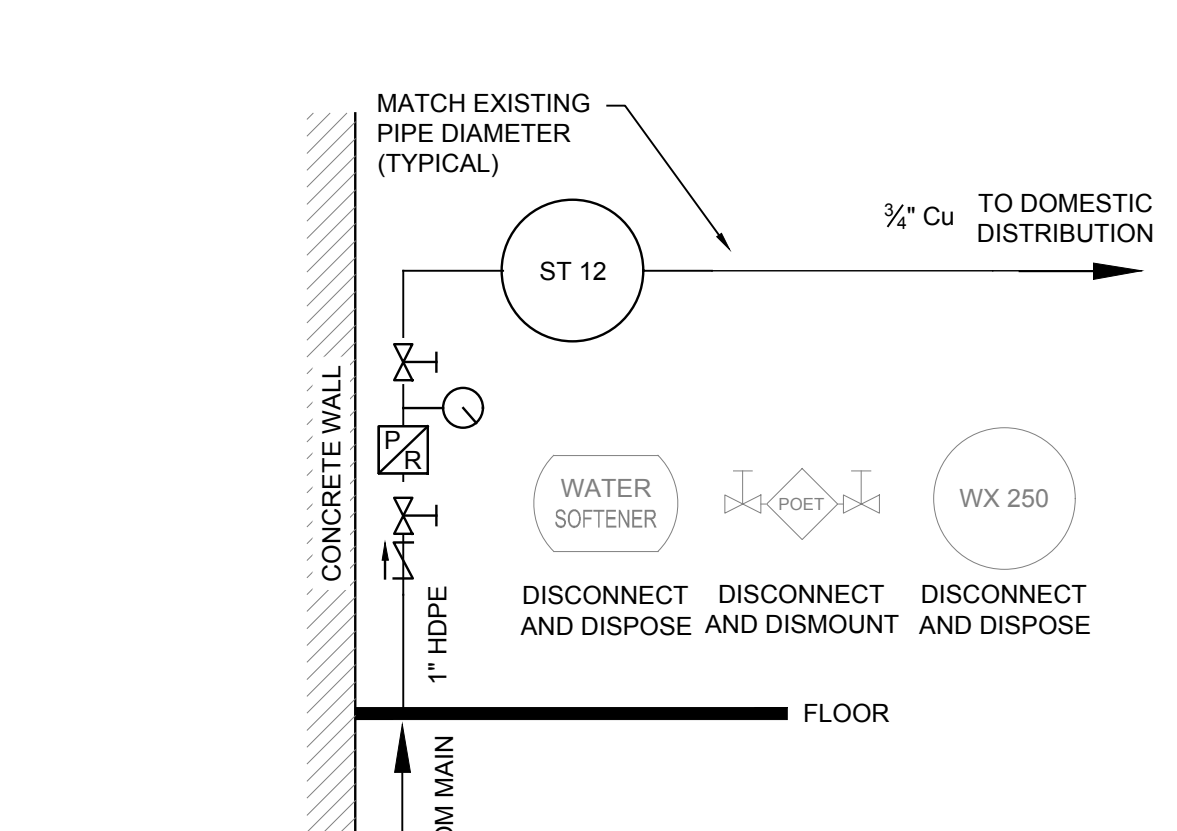
17 WATER SERVICE ENTRANCE DETAIL  
113 BEAUDOIN LN (EXISTING) Scale: NTS



18 WATER SERVICE ENTRANCE DETAIL  
113 BEAUDOIN LN (PROPOSED) Scale: NTS



19 WATER SERVICE ENTRANCE DETAIL  
226 BEAUDOIN LN (EXISTING) Scale: NTS



20 WATER SERVICE ENTRANCE DETAIL  
226 BEAUDOIN LN (PROPOSED) Scale: NTS

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 441-1402 FAX: (802) 445-1291



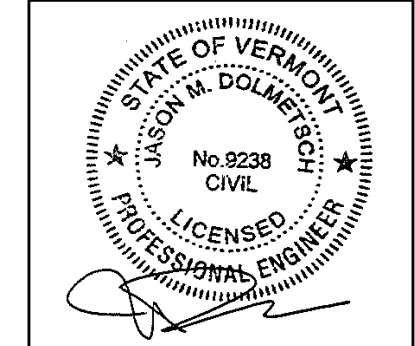
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
CONTRACT 5  
SERVICE ENTRANCE  
DIAGRAMS

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C604**



4. DRAWING DATE: 05/14/2019 2:00:17 PM 4. DRAWING TIME: 14:00:17 PM 4. DRAWING USER: JMD 4. DRAWING CONTRACT: 5. SERVICE ENTRANCE DIAGRAMS





Civil – Environmental – Mechanical – Structural – Surveying  
Site & Facility Development – Construction- Compliance – Regulatory Permitting

Professional Engineering in Vermont – New Hampshire – New York

**Town of Bennington**  
**Water System Remedial Expansion Contract #5**  
**Bennington, Vermont**

Prepared by Project Engineer:

MSK Engineering & Design, Inc.  
Jason Dolmetsch, P.E.  
P.O. Box 139  
150 Depot Street  
Bennington, Vermont 05201  
Ph: 802-447-1402  
jdolmetsch@mskeng.com

For the Owners:

Town of Bennington  
205 South Street  
Bennington, VT 05201

Date of Issue: May 2019



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## **Contract Documents**

Town of Bennington  
Town of Bennington Water System Remedial Expansion  
Contract #5  
Bennington, Vermont  
May 2019

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For Reference Only: Geotechnical Report from QCQA Labs dated 2/6/2017  
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## **ADVERTISEMENT FOR BIDS**

**Town of Bennington, Vermont**  
(OWNER)

**205 South Street Bennington, VT 05201**  
(Address)

Separate sealed BIDS for the construction of

**Town of Bennington Water System Remedial Expansion, Contract #5 – This project consists of the extension of water main line along Harwood Hill Road (VT Route 7A), Settlers Lane, Beaudoin Lane, Houghton Lane, and Becks Drive in the Town of Bennington, Vermont. Specifically, the work will include trenching, removal of the existing asphalt and subbase, installation of water main, thrust blocks, hydrants, curb stops, service lines, sitework for placement and connection to a pre-fabricated pressure reducing valve vault (PRV) , base material, trenchless installation of water main and sleeving under Harwood Hill Road (VT Route 7A), and associated site work in accordance with the contract plans and specifications.**

will be received by **Town of Bennington, Vermont** at the office of **Town of Bennington, 205 South Street, Bennington, VT 05201**

until **2:00 pm**, (Prevailing Local Time) **June 6, 2019**, and then at said office publicly opened and read aloud.

Each BID must be accompanied by a certified check payable to the OWNER for five percent (5%) of the total amount of the BID. A BID bond may be used in lieu of a certified check.

The CONTRACT DOCUMENTS may be examined at the following locations:

**Town of Bennington – 205 South Street, Bennington, VT 05201**

**MSK Engineering & Design, Inc. – 150 Depot Street, Bennington, VT 05201**

Copies of the CONTRACT DOCUMENTS may be obtained by contacting Abby Chaloux at MSK Engineering & Design at (802) 447-1402, ext. 3 or [achaloux@mskeng.com](mailto:achaloux@mskeng.com). Copies may also be attained by contacting Nicholas Ratzer [nratzer@mskeng.com](mailto:nratzer@mskeng.com). CONTRACT DOCUMENTS will be sent electronically unless otherwise requested by the prospective bidder.

A Performance BOND and a Payment BOND each in an amount equal to one hundred percent (100%) of the contract price will be required.

A pre-bid conference for prospective bidders will be held at the **MSK Engineering and Design, Inc., 150 Depot Street, Bennington, VT 05201** on **May 28, 2019** at **10:00 am.**

Representatives of the **Town of Bennington** will be present to answer questions from bidders.

**10 May 2019**

Date



Authorized Representative



## **INFORMATION FOR BIDDERS**

BIDS will be received by **Town of Bennington, Vermont** (herein called the "OWNER"), at **205 South Street, Bennington, VT 05201**

until **June 6, 2019 at 2:00 pm**, (local prevailing time) and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to **Town of Bennington at 205 South Street, Bennington, VT 05201**. Each sealed envelope containing a BID must be plainly marked on the outside as BID for **Town of Bennington Water System Remedial Expansion, Contract #5** and the envelope should bear on the outside the name of the BIDDER, BIDDER'S address, license number if applicable, and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at:

**Town of Bennington  
205 South Street  
Bennington, VT 05201**

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed (including Schedule A) and executed when submitted. Only one copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. A Bidder may withdraw any proposal submitted prior to the hour set for the closing of the Bids provided the request is signed in a manner identical with the proposal being withdrawn. Any BID received after the time and date specified, shall not be considered. No BIDDER may withdraw a BID within 30 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

All questions by prospective BIDDERS as to the interpretations of the INFORMATION FOR BIDDERS, Forms of PROPOSAL, Form of CONTRACT, Plans, Specifications or BONDS, must be submitted electronically in writing to the Consulting Engineer, at least seven (7) days before the date herein set for the opening of BIDS. An interpretation will be emailed with return receipt requested to prospective BIDDERS at the addresses given by them no later than five (5) days before the date of opening BIDS. Failure of any BIDDER to receive any such ADDENDUM or interpretation shall not relieve such BIDDER from any obligation under its BID as submitted. All ADDENDA so issued shall become part of the CONTRACT DOCUMENTS.

In the event there is any discrepancy in the PROPOSAL between any price in words, figures, or the extended totals, the price in words shall govern and the extended totals in each case shall be corrected accordingly. No BID will be accepted which does not contain a price for each item in this PROPOSAL.

Prospective BIDDERS and their agents will be permitted to make, at their own responsibility and expense, such borings, soundings, or other investigations over the site of the proposed work as they deem necessary. They must satisfy themselves by personal examination of the location of the proposed work, and by such other means as they deem necessary, as to the actual conditions and requirements of the WORK and as to the actual quantities required for the construction. Prices bid shall include every and all costs for the construction complete between the limits indicated on the plans and/or as set out in the specifications.

At the time of the opening of BIDS, each BIDDER will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Drawings and CONTRACT DOCUMENTS (including all ADDENDA).

The failure or omission of any BIDDER to receive or examine any form, instrument, or document shall in no way relieve any BIDDER from the obligation in respect to its BID.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a certified check payable to the OWNER for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the certified checks of all except the three lowest responsive, responsible BIDDERS. When the Agreement is executed, the certified checks of the two remaining unsuccessful BIDDERS will be returned. The certified check of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A BID BOND may be used in lieu of a certified check.

A performance BOND and a payment BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND, a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary Agreement and BOND forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may, at its option, consider the BIDDER in default, in which case the BID BOND or certified check accompanying the proposal shall become the property of the OWNER.

The OWNER, within ten (10) days of receipt of acceptable performance BOND, payment BOND and Agreement signed by the party to whom the Agreement was awarded, shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The OWNER shall issue the NOTICE TO PROCEED within ten (10) days of the execution of the Agreement. The "Date of Issuance" of the NOTICE TO PROCEED shall start the CONTRACT time. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended only by mutual written agreement between the OWNER and CONTRACTOR.

If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as it deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the BIDDER fails to submit the requested information and data, or the evidence submitted by or investigation of such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the WORK contemplated therein.

**A conditional or qualified BID will not be accepted.**

**Award will be made to the lowest responsive, responsible BIDDER.**

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.



Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the "Equal Employment Opportunity" clause set forth in the SUPPLEMENTAL GENERAL CONDITIONS.

Successful BIDDERS must be prepared to comply in all respects with the CONTRACT provisions regarding non-discrimination and sign the nondiscrimination statement which is part of the BID.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall, in no way, relieve any BIDDER from any obligation in respect to his BID.

If the low BIDDER intends to award the WORK to SUBCONTRACTOR(S) in excess of fifty (50) percent of the CONTRACT PRICE, the OWNER'S written approval is required prior to CONTRACT AWARD. The low BIDDER shall, within five (5) calendar days after the BID date, make written request to OWNER and will supply the names and addresses of major material SUPPLIER(S) and SUB-CONTRACTOR(S) in support of the request.

Wherever it may be written that an equipment manufacturer must have a specified period of experience with its product, equipment which does not meet the specified experience period can be considered if the equipment SUPPLIER or manufacturer is willing to provide BOND or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of a failure.

The BIDDER'S attention is directed to the "Supplemental General Conditions" of the CONTRACT SPECIFICATIONS, which contains requirements, provisions, policies and permits applicable to WORK under the CONTRACT.

The ENGINEER and contact is: **MSK Engineering and Design, Inc. – Jason M. Dolmetsch, P.E.**

Address and phone number is: **150 Depot Street, Bennington, VT 05201**

**Ph: 802 447-1402**

**Fx: 802 445-1291**

Inspection trips for prospective BIDDERS may be scheduled upon request.

**BID**

Proposal of \_\_\_\_\_ (hereinafter called "BIDDER"), organized and existing under the laws of the State of \_\_\_\_\_ doing business as: \_\_\_\_\_  
(a corporation, a partnership or an individual)

To the: **Town of Bennington, Vermont**  
(hereinafter called "OWNER".)

In compliance with your Advertisement for BIDS, BIDDER hereby proposes to perform all WORK for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #5**

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in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID, each party thereto certifies as to his own organization, that his BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence MOBILIZATION AND CONSTRUCTION under this contract by JUNE 27, 2019 and to substantially complete the PROJECT by AUGUST 1, 2020. Final completion of the project shall take place on or before AUGUST 31, 2020. BIDDER further agrees to pay as liquidated damages, the sum of **\$750.00** for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDA:

- 1.
- 2.
- 3.
- 4.



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## BID SCHEDULE

BIDDER agrees to perform all the WORK described in the CONTRACT DOCUMENTS for the following unit prices:

ITEM NO.	ITEM DESCRIPTION	Unit	UNIT PRICE	ESTIMATED QUANTITY	EXTENDED AMOUNT
1	<b>Mobilization/Demobilization</b>	LS	\$	1	\$
	UNIT PRICE (written)				
2	<b>Erosion and Sediment Controls</b>	LS	\$	1	\$
	UNIT PRICE (written)				
3	<b>Traffic Control</b>	LS	\$	1	\$
	UNIT PRICE (written)				
4	<b>Trench Excavation of Rock</b>	CY	\$	1500	\$
	UNIT PRICE (written)				
5	<b>French Drain</b>	LF	\$	1500	\$
	UNIT PRICE (written)				
6	<b>Removal and Replacement of Unsuitable Trench Material</b>	CY	\$	2050	\$
	UNIT PRICE (written)				
7	<b>Gravel Road</b>	CY	\$	280	\$
	UNIT PRICE (written)				
8	<b>2.5" Caliper Tree Installation</b>	EA	\$	5	\$
	UNIT PRICE (written)				
9	<b>Bituminous Concrete Pavement - Patching</b>	TON	\$	800	\$
	UNIT PRICE (written)				



10	<b>Bituminous Concrete Pavement – Overlay</b>	TON	\$	1100	\$
	UNIT PRICE (written)				
11.1	<b>¾" Corporation Stops</b>	EA	\$	41	\$
	UNIT PRICE (written)				
11.2	<b>1" Corporation Stops</b>	EA	\$	13	\$
	UNIT PRICE (written)				
11.3	<b>1.5" Corporation Stops</b>	EA	\$	7	\$
	UNIT PRICE (written)				
11.4	<b>2" Corporation Stops</b>	EA	\$	2	\$
	UNIT PRICE (written)				
12.1	<b>¾" Curb Stop</b>	EA	\$	50	\$
	UNIT PRICE (written)				
12.2	<b>1" Curb Stop</b>	EA	\$	20	\$
	UNIT PRICE (written)				
12.3	<b>1.5" Curb Stop</b>	EA	\$	6	\$
	UNIT PRICE (written)				
12.4	<b>2" Curb Stops</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
13.1	<b>3" Gate Valve</b>	EA	\$	2	\$
	UNIT PRICE (written)				
13.2	<b>4" Gate Valve</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				

13.3	<b>6" Gate Valve</b>	EA	\$	N/A	\$
	UNIT PRICE (written)				
13.4	<b>8" Gate Valve</b>	EA	\$	24	\$
	UNIT PRICE (written)				
14	<b>Ductile Iron MJ Fittings</b>	LB	\$	930	\$
	UNIT PRICE (written)				
15.1	<b>4" Ductile Iron Pipe</b>	LF	\$	N/A	\$
	UNIT PRICE (written)				
15.2	<b>6" Ductile Iron Pipe</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
15.3	<b>8" Ductile Iron Pipe</b>	LF	\$	8105	\$
	UNIT PRICE (written)				
15.4	<b>1" HDPE Tubing Pipe</b>	LF	\$	3945	\$
	UNIT PRICE (written)				
15.5	<b>1.5" HDPE Tubing Pipe</b>	LF	\$	4120	\$
	UNIT PRICE (written)				
15.6	<b>2" HDPE Tubing Pipe</b>	LF	\$	600	\$
	UNIT PRICE (written)				
15.7	<b>3" HDPE Tubing Pipe</b>	LF	\$	1740	\$
	UNIT PRICE (written)				
15.8	<b>3/4" Copper Tube</b>	LF	\$	780	\$
	UNIT PRICE (written)				



15.9	<b>1" Copper Tube</b>	LF	\$	480	\$
	UNIT PRICE (written)				
15.10	<b>1.5" Copper Tube</b>	LF	\$	935	\$
	UNIT PRICE (written)				
15.11	<b>2" Copper Tube</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.1	<b>4" HDPE Sleeve</b>	LF	\$	330	\$
	UNIT PRICE (written)				
16.2	<b>6" HDPE Sleeve</b>	LF	\$	160	\$
	UNIT PRICE (written)				
16.3	<b>10" HDPE Sleeve</b>	LF	\$	145	\$
	UNIT PRICE (written)				
16.4	<b>18" HDPE Sleeve</b>	LF	\$	170	\$
	UNIT PRICE (written)				
16.5	<b>24" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
17	<b>Trenchless Water Main</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
18	<b>Pressure Reducing Valve Vault – Site Preparation</b>	LS	\$	1	\$
	UNIT PRICE (written)				
19	<b>Cast-in-Place Concrete Thrust Block</b>	EA	\$	20	\$
	UNIT PRICE (written)				

20	<b>Buried Rigid Insulation Board</b>	SF	\$	1500	\$
	UNIT PRICE (written)				
21	<b>Connection to Existing Mains</b>	EA	\$	2	\$
	UNIT PRICE (written)				
22	<b>Connection to Existing Gate Valves</b>	LS	\$	1	\$
	UNIT PRICE (written)				
23.1	<b>Building Service</b>	EA	\$	48	\$
	UNIT PRICE (written)				
23.2	<b>Slab on Grade Building Service</b>	EA	\$	15	\$
	UNIT PRICE (written)				
23.3	<b>Mobile Home Building Service</b>	EA	\$	13	\$
	UNIT PRICE (written)				
23.4	<b>Meter Installation</b>	EA	\$	21	\$
	UNIT PRICE (written)				
23.5	<b>Booster Pump Installation</b>	EA	\$	1	\$
	UNIT PRICE (written)				
24	<b>Fire Hydrant Assembly</b>	EA	\$	13	\$
	UNIT PRICE (written)				
25	<b>Flush Hydrant Assembly</b>	EA	\$	4	\$
	UNIT PRICE (written)				
26.1	<b>Lockable Well Caps</b>	EA	\$	2	\$
	UNIT PRICE (written)				



26.2	<b>Water Sampling Stations</b>	EA	\$	3	\$
	UNIT PRICE (written)				
27.1	<b>Closure of Abandoned Wells: Drilled</b>	LF	\$	8000	\$
	UNIT PRICE (written)				
27.2	<b>Closure of Abandoned Wells: Dug</b>	EA	\$	9	\$
	UNIT PRICE (written)				
28	<b>Utility Crossings</b>	EA	\$	20	\$
	UNIT PRICE (written)				
29	<b>Sewer Crossing – Water Below</b>	EA	\$	20	\$
	UNIT PRICE (written)				
30.1	<b>Culvert Installation – 18" CPEP Pipe</b>	LF	\$	120	\$
	UNIT PRICE (written)				
30.2	<b>Culvert Installation – 24" CPEP Pipe</b>	LF	\$	40	\$
	UNIT PRICE (written)				
30.3	<b>Culvert Installation – 36" CPEP Pipe</b>	LF	\$	40	\$
	UNIT PRICE (written)				
30.4	<b>Culvert Installation – 48" CPEP Pipe</b>	LF	\$	40	\$
	UNIT PRICE (written)				
31	<b>Riprap Stone Installation</b>	TON	\$	75	\$
	UNIT PRICE (written)				
32	<b>Leakage Clamps</b>	EA	\$	11	\$
	UNIT PRICE (written)				

33	Heat Tape installation	EA	\$	10	\$
	UNIT PRICE (written)				
34	Large Diameter Tree Removal (18 inches or larger)	EA	\$	10	\$
	UNIT PRICE (written)				
35	Yard Hydrant Installation	EA	\$	1	\$
	UNIT PRICE (written)				
36	Bollard Installation	EA	\$	8	\$
	UNIT PRICE (written)				
37	Fluoroelastomer Gaskets	EA	\$	35	\$
	UNIT PRICE (written)				
38	Meter Pit Installation	EA	\$	2	\$
	UNIT PRICE (written)				
39	Concrete Curb	LF	\$	200	\$
	UNIT PRICE (written)				
40	Off-Site Activity Area Spoils Management	LS	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
41	Excavating and Handling for Offsite Disposal of Contaminated Soil	CY	\$	200	\$
	UNIT PRICE (written)				

**TOTAL CONTRACT PRICE \$ \_\_\_\_\_**

**TOTAL CONTRACT PRICE (written) \_\_\_\_\_**

**BASIS FOR BID COMPARISON – TOTAL CONTRACT PRICE**



**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_ as Principal,

and \_\_\_\_\_ as Surety, are hereby held and firmly bound unto

\_\_\_\_\_ as OWNER in the penal sum of \_\_\_\_\_

for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_. The Condition of the above obligation is such that whereas the

Principal has submitted to **Town of Bennington, Vermont** certain BID,

attached hereto and hereby made a part hereof to enter into a contract in writing, for the

**Town of Bennington Water System Remedial Expansion, Contract #5**

NOW, THEREFORE,

(a) If said BID shall be rejected, or

(b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect, it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

\_\_\_\_\_  
Principal (L.S.)

\_\_\_\_\_  
Surety

By: \_\_\_\_\_

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

**NOTICE OF AWARD**

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT Description:

OWNER's P.O. Number: \_\_\_\_\_  
Owners Project Name: \_\_\_\_\_

**Town of Bennington Water System Remedial Expansion, Contract #5 – This project consists of the extension of water main line along Harwood Hill Road (VT Route 7A), Settlers Lane, Beaudoin Lane, Houghton Lane, and Becks Drive in the Town of Bennington, Vermont. Specifically, the work will include trenching, removal of the existing asphalt and subbase, installation of water main, thrust blocks, hydrants, curb stops, service lines, sitework for placement and connection to a pre-fabricated pressure reducing valve vault (PRV) , base material, trenchless installation of water main and sleeving under Harwood Hill Road (VT Route 7A), and associated site work in accordance with the contract plans and specifications.**

The OWNER has considered the BID submitted by you for the above described WORK in response to its ADVERTISEMENT FOR BIDS dated **10 May 2019** and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$ \_\_\_\_\_

You are required by the Information for Bidders to execute the Agreement and furnish the required certificates of insurance and IRS W9 form within (10) calendar days from the date of this NOTICE to you.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this \_\_\_\_\_

\_\_\_\_\_  
**Town of Bennington**  
OWNER

\_\_\_\_\_  
(Print or Type Name)

Title: \_\_\_\_\_

\_\_\_\_\_  
Signature

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE OF AWARD is hereby acknowledged

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
CONTRACTOR

\_\_\_\_\_  
(Print or Type Name)

Title: \_\_\_\_\_

\_\_\_\_\_  
Signature



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## AGREEMENT

THIS AGREEMENT, made this \_\_\_\_ day of \_\_\_\_\_, 2019, by and

Between the **Town of Bennington**, hereinafter called "OWNER" and \_\_\_\_\_ doing business as (an individual, a partnership or a corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of **Town of Bennington Water System Remedial Expansion, Contract #5** (Project Name & OWNER's Project Number).
2. The CONTRACTOR will furnish all the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the WORK required by the CONTRACT DOCUMENTS on the date of issuance of the NOTICE TO PROCEED and will complete the same **no later than 90 days after the issuance of the NOTICE TO PROCEED** unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.
4. The CONTRACTOR agrees to perform all the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$\_\_\_\_\_ or as shown in the BID schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:
  - Advertisement for BIDS
  - Information for BIDDERS
  - BID
  - BID Bond
  - Notice of Award
  - Agreement
  - Payment BOND
  - Performance BOND
  - Notice to Proceed
  - Change Order Format
  - Partial Release and Waiver of Lien
  - Consent of Surety to Reduce Retainage at Substantial Completion
  - Certificate of Substantial Completion
  - Consent of Surety to Release Final Payment
  - Certificate of Final Completion and Acceptance of Work
  - General Conditions
  - Supplemental General Conditions
  - List of Permits
  - DRAWINGS prepared by **MSK Engineering and Design, Inc.** numbered **G005, C101 through C111A, C401 through C403, C500 through C509, and C601 through C604**, and dated **May 14<sup>th</sup>, 2019**
  - SPECIFICATIONS prepared or issued **MSK Engineering and Design, Inc.** and Dated **May 2019**



- 6. OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.
- 7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in 3 copies, each of which shall be deemed an original on the date first above written.

OWNER: **Town of Bennington** \_\_\_\_\_

ATTEST: \_\_\_\_\_  
(Signature)

BY: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

Name: \_\_\_\_\_  
(Print or Type)

(Seal)

Title: \_\_\_\_\_

Title: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

BY: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

(CONTRACTOR Seal if available)

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ Phone #

ATTEST: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

Title: \_\_\_\_\_

**PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS THAT:

\_\_\_\_\_  
(Name of CONTRACTOR)

\_\_\_\_\_  
(Address of CONTRACTOR)

a \_\_\_\_\_, hereinafter called Principal,  
(Corporation, Partnership or Individual)

and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

**Town of Bennington, Vermont**  
(Name of OWNER)

**205 South Street, Bennington, Vermont 05201**  
(Address of OWNER)

hereinafter called OWNER, in the penal sum of \_\_\_\_\_ Dollars,  
\$(\_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2019, a copy of which is hereto attached and made a part hereof for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #5**

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK and all insurance premiums on said WORK, and for all labor performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.



PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2019.

ATTEST:

\_\_\_\_\_  
(Principal Secretary)

(Seal)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
Address

ATTEST:

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
Address

\_\_\_\_\_  
Principal's Printed Name

By: \_\_\_\_\_(s)

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Surety

By: \_\_\_\_\_  
Attorney-in-Fact

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570) as amended and be authorized to transact business in the State where the PROJECT is located.

**PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS THAT:

\_\_\_\_\_  
(Name of CONTRACTOR)

\_\_\_\_\_  
(Address of CONTRACTOR)

a \_\_\_\_\_, hereinafter called Principal, and  
(Corporation, Partnership or Individual)

\_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

**Town of Bennington, Vermont**  
(Name of OWNER)

**205 South Street, Bennington, Vermont 05201**  
(Address of OWNER)

hereinafter called OWNER, in the penal sum of \_\_\_\_\_ Dollars, \$(\_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #5**

NOW, THEREFORE, if the principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.



PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2019.

ATTEST:

\_\_\_\_\_  
Principal's Printed Name  
\_\_\_\_\_  
(Principal Secretary)

(Seal)

\_\_\_\_\_  
Witness as to Principal  
\_\_\_\_\_  
Address

\_\_\_\_\_  
By: \_\_\_\_\_(s)  
Address: \_\_\_\_\_  
\_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Witness as to Surety  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Address

\_\_\_\_\_  
Surety  
By: \_\_\_\_\_  
Attorney-in-Fact  
Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570) as amended and be authorized to transact business in the State where the PROJECT is located.

**NOTICE TO PROCEED**

To: \_\_\_\_\_  
(CONTRACTOR)

Date of Issuance: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Project: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

You are hereby notified to commence all WORK on this date in accordance with the Agreement dated \_\_\_\_\_, 2019. The date of completion of all WORK is **August 1, 2020**.

\_\_\_\_\_  
Town of Bennington, Vermont  
(OWNER)

By: \_\_\_\_\_  
(Printed or Typed Name)

By: \_\_\_\_\_  
(Signature)

Title: \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE TO PROCEED

is hereby acknowledged by \_\_\_\_\_,  
(Name of CONTRACTOR)

this the \_\_\_\_ day of \_\_\_\_\_, 20\_\_

By: \_\_\_\_\_  
(Printed or Typed Name)

By: \_\_\_\_\_  
(Signature)

Title: \_\_\_\_\_



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**INSTRUCTIONS FOR CONTRACTORS OR SUBCONTRACTORS**  
**RELEASE AND WAIVER OF LIEN FORM**

1. At the preconstruction meeting, the OWNER will receive from the CONTRACTOR a list of all major items (s)he intends to subcontract.
2. Prior to the first requisition for payment, the OWNER will inform the CONTRACTOR as to which of these SUBCONTRACTORS or vendors may be required to complete a Release of Lien Form. Note that 40 CFR §33.302 requires CONTRACTOR to pay their SUBCONTRACTORS for satisfactory performance within 30 days of payment to CONTRACTOR by OWNER.
3. The CONTRACTOR shall include in the payment package a Release of Lien Form for the overall CONTRACT and those of any SUBCONTRACTORS or vendors so identified by the OWNER.
4. For all interim payments prior to 90% completion of the CONTRACT, the CONTRACTOR may delete, "...the undersigned does hereby waive, release and relinquish any and all claims, demands and rights of lien for all work, labor, materials, machinery or other goods, equipment or services done, performed or furnished..." from the first statement.
5. Final payment requires complete wording in the first statement and a fully executed form.

**GENERAL CONTRACTOR'S OR SUBCONTRACTOR'S**  
**RELEASE AND WAIVER OF LIEN**

For and in consideration of the receipt of \$ \_\_\_\_\_, in payment for labor and/or materials furnished, the undersigned does hereby waive, release and relinquish any and all claims, demands and rights of lien for all work, labor, materials, machinery or other goods, equipment or services done, performed or furnished for the construction located at the site hereinafter described, to wit:

**Town of Bennington Water System Remedial Expansion, Contract #5**  
(Project Name and OWNER)

\_\_\_\_\_

\_\_\_\_\_, Vermont as of \_\_\_\_\_  
(Date)

The undersigned further warrants and represents that any and all valid labor and/or materials and equipment bills, now due and payable on the property herein above described in behalf of the undersigned, have been paid in full to date of this waiver, or will be paid from these funds.

\$ \_\_\_\_\_  
Total Paid to Date This Contract

\$ \_\_\_\_\_  
Current Payment Due

\$ \_\_\_\_\_  
Total Billed to Date This Contract

\_\_\_\_\_  
CONTRACTOR/SUB-CONTRACTOR

\_\_\_\_\_  
Witness Signature

By: \_\_\_\_\_

\_\_\_\_\_  
Witness Printed Name

Title: \_\_\_\_\_



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**CHANGE ORDER # \_\_\_\_\_**

Owner's Project Number RF/VT/STAG # _____	Date: _____
Contract #: _____	Agreement Date: _____
Contract Title: _____	ORIGINAL PRICE: \$ _____
Owner: _____	Notice to Proceed Date: _____
Contractor: _____	Calendar Days: _____
Engineer: _____	Original Completion Date: _____

**The following changes are hereby made to the CONTRACT DOCUMENTS:**

**DESCRIPTION:**

**JUSTIFICATION:**

PRICE: This C.O.<sup>(1)</sup> will (not change/increase/decrease) the Contract Price By: \$ \_\_\_\_\_  
Current Contract Price per most recent C.O.: \$ \_\_\_\_\_  
The new Contract Price including this C.O. is: \$ \_\_\_\_\_

TIME: Current Contract Calendar Days as per most recent C.O.: Calendar Days \_\_\_\_\_  
This C.O. will (not change/increase/decrease) the Contract Calendar Days by: Calendar Days \_\_\_\_\_  
The new Contract Calendar Days including this C.O. is: Calendar Days \_\_\_\_\_  
The new Contract Completion Date is, therefore: \_\_\_\_\_

**NOTE: The CONTRACTOR must provide a Revised Project Schedule to reflect increases or decreases in Contract Time as authorized by this C.O.**

REQUESTED BY: \_\_\_\_\_  
Print or Type Name Signature

SIGNATURES/APPROVALS:  
Stipulated price and time adjustment includes all costs and time associated with the above described change. CONTRACTOR waives all rights for additional compensation or time extension for said change. CONTRACTOR and OWNER agree that the price(s) and time adjustment(s) stated above are equitable and acceptable to both parties.

Recommended By (Engineer): \_\_\_\_\_  
Print or Type Name Signature

Accepted By (CONTRACTOR): \_\_\_\_\_  
Print or Type Name Signature

Ordered By (OWNER): \_\_\_\_\_  
Print or Type Name Signature

(1) C.O. means Change Order



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**Supply (with an original signature) the Consent of Surety to Reduction in Retainage, using AIA Document G707A or a similarly formed document, along with the original of the CONTRACTOR's request for the reduction of retainage. A sample of the CONTRACTOR's request form for reduction in retainage on page 3 of 3. This document will be submitted to the Engineer for review and recommended approval to the OWNER prior to the payment requisition which shows a reduction in retainage at successful completion of at least 50% of the work (not including materials stored on site) or at Substantial Completion for further reduction below 5% (but not less than the remaining value of work to be completed). Retainage will not be reduced until the Surety provides a document in the form (as noted above) to the CONTRACTOR for submission by the CONTRACTOR to the OWNER which indicates that the Surety agrees with the reduction.**

Note: if additional copies are needed, a copy of the Consent of Surety form and a copy of the CONTRACTOR's Request for Reduction of Retainage are acceptable.



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**CONTRACTOR'S REQUEST FOR REDUCTION OF RETAINAGE**

TO:

OWNER:

Date

FROM: CONTRACTOR Name, Address

OWNER'S PROJECT #:

**CONTRACT NO.:**

**CONTRACT WORK:**

Adjusted Total Contract (Including Change Orders)		\$	_____
Work Completed (Not Including Material Stored)	%	\$	_____
Current Retainage	%	\$	_____
Requested Retainage	%		_____

Consent of Surety Letter attached

CONTRACTOR Signature: \_\_\_\_\_

CONTRACTOR's Typed Name: \_\_\_\_\_

Title

Date

**PROFESSIONAL ENGINEER'S RECOMMENDATION FOR REDUCTION OF RETENTION**

Pursuant to the conditions of the Construction Documents and my evaluation of the satisfactory performance by the CONTRACTOR in the execution of the work, I do  do not  recommend release of retention and future percentage as set forth below.

Typed Name	Recommend Release/Sign	Do Not Recommend Release/Sign	Date
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

**OWNER'S AUTHORIZATION FOR REDUCTION OF RETENTION**

Authorization is hereby granted for retention on the subject contract to be maintained at \_\_\_\_\_ % until further notice.

OWNER's Authorized Representative Signature: \_\_\_\_\_

Date: \_\_\_\_\_

OWNER's Authorized Representative Typed Name: \_\_\_\_\_

**E-MAIL THIS FORM:** This form may be submitted to OWNER/ENGINEER electronically for review by e-mail addressed to the OWNER'S Authorized Representative at: \_\_\_\_\_ and the ENGINEER at: \_\_\_\_\_

**NOTE:** Form may be submitted electronically only for review purposes. To meet contractual requirements, form submitted to OWNER must have original signatures and be accompanied by Consent of Surety. Reduction of Retainage does not release the CONTRACTOR or Surety of the requirements to satisfactorily complete the Contract. General Conditions Section 19.1 applies to this request.

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**CERTIFICATE OF SUBSTANTIAL COMPLETION**

OWNER \_\_\_\_\_

OWNER's Project Number \_\_\_\_\_

Project Name \_\_\_\_\_

=====

CONTRACTOR \_\_\_\_\_ Contract Date \_\_\_\_\_

Contract for \_\_\_\_\_

=====

Project or Specified Part Shall Include \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

=====

**DEFINITION OF SUBSTANTIAL COMPLETION**

**The date of Substantial Completion of a Project or specified part of a Project is the date when the construction is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part of the Project can be utilized for the purpose for which it was intended.**

=====

To: \_\_\_\_\_

(OWNER)

And To: \_\_\_\_\_

(CONTRACTOR)

The WORK performed under this CONTRACT has been inspected by authorized representatives of the OWNER, CONTRACTOR, and ENGINEER, and the Project or Specified Part of the Project is hereby declared to be Substantially Completed as of the following date:

Date of Substantial Completion: \_\_\_\_\_

If a tentative list of items to be completed or corrected is appended hereto, the failure to include an item on it does not alter the responsibility of the CONTRACTOR to complete all the WORK in accordance with the CONTRACT DOCUMENTS and CONTRACT TIME.

Recommended By:

ENGINEER	(Signature)	Date
	(Print or Type Name)	

Approved By:

OWNER	(Signature)	Date
	(Print or Type Name)	

=====

The CONTRACTOR accepts the above Certificate of Substantial Completion.

CONTRACTOR	(Signature)	Date
	(Print or Type Name)	

=====

EXCEPTIONS AS TO GUARANTEES AND WARRANTIES:

=====

ATTACHMENTS:

1) Punch List Dated: \_\_\_\_\_

2) List the CONTRACTOR's Warranty Start and End Dates along with any Extended Warranty information here. Some items (such as roofing) may have a manufacturer's warranty longer than one year. Any documentation to support warranty requests (bill of sale, etc.) need to be supplied as part of the OWNER's O&M Manual under the warranty section.

**Consent of Surety Company to release the Final Payment, using AIA Document G707 or a similarly formed letter (sample next page), with the original of the Consent attached to the original of the application, and a copy of the consent attached to each copy of the application.**



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**CONSENT OF SURETY COMPANY TO FINAL PAYMENT**

Project: \_\_\_\_\_  
Location: \_\_\_\_\_  
Contract #: \_\_\_\_\_

TO: \_\_\_\_\_, **OWNER**  
\_\_\_\_\_  
\_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

Contract Date: \_\_\_\_\_

---

In accordance with the provisions of the Contract between the OWNER and the CONTRACTOR as indicated above, the

\_\_\_\_\_ (here insert name and address of Surety Company and delete this reminder) \_\_\_\_\_, Surety Company,  
\_\_\_\_\_  
\_\_\_\_\_

on bond of

\_\_\_\_\_ (here insert name and address of CONTRACTOR and delete this reminder) \_\_\_\_\_, CONTRACTOR,  
\_\_\_\_\_  
\_\_\_\_\_

hereby approves of the final payment to the CONTRACTOR, and agrees that final payment to the CONTRACTOR shall not relieve the Surety Company of any of its obligations to the OWNER as set forth in the said Surety Company's bond. The Surety agrees to be bound to the warranty period under the same conditions as the CONTRACTOR. The warranty is defined as commencing with Substantial Completion (or with each Substantial Completion if there is more than one) of the Project, or any portion thereof, and continuing for one (1) calendar year from the date of Final Acceptance of the entire project unless otherwise modified in writing as part of the Substantial Completion or Final Acceptance.

IN WITNESS WHEREOF, \_\_\_\_\_  
the Surety Company has hereunto set its hand this \_\_\_\_\_ Day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
Surety Company

\_\_\_\_\_  
Signature of Authorized Representative

Attest:  
(Seal)

\_\_\_\_\_  
Title

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**CERTIFICATE OF FINAL COMPLETION AND ACCEPTANCE OF WORK**

CONTRACT NO. \_\_\_\_\_ AGREEMENT DATE: \_\_\_\_\_

CONTRACT DESCRIPTION: \_\_\_\_\_

Notice to Proceed Date of Issuance: \_\_\_\_\_

Completion Date per Agreement and Change Orders # \_\_\_\_\_ thru # \_\_\_\_\_; \_\_\_\_\_  
(Date)

**FINAL CERTIFICATION OF CONTRACTOR**

I hereby certify that the WORK as identified in the Final Estimate of Payment for construction CONTRACT WORK dated \_\_\_\_\_, represents full compensation for the actual value of WORK completed. All WORK completed conforms to the terms of the AGREEMENT and authorized changes.

\_\_\_\_\_  
CONTRACTOR Signature  
\_\_\_\_\_  
Date Print or Type Name  
\_\_\_\_\_  
Title

**FINAL CERTIFICATION OF ENGINEER**

I have reviewed the CONTRACTOR'S Final Payment Request dated \_\_\_\_\_ and hereby certify that to the best of my knowledge, the cost of the WORK identified on the Final Estimate represents full compensation for the actual value of WORK completed and that the WORK has been completed in accordance with the terms of the AGREEMENT and authorized changes. This certification is provided in accord with the terms of GENERAL CONDITION number 20.1.

\_\_\_\_\_  
ENGINEER Signature  
\_\_\_\_\_  
Date Print or Type Name

**FINAL ACCEPTANCE OF OWNER**

I, as representative of the OWNER, accept the above Final Certifications and authorize Final Payment in the amount of \$ \_\_\_\_\_ and direct the CONTRACTOR'S attention to the GENERAL CONDITION #5. The guaranty for all WORK completed subsequent to the date of SUBSTANTIAL COMPLETION, expires one (1) year from the date of this Final Acceptance.

\_\_\_\_\_  
OWNER Signature  
\_\_\_\_\_  
Date Print or Type Name  
\_\_\_\_\_  
Title

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## GENERAL CONDITIONS

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### 1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

1.2 ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications or corrections.

1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER - Any person, firm or corporation submitting a BID for the WORK.

1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER - A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS - The contract, including Advertisement For Bids, Information For Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR - The person, firm or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS - The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12 ENGINEER - The person, firm or corporation named as such in the CONTRACT DOCUMENTS.



1.13 FIELD ORDER - A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.

1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.

1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR - An individual, firm or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION - That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.

1.24 SUPPLIER - Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

## 2. ADDITIONAL INSTRUCTION AND DETAIL DRAWINGS

2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.

2.2 The additional drawings and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

## 3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that he anticipates he will earn during the course of the WORK.

#### 4. DRAWINGS AND SPECIFICATIONS

4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2 Any conflicts between the Contract Documents and Specifications, between Contract Drawings, and/or site conditions shall be brought to the attention of the ENGINEER in writing immediately upon discovery. The ENGINEER shall respond per General Conditions 27.4. If the CONTRACTOR requests additional compensation refer to General Condition 13. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR's risk.

#### 5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING, which substantially deviates from the requirement of the CONTRACT DOCUMENTS, shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

#### 6. MATERIALS, SERVICES AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, supplies and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

## 7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at his expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests or approvals by the engineer or others shall not relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection, or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR'S expense.

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in questions, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

## 8. SUBSTITUTIONS

8.1 Whenever a material, article or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalog number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalog number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and



use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

## 9. PATENTS and COPYRIGHTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and copyrights, and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, however, if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent or copyright, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

## 10. SURVEYS, PERMITS, REGULATIONS

10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

## 11. PROTECTION OF WORK, PROPERTY AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify OWNERS of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. He will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

## 12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. **The supervisor shall be present on the site during any construction activity to perform adequate supervision and coordination of the WORK.**

## 13. CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 The ENGINEER may also at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

## 14. CONTRACT CHANGE ORDERS

14.1 All changes affecting the Project's construction cost, length of time, or modifications of the terms or conditions of the CONTRACT, must be authorized by means of a written CONTRACT Change Order which is mutually agreed to by the OWNER and CONTRACTOR. The CONTRACT Change Order will include extra WORK, WORK for which quantities have been altered from those shown in the BID Schedule, as well as decreases or increases in the quantities of installed units which are different from those shown in the BID Schedule because of final measurements. All changes must be recorded on a CONTRACT Change Order (which form is part of these CONTRACT Documents) and fully executed before they can be included in a partial payment estimate. Changes for WORK, quantities, and/or conditions will include any respective time adjustment, if justified. Time adjustments will require an updated Project Schedule with the Change Order.

14.2 When the Contract sum is, in whole or in part, based on unit prices, the OWNER reserves the right to increase or decrease a unit price quantity as may be deemed reasonable or necessary in order to complete the WORK contemplated by this CONTRACTOR. Overhead and Profit (OHP) will not be included in a unit quantity Change Order.

14.3 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

- (a) Unit prices previously approved, or
- (b) An agreed lump sum, or
- (c) Time and Materials (T&M) for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the WORK.

14.4 In addition, there may be added an amount to be agreed upon to cover the cost of general overhead and profit (OHP). The markup for OHP by the General CONTRACTOR may not exceed 15% if the General CONTRACTOR executes the WORK. If a SUBCONTRACTOR executes the WORK, the Sub-CONTRACTOR's OHP may not exceed 15% of the cost of the actual WORK, and the General CONTRACTOR may not apply for more than a 5% markup for OHP on the actual WORK (not including the SUBCONTRACTOR's OHP).

## 15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure final completion within the CONTRACT TIME. IT is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following, and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order duly issued by the OWNER;

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a CONTRACT with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1. and 15.4.2 of this article.

## 16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR's expense. If the CONTRACTOR does not take action to remove such rejected work within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

## 17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or



17.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the OWNER may, if he determines the facts so justify, consider and adjust any such claims. If the OWNER finds that payment is not warranted he shall issue a written justification to the CONTRACTOR. The CONTRACTOR will have 14 calendars days to respond with additional written information or justification after which the claim for additional compensation may no longer be asserted.

## 18. SUSPENSION OF WORK, TERMINATION AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume the WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged as bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT price exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR's services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of this approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days WRITTEN NOTICE to the OWNER and the ENGINEER

stop the WORK until he has been paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.

18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

## 19. PAYMENTS TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER's title to the material and equipment and protect his interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The ENGINEER will, within five (5) days after receipt of each corrected partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. The OWNER will, within fifteen (15) working days of the presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain ten (10) percent of the amount of each payment until final completion and acceptance of all WORK covered by the CONTRACT DOCUMENTS. However, after fifty (50) percent of the WORK has been completed, if the OWNER finds that satisfactory quality and progress is being made, the OWNER shall reduce Retainage to five (5) percent on the current and remaining estimates. When the WORK is substantially complete (operational or beneficial occupancy), the retained amount shall be further reduced below five (5) percent to only that amount related to the punchlist and necessary to assure completion. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

19.2 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.3 The OWNER shall have the right to enter the premises for the purpose of doing WORK not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.4 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

19.5 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, material-men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills

or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

19.6 If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there may be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

## 20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1 Upon final completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

20.2 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the CONTRACT DOCUMENTS or the Performance BOND or Payment BONDS.

## 21. INSURANCE

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

21.1.1 Claims under workmen's compensation, disability benefit and other similar employee benefit acts

21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death or his employees

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees

21.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting there from.

21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverage afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 INSURANCE REQUIREMENTS. Insurance obtained by the CONTRACTOR to cover the below-listed requirements shall be procured from an insurance company registered and licensed to do business in the State of



Vermont. All insurance coverage for property damage shall provide coverage for "Replacement" cost. Before the CONTRACT is signed and becomes effective, the CONTRACTOR shall file with the OWNER a certificate of insurance, in duplicate, executed by an insurance company or its licensed agent(s), on a form satisfactory to the OWNER, stating that with respect to the CONTRACT awarded, the CONTRACTOR carries insurance in accordance with the following requirements. Renewal certificates for keeping the required insurance in force for the duration of the CONTRACT shall also be filed as specified above. No warranty is made that the coverages and limits listed herein are adequate to cover and protect the interests of the CONTRACTOR and any SUBCONTRACTOR for the CONTRACTOR'S and any SUBCONTRACTOR'S operations. These are solely minimums that have been established to protect the interests of the OWNER. The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, insurances as hereinafter specified:

21.3.1 Workers Compensation Insurance. With respect to all operations performed the CONTRACTOR shall carry Workers Compensation Insurance in accordance with the laws of the State of Vermont, 21 V.S.A. Chapter 9. The CONTRACTOR shall also ensure that all SUBCONTRACTORS carry Workers Compensation Insurance in accordance with 21 V.S.A. Chapter 9 for all work performed by them.

CONTRACTOR shall carry Employer's Liability Insurance with Limits of Coverage not less than:

- \$1,000,000 Each employee for disease
- \$1,000,000 Each accident
- \$1,000,000 Disease policy limit

CONTRACTOR shall amend their policy to include a waiver of subrogation endorsement in favor of Saint-Gobain Parties, which shall be defined as: Saint-Gobain, its parent(s), and each of their respective direct or indirect, partners, members, affiliates, principals, directors, officers, stockholders, and employees ("Saint-Gobain Parties"). CONTRACTOR shall also include a waiver of subrogation endorsement in favor of the State of Vermont, Officers and Employees ("State of Vermont").

21.3.2 Commercial General Liability Insurance. With respect to all operations performed by the CONTRACTOR and SUBCONTRACTORS, the CONTRACTOR shall carry Commercial General Liability Insurance on an occurrence form providing all major divisions of coverage, including but not limited to:

- Premises - Operations
- Independent CONTRACTOR's Protective
- Products and Completed Operations
- Personal Injury Liability

Policy shall include endorsements ISO form CG20 10, CG 20 37 and CG 20 01, including Saint-Gobain Parties and State of Vermont as additional insureds. Saint-Gobain Parties and State of Vermont are to be afforded the same types of coverage as listed in declarations page of the named insured's policy. Policy shall include a waiver of subrogation endorsement in favor of Saint-Gobain Parties and State of Vermont. Policy shall include a cross-liability and severability of interest clauses. Policy shall contain an endorsement noting that CONTRACTOR'S insurance is primary and any other insurance carried by Saint-Gobain or the State of Vermont shall be noncontributory.

CONTRACTOR's General Liability and Property Damage Insurance will be obtained by the CONTRACTOR protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by himself or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. Contractual Liability applying to the CONTRACTOR'S obligations, unless this requirement is waived in writing by the OWNER, shall have Limits of Coverage not less than:

- \$1,000,000 Each Occurrence
- \$2,000,000 General Aggregate applying, in total to this project only
- \$1,000,000 Products/Completed Operations Aggregate
- \$ 250,000 Fire Damage Legal Liability

21.3.3 Automobile Liability Insurance. The CONTRACTOR shall carry Automobile Liability Insurance covering all motor vehicles, including owned, hired, borrowed, and non-owned vehicles, used in connection with the project. Limits of Coverage shall be not less than:

Bodily Injury: \$1,000,000 Each Person, \$1,000,000 Each Occurrence  
Property Damage: \$ 1,000,000 Each Occurrence, OR  
Combined Single Limit: \$2,000,000 Each Occurrence

Policy shall include an endorsement, including Saint-Gobain Parties and the State of Vermont as additional insureds. Saint-Gobain Parties and the State of Vermont are to be afforded the same types of coverage as listed in declarations page of the named insured's policy. Policy shall include a waiver of subrogation endorsement in favor of Saint-Gobain Parties and the State of Vermont. Policy shall include a cross-liability and severability of interest clauses. Policy shall contain an endorsement noting that CONTRACTOR'S insurance is primary and any other insurance carried by Saint-Gobain or the State of Vermont shall be noncontributory.

21.3.4 Excess/Umbrella Liability. CONTRACTOR shall carry Excess/Umbrella Liability insurance with a limit of not less than \$5,000,000 per occurrence, at least with respect to policies required in 21.3.1, 23.3.2 and 23.3.3; coverage shall provide excess limits and be at least follow form or broader.

21.3.5 Pollution Liability. CONTRACTOR shall carry a Pollution Liability policy for losses caused by pollution conditions that arise from the operations of the CONTRACTOR described under the terms of the CONTRACT. CONTRACTOR shall carry Pollution Liability Insurance with Limits of Coverage not less than:

\$3,000,000 Per pollution condition  
\$3,000,000 Aggregate written on occurrence form with no sunset clause

The pollution conditions include:

- (a) Bodily injury, sickness, and disease to include mental anguish or shock, sustained by any one person; including death
- (b) Property damage including physical damage to or destruction of tangible property including the resulting loss of use thereof, clean-up costs, and the loss of use of tangible property that has not been physically destroyed.
- (c) Defense including costs, charges, and expenses incurred in the investigation, adjustment of defense claims for such compensatory damages;
- (d) Transportation coverage including the loading and unloading of products, goods, and/or waste

21.3.6 General Insurance Conditions. The insurance specified under paragraphs 21.3.1, 21.3.2, 21.3.3, 21.3.4 and 21.3.5 above shall be maintained in force until acceptance of the project by the OWNER. Under paragraph 21.3.2 above, Products and Completed Operations Coverage shall be maintained in force for at least one year from the date of acceptance of the project. The contractual liability insurance requirements detailed in the Contract Documents are to indemnify, defend, and hold harmless the OWNER, and additional insureds, as applicable, and their officers, agents, representatives, and employees, with respect to any and all claims, causes of actions, losses, expenses, or damages that arise out of, relate to, or are in any manner connected with the CONTRACTOR'S work or the supervision of the CONTRACTOR'S work on this project. Each policy, except the Workers Compensation Policy, shall name the OWNER, St. Gobain Parties, and the State of Vermont, as additional insured for actions, losses, expenses or damages that arise out of, relate to, or are in any manner connected with the CONTRACTOR'S work or the supervision of the CONTRACTOR'S work on this project. Umbrella Excess Liability Policies may be used in conjunction with primary policies to comply with any of the limit requirements specified above. "Claims-made" coverage forms are expressly prohibited. The CONTRACTOR shall investigate and the CONTRACTOR and/or insurance company shall either adjust or defend all claims against the insured for damages covered, even if groundless. Each policy furnished shall contain a rider or non-cancellation clause reading in substance as follows:

Anything herein to the contrary notwithstanding, no cancellation, termination, or alteration of this policy by the company or the assured shall become effective unless and until notice of cancellation, termination, or alteration has been given by registered mail to the OWNER, at least 30 calendar days

before the effective cancellation, termination, or alteration date unless all work required to be performed under the terms of the CONTRACT is satisfactorily completed as evidenced by the formal, final acceptance of the project by the OWNER. There shall be no directed compensation allowed the CONTRACTOR on account of any premium or other charge necessary to take out and keep in effect such insurance or bond; the cost thereof shall be considered included in the general cost of the work.

21.3.7 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, in accordance with the provision of the laws of the state in which the WORK is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any WORK is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous WORK under this CONTRACT at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause, each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

21.5 The CONTRACTOR shall secure "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, water and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, the ENGINEER, and the OWNER.

## 22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance BOND and a Payment BOND in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. The form of such BONDS are subject to review and approval by St. Gobain. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal BONDS, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

## 23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign or otherwise dispose of the CONTRACT or any portion thereof, or of his right, title or interest therein, or his obligations hereunder, without written consent of the other party.

## 24. INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out



of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, design or SPECIFICATIONS.

## 25. SEPARATE CONTRACTS

25.1 The OWNER reserves the right to let other CONTRACTS in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT by himself or he may let other CONTRACTS containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS, who are parties to such CONTRACTS (for the OWNER, if he is performing the additional WORK himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his WORK with theirs.

25.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, WRITTEN NOTICE thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefore as provided in Section 14 and 15.

## 26. SUBCONTRACTING

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 If the CONTRACTOR was not required to obtain OWNER approval of the SUBCONTRACTOR(s) prior to Award of the CONTRACT, the CONTRACTOR shall provide written notification to the OWNER within 10 working days of the CONTRACTOR'S intent to employ SUBCONTRACTOR(s) on site. The notification shall list the name, address and telephone number of the SUBCONTRACTOR(s); estimated dollar amounts of SUBCONTRACT(s); estimated start and completion dates of the SUBCONTRACTOR(s) work.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS and of persons whether directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.

26.5 Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

## 27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions in writing relative to interpretation of the CONTRACT DOCUMENTS.

## 28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

## 29. GUARANTY

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one, (1) year from the date of SUBSTANTIAL COMPLETION or FINAL COMPLETION OF THE PROJECT or specified part, as appropriate. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION (or FINAL COMPLETION OF THE PROJECT for items not completed at time of SUBSTANTIAL COMPLETION) or specified part, as appropriate, that the completed project is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the project resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

## 30. TAXES

30.1 The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

**TOWN OF BENNINGTON**  
**WATER SYSTEM REMEDIAL EXPANSION PROJECT**  
**10 May 2019**

State Permits  
Attachment 1

- State of Vermont Stream Alteration Permit (will be issued in separate Addendum)
- State of Vermont Water Supply Permit (will be issued in separate Addendum)
- State of Vermont Construction General Permit (will be issued in separate Addendum)
- Erosion Prevention and Sediment Control Plan (EPSC) (will be issued in separate Addendum)
- Army Corps of Engineer's Category 2 General Permit (will be issued in separate Addendum)
- State of Vermont Agency of Transportation State Highway Access Permit Letter of Intent (will be issued in separate Addendum)



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**SECTION 012600  
MEASUREMENT AND PAYMENT**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. This section specifies administrative and procedural requirements for Unit and Lump Sum Prices stated in the Bid Schedule.
- B. A "Measurement and Payment Schedule" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods described under each Price.

**1.03 GENERAL PROVISIONS**

- A. Each unit price or lump sum stated in the Bid Schedule shall constitute full compensation for all materials, labor, tools, equipment and incidentals thereto, to perform the work in accordance with the Contract Documents.
- B. Consider all work required by the Contract Documents and/or normally required during the construction of the work herein specified, and not listed as a separate Item, as included and incidental to all items stated in the Bid Schedule. Such work will not be paid for as a separate Item.

**1.04 ITEMS INVOLVING EARTHWORK**

- A. Items involving earthwork shall include full compensation for the following as required:
  - 1. Excavation of earth, sawcutting and removal of pavement, stripping, grubbing, clearing, tree removal, disposal of surplus, demolition of waste material
  - 2. Supply, placement, and compaction of bedding material, backfill, any other borrow material;
  - 3. Dewatering of surface and groundwater where encountered;
  - 4. Sheeting, bracing, and trench protection;
  - 5. Final cleanup and surface restoration unless specifically described in another Item.

**1.05 ITEMS INVOLVING ROCK REMOVAL**

- A. Items involving rock removal shall include, but are not limited to, the following:
  - 1. The cost of the pre-blast survey (if applicable);
  - 2. Rock removal within the specified pay limits;
  - 3. Transportation and disposal of rock;
  - 4. Refilling with appropriate backfill material.
- B. The Contractor and Engineer shall agree on the method of measurement prior to blasting or removal of material. The Engineer shall be present during rock removal operations and all quantities shall be agreed upon with the Contractor at that time.
- C. The Contractor shall only be reimbursed for removal of rock within the specified pay limits. The Contractor will be responsible for removing and replacing any material blasted beyond the specified pay limits with appropriate backfill material at no additional cost to the Owner.

**1.06 INCREASE, DECREASE OR ELIMINATION OF ITEMS**

- A. The quantity of units identified in the Contract Documents are not guaranteed. No additional compensation for anticipated profits shall be granted nor shall the Contract be deemed

invalid due to an increase, decrease or elimination of an item in the Bid Schedule by the Engineer.

#### **1.07 CONTRACTOR COORDINATION WITH WORK BY OTHERS**

- A. The watermain extension project includes multiple concurrent contracts that may be performed by separate contractors, and that will require contractor coordination. Water Main tie-ins between multiple contracts will occur at the following locations:
  - 1. Contract 5 - Contract 6:
    - a. Houghton Lane
- B. Contractor means & methods will determine which Contractor arrives first. Whichever Contractor arrives first shall provide the gate valves, pipe stub and a temporary cap and thrust block for connection by subsequent Contractor. Subsequent Contractor shall be responsible for all labor and materials required to make connection and for restoration immediately adjacent to the connection. Each Contractor shall be paid for the actual units of work installed. No additional payment will be made for any required coordination.

#### **1.08 EXCESS SPOILS AND UNSUITABLE EXCAVATED MATERIAL**

- A. All excavated native soil that is not re-used within the project limits shall be delivered to a collection site designated by the Engineer and secured by the Contractor with approval from the State of Vermont. The designated site shall be located at the Town of Benningtons former landfill on Houghton Lane, within the specified corrective action area. All costs associated with loading, hauling and discharge of excess spoils and unsuitable excavated material shall be incidental to other items of work.
- B. All costs associated with coordinating spoils loads from Contracts 5-7 shall be incidental to other items of work. Management, security, and restoring collection area shall be the responsibility of the Contract #6 Contractor.
- C. The Contract #6 Contractor shall construct, maintain, and restore the spoils site and all access roads to the designated spoils site to accommodate all construction spoils loads from Contracts 5-7 until the date of Final Completion listed in the Contract Documents. All coordination with other contracts and contractors including, but not limited to, designated dump areas, scheduling, access, and frequency of loads shall be the responsibility of the Contract #6 Contractor.
- D. The Contractor shall conduct operations at the spoils management site so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.
- E. The Contractors responsible for Contracts #5 and #7 shall coordinate with the Contract #6 Contractor all activities including, but not limited to, scheduling, access, and frequency of loads.
- F. The opening and managing of the designated off site activity area for spoils shall be operable and ready to receive excavated materials within 15 work days of the Notice to Proceed. Any claims from other Contracts associated with the delay of an operable spoils site shall be the responsibility of the Contract #6 Contractor.
- G. The Contractor shall conduct operations at the spoils management site so as to prevent unauthorized access from the public. The access gate to the site shall be secure at all times.



- H. The opening and managing of an off site activity area for spoils other than the designated spoils site shall require compliance with Section 015713 of the Contract Documents and will be the responsibility of the individual Contractors.

#### **1.09 MEASUREMENT OF QUANTITIES**

- A. All work completed under the Contract will be measured by the Engineer according to U.S. Customary units, as required by the Contract Documents. The measurement and determination of the number of units will be made as specifically described in Part 3 of this Section.
- B. Area: Unless otherwise specified in the Contract, area computations will be made horizontally. Measurements for area computations will be the neat dimension shown on the Plans or authorized in writing by the Engineer.
- C. Volumes: Unless otherwise specified in the Contract, volume computations will be made using arithmetical formulae of in-place quantities after compaction to the specified density and in accordance with the limits shown in the Contract Documents or as authorized in writing by the Engineer.
- D. Length Measurement: All items measured by the linear foot will be measured parallel to the base or foundation upon which the item is placed, unless otherwise indicated in the Contract Documents.
- E. Lump Sum: The term "lump sum", when used as a unit of measurement for an item of payment, means complete payment for the work described in the Item Description.
- F. Each: The term "Each", when used as a unit of measurement for an item of payment, means the complete payment per item for the work described in the Item Description.

#### **1.10 SCOPE OF PAYMENT**

- A. In general, the Contractor shall receive and accept the compensation provided in accordance with the General Conditions of the Contract Documents as full payment for:
  - 1. Furnishing all materials, labor, tools, equipment and performing all work contemplated and required under the Contract Documents;
  - 2. All loss or damage arising out of the work from actions of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered during the prosecution of the work until its acceptance by the Owner;
  - 3. All risks of every description connected with the prosecution of the work;
  - 4. All expenses incurred by or in consequence of the temporary suspension or discontinuance of the work for any infringement of patent, trademark, or copyright, and for the completing the work in an acceptable manner according to the Contract Documents.

### **PART 2 - PRODUCTS (NOT APPLICABLE).**

### **PART 3 - EXECUTION**

#### **3.01 UNIT PRICED ITEM DESCRIPTIONS**

- A. Item No. 1 - Mobilization/Demobilization
  - 1. Mobilization and demobilization of all necessary equipment and materials; set up of the necessary storage areas, field offices, sanitary and other facilities required by Federal, State and local law or regulation; obtaining all required permits, insurance and bonds; and any costs associated with initiation of the Contract work.
  - 2. Unit of Measure: Lump Sum (The maximum amount of Mobilization/Demobilization shall not be greater than 6% of the Total Contract Price).
- B. Item No. 2 - Erosion and Sediment Controls

1. Planning, furnishing, installing, maintaining, removing, and disposing of erosion prevention and sediment control measures in accordance with the Contract Documents.
  2. Unit of Measure: Lump Sum.
- C. Item No. 3 – Traffic Control
1. Development and submittal of traffic control plan for approval by agencies having jurisdiction, purchase and installation of traffic control signs, traffic control management in compliance with applicable standards and permits.
  2. Unit of Measure: Lump Sum
- D. Item No. 4 - Trench Excavation of Rock
1. Removal of all solid rock in formation, or boulders measuring 1 cubic yard or more, excavated within 6 inches beneath invert elevation of pipe in trenches, and 24 inches wider than pipe diameter, or 42 inches wide, whichever is greater. This item includes the backfill of all voids where solid rock was removed with suitable material.
  2. Unit of Measure: Cubic Yard
- E. Item No. 5 - French Drain
1. Installation of French Drain as shown in the Contract Plans to daylight and as directed by the Engineer if excessive groundwater is encountered during the installation of water distribution lines.
  2. Unit of Measure: Linear Foot
- F. Item No. 6 - Removal and Replacement of Unsuitable Trench Material
1. Furnishing and installing of replacement trench backfill meeting the requirements of Specification 312323, only where excavated on-site materials are unsuitable for trench backfill and only as directed by the Engineer.
  2. Unit of Measure: Cubic Yard
- G. Item No. 7 - Gravel Road
1. Furnishing and installing gravel road material meeting the requirements of Specification 312323 as shown in the Contract Plans and as directed by the Engineer. General restoration of gravel driveways shall be incidental to waterline installation unless explicitly noted on the plans. Quantities will be based on neat line measurements in place.
  2. Unit of Measure: Cubic Yard
- H. Item No. 8 – 2.5” Caliper Tree Installation
1. Furnishing, installing in a prepared bed and watering of 2.5” caliper deciduous trees in accordance with the details shown in the Contract Documents.
  2. Unit of Measure: Each
- I. Item No. 9 - Bituminous Concrete Pavement - Patching
1. Costs shall include all labor, materials and equipment necessary to repair the asphalt pavement within the removal limits of the watermain installation trenches including, but not limited to, preparation of a mix design and material submittals for Engineer’s review, saw-cutting, removal and disposal of existing pavement, replacement of existing detectable warning panels and posts where removed for construction, preparation of subbase and installation of base course, tack coating, pavement installation and field quality control, protection of the installed pavement until the surface temperature has cooled sufficiently to prevent mechanical injury, and clean-up. Costs shall also include re-establishment of pavement markings disturbed by

construction. All work shall conform to the Contract Documents.

2. Unit of Measure: Ton
- J. Item No. 10 – Bituminous Concrete Pavement – Overlay
1. Costs shall include all labor, materials and equipment necessary to install 2,  $\frac{3}{4}$ "-inch compacted lifts of Type IV asphalt overlay including, but not limited to, cold-planing at terminations, sweeping, tack coating, pavement installation and field quality control, protection of the installed pavement until the surface temperature has cooled sufficiently to prevent mechanical injury, and clean-up. Costs shall also include re-establishment of pavement markings disturbed by construction. All work shall conform to the Contract Documents. Cold planing shall be assumed to be a  $\frac{3}{4}$ " average depth when joining to existing asphalt pavement at a 2-foot length including paved driveways. A rubber-tired roller must be used on the shim coat to knead the pavement in the existing road profile. Costs shall also include re-establishment of pavement markings disturbed by construction. Copies of all load slips must be handed to inspectors at the delivery of each load.
  2. Unit of Measure: Ton
- K. Item No. 11 – Corporation Stops
1. Furnishing and installing corporation stops in accordance with the Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 11.1 –  $\frac{3}{4}$ " Corporation Stops
    - b. Item No. 11.2 – 1" Corporation Stops
    - c. Item No. 11.3 – 1.5" Corporation Stops
    - d. Item No. 11.4 - 2" Corporation Stops
- L. Item No. 12 – Curb Stops
1. Furnishing and installing Curb Stops in accordance with Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 12.1 –  $\frac{3}{4}$ " Curb Stop
    - b. Item No. 12.2 – 1" Curb Stop
    - c. Item No. 12.3 - 1.5" Curb Stop
    - d. Item No. 12.4 - 2" Curb Stops
- M. Item No. 13 – Gate Valves
1. Furnishing and installing Gate Valves including, but not limited to, furnishing and installing anchorages and valve boxes in accordance with the Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 13.1 – 3" Gate Valve
    - b. Item No. 13.2 – 4" Gate Valve
    - c. Item No. 13.3 – 6" Gate Valve
    - d. Item No. 13.4 – 8" Gate Valve
- N. Item No. 14 – Ductile Iron MJ Fittings
1. Furnishing and installing ductile iron fittings including, but not limited to, mechanical joint thrust restraints, and manufacturer "blue" bolts in accordance with the Contract Documents.



2. Unit of Measure: Pound (lb). Weight of fitting shall be determined as published by the Ductile Iron Pipe Research Association. Mechanical joints, bolts, fasteners and gaskets shall be incidental.
- O. Item No. 15 – Pipe and Tube
1. Earthwork, sawcutting and removing existing pavement, furnishing and installing pipe or tube, pipe bedding, installation of Trace Wire for non-conductive water mains and service lines, cleaning, disinfection, pressure and bacteria testing in accordance with the Contract Documents. Coordination with other contractors for connection to new water mains installed under separate contracts shall be incidental to the unit price bid for the associated water main pipe. Copper tees, reducers and miscellaneous fittings for service line connections shall be incidental. 90% payment upon complete installation of pipe and service corporation and curb stops. 10% payment upon completion of required pressure and bacteria testing. All service lines shall be paid 90% upon complete installation of pipe through foundation and final 10% upon completion of yard restoration.
  2. Unit of Measure: Linear Foot
    - a. Item No. 15.1 - 4" Ductile Iron Pipe
    - b. Item No. 15.2 - 6" Ductile Iron Pipe
    - c. Item No. 15.3 - 8" Ductile Iron Pipe
    - d. Item No. 15.4 – 1" HDPE Tubing Pipe
    - e. Item No. 15.5 – 1.5" HDPE Tubing Pipe
    - f. Item No. 15.6 – 2" HDPE Tubing Pipe
    - g. Item No. 15.7 – 3" HDPE Tubing Pipe
    - h. Item No. 15.8 – 3/4" Copper Tube
    - i. Item No. 15.9 – 1" Copper Tube
    - j. Item No. 15.10 – 1.5" Copper Tube
    - k. Item No. 15.11 – 2" Copper Tube
- P. Item No. 16 – Sleeves
1. Trenchless installation of casing sleeves in accordance with the Contract Documents, including boring pits, carrier pipe, casing spacers, end seals and thrust blocks. If Agency approval is granted for open cut in lieu of trenchless installation, all excavation, bedding, backfill, carrier pipe, casing spacers and end seals shall be incidental.
  2. Unit of Measure: Linear Foot
    - a. Item No. 16.1 – 4" HDPE Sleeve
    - b. Item No. 16.2 – 6" HDPE Sleeve
    - c. Item No. 16.3 – 10" HDPE Sleeve
    - d. Item No. 16.4 – 18" HDPE Sleeve
    - e. Item No. 16.5 – 24" HDPE Sleeve
- Q. Item No. 17 – Trenchless Water Main
1. Trenchless installation of 10" HDPE water main carrier pipe installed within a specified HDPE casing pipe and all associated accessories and appurtenances, casing spacers and end seals, cleaning, disinfecting, pressure and bacteria testing and trenchless installation of casing sleeves in accordance with the Contract Documents. Unit price

shall include all labor, equipment and materials, boring pit construction, protection and clean-up.

2. Unit of Measure: Linear Foot (Horizontal Distance)
- R. Item No. 18 – Pressure Reducing Valve Vault – Site Preparation
1. Work required to prepare the site for installation of Pressure Reducing Valve Vaults (PRV's) including, but not limited to, site preparation, excavation, installation of 8-inch compacted gravel base for PRV vault, connection of exterior lines, coordination with PRV supplier on delivery and construction progress, electrical trenching and energizing of the PRV, incidental site work, installation of 1-1/2" pvc sump drain pipe to daylight, and backfill and restoration. PRV shall be supplied and offloaded by others. This item includes all coordination and associated lead times associated with the PRV and its supplier.
  2. Unit of Measure: Lump Sum
- S. Item No. 19 - Cast-in-Place Concrete Thrust Block
1. Furnishing and Installing cast-in-place concrete thrust blocks in accordance with the Contract Documents.
  2. Unit of Measure: Each
- T. Item No. 20 - Buried Rigid Insulation Board
1. Furnishing and installing minimum 2" thick buried rigid insulation board in accordance with the Contract Documents.
  2. Unit of Measure: Square Foot
- U. Item No. 21 – Connection to Existing Mains
1. All labor, equipment and materials required to make connections to existing water mains including test digs and field verification of existing mains.
  2. Unit of Measure: Lump Sum
- V. Item No. 22 – Connection to Existing Gate Valves
1. All labor, equipment and materials required to make connections to existing gate valves.
  2. Unit of Measure: Lump Sum
- W. Item No. 23 – Service Connections
1. All work required within the building envelope for the installation and connection of new water service lines including, but not limited to, demolition, disposal, construction, modification of existing water systems, installation of equipment and appurtenances, electrical and plumbing permits, record documents, O&M Manuals and owner training as outlined in the Contract Documents and within the specified pay limits. Existing line sizes indicated on individual service connection details are approximate. Contractor shall provide all required materials and fittings necessary for a complete system. Where required, meters shall be purchased from the Town of Bennington Water Department.
  2. Unit of Measure: Each
    - a. Item 23.1 – Building service
    - b. Item 23.2 – Slab on Grade Building Service
    - c. Item 23.3 – Mobile Home Building Service
    - d. Item 23.4 – Meter Installation

- e. Item 23.5 – Booster Pump Installation
- X. Item No. 24 – Fire Hydrant Assembly
  - 1. Furnishing, assembling and installing fire hydrant assemblies in accordance with Contract Documents including, but not limited to, hydrants and appurtenances, mechanical joint thrust restraint at the hydrant assembly joints, hydrant isolation gate valves, hydrant tee, hydrant branch pipe, hydrant markers, and concrete thrust blocking at the hydrant and hydrant tee.
  - 2. Unit of Measure: Each
- Y. Item No. 25 – Flush Hydrant Assembly
  - 1. Furnishing, assembling and installing flush hydrant assemblies in accordance with Contract Documents including, but not limited to, hydrants and appurtenances, hydrant isolation gate valve, mechanical joint thrust restraint at the hydrant assembly joints and concrete thrust blocking at the hydrant and isolation gate valve.
  - 2. Unit of Measure: Each
- Z. Item No. 26 – Lockable Well Caps and Water Sampling Stations
  - 1. Furnishing, assembling and installing lockable well caps and water sampling station assemblies where indicated on the plans or as directed by the Engineer in accordance with the Contract Documents. This item shall include, but is not limited to, the removal of the well pump and well line, and capping of abandoned service line at well casing and foundation.
  - 2. Unit of Measure: Each
    - a. Item 26.1 – Lockable well caps
    - b. Item 26.2 – Water Sampling Station
- AA. Item No. 27 – Closure of Abandoned Wells
  - 1. All work associated with decommissioning wells including State of Vermont well closure reports in accordance with the Contract Documents. This item shall include, but is not limited to, the removal of the well pump and well line, and capping of abandoned service line at well casing and foundation.
  - 2. Unit of Measure:
    - a. 27.1 – Drilled Well: Linear Foot
    - b. 27.2 – Dug Well: Each
- BB. Item No. 28- Utility Crossings
  - 1. Temporary disconnection, temporary service (if required) and reconnection of underground electrical or telecommunications utilities for the purpose of completing trench excavation as noted on the Drawings.
  - 2. Unit of Measure: Each
- CC. Item No. 29 - Sewer Crossing – Water Below
  - 1. Removal and replacing of an existing sewer line crossing above a water line in accordance with the Contract Documents.
  - 2. Unit of Measure: Each
- DD. Item No. 30 Culvert Installation
  - 1. All work associated with the removal and replacement of existing culverts as noted in the contract plans or directed by the Engineer including, but not limited to; earthwork, sawcutting and removing existing pavement, removal and disposal of existing storm

pipe, furnishing and installing new pipe, pipe bedding, removal and replacement of unsuitable trench material, and trench backfill.

2. Unit of Measure: Linear Foot
  - a. Item 30.1 - 18" CPEP Pipe
  - b. Item 30.2 - 24" CPEP Pipe
  - c. Item 30.3 - 36" CPEP Pipe
  - d. Item 30.4 - 48" CPEP Pipe
- EE. Item No. 31 Riprap Stone Installation
  1. All work associated with installing riprap stone at culvert ends and specified swales as noted in the contract plans or directed by the Engineer including, but not limited to: earthwork, grading, removal of existing material, and furnishing and installing new stone. Load tickets shall be provided at time of delivery.
  2. Unit of Measure: Ton
- FF. Item No. 32. Leakage Clamps
  1. Furnishing and installing ductile iron leakage clamps in accordance with the Contract Documents.
  2. Unit of Measure: Each
- GG. Item No. 33. Heat Tape installation
  1. Furnishing and installation of heat tape on service lines in accordance with the Contract Documents.
  2. Unit of Measure: Each
- HH. Item No. 34 – Large Diameter Tree Removal (18 inches or larger)
  1. All work associated with removing large diameter trees including, but not limited to, cutting and chipping, stump removal, earthwork and cleanup in accordance with the Contract Documents.
  2. Unit of Measure: Each
- II. Item No. 35 - Yard Hydrant Installation
  1. Furnishing, assembling and installing yard hydrant assembly in accordance with Contract Documents including, but not limited to, hydrant and appurtenances.
  2. Unit of Measure: Each
- JJ. Item No. 36 - Bollard Installation
  1. Furnishing, assembling and installing bollard assembly in accordance with Contract Documents.
  2. Unit of Measure: Each
- KK. Item No. 37 - Fluoroelastomer Gaskets
  1. Furnishing and installing fluoroelastomer gaskets in accordance with Contract Documents and as directed by the Engineer.
  2. Unit of Measure: Each
- LL. Item No. 38 - Meter Pit Installation
  1. Furnishing, assembling and installing meter pit assembly in accordance with Contract Documents including, but not limited to, site preparation, excavation, installation of 8-inch compacted gravel base for meter pit, connection of exterior lines, meter, valves and appurtenances.



2. Unit of Measure: Each

MM. Item No. 39 - Concrete Curb

1. All excavation, subbase installation and preparation, installation, and surrounding surface restoration for concrete curbing in accordance with the Contract Documents
2. Unit of Measure: Linear Foot

NN. Item No. 40 - Off-Site Activity Area Spoils Management (Contract #6 Only)

1. All work associated with coordinating and managing a preapproved spoils disposal location for Contracts 5, 6 and 7. Costs shall include all security, labor, materials, and equipment necessary to maintain spoils site and access for the duration of the Contract. Work shall include, but is not limited to, preparation of a Spoils Management plan for Engineer's review, acquisition of necessary permits, preparation of site for construction vehicle access, installation and maintenance of erosion control fencing, field quality control, site grading, and clean-up in accordance with the Contract Documents.
2. Unit of Measure: Lump Sum

OO. Item No. 41 - Excavating and Handling for Offsite Disposal of Contaminated Soil

1. All work associated with initial identification of potential petroleum-contaminated soil through visual (soil staining, slicks, or sheens) or olfactory (odor) methods, notifying the Site Health & Safety Officer regarding the potential soil contamination as soon as possible so that the existence of any contamination can be confirmed; Excavation, segregation, and handling of contaminated soils, placement, wrapping and maintenance of contaminated soils on 6 mil plastic sheeting, removal of contaminated soils from project site to a temporary stockpile to the satisfaction of State of Vermont Department of Environmental Conservation, Sites Management Section, loading of contaminated soils. The truck bed will be wrapped in 6 mil plastic sheeting to prevent contamination of the truck bed and seepage.
2. Unit of Measure: Cubic Yard

**END OF SECTION**

**SECTION 013000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittal procedures, schedules, lists and instructions for proper and prompt submittal and review of construction related documents.
- B. Coordination, field engineering, preconstruction meeting, progress meetings, and examination.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Requests for Interpretation (RFI) procedures.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRECONSTRUCTION MEETING**

- A. A pre-construction meeting will be held prior to the start of construction.
- B. Engineer shall schedule the Pre-Construction Meeting after Notice of Award and shall be responsible for preparing an agenda, recording discussions and distributing meeting minutes.
  - 1. Minimum Agenda - Pre-construction Meeting:
    - a. Individual sign-in.
    - b. Owner's, Prime Contractor's, Major Sub-Contractor's, and Engineer's contact persons for project.
    - c. Procedures to be followed when working on site.
    - d. Submittals:
      - 1) Shop Drawings
      - 2) Samples
      - 3) Products
      - 4) Traffic Control Plan
      - 5) Erosion Control Plan
    - e. Material Deliveries:
      - 1) Owner-supplied equipment
      - 2) Contractor-supplied equipment
      - 3) Site laydown area
    - f. General Discussion and Critical Areas.
    - g. Sequence of Work and Procedures:
      - 1) Contractor's Schedule
      - 2) Start of on-site work
      - 3) Construction Staking
      - 4) Completion date specified
      - 5) Coordination with on-site Owner's representatives
      - 6) Owner's Work in conjunction with Contract

- h. Specific Procedures:
  - 1) Temporary Facilities
  - 2) Noise, General Safety & Site Security
  - 3) Traffic in site area
  - 4) Site access - (key procedures)
  - 5) Utility notifications & coordination
  - 6) Other special procedures

### 3.02 PROGRESS MEETINGS

- A. The Engineer shall schedule and conduct Construction Progress Meetings and shall be responsible for preparing an agenda, recording discussions and distributing the meeting minutes. These meetings will be held every week, or more frequently as needed.
  - 1. Minimum Agenda - Construction Progress Meeting:
    - a. Review, revise as necessary, and approve minutes of previous meeting(s).
    - b. Review progress of the work since last meeting, including status of submittals for approval.
    - c. Identify problems which will impede planned progress.
    - d. Develop corrective measures and procedures to regain planned schedule.
    - e. Complete other current business.
    - f. Three week Look-Ahead Schedule.
    - g. Schedule of the next meeting.
- B. Minimum Attendance Required:
  - 1. Contractor.
  - 2. Owner.
  - 3. Contractor's Superintendent.
  - 4. Major Subcontractors as requested.
  - 5. Engineer.
- C. The Engineer shall schedule and conduct special Construction Administration meetings including Pre-Installation meetings on critical systems and assemblies and other meetings as deemed necessary.

### 3.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Submit preliminary schedule in duplicate within 15 days after effective date of the Agreement.
- B. Revise and resubmit as required within 5 days.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities.
- E. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- F. Submit updated schedule with each Application for Payment.
- G. Indicate estimated percentage of completion for each item of work at each submission.

- H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by allowances.

#### **3.04 MANUFACTURER INSTALLATION INSTRUCTIONS**

- A. When required, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing to Engineer.
- B. Indicate special procedures, conditions requiring special attention, and special environmental criteria required for application or installation.

#### **3.05 MANUFACTURER CERTIFICATES**

- A. When specified in individual specification sections, submit certification by manufacturer to Engineer, in duplicate.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

#### **3.06 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
  - 5. Traffic Control Plan.
  - 6. Erosion Control Plan.
  - 7. Lighting Plan.
- B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
  - 1. Shop Drawings and proposed products intended for incorporation in the Work, including fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
    - a. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
    - b. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
    - c. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
    - d. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - e. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - f. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
    - g. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.



- h. Provide space for Contractor and Engineer review stamps.
  - i. If directed to revise and resubmit, identify all changes made since previous submission.
  - j. Submittals not requested will not be recognized or processed.
  - k. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 24" x 36".
  - l. Submittal: Submit one electric copy and two hard copies for the Engineer's concurrent review.
  - m. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
  - n. Engineer shall not proceed with Shop Drawing review without prior review and approval by Contractor.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- 1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical to the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
    - a. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
      - 1) Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
    - b. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
      - 1) Preliminary submittals will be reviewed and returned with the Engineer's mark indicating selection and other action.
  - 2. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

### 3.07 REQUESTS FOR INFORMATION (RFI)

- A. Definition: A request seeking one of the following:
  - 1. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  - 1. Prepare a separate RFI for each specific item.
  - 2. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Review Time: Engineer will respond and return RFIs to Contractor within ten calendar days of receipt.
- D. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

### **3.08 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

### **3.09 SUBMITTAL REVIEW**

- A. Submittals for Review: Engineer will review each submittal, and acknowledge, or take other appropriate action.
- B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.
- C. Engineer's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
  - 1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Engineer's and consultants' actions on items submitted for review:
  - 1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Acknowledged", or language with same legal meaning.
    - b. "Acknowledged as noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
  - 2. Not Authorizing fabrication, delivery, and installation:
    - a. "Revise and Resubmit".
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.
    - b. "Rejected".
      - 1) Submit item complying with requirements of Contract Documents.
- E. Engineer's and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  - 2. Items for which action was taken:
    - a. "Reviewed" - no further action is required from Contractor.

### **MEASUREMENT AND PAYMENT**

- 4.01 **ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

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**SECTION 014000**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Instructions and requirements for quality assurance and quality control of installation.
- B. Control of installation.

**1.02 REFERENCES**

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date for receiving bids, except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. The contractual relationship, duties, and responsibilities of the parties in the contract nor those of the Engineer will not be altered from the Contract Documents by mention or inference otherwise in any reference document.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Submit a certified written report of each inspection, test or similar service to the Engineer, in duplicate, within 48 hours after completion of results.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Conformance with Contract Documents.
    - k. When requested by Engineer, provide interpretation of results.
  - 2. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

**1.04 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Contractor shall engage and pay for services of an independent testing agency to perform compliance testing for submitted products and materials.
- B. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work and the Contractor is also required to engage an entity for the same or related element, Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
- C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.



D. Contractor Employed Agency:

1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

**PART 2 PRODUCTS - NOT USED**

1. Laboratory: Authorized to operate in the State in which the Project is located.
2. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

**PART 3 EXECUTION**

**3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, sub-contractors, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

**3.02 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

**3.03 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
  2. Perform inspections, sampling and testing of materials and construction specified with qualified personnel.
  3. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
  4. Perform additional tests and inspections required by Engineer .
  5. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the Work.

3. Agency may not assume any duties of Contractor .
  4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.

#### **3.04 ASSOCIATED SERVICES**

- A. Cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
  2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

#### **3.05 DEFECT ASSESSMENT**

1. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
2. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
3. Security and protection of samples and test equipment at the project site.

#### **3.06 COORDINATION AND SCHEDULING**

- A. Coordinate the sequence of activities to accommodate required services with a minimum of delay and avoid the necessity of removing and replacing construction to accommodate inspections and tests.
- B. Responsible for scheduling times for inspections, tests, taking samples and similar activities.

#### **3.07 RETESTING**

- A. The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
- B. Cost of retesting construction for Work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
- C. Replace Work or portions of the Work not complying with specified requirements.

- D. In the event that additional testing is specifically requested by the Engineer in excess of the number of tests required by the individual specification sections:
  - 1. If the additional requested test fails, the Contractor shall be responsible for the cost of the test and any subsequent testing required until a passing test is recorded.
  - 2. If the additional requested test passes, the Owner shall be responsible for the cost of the test.

**3.08 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer in advance of required observations. Observer subject to approval of Engineer and Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to Manufacturer's written instructions.
- D. Submit report within 15 days of observation to Engineer for information.
- E. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- F. If, in the opinion of Owner, it is not practical to remove and replace the work, Owner may, at their discretion, direct an appropriate remedy or adjust payment.

**PART 4 MEASUREMENT AND PAYMENT**

- 4.01 **ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

**SECTION 015000**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Guidelines, directions, and descriptions for temporary utilities, including electricity, lighting, heat, ventilation, telephone service, water and sanitary facilities.
- B. Temporary controls for barriers and protection of the work during construction.
- C. Construction Facilities: Progress cleaning.
- D. Temporary Controls: Barriers, enclosures and fencing.
- E. Security requirements.
- F. Waste removal facilities and services.
- G. Field offices.

**1.02 RELATED REQUIREMENTS**

- A. Section 015500 - Vehicular Access and Parking.

**1.03 REFERENCE STANDARDS**

- A. OSHA Publications:
  - 1. 3007 Ground Fault Protection on Construction Sites
  - 2. No. 3115 Underground Construction
  - 3. No. 3124 Stairs and Ladders
  - 4. No. 2226 Excavation and Trenching Operations
- B. International Fire Code (IFC), latest edition.
  - 1. Chapter 14 for construction with flammable materials present.

**1.04 TEMPORARY UTILITIES - SEE SECTION 015100**

- A. Electricity: If available and adequate, Owner's existing power service may be utilized during construction. Do not disrupt Owner's need for continual service.
  - 1. Owner's permanent convenience receptacles may be utilized during construction.
  - 2. Owner's permanent building lighting may be utilized during construction.
- B. Heat: Existing heating system, if available, may be utilized during construction. If not available provide temporary heat for construction and protection of facilities. Maintain space at 68 degrees F.
- C. Ventilation: Ventilate enclosed areas to assist cure of materials, dissipate humidity and prevent accumulation of dust, fumes, vapors or gases.
  - 1. Extend and supplement existing equipment with temporary fan units as required to maintain clean air for construction operations.
  - 2. Provide additional fans as needed.
  - 3. During winter heating season use conservation measures to reduce heat loss.
- D. Telephone Service: Provide and maintain telephone service, if required.
- E. Water Service: Existing water system (if available) may be utilized during construction. Utilize measures to conserve water. If not available, provide temporary supply for potable use, sanitation and construction.
- F. Sanitary Facilities: Existing restroom facility (if available) may be utilized during construction. If not available, provide temporary sanitary facilities for workers and



representatives.

- G. Safety Barriers: Provide safety barriers to prevent unauthorized entry into construction areas and allow for Owner's use of site if required.
- H. Field Office: If required, provide a clean, weather tight structure with necessary electrical and mechanical equipment and a drawing table and chair. Locate as directed by Owner or Engineer in the field.
- I. Internet: Provide and maintain high speed internet service to all work stations with wireless capabilities. 25 megabits per second minimum.
- J. Printer: One(1) - All in one color inkjet printer capable of printing, scanning and coping Ledger, Legal and Letter sizes. Standard interfaces shall include Hi-Speed USB 2.0, Wireless (802.11b/g/n), Ethernet. Minimum requirements include: 35 page automatic document feeder, printing 20 color copies per minute at 6000 x 1200 dpi resolution, scan resolution 2400 x 2400 dpi, flat bed document glass size Ledger (11" x 17") with standalone copy features, minimum of 250 sheet input capacity cassettes and 2 additional complete set of ink cartridges. All warranties, maintenance, servicing and sufficient appropriate ink/toner cartridges and paper for the duration of the Work.
  - 1. Supplies for the printer/scanner/copier shall include 8.5x11 inch paper, 11x17 inch paper, ink and toner throughout the duration of the project.
- K. Office Furnishings: Furniture will be delivered and placed as directed by the Engineer. Provide and maintain work stations to include the following:
  - 1. Desks: Flat top, double pedestal, with one box and one file drawer in each pedestal, 60-inches by 30-inches.
  - 2. Chairs: Ergonomic, adjustable heights, on rollers, with armrests.
  - 3. File Cabinet: Two drawer file cabinet.
  - 4. Conference Table and Chairs: One (1) table (3-feet by 10-feet minimum), scratch and stain resistant and 15 meeting-type chairs.
  - 5. One (1) each refrigerator, microwave, and coffee machine.
- L. Waste Disposal: One waste receptacle and recycling bin for each desk with weekly janitorial services.
- M. Miscellaneous Field Supplies:
  - 1. One (1) minimum/maximum digital thermometer, with batteries for the duration of the Work.
  - 2. One (1) rain gauge
  - 3. One (1) first aid kit conforming to the latest revision of ANSI/ISEA Z 308.1
  - 4. Toiletries as needed.
- N. Provide and pay for all electrical power, lighting, water, heating and cooling, ventilation and temporary utilities required for construction purposes.

#### 1.05 FIELD OFFICE AND STORAGE AREA

- A. If unused space is available on site, Contractor may use it for office and storage space. Space must be coordinated with and approved by Owner.
- B. Areas designated for storage must be secured by Contractor. Sensitive or hazardous materials shall not be brought on site without the written consent of Owner.

#### 1.06 SITE DRAINAGE

- A. Grade site to drain around temporary facilities.

- B. Provide erosion control and protection as needed.

#### 1.07 **BARRIERS**

- A. Sensitive and hazardous materials must be stored away from drainage areas and water ways.
- B. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- C. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- D. Provide protection for plants designated to remain. Replace damaged plants.
- E. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

#### 1.08 **FENCING**

- A. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

#### 1.09 **SECURITY**

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

#### 1.10 **VEHICULAR ACCESS AND PARKING - SEE SECTION 01 5500**

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.

#### 1.11 **WASTE REMOVAL**

- A. Provide means of removing mud from vehicle wheels before entering streets.
- B. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- C. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- D. Provide containers with lids. Remove trash from site weekly.
- E. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

#### 1.12 **REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities and materials prior to final application for payment.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.
- D. Restore new permanent facilities used during construction to specified condition.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION - NOT USED**

**END OF SECTION**

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**SECTION 015500  
VEHICULAR ACCESS AND PARKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Construction Traffic Control
- B. Access roads.
- C. Parking.
- D. Flag persons.
- E. Haul routes.
- F. Maintenance.
- G. Removal, repair.

**1.02 REFERENCES**

- A. Manual of Uniform Traffic Control Devices, (MUTCD), latest edition.
- B. Vermont Agency of Transportation (VTrans) - Standard Specifications for Construction, Division 100 and 600.

**1.03 SUBMITTALS**

- A. Submit a Traffic Control Plan for Engineer, State, and Local Agency review and approval at the Pre-Construction Conference. If no Pre-Construction Conference is held, Traffic Control Plan shall be submitted prior to site mobilization.

**1.04 QUALIFICATIONS**

- A. Procure all required permits and certifications for commercial vehicles hauling equipment and materials onto and off of the project site.
- B. Provide a qualified traffic maintenance person with the following minimum qualifications:
  - 1. Be familiar with the requirements and importance of maintaining safe and smooth traffic flows.
  - 2. Have previous experience working with maintenance and protection of traffic.
  - 3. Be competent to supervise personnel in traffic maintenance operations.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Use only traffic control devices manufactured from materials that are durable, lightweight, rigid and visible, but do not create a hazard when struck.
- B. All traffic control devices used shall comply with applicable provisions of the MUTCD, latest edition.

**2.02 ACCESSORIES**

- A. Barricades: Type III, clear, well maintained and properly marked or lighted for nighttime use.
- B. Signs: Utilize signs with messages appropriate to provide adequate construction control. Signs and sign mountings shall conform to the Vtrans Standard Specifications for Construction, current edition.
- C. Traffic Cones: The cones shall be orange in color, shall be a minimum of 28 inches in height with a broadened base, and fabricated from materials that withstand impact. For nighttime use, cones shall have a minimum 6 inch wide white flexible reflectorized band placed a minimum of 3 inches, but not more than 4 inches, from the top. An additional 4 inch white reflectorized band shall be placed a minimum of 2 inches below the 6 inch band.



The cones shall be weighted at the base to prevent overturning by wind. The reflectorized band shall be fabricated from Type III C, Type IV or Wide Angle Prismatic flexible reflective sheeting.

- D. Lights, delineators and reflectors: Red, yellow or white in color with no less than 12 square inches of reflective area per unit.
- E. Delineator Drums: Drums shall be approximately 36 inches in height and minimum of 18 inches in diameter at the top. They shall be constructed of durable plastic with horizontal, circumferential, orange and white reflectorized stripes. The reflectorized striped shall be fabricated from Type III C, Type IV, or Wide Angle Prismatic flexible reflective sheeting. Delineator drums shall be weighted with sand placed at the bottom of the drum or constructed so that they cannot be blown over or displaced by wind or passing traffic, and do not create a hazard if accidentally struck.

### **PART 3 EXECUTION**

#### **3.01 SCHEDULING AND COORDINATION**

- A. Prior to commencing work, develop and agree to a detailed schedule between the Engineer, Utility Companies, the Contractor and Subcontractor(s).
- B. Before any detour or temporary route is opened to traffic, all necessary Temporary Traffic Control (TTC) devices shall be in place.
- C. Schedule work to reopen a closed intersection in the most expedient manner. Any public road closures shall be approved by the governmental authority having jurisdiction.
- D. Provide access to all residential dwellings and businesses adjacent to this project.
- E. All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, TTC devices that are no longer appropriate shall be removed or covered.

#### **3.02 PREPARATION**

- A. Provide, erect and place all required traffic control devices in the appropriate locations prior to beginning any construction activity.

#### **3.03 ACCESS ROADS**

- A. Tracked vehicles not allowed on paved areas.
- B. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.
- C. Provide unimpeded access for emergency vehicles. Maintain 20 foot (6 m) width driveways with turning space between and around combustible materials.
- D. Contractor shall utilize only those roads designated as access roads by the governing authority having jurisdiction for access to the project site.

#### **3.04 PARKING**

- A. Contractor shall install vehicle tracking pads to prevent material tracking onto adjacent roadways.
- B. Provide and maintain access to fire hydrants free of obstructions.
- C. Arrange for temporary parking areas to accommodate use of construction personnel.
- D. Construction may utilize those portions of the existing facilities designated by the Owner for access and parking.

#### **3.05 FLAG PERSONS**

- A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.

### 3.06 HAUL ROUTES

- A. Confine construction traffic to haul routes.
- B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
- C. Provide traffic control and access to all commercial vehicles including, but not limited to: Emergency vehicles, mail trucks, school buses and dairy trucks.

### 3.07 MAINTENANCE

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

### 3.08 REMOVAL, REPAIR

- A. Repair existing facilities damaged by use, to original condition.
- B. Repair damage caused by installation.

## PART 4 MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

- A. Items as required within the plans and traffic control details.

### END OF SECTION

- A. If traffic control is bid as a Lump Sum on the bid form, the amount bid must include the appropriate number of units as defined in "A" above within the plans and traffic control details to properly complete the project.

### 5.02 PAYMENT

- A. Include all costs associated with the requirements listed herein in the lump sum price bid for traffic control.
- B. If no bid item is provided, payment will be incidental to other related items of work.

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**SECTION 015713  
EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Permanent erosion control.
- E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor .

**1.02 RELATED REQUIREMENTS**

- A. Section 311000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.
- B. Section 312200 - Grading: Temporary and permanent grade changes for erosion control.
- C. Section 321123 - Aggregate Base Courses: Temporary and permanent roadways.
- D. Section 329219 - Seeding: Permanent turf for erosion control.
- E. Section 329300 - Plants: Permanent plantings for erosion control.

**1.03 REFERENCE STANDARDS**

- A. State of Vermont Agency of Natural Resources, Department of Environmental Conservation: Chapter 22 - Stormwater Permitting Rule.
- B. State of Vermont :Vermont Standards and Specifications for Erosion Prevention and Sediment Control", current edition.
- C. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus 2014.
- D. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity. 1999a (Reapproved 2014).
- E. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles 2011.
- F. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.
- G. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile 2016.
- H. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples 2002 (Reapproved 2009).

**1.04 PERFORMANCE REQUIREMENTS**

- A. Comply with all State of Vermont Erosion and Sedimentation control standards.
- B. Review, revise, and follow the Erosion and Sedimentation Prevention Plan and submit periodic inspection reports in accordance with the SWPPP requirements and state stormwater permits and regulations.
- C. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained.
  - 1. Obtain permits and pay for securities required by authority having jurisdiction.
  - 2. Contractor shall sign on as Co-Permittee and Permit Operator where required.



3. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
  - E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
    1. Prevent runoff of sediment-laden water into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less..
  - F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
    1. Control movement of sediment and soil from temporary stockpiles of soil.
    2. Prevent development of ruts due to equipment and vehicular traffic.
    3. If erosion occurs due to non-compliance with these requirements, restore eroded areas immediately at no cost to Owner, including removal and disposal of accumulated sediment in storm and sanitary sewer systems, open channels and stormwater treatment practices.
  - G. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
    1. Prevent windblown soil from leaving the project site.
    2. Prevent tracking of mud onto public roads outside site.
    3. Prevent mud and sediment from flowing onto sidewalks and pavements.
    4. If erosion occurs due to non-compliance with these requirements, restore eroded areas immediately at no cost to Owner .
  - H. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
    1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner ; remove deposited sediments; comply with requirements of authorities having jurisdiction.
    2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
  - I. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
    1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner ; remove deposited sediments; comply with requirements of authorities having jurisdiction.
  - J. Open Water: Prevent standing water that could become stagnant.
  - K. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

#### 1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
  1. Submit within 2 weeks after Notice to Proceed.

2. Include:
    - a. Site plan identifying proposed erosion and sedimentation controls compliant with Contract Documents and applicable permits.
    - b. Schedule of temporary preventive measures, in relation to ground disturbing activities.
  3. Obtain the approval of the Plan by authorities having jurisdiction.
  - 4.
  5. Obtain the approval of the Plan by Owner .
- C. Inspection Reports: Contractor shall perform inspections and maintain records in accordance with the General Permit 3-9020 conditions and requirements.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Mulch: Use one of the following:
  1. Straw or hay.
  2. Wood waste, chips, or bark.
  3. Erosion control matting or netting.
- B. Grass Seed For Temporary Cover: Use seed mix identified on plans or select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- C. Fiber Rolls (Straw Wattles):
  1. Wood, 2 by 2 inches (50 by 50 mm) in cross section.
  2. 9 inch, East Coast Erosion Control Sediment Retention Fiber Rolls, or approved equal.
- D. Silt Fence:
  1. Where required by the local municipality having jurisdiction, where indicated on the plans, or where required at critical areas.
  2. Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible. Silt fence shall be backed with wire fence, minimum 14 gauge with 6" openings.
  3. Posts: hardwood, 2" by 2" in cross section.
- E. Erosion Control Blanket: Erosion Control Blanket and Turf Reinforcement Mat shall conform to VTrans Standard Specifications for Construction, current edition. Install on slopes 3:1 or steeper, in swales and stormwater conveyance channels, and where indicated on plans.
- F. Permanent Turf Reinforcement Mat
  1. As per pan.
- G. Clean Stone: See Section 321123 for aggregate.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

### **3.02 PREPARATION**

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

- B. Maximum area of disturbance at any one time shall be as established in issued General Permit 3-9020.

### 3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed, temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
  - 1. Width: As required; 20 feet (7 m), minimum.
  - 2. Length: 50 feet (16 m), minimum.
  - 3. Provide at each construction entrance from public right-of-way.
  - 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences, bales or approved alternative.
  - 1. Provide linear sediment barriers:
    - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
    - b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
    - c. Along the toe of cut slopes and fill slopes.
    - d. Across the entrances to culverts that receive runoff from disturbed areas.
- D. Storm Drain Drop Inlet Sediment Traps: Manufactured drop-in style filter bags or site-construction sediment filters shall be installed at each existing and newly installed storm sewer inlet to prevent sediment laden water from entering. Contractor shall maintain as needed and in accordance with Manufacturer's instructions.
- E. Soil Stockpiles: Protect using one of the following measures:
  - 1. Cover with polyethylene film, secured by placing soil on outer edges.
  - 2. Cover with mulch at least 4 inches (100 mm) thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches (150 mm) of straw or hay.
  - 3. Install perimeter silt fence at tow of stockpile.
- F. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
  - 1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- G. Temporary Seeding: Use where temporary vegetated cover is required.
- H. Permanent turf reinforcement mats or temporary erosion control: Install where required or where indicated on plans.

### 3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface at Construction Entrances:
  - 1. Excavate minimum of 6 inches (150 mm).
- B. Permanent turf reinforcement mats or temporary erosion control: Install where required or where indicated on plans.
  - 1. Place geotextile fabric full width and length, with minimum 12 inch (300 mm) overlap at joints.
  - 2. Place and compact at least 6 inches (150 mm) of [2" - 3"] inch ([ ] mm) diameter stone.
- C. Silt Fences:

1. Store and handle fabric in accordance with ASTM D4873.
  2. Silt fence shall either be installed in a 4 inch deep by 6 inch wide trench on the upslope side of the fence, or be machine sliced in with a 4 inch fabric embedment. If utilizing trench method, trench shall be backfilled and compacted. Top of fabric shall be at a minimum 32 inch nominal height.
  3. Posts shall be installed at a maximum 4 foot spacing, with a minimum embedment of 24 inches.
  4. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches (460 mm), with J hooks.
  5. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches (300 mm) high with post spacing not more than 4 feet (1220 mm).
- D. Fiber Rolls:
1. Install in fiber roll sections with roll ends overlapping 4 feet or greater, with each end of row turned uphill.
- E. Erosion Control Blankets:
1. Install where indicated in plans or as needed per manufacturers recommendations.
- F. When hydraulic seeder is used, seedbed preparation is not required.
1. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.
- G. Permanent Turf reinforcement mats:
1. Install where indicated in plans per manufacturers recommendations.
- H. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
  2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
  3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at manufacturers specified rate.
  4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft (6 to 8 kg per 100 sq m).
  5. Incorporate fertilizer into soil before seeding.
  6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.
  7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
  8. Repeat irrigation as required until grass is established.

### 3.05 MAINTENANCE

- A. Comply with General Permit 3-9020 inspection and reporting requirements.
- B. Repair deficiencies immediately.
- C. Silt Fences:
  1. Promptly replace fabric that deteriorates unless need for fence has passed.



2. Remove silt deposits that exceed one-third of the height of the fence.
  3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Fiber Rolls:
1. Promptly replace rolls that fall apart or otherwise deteriorate unless need has passed.
- E. Clean out temporary sediment control structures as required and relocate soil on site.
- F. Place sediment in appropriate locations on site; do not remove from site.
- G. Sweep debris and soil from work area daily in a manner that prevents dust from becoming airborne.

### 3.06 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer .
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.
- D. Comply with all SWPPP requirements relative to protection removal.

### 3.07 OFF-SITE ACTIVITY AREAS

- A. Off-Site Activity (OSA) areas are those areas located outside of the Project's defined construction limits but within the projects Corrective Action Area II (CAII) and associated Operational Unit A (OUA) that are necessary adjuncts used for supporting the construction activities, including access roads, waste, borrow, and staging areas. Compliance with Environmental and Pollution Control Regulations described in construction permits and the spoils management plan shall apply to all OSA areas.
- B. The projects corrective action area can be found at the State of Vermont Agency of Natural Resources Department of Environmental Conservation Website, found at the following link: <https://anrweb.vt.gov/PubDocs/DEC/PFOA/Maps/PFASOpenHouseMap.pdf>
- C. Opening Off Site Activity Areas:
  1. General: The Contractor shall demonstrate that the proposed OSA area is in accordance with all Project permits and that the following are met:
    - a. The final shape, slope, and contour of the land in and about the area will not be undesirable aesthetically or as it relates to drainage.
    - b. Is consistent with any duly adopted development plan, land use plan or land capability plan, whether site specific, local, or regional.
    - c. The entrance is at the most desirable angle or perspective from any nearby Town and State roads, residences, and other facilities.
    - d. The Contractor shall remove, stockpile, and preserve topsoil, sod, and other suitable material from the surface of the area prior to proceeding with other operations.
    - e. The Contractor has all erosion prevention and sediment control measures, as indicated in the Conforming Erosion Prevention and Sediment Control Plan, in place prior to use of the area. At a minimum, erosion prevention and sediment control measures published by ANR shall be used as best management practices for OSA areas.

2. The Contractor shall meet all Vermont Agency of Natural Resources (VT ANR) siting criteria listed below for each spoils management site.
    - a. Areas where water lines are being expanded within Corrective Action Area II (CAII) as identified in the Consent Order
    - b. On public land/in public right of way area, if possible
    - c. Areas with limited erosion potential
    - d. Greater than 100 feet from wetlands, river corridor, and Federal Emergency Management Agency (FEMA) floodplains
    - e. Outside of public water supply source protection areas; and
    - f. Distal from homes with private wells that will not be replaced with municipal water.
- D. Clearances:
1. Permits. The Contractor and/or the property owner shall be required to obtain or amend all necessary State, Federal, and local permits and clearances, prior to using an area for the Project. Any fees related to applications for such permits shall be the responsibility of the Contractor
- E. Maintaining Off-Site Activity Areas:
1. General: The Contractor shall conduct operations at OSA areas so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.
  2. Area Erosion Prevention and Sediment Control Measures. Installation and maintenance of erosion prevention and sediment control measures at OSA areas shall be consistent with the Conforming Erosion Prevention and Sediment Control Plan for the specific area. The On-Site Plan Coordinator (OSPC) shall review these areas as required in the Contract.
  3. Seasonal Shutdown. For areas that will be utilized for more than one Construction Season the Contractor shall grade to no more than 1:3 (V:H), seed and mulch disturbed fill areas prior to shutting down for the season.
- F. Closing Off-Site Activity Areas:
1. With the exception of those areas which will remain open for commercial use, the Contractor shall complete the following prior to the Completion and Acceptance of the Project:
    - a. Shape the entire area to leave banks in a neat and presentable condition, properly and thoroughly graded and drained.
    - b. Establish vegetation on all disturbed areas.
    - c. All stones, boulders, stumps, and debris shall be removed or satisfactorily disposed of.
- G. The Contractor shall conduct operations at the spoils management site so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.

1. Slopes shall not be left steeper than 1:3 (V:H) for earthen fills. Slopes shall not be left steeper than 1:2 (V:H) for fill made up of stone or concrete. The tops of slopes and toes of slopes shall be neatly rounded.
2. Stockpiled sod, topsoil, and other stripped material shall be evenly spread over the surface of the area. The complete area shall be seeded and mulched in accordance with the Contract Documents.

**END OF SECTION**

**SECTION 016000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations and procedures.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 RELATED SECTIONS**

- A. Instructions to Bidders: Product options and substitution procedures.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures.
- C. Section 014000 - Quality Requirements: Product quality monitoring.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal requirements and procedures.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

**PART 2 PRODUCTS**

**2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner , or otherwise indicated as to remain the property of the Owner , become the property of the Contractor ; remove from site.

**2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by the Contract Documents.

**2.03 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

**PART 3 EXECUTION**

**3.01 SUBSTITUTION PROCEDURES**



- A. Instructions to Bidders specifies time restrictions for submitting requests for Substitutions during the bidding period and the documents required. Any products approved during the bidding period will be identified by Addendum.
- B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request for substitution constitutes a representation that the Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
  - 1. Submit three copies and one electronic copy of request for substitution for consideration. Limit each request to one proposed substitution.
  - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  - 3. The Engineer will notify Contractor in an addendum of decision to accept or reject request.

### 3.02 **TRANSPORTATION AND HANDLING**

- A. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- B. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- C. Transport and handle products in accordance with manufacturer's instructions.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

### 3.03 **STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.

- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**PART 4 MEASUREMENT AND PAYMENT**

**4.01 ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

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**SECTION 017000  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Starting systems, demonstration, instructions, testing, adjusting, and balancing.
- B. Examination, preparation, and general installation procedures.
- C. Surveying for laying out the work.
- D. Cleaning and protection.
- E. Closeout procedures, final cleaning, punch list, adjusting, project record documents, warranties, spare parts, and maintenance materials.

**1.02 REFERENCES**

- A. Applicable and appropriate operations and maintenance manuals provided by manufacturer.
- B. Contract Documents

**1.03 PERFORMANCE REQUIREMENTS**

- A. Equipment and system must perform as stated in the applicable sections herein prior to final acceptance and payment.

**1.04 SUBMITTALS**

- A. Provide written guidance on schedules and time frame for coordination of various components.
- B. See Section 013000 - Administrative Requirements, for submittal procedures.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

**1.05 OPERATIONS AND MAINTENANCE DATA**

- A. Every individual component supplied for the project shall be identified in the operations and maintenance manual which shall be assembled as follows:
  - 1. Each O&M manual shall be divided into a minimum of two volumes.

**1.06 QUALITY ASSURANCE**

- A. All equipment must be properly labeled as directed by the Manufacturer or in the technical specifications.
- B. All components must be properly labeled and all operations and maintenance manuals must be present on site prior to startup.

**1.07 QUALIFICATIONS**

- A. When specified in individual technical sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to startup, and to supervise placing equipment or system in operation.
- B. Perform testing, adjusting, and balancing.
  - 1. Volume One shall contain at least the following:
    - a. Final tag list.
    - b. Detailed floor plan showing location of each tagged piece of equipment.
    - c. An overview of the plant, the process equipment, and the control system and how the plant's systems and subsystems interact and are controlled.



- d. Complete description prepared by the Process Equipment Supplier of each system and subsystem and component with cross reference to tag number.
  - e. Complete operating and maintenance instructions for each and every item of equipment (referencing tag number), setting forth in detail and step-by-step the procedure for starting, stopping, operating and maintaining the entire system as installed. A schedule of recommended maintenance intervals shall also be included.
  - f. Any special emergency operating instructions and a list of service organizations, including addresses and telephone numbers, capable of rendering emergency service to the various parts of the system.
  - g. Procedures for normal operation, trouble shooting, routine data analysis, water analysis, interpretation of data, etc.
  - h. A section on plant safety in general and for each system.
  - i. Appendices to Volume One shall include the following:
    - 1) P & I.D.'s and mechanical, electrical and instrumentation installation drawings on 11" x 17" size paper.
    - 2) Copy of final control system ladder logic.
    - 3) A complete valve tag list, including the name and function of the pipe in which the valve is mounted.
    - 4) All manufacturer's equipment guarantees and warranties.
2. Volume Two shall contain, at lease, the following:
- a. Manufacturer's manuals for each piece of equipment including individual components and subsystems of complete assemblies. The section of the manual on operation shall describe the function of each component and its relationship to the system of which it is a part. Where several models, options or styles are described, the manual shall identify the items actually provided.
  - b. Blue line prints or reviewed shop drawings or reviewed shop drawing and diagrams of all systems.
  - c. Certified equipment drawings or reviewed shop drawing data clearly marked for equipment furnished.
- C. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Engineer. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
- a. Complete parts list of all replaceable parts, their part numbers and the name and address of the nearest vendor.
2. Binding
- a. Manuals shall be bound in durable plastic or fiberboard covers. Each sheet shall be reinforced to prevent tearing from continued use and each manual shall have the following information clearly printed on its inside cover:
    - 1) Project name, name of owner and address (inside and outside cover).
    - 2) Name and address of Engineers.
    - 3) Name and addresses of Contractor and Subcontractors.
    - 4) Telephone numbers of Contractors, including night and emergency numbers.
    - 5) Major equipment vendor's names and telephone numbers.

3. Number of complete sets shall be 3, as outlined herein.

#### **1.08 PROJECT CONDITIONS**

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas as required by Contract Documents and permits. Prevent erosion and sedimentation.
- C. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

#### **1.09 WARRANTY**

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, Suppliers, and Manufacturers.
- C. Provide Table of Contents and assemble in binder with durable cover.
- D. Submit prior to final Application for Payment.

### **PART 2 PRODUCTS NOT APPLICABLE**

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.
- B. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- C. Verify wiring and support components for equipment are complete and tested.
- D. Execute start up under direct supervision of Contractor and in full accordance with manufacturer's instructions.

#### **3.02 PREPARATION**

- A. Execute final facility cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate for the surface and material being cleaned.
- D. Clean operating equipment components and accessories such as filters.
- E. Clean debris from drainage systems.
- F. Clean site, sweep paved areas, rake clean landscaped surfaces, remove applicable erosion control measures.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- H. Adjust operating products and equipment to ensure smooth and unhindered operation.

#### **3.03 SCHEDULING AND COORDINATION**

- A. Coordinate schedule for startup of various equipment and systems.
- B. Coordinate with Owner on how project is taken over and operated during transition.

#### **3.04 LAYING OUT THE WORK**

- A. Notify Engineer 48 hours prior to startup of each item.

### **3.05 FIELD QUALITY CONTROL**

- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of final inspection.
- B. Demonstrate equipment and instruct in a classroom environment on site by qualified representatives who are knowledgeable about the equipment and its performance.
- C. Verify locations of survey control points prior to starting work.
- D. Demonstrate start up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- E. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

### **3.06 TOLERANCES**

- A. Verify that all specified tolerances are being met.
- B. Promptly notify Engineer of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer .
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

### **3.07 PROGRESS CLEANING**

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect all finished work until Owner accepts responsibility.

### **3.09 PROJECT RECORD DOCUMENTS**

- A. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during construction.
- B. Submit a written report stating that equipment or system has been properly installed and is functioning correctly.

### **3.10 SPARE PARTS AND MAINTENANCE MATERIALS**

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual technical specification sections.
- B. Deliver to location as directed by Engineer.

- C. Reports will be submitted to the Engineer indicating observations and results of tests and indicating compliance or noncompliance with the requirements of the Contract Documents.
- D. Provide to Engineer one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instructions for assembly, installation, and adjusting.
- E. Ensure entries are complete and accurate, enabling future reference by Owner.
- F. Store record documents separate from documents used for construction.
- G. Record information concurrent with construction progress.
- H. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- I. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finished first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract Drawings.
  - 6. Change orders where applicable.
- J. Submit Operations and Maintenance Manual bound in 8½ x 11 inch text pages, capacity expansion binders with durable covers.
  - 1. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project and subject matter of binder when multiple binders are required.
  - 2. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
  - 3. Prepare a Table of Contents for each volume, with each product or system description identified.
  - 4. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned, with Engineer comments. Revise content of all document sets as required by Engineer prior to final submission.
  - 5. Submit 3 sets of revised final volumes, within 10 days after final inspection.

- K. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

**PART 4 MEASUREMENT AND PAYMENT**

- 4.01 **ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**



**SECTION 023000  
SUBSURFACE INVESTIGATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Geotechnical Evaluation of Sub-Surface Conditions.

**1.02 REFERENCES**

- A. Contract Documents

**1.03 SOIL INVESTIGATION**

- A. A Geotechnical Evaluation Report has been prepared by QC/QA Laboratories, Inc., hereinafter referred to as the Geotechnical Engineer. Electronic copies of the report are available and may be obtained by contacting the Engineer. The actual report, including boring logs, soils analysis and recommendations, is on file and may be inspected at the Engineer's office.
- B. This report was obtained only for the Owner's use in design and is not a part of the Contract Documents. The report and log of borings is available for the Contractor's information, but is not a warrant of subsurface conditions.
- C. The Contractor should visit the site and become acquainted with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but such subsurface investigation shall be performed only under time schedules and arrangements approved in advance by the Construction Manager and Engineer.
- D. The Geotechnical Engineer shall be retained by the Contractor to observe performance of work in connection with excavation, filling and grading. Re-adjust all work that does not meet technical or design requirements, but make no deviations from the Contract Documents without specific and written approval of the Geotechnical Engineer.
- E. The Geotechnical Engineer may be retained by the Owner to observe performance of work in connection with excavation, filling and grading. Re-adjust all work that does not meet technical or design requirements, but make no deviations from the Contract Documents without specific and written approval of the Project Engineer.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

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**SECTION 024100  
DEMOLITION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Building demolition.
- B. Abandonment and removal of existing utilities and utility structures.

**1.02 RELATED REQUIREMENTS**

- A. Section 312323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

**1.03 REFERENCE STANDARDS**

- A. State of Vermont Wastewater System and Potable Supply Rules, 2007.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
  - 1. Areas for temporary construction and field offices.
  - 2. Areas for temporary and permanent placement of removed materials.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
  - 2. Identify demolition firm and submit qualifications.
- D. Construction Waste Management Plan: Submit plan in accordance with Section 017419.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION**

**3.01 SCOPE**

- A. Remove all buildings, appurtenant structures, waste and debris from the area designated on the Contract Plans.
- B. Remove underground tanks that contain or once contained petroleum products; fill and bury other types of tanks.
- C. Remove or abandon existing septic system and all associated appurtenances. Any waste stone or soil removed from the systems shall be disposed or in compliance with section 1-930 of the 2019 Wastewater System and Potable Water Supply Rules.
- D. Remove fences and gates.
- E. Remove other items indicated, for salvage, relocation, recycling and disposal.
- F. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 312200.

**3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.

2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  3. Provide, erect, and maintain temporary barriers and security devices.
  4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  5. Do not close or obstruct roadways or sidewalks without permit.
  6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
  7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner .
- C. Protect existing structures and other elements that are not to be removed.
1. Provide bracing and shoring.
  2. Prevent movement or settlement of adjacent structures.
  3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner ; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Comply with requirements of Section 017419 - Waste Management.
  2. Dismantle existing construction and separate materials.
  3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

### 3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner .
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner .
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

### 3.04 **DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**



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**SECTION 311000  
SITE CLEARING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Clearing and protection of vegetation.
- B. Removal of existing debris.

**1.02 RELATED REQUIREMENTS**

- A. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- C. Section 312200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Fill Material: As specified in Section 312200 - Grading

**PART 3 EXECUTION**

**3.01 SITE CLEARING**

- A. Comply with other requirements specified in Section 017000.
- B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

**3.02 EXISTING UTILITIES AND BUILT ELEMENTS**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Protect existing structures and other elements that are not to be removed.

**3.03 VEGETATION**

- A. Do not remove or damage vegetation beyond the limits indicated on drawings.
- B. Install substantial, highly visible fences at least 3 feet high (at least 1 m high) to prevent inadvertent damage to vegetation to remain:
  - 1. At vegetation removal limits.
  - 2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
  - 3. Around other vegetation to remain within vegetation removal limits.
  - 4. Where required for permit compliance.
- C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.
- D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
  - 1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.

2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
  3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
  4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
- E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner .

#### 3.04 **DEBRIS**

- A. Remove debris and trash from work limits as necessary to complete work.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

**SECTION 311143  
HORIZONTAL DIRECTIONAL DRILLING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes provisions for the materials and installation of sleeve and carrier pipe via the method of horizontal directional drilling.

**1.03 SYSTEM PERFORMANCE REQUIREMENTS**

- A. Assembly to meet applicable AOT and AWWA standards.

**1.04 SUBMITTALS**

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Provide product data, including thickness and size for the following:
  - 1. Steel, PVC or HDPE casing pipe.
  - 2. Carrier pipe.
  - 3. Casing spacers.
  - 4. End seals.
  - 5. HDPE headwall thrust restraint.
  - 6. High strength trace wire.
- C. Provide the name and qualification of proposed directional drilling subcontractor. The information shall include, at a minimum:
  - 1. The qualifications of the subcontractor and key personnel showing that all directional drilling operations will be performed by a competent drill contractor and crew with a minimum of (5) years of relevant experience, at least as complex and of similar size as this project.
  - 2. Identification of key person(s) and contact information proposed for this project.
  - 3. A list of completed projects with details of the types of pipe installations including Owner and Engineer contact names and telephone numbers.
- D. Provide a work plan and schedule of activities proposed to perform the work under this specification, including any proposed variation from the Drawings and Specifications. Information in this work plan shall include, but not be limited to, the following:
  - 1. Method for directional drilling indicating the following:
    - a. Plan showing the work zone equipment configuration at the end of the bore(s), staging areas, storage areas, and the location of slurry, cuttings and pit spoil handling areas.
    - b. Boring procedure, tooling for drilling, method for control slurry, design of entrance and exit pits and method to verify that installed utilities are acceptable.
    - c. Materials list including bentonite and bentonite additives proposed for use on the project along with product data sheets for all materials used on the site.
    - d. Steering and tracking equipment procedures and proposed locations of ground based coils or other equipment requiring surface or subsurface access.

2. Contingency Plans that address each of the following:
  - a. Inadvertent return, and/or spill of drilling fluids, hydraulic fluids, etc., including measures to contain and clean the affected area.
  - b. Clean up of surface seepage of drilling fluids and spoils.
  - c. Collapse of borehole.
  - d. Sealing of abandoned boreholes.
3. Drilling Fluids Management Plan should address the following:
  - a. Identify all proposed drilling muds and additives to be used and provide the Engineer with the appropriate MSDA sheets.
  - b. Calculated hole volumes and drilling fluids volumes.
  - c. Source and amount of water required for drilling mud and all necessary approvals and permits.
  - d. Method of slurry containment and cleanup of all drilling fluid overflows or spills.
  - e. Method of recycling drilling fluid and spoils.
  - f. Method of transporting and disposing of drilling fluids and spoils including proof of approvals for same.
  - g. Allowable pull-back forces and stresses for pipes.
4. Time required for complete pipe installation.

#### 1.05 **QUALITY ASSURANCE**

- A. Directional drilling subcontractor shall comply with requirements of the Town of Bennington Water Department, State of Vermont Agency of Natural Resources and State Agency of Transportation, and all associated permit requirements.
- B. The directional drilling subcontractor shall provide a full-time on-site representative thoroughly knowledgeable of the equipment, boring procedures, and available to address immediate concerns and emergency operations.
- C. The Contractor shall protect piping materials before, during and after installation. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.
- D. Upon the direction of the Engineer, the Contractor shall remove, replace and/or rework all piping that does not meet the requirements of this section. The Contractor shall perform all remedial measures at no additional cost to the Owner.
- E. All work shall be subject to applicable testing requirements of other Specifications Sections.

#### 1.06 **PROJECT CONDITIONS**

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Verify that piping may be installed in compliance with original design and referenced standards.
- C. Site Information: Reports on subsurface condition investigations made during the design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions (between soil borings). Owner assumes no responsibility for interpretations or conclusions drawn from this information. Contractor has the responsibility to make themselves aware of site conditions and perform any testing they deem necessary prior to bid.

### **PART 2 - PRODUCTS**



## 2.01 DRILLING FLUIDS

- A. Provide drilling fluids specifically suited for horizontal directional drilling and the site-specific soil/project conditions. Do not use any chemicals or polymer surfactants in the drilling fluid without written consent from the Engineer.
- B. Drilling fluids intended to provide support for pipe in a conduit or sleeve shall be selected to cure in such a manner to provide permanent protection and support of the pipe.
- C. All drilling fluids shall be approved by agencies having jurisdiction prior to use.

## 2.02 WATER

- A. The Owner will allow the Contractor to take water from the Owner's water system at Owner stipulated locations, if necessary. The Contractor shall provide all required tools, equipment and trucking necessary to transport water to the work site.

## 2.03 CASING SPACERS AND END SEALS

- A. Casing Spacers shall be SSI Stainless Steel Casing Spacer as manufactured by Advance Products and Systems, Inc., (APS) or approved equal.
- B. End seals shall be one piece pull-on rubber end seal, Model AC or IL-S316 "Innerlynx" with stainless steel hardware, as manufactured by Advance Products and Systems, Inc., (APS) or approved equal.

## 2.04 PIPING

- A. Casing pipe shall be DR 17 HDPE - 4710, Carbon Steel ASTM A139 Gr. B, AWWA C900/C905 fusible PVC, or approved equal.
- B. Carrier pipe shall be as noted on plans.
- C. HDPE headwall thrust restraint shall be axial thrust restraint as manufactured by Plasson or approved equal.
- D. Trace wire shall be Copperhead SoloShot extra high strength #12 AWG high carbon 1055 grade steel with blue colored insulation or approved equal.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. All pipes shall be cut, fabricated, and installed in strict conformance with the pipe manufacturer's recommendations.
- B. All pipes shall be installed to lines and grades as shown on the subcontractors drilling plan. Provide horizontal and vertical record locations at 20 ft intervals or less as directed by the Engineer.

### 3.02 DRILLING OPERATIONS

- A. The Contractor shall notify the Engineer (2) business days in advance of starting directional drilling work.
- B. The exact method and techniques for completing the directionally drilled installation shall be determined by the directional drilling subcontractor. The Contractor shall prepare a plan to be submitted for the Engineer review which describes the noise reduction program, solids control plan, and drilling procedure. All drilling operations shall be performed by supervisors and personnel experienced in direction drilling. All required labor, equipment, materials and support services shall be provided by the Contractor. Installation shall at all times comply with the subcontractors directional drilling plan.
- C. The position of the drill string shall be monitored by the directional drilling subcontractor with the downhole survey instruments. The directional drilling subcontractor shall compute the position in the X,Y, and Z axis relative to ground surface from downhole survey data, a

minimum of once per length of each drilling pipe approximately 20 foot interval. Deviations from the acceptable tolerances described in the Specifications shall be documented and immediately brought to the attention of the Engineer for review and/or approval/rejection. The profile and alignment defined on the drawings for the bores define the required grade. The Contractor shall maintain and provide to the Engineer, upon request, the data generated by the downhole survey tools in a form suitable for independent calculation of the pilot hole profile.

- D. Between the entry and exit point, the directional drilling subcontractor shall provide and use a separate steering system employing a ground survey grit system such as "TRU-TRACKER", or equal, wherever possible.
- E. During the entire operation, waste and leftover drilling fluids from the pits and cuttings shall be dewatered and disposed of in accordance with all permits and regulatory agencies requirements. Remaining water shall be cleaned by Contractor to meet permit requirements.
- F. The Owner retains the right to sample or monitor waste drilling mud, cuttings and water.

### 3.03 HANDLING DRILLING FLUIDS AND CUTTINGS

- A. During the drilling, reaming, or pullback operations the directional drilling subcontractor shall make adequate provisions for handling the drilling fluids, and cuttings at the entry and exit pits. These fluids must not be discharged into any waterway or stormwater system. When provisions for storage of the fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal disposal site. The directional drilling operation shall be conducted in such a manner that drilling fluids are not forced through the sub-bottom into any waterway. After completion of the directional drilling work, the entry and exit pit locations shall be restored to original conditions. The Contractor shall comply with all permit provisions.
- B. Pits constructed at the entry or exit point area shall be constructed to completely contain the drill fluid and prevent escape to any waterway. The directional drilling subcontractor shall utilize drilling tools and procedures which will minimize the discharge of any drill fluids. The Contractor shall comply with all mitigation measures indicated in the required permits and elsewhere in the Specifications.
- C. To the extent practical, a closed loop drilling fluid system shall be maintained.
- D. Drilling fluid disposal quantities shall be minimized by utilizing a drilling fluid cleaning system which allows returned fluids to be used.
- E. As a part of the installation plan specified herein before, the Contractor shall submit a drilling fluid plan which details types of drilling fluids, cleaning and recycling equipment, estimated flow rates, and procedures for minimizing drilling fluid escape.

### 3.04 TOLERANCES

- A. Pipe installed by the directional drilling method must be located as shown on the Drawings, both horizontally and in profile unless otherwise approved.
- B. When requested, the Contractor shall provide explanations of this position monitoring and steering equipment and data. The directional drilling subcontractor shall employ experienced personnel to operate the directional drilling equipment and, in particular, the position monitoring steering equipment. No information pertaining to the position or inclination of the pilot bores shall be withheld from the Engineer.
- C. The exit point shall fall within a rectangle 5 feet wide and 10 feet long centered on the planned exit point.

### 3.05 ENVIRONMENTAL PROVISIONS

- A. The directional drilling operation is to be completed in a manner to prevent the discharge of water, drilling mud and cuttings to the adjacent stream, groundwater, or land areas involved during the construction process. Equipment and procedures shall maximize the reuse of drilling mud to minimize waste. All excavated pits used in the drilling operation shall be lined by the Contractor with heavy duty plastic sheeting with sealed joints to prevent the migration of drilling fluids.
- B. The Contractor and directional drilling subcontractor shall visit the site and must be aware of all structures and site limitations at the directional drilling crossing and provide the Engineer with a drilling plan outlining procedures to prevent drilling fluid from adversely affecting the surrounding area.
- C. The general work areas on the entry and exit ends of the drilling shall be enclosed by a berm to contain planned spills or discharge.
- D. Waste cuttings and drilling mud shall be processed through a solid control plant comprised at sumps, pumps, tanks, desalter/desander, centrifuges, material handlers, and/or handlers all in a quantity sufficient to perform the cleaning/separating operation without interference with the drilling program. The cutting and excess drilling fluids shall be dewatered and dried to the extent necessary for disposal in off site landfills. Water from the dewatering process shall be treated by the Contractor to meet permit requirements and disposed of per the authority requirements. The cuttings and water for disposal are subject to being sampled and tested. The construction site and adjacent areas will be checked frequently for signs of unplanned leaks or seeps, as required by the authority.
- E. Equipment and materials for cleanup and contingencies shall be provided in sufficient quantities by the Contractor and maintained by all sites for use in the event of inadvertent leaks, seeps or spills.

### 3.06 **SITE RESTORATION**

- A. At the conclusion of all drilling operations, remove any excavation support systems that may have been installed for the entrance and exit pits. If withdrawal would damage or disturb the roadway subgrade or ground surface, leave supports in place and cut off three feet below finished grade.
- B. All abandoned pilot and boreholes shall be grouted closed with grout or bentonite within 48 hours of abandonment. No additional compensation will be provided for grouting abandoned boreholes.

### 3.07 **BORE PATH REPORT**

- A. The Contractor shall furnish a Bore Path Report to the Engineer within seven days of the completion of each bore path. Include in the following report:
  - 1. Location of the project.
  - 2. Name of the person collecting data, including title, position and company name.
  - 3. Identification of the detection method used.
  - 4. Elevations and offset locations of critical changes in bore path.
  - 5. Copy of drilling fluids testing logs.

### 3.08 **RECORD PLANS**

- A. The Contractor shall provide the Engineer with a complete set of Record Plans showing all bores (successful and failed) within 30 calendar days of completing the work. Ensure that the plans are dimensionally correct copies of the Contract Plans and include plan and profile, boring location and subsurface conditions as directed by the Engineer. The plans must show appropriate elevations at 20 foot intervals and be referenced to the design plan datum. Specific plan content requirements include, but are not limited to the following:

1. The horizontal center of the pipe.
2. Bore path profile.
3. Bore notes on each plan stating the final bore path diameter, pipe diameter, drilling fluid composition, and composition of any other material used to fill the annular void between the bore path and the pipe.

**END OF SECTION**

**SECTION 312200  
GRADING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Removal of topsoil.
- B. Rough grading the site for site structures.
- C. Finish grading.

**1.02 RELATED REQUIREMENTS**

- A. Section 311000 - Site Clearing.
- B. Section 312316 - Excavation.
- C. Section 312316.13 - Trenching: Trenching and backfilling for utilities.
- D. Section 312316.26 - Rock Removal.
- E. Section 312323 - Fill: Filling and compaction.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Topsoil: See Section 312323.
- B. Other Fill Materials: See Section 312323.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Verify the absence of standing or ponding water.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Notify utility company to remove and relocate utilities.
- E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
- F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs, from damage by grading equipment and vehicular traffic.

**3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.



- G. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

#### 3.04 SOIL REMOVAL

- A. Stockpile topsoil to be re-used on site; remove remainder from site.
- B. Stockpile subsoil to be re-used on site; remove remainder from site.
- C. Stockpiles: Use areas designated on site; protect from erosion.
- D. All removed material shall be transported to a Contractor secured site within the corrective action area. No material shall leave the corrective action area.

#### 3.05 FINISH GRADING

- A. Before Finish Grading:
  - 1. Verify building and trench backfilling have been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch (13 mm) in size. Remove soil contaminated with petroleum products.
- C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches (75 mm).
- D. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- E. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

#### 3.06 REPAIR AND RESTORATION

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

#### 3.07 FIELD QUALITY CONTROL

- A. See Section 312323 for compaction density testing.

**END OF SECTION**

**SECTION 312316  
EXCAVATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures and utilities within the building.
- B. Trenching for utilities outside the building to utility main connections.
- C. Temporary excavation support and protection systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.
- C. Section 311000 - Site Clearing: Vegetation and existing debris removal.
- D. Section 312200 - Grading: Soil removal from surface of site.
- E. Section 312200 - Grading: Grading.
- F. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.
- G. Section 312316.26 - Rock Removal: Removal of rock during excavating.
- H. Section 312323 - Fill: Fill materials, backfilling, and compacting.
- I. Section 313700 - Riprap.
- J. Section 334100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

**1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards current edition.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Bedding and Fill to Correct Over-Excavation:
  - 1. See Section 312323 for bedding and corrective fill materials at general excavations.
  - 2. See Section 312316.13 for bedding and corrective fill materials at utility trenches.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the work are as indicated.
- B. Survey existing adjacent structures and improvements and establish exact elevations at fixed points to act as benchmarks.
  - 1. Resurvey benchmarks during installation of excavation support and protection systems and notify Owner if any changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 311000 for clearing, grubbing, and removal of existing debris.

- C. See Section 312200 for topsoil removal.
- D. Locate, identify, and protect utilities that remain and protect from damage.
- E. Notify utility company to remove and relocate utilities.
- F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.
- G. Protect plants, lawns, rock outcroppings and other features to remain.
- H. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Engineer.
- I. Contractor shall schedule meeting with Homeowner and Engineer to coordinate service line route prior to commencing any work on private property.

### 3.03 **TEMPORARY EXCAVATION SUPPORT AND PROTECTION**

- A. Excavation Safety: Comply with OSHA's Excavation Standard, 29 CFR 1926, Subpart P.
  - 1. Depending upon excavation depth, time that excavation is open, soil classification, configuration and slope of excavation sidewalls, design and provide an excavation support and protection system that meets the requirements of 29 CFR 1926, Subpart P:

### 3.04 **EXCAVATING**

- A. Excavate to accommodate new structures and construction operations.
  - 1. Excavate to the specified elevations.
  - 2. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
- B. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Provide temporary means and methods, as required, to remove all water from excavations until directed by Engineer. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

**END OF SECTION**

## **SECTION 312316.13 TRENCHING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Backfilling and compacting for utilities outside the building to utility main connections.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Site grading.
- B. Section 312316 - Excavation: Building and foundation excavating.
- C. Section 312316.26 - Rock Removal: Removal of rock during excavating.

#### **1.03 REFERENCE STANDARDS**

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2018.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method 2007.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2011.
- G. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017.

### **PART 2 PRODUCTS**

#### **2.01 FILL MATERIALS**

#### **2.02 SOURCE QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

#### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic. If disturbed or lost, the Contractor shall immediately have them replaced by a Licensed Surveyor, at no additional

cost to the Owner.

- E. Protect plants, lawns, rock outcroppings and other features to remain.
- F. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Engineer.
- G. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. The Contractor shall be responsible for any repairs or remedial work necessary, at no additional cost to the Owner.
- H. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- I. Provide erosion control measures to meet State Permit and as out lined in the Erosion Control Specification Section.

### **3.03 TRENCHING**

- A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- G. Remove lumped subsoil, boulders, and rock.
- H. Remove excavated material that is unsuitable for re-use from site.
- I. Stockpile excavated material to be re-used in area designated on site.
- J. Remove excess excavated material from site.
- K. Provide temporary means and methods, as required, to remove all water from trenching. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

### **3.04 PREPARATION FOR UTILITY PLACEMENT**

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.
- D. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, and 12 inches each side, unless otherwise indicated.
- E. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading



- F. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches below invert elevation to receive bedding course.

### 3.05 BACKFILLING

- A. Notify Engineer when excavations have reached required Subgrade.
- B. When Engineer determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Backfill to contours and elevations indicated using unfrozen materials.
- D. Employ a placement method that does not disturb or damage other work.
- E. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Slope grade away from building minimum 2 inches in 10 feet (50 mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
  - 1. Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade and similar construction: 95 percent of maximum dry density.
  - 2. At other locations: 85 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Install warning tape directly above utilities, 18 inches above utility.
- L. Backfill excavations promptly, but not before completing the following:
  - 1. Acceptance of construction below finish grade.
  - 2. Removal of temporary shoring and bracing, and sheeting.
  - 3. Removal of all trash and debris from excavation.
  - 4. Any existing underground utilities encountered during trenching shall be inspected and surveyed for as built before backfilling.
- M. Backfill excavations at the end of each working day.

### 3.06 TOLERANCES

- A. Top Surface of General Backfilling: Plus or minus 1 inch (h) from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus [0.5] inch ([ ] mm) from required elevations.

### 3.07 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167 or ASTM D6938.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor") or ASTM D698 ("standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests:

1. Trench Backfill: At minimum 200 LF intervals, density tests shall be performed at top of pipe bedding and each successive lift.

**END OF SECTION**

**SECTION 312316.26  
ROCK REMOVAL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Removal of identified rock during excavation.

**1.02 DEFINITIONS**

- A. Site Rock: Solid mineral material with a volume in excess of 1 cubic yard ([ ] cubic meter) or solid material that cannot be removed with a 3/4 cubic yard (0.57 cubic meter) capacity power shovel without drilling.

**1.03 REFERENCE STANDARDS**

- A. NFPA 495 - Explosive Materials Code 2018.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate the proposed method of blasting, delay pattern, explosive types, type of blasting mat or cover, and intended rock removal method.
- C. Pre and Post Blast Surveys.

**1.05 QUALITY ASSURANCE**

- A. Seismic Survey Firm: Company specializing in seismic surveys with five years documented experience.
- B. Explosives Firm: Company specializing in explosives for disintegration of rock, with five years documented experience.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Explosives: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.
- B. Delay Device: Type recommended by explosives firm.
- C. Blast Mat Materials: Type recommended by explosives firm.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify site conditions and note subsurface irregularities affecting work of this section.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.

**3.03 ROCK REMOVAL**

- A. Excavate and remove rock by either mechanical or explosive methods.
- B. Mechanical Methods: Drill holes and utilize expansive tools to fracture rock.
- C. If rock is uncovered requiring the explosives method for rock disintegration, execute as follows:
  - 1. Maintain at least two continuous recording seismographs on site during explosive detonation which shall be reviewed by an Engineer qualified to assess accelerations produced by explosive shockwaves.
  - 2. Disintegrate rock and remove from excavation.

- D. Use of Explosives: Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.
  - 1. Comply with NFPA 495 and applicable state and local codes.
  - 2. Prior to blasting, obtain a seismographic survey to determine maximum charges that can be used at each location in area of excavation without damaging adjacent properties or other work.
  - 3. Prior to executing seismographic survey, advise owners of adjacent buildings and structures in writing; explain planned survey and blasting operations.
  - 4. Prior to blasting, document conditions of buildings near locations of intended blasting and photograph existing conditions identifying existing irregularities.
  - 5. Schedule work to avoid working hours of occupied buildings nearby.
  - 6. Unless otherwise noted, conduct drilling operations Monday through Friday; 7:00 am to 5:00 pm. Explosive detonations shall be limited to 9:00 am to 4:00 pm Monday through Friday.
  - 7. After blasting, document conditions of buildings near locations of blasting and photograph conditions identifying any changes to the pre-existing conditions.
- E. Form level bearing at bottom of excavations.
- F. Remove shaled layers to provide sound and unshattered base for footings.
- G. In utility trenches, excavate to 6 inches (150 mm) below invert elevation of pipe and 24 inches (600 mm) wider than pipe diameter. Or 42 inches wide, whichever is greater.
- H. Remove excavated materials from site.
- I. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 312323. No payment will be made to correct unauthorized rock removal.
- J. Maintain and provide to Engineer daily records of hole location, total depth, depth to rock, explosive load, weight per delay per hole, and the type of subsurface materials and any unusual event during an explosive detonation.

#### 3.04 FIELD QUALITY CONTROL

- A. Independent agency field inspection will be provided under provisions of Section 014000 - Quality Requirements.

**END OF SECTION**

**SECTION 312323**  
**FILL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Filling, backfilling, and compacting for building volume below grade.
- B. Backfilling and compacting for utilities outside the building to utility main connections.

**1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 033000 - Cast-in-Place Concrete.
- C. Section 312200 - Grading: Removal and handling of soil to be re-used.
- D. Section 312200 - Grading: Site grading.
- E. Section 312316 - Excavation: Removal and handling of soil to be re-used.
- F. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.
- G. Section 312316.26 - Rock Removal: Removal of rock during excavating.
- H. Section 313700 - Riprap.

**1.03 REFERENCE STANDARDS**

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses 2017.
- B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2014.
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2011.
- G. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Soil Samples: 10 pounds (4.5 kg) sample of each type of fill; submit in air-tight containers to testing laboratory.
- C. Materials Sources: Submit name of imported materials source.
- D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- E. Compaction Density Test Reports.
- F. Testing Agency Qualification Statement.

**1.05 QUALITY ASSURANCE**



- A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.

**PART 2 PRODUCTS**

**2.01 FILL MATERIALS**

- A. General Fill: Subsoil excavated on-site.
  - 1. Graded.
  - 2. Free of lumps larger than 3 inches (75 mm), rocks larger than 6 inches ([ ] mm), and debris.
- B. Structural Fill: Subsoil excavated on-site.
  - 1. Structural Fill shall consist of on-site sand and/or gravel soils, or an imported, well graded crusher run stone or bank-run sand and gravel, which is free of clay, organics and friable or deleterious particles. Imported Structural Fill should also conform to the following gradation requirements.
    - 2 inch sieve: 100 percent passing
    - 1/4 inch sieve: 25 to 85 percent passing
    - #40 sieve: 5 to 50 percent passing
    - #200 sieve: 0 to 8 percent passing
- C. Crushed Gravel for Subbase: Coarse aggregate, conforming to State of Vermont Highway Department standard.
  - 1. Coarse - 704.05A:
    - 4 inch sieve: 95 to 100 percent passing
    - #4 sieve: 25 to 50 percent passing
    - #100 sieve: 0 to 12 percent passing
    - #200 sieve: 0 to 6 percent passing
  - Fine - 704.05B:
    - 2-inch sieve: 100 percent passing
    - 1-1/2 inch sieve: 90 to 100 percent passing
    - #4 sieve: 30 to 60 percent passing
    - #100 sieve: 0 to 12 percent passing
    - #200 sieve: 0 to 6 percent passing
- D. Drainage Aggregate: Shall consist of clean, hard, crushed washed stone or washed crushed gravel meeting the material and gradation requirements of the VTrans Standard Specifications Section 704.16A, or approved equivalent:
  - 1. 3/4" Crushed Stone

- 1 inch sieve: 100 percent passing
  - 3/4 sieve: 90 to 100 percent passing
  - 3/8 sieve: 20 to 55 percent passing
  - #4 sieve: 0 to 10 percent passing
  - #8 sieve: 0 to 5 percent passing
- E. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
1. Graded in accordance with ASTM C136/C136M; within the following limits:
    - #4 sieve: 100 percent passing
    - #100 sieve: 0-20 percent passing
    - #200 sieve: 0-8 percent passing
- F. Bedding Material: Sand or granular materials with 100 percent passing a 1/2 inch sieve, 20 percent passing the #4 and not more than 8 percent passing a No. 200 sieve.
- G. Topsoil: Obtain from project site or from areas having similar soil characteristics found at the project site.
1. Whenever possible, stockpile and reapply topsoil to disturbed areas.
  2. When insufficient topsoil on site exists, provide new topsoil with the following characteristics:
    - a. 4 to 6 percent by weight of fine-textured, stable organic material.
    - b. Contains not less than 20 percent fine textured material (passing the No 200 sieve) and not more than 15% clay.
    - c. Be relatively free of stones over 1-1/2 inch diameter, trash, noxious weeds such as nutsedge and quackgrass.
    - d. Compost and other amendment materials shall have a C:N ratio below 25:1. Compost shall meet the Vermont Solid Waste Management definition.
    - e. Does not contain soluble salts greater than 500 ppm.
  3. Free of roots, rocks larger than 1/2 inch (12 mm), subsoil, debris, large weeds and foreign matter.
- H. Stone for Stone Fill: Stone for stone fill shall be approved, hard, blasted, angular rock other than serpentine rock containing the fibrous variety chrysotile (asbestos). The least dimension of the stone shall be greater than 33 percent of the longest dimension. The stone fill shall be reasonably well graded from smallest to the maximum size stone specified so as to form a compact mass when in place
1. Type I. The longest dimension of the stone shall vary from 1-12 inches, and at least 50% of the volume of the stone in place shall have a minimum dimension of 4 inches.
  2. Type II . The longest dimension of the stone shall vary from 2 to 36 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 12 inches.
  3. Type III. The longest dimension of the stone shall vary from 3 to 48 inches, and at least 50% of the volume of the stone in-place shall have a minimum dimension of 16 inches.
  4. Type IV. The longest dimension of the stone shall vary from 3 to 60 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 20 inches.

5. Type X. The longest dimension of the stone shall be at least 120 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 24 inches. The least dimension of the stone shall be greater than 33 percent of the longest dimension.

## 2.02 ACCESSORIES

- A. Turf Reinforcement: Biodegradable, East Coast Erosion Control Blanket ECC-2B, or Engineer approved equal.
- B. Geotextile fabrics shall conform to VTrans Standard Specifications Section 720, or approved equivalent, or as indicated on the plans.

## 2.03 SOURCE QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the Work are as indicated.
- B. Identify required lines, levels, contours, and datum locations.
- C. Verify areas to be filled are not compromised with surface or ground water.

### 3.02 PREPARATION

- A. Proofroll subgrade to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

### 3.03 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Place and compact material in equal continuous layers not exceeding 6 inches compacted depth.
- G. Slope grade away from building minimum 6 inches in 10 feet ([ ] mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
  1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 95 percent of maximum dry density.
  2. Other areas: Use general fill, flush to required elevation, compacted to minimum 85 percent of maximum dry density.

- I. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade and similar construction: 95 percent of maximum dry density.
  - 2. At other locations: 85 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

### 3.04 FILL AT SPECIFIC LOCATIONS

- A. Use general fill unless otherwise specified or indicated.
- B. Over Subdrainage Piping at Foundation Perimeter and Under Slabs:
  - 1. Drainage aggregate and geotextile fabric.
  - 2. Cover drainage fill with general fill.
  - 3. Compact to 95 percent of maximum dry density.
- C. Buried Utility Piping, Conduits and Duct Bank in Trenches:
  - 1. Bedding: Use Fill Type Bedding.
  - 2. Cover with general fill.
  - 3. Fill up to subgrade elevation.
  - 4. Compact in maximum 6 inch ([ ] mm) lifts to 95 percent of maximum dry density.
- D. At Lawn Areas:
  - 1. Use general fill.
  - 2. Fill up to 4 inches ([ ] mm) below finish grade elevations.
  - 3. Fill up to subgrade elevations.
  - 4. Compact to 85 percent of maximum dry density.
  - 5. See Section 312200 for topsoil placement.
- E. At Planting Areas Other Than Lawns:
  - 1. Use general fill.
  - 2. Fill up to 12 inches (300 mm) below finish grade elevations.
  - 3. Fill up to subgrade elevations.
  - 4. Compact to 85 percent of maximum dry density.
  - 5. See Section 312200 for topsoil placement.
- F. At French Drains:
  - 1. Use Fill Type Drainage Aggregate.
  - 2. Compact to 95 percent of maximum dry density.

### 3.05 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch (25 mm) from required elevations.
- B. Top Surface of Subgrade Under Paved Areas: Plus or minus 1 inch (25 mm) from required elevations.
- C. Top Surface Under Paved Areas: Plus or minus 1/2 inch from required elevations.

### 3.06 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Soil Fill Materials:
  - 1. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor").
  - 2. If tests indicate work does not meet specified requirements, remove work, replace and retest.
  - 3. Frequency of Tests:
    - a. Trench Backfill: At 200 LF intervals, density tests shall be performed at top of pipe bedding, mid-depth of general backfill, and top of general backfill.
    - b. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 5,000 sq. ft. (186 sq. m) or less of paved area but in no case less than three tests.
    - c. As directed by Engineer.

### 3.07 CLEANING

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**



**SECTION 321216  
ASPHALT PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aggregate base course.
- B. Bituminous concrete paving.

**1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Preparation of site for paving and base.
- B. Section 312323 - Fill: Compacted subgrade for paving.
- C. Section 321723.13 - Painted Pavement Markings

**1.03 REFERENCE STANDARDS**

- A. Vermont Agency of Transportation (VTrans) - Standard Specifications for Construction; 2018.
- B. AI MS-2 - Asphalt Mix Design Methods 2015.
- C. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction 2009a.

**1.04 QUALITY ASSURANCE**

- A. Perform Work in accordance with VTrans Standard Specifications.
- B. Provide Engineer with Manufacturers written certification that each load of asphalt cement (A.C.) meets the requirements of the specification.
- C. Provide asphalt mix design no less than 15 days prior to beginning construction.
- D. Mixing Plant: Conform to VTrans Standard Specifications.
- E. Obtain materials from same source throughout.

**1.05 FIELD CONDITIONS**

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F ([ ] degrees C), or surface is wet or frozen.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Performance-Graded Asphalt Binder: Conform to Section 406 of the VTrans Standard Specifications for Bituminous Concrete Pavement (Marshall).
- B. Aggregate for mix: Conform to Section 406.03A of the VTrans Standard Specifications.
- C. Tack Coat: Homogeneous, medium curing, liquid asphalt.
  - 1. Emulsified asphalt meeting requirements of either ASTM D977, Grade SS-1H, or ASTM D2397, Grade CSS-1H.
- D. Geotextile Fabric: Geotextile for Roadbed Separator shall conform to Section 720 of the VTrans Standard Specifications.

**2.02 ASPHALT PAVING MIXES AND MIX DESIGN**

- A. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
- B. Submit proposed mix design of each class of mix for review prior to beginning of work. Unless otherwise noted, mix designs shall be Marshall Type 2, Type 3 or Type 4.

**2.03 SOURCE QUALITY CONTROL**

- A. Test mix design and samples in accordance with State of Vermont Highway standards.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that compacted subgrade and/or aggregate base is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct prior to beginning paving operations.
- C. Verify utility castings are properly adjusted to grade prior to beginning paving operations.

#### **3.02 PREPARATION - TACK COAT**

- A. Provide clean saw cut edges prior to paving.
- B. All surfaces shall be cleaned and sprayed with an RS-1, CRS-1, RS-1h or CRS-1h emulsified asphalt prior to placing any bituminous mixture.
- C. Apply tack coat in accordance with manufacturer's instructions.
- D. Apply tack coat in accordance with Section 406.12 and at the application rates stated Table 406.12A of the VTrans Standard Specifications.
- E. Apply tack coat to contact surfaces of curbs, gutters, adjacent pavement joints, and between subsequent asphalt lifts.
- F. Maintain proper distributor spray bar height and spray nozzle angle. Maintain proper distributor speed during application.
- G. Coat surfaces of manhole frames with environmentally safe product to prevent bond with asphalt pavement. Do not tack coat these surfaces.

#### **3.03 PLACING ASPHALT PAVEMENT**

- A. Place asphalt base course within 8 hours of applying primer or tack coat.
- B. Place base and wearing courses to compacted thickness specified in plans.
- C. Maintain a mix laydown temperature of no less than 230 degrees F when ambient temperature is 60 degrees F or higher. When ambient temperature is below 60 degrees F, Engineer will determine laydown temperature.
- D. Spread and finish all mixtures with a self-propelled, bituminous paver, to the required section, leaving the mixture uniformly dense, smooth, and free from irregularities. In locations where it is impractical to use self-propelled bituminous pavers, or other types of lay-down equipment, a road grader or maintainer may be used if approved by the Engineer.
- E. Control the speed of paver to place the mixture uniformly and continuously without tearing or gouging. Do not exceed the Manufacturer's recommendation, and coordinate the paver speed with the output of the plant to provide for a smooth, continuous operation, minimizing starting and stopping.
- F. Level, fill or rake all transverse and longitudinal joints, high or low areas, and surface irregularities, prior to compaction. Immediately remove material dropped on previously compacted lanes.
- G. Sweep and tack previously placed layer or surface before spreading the next layer.
- H. Tack all joints and coordinate vertical construction joints in successive courses so the joints do not fall on the same vertical plane.
- I. Place pavement uniformly against the surface or edge of curb, gutters, manholes or similar structures, and at such an elevation so that the pavement is 1/4-inch higher than the edge of the structure after the pavement has been compacted.

- J. Correct any low or high defective areas immediately. Correction can be accomplished by patching or cutting out the surface and replacing with fresh, hot, bituminous mixture, or by milling the surface.
- K. The sequence of rolling operations as well as the type and number of rollers must be commensurate with production, and adequate to obtain the specified density before the mat temperature falls below 185 degrees F.
- L. Thoroughly compact with hand or other mechanical tampers approved by the Engineer any areas not accessible to standard asphalt rollers.
- M. Remove and replace any mixture that becomes loose, broken, or becomes mixed with dirt, shows any excess deficiency of bitumen, or is defective in any manner.
- N. Do not place hot mix on a frozen subgrade, or when weather conditions prevent the proper handling or finishing of the asphalt pavement. Presence of frost particles in or on the subgrade or base course is considered a frozen subgrade.
- O. Compact asphalt pavement sloughs with rollers capable of providing a smooth, finished, compacted slough that is free of tire marks and unevenness or drop-off.
- P. Failing tests from field samples will be considered sufficient evidence to reject a full day's work.
- Q. Adjust any casting that is not 1/4-inch below the top of the finished surface. Adjust casting upward if greater than 1/4-inch below the top of the finished surface.
- R. Asphalt pavement shall be compacted to 95 percent of the Theoretical Maximum Density (Rice Method). Density of field samples shall be tested with a nuclear density gage at specified frequency.
- S. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

#### 3.04 **PLACING ASPHALT PAVEMENT - OVERLAY**

- A. Cold-plane at terminations.
- B. Prepare surface for pavement installation by sweeping and tack coating pavement.
- C. Installed specified overlay as noted in the Contract Plans.
- D. A rubber-tired roller must be used on the shim coat to knead the pavement in the existing road profile.

#### 3.05 **TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch (6 mm) measured with 10 foot (3 m) straight edge.
- B. Compacted Thickness: Within 1/4 inch (6 mm) of specified or indicated thickness.
- C. Variation from True Elevation: Within [1/4] inch ([\_\_\_\_] mm).
- D. Adjacent surface match: New finished surface must be 1/4-inch above any adjacent surface.

#### 3.06 **FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for quality control.
- B. The density of the compacted asphalt pavement shall be tested with a nuclear density gauge at a frequency of one (1) test per 1,500 square yards per lift of asphalt pavement, or a minimum of one (1) test per lift of pavement per day.
- C. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.
- D. Asphalt paving mixture shall be field sampled and tested for conformance with the mix design at intervals of one (1) test per 1,000 tons of asphalt pavement produced, or a

minimum of one (1) test per lift of pavement per day.

- E. The density of the compacted asphalt pavement shall be tested with a nuclear density gauge at a frequency of one (1) test per 1,500 square yards per lift of asphalt pavement, or a minimum of one (1) test per lift of pavement per day.
- F. Contractor shall pay for all additional tests and inspection required due to failing work and/or tests, and for any repairs and/or replacement necessitated by failing work.
- G. Copies of all load slips must be handed to inspectors at the delivery of each load.

### 3.07 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury until surface temperature is less than 140 degrees F (60 degrees C).
- B. Do not allow traffic on the completed surfacing until the mat has been compacted and has cooled sufficiently to prevent damage.
- C. Damage to the asphalt pavement due to inadequate protection shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the Owner.

**END OF SECTION**

**SECTION 321313  
CONCRETE PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete sidewalks, stair steps, integral curbs, gutters, median barriers, parking areas and roads.
- B. Detectable Warning Panels for ADA curb ramps.
- C. Concrete Formwork.

**1.02 RELATED REQUIREMENTS**

- A. Concrete Reinforcement.
- B. Joint sealing for concrete expansion joints.
- C. Section 312200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- D. Section 312323 - Fill: Compacted subbase for paving.

**1.03 REFERENCE STANDARDS**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete 2016.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- D. ACI 305R - Guide to Hot Weather Concreting 2010.
- E. ACI 306R - Guide to Cold Weather Concreting 2016.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2018.
- G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- H. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2016, with Editorial Revision (2016).
- I. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2018.
- J. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2018.
- K. ASTM C150/C150M - Standard Specification for Portland Cement 2018.
- L. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.
- M. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- N. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2011.
- O. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2017.
- P. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2015.
- Q. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2014.



- R. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- S. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction 2018.
- T. ASTM D8139 - Standard Specification for Semi-Rigid, Closed-Cell Polypropylene Foam, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction 2017.

#### 1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, curing compound and detectable warning panels.
- C. Provide a concrete mix design prepared by an independent testing laboratory. Design mixes in accordance with ACI 301.
- D. Prior to pouring concrete in hot weather, submit a written hot weather concreting plan to the Engineer for approval.
- E. Prior to pouring concrete in cold weather, submit a written cold weather concreting plan to the Engineer for approval.

### PART 2 PRODUCTS

#### 2.01 PAVING ASSEMBLIES

- A. All site concrete shall be, at a minimum, 4,000 psi at 28 days, unless specified elsewhere. Thickness, section and reinforcement as indicated on plans.

#### 2.02 FORM MATERIALS

- A. Form Materials: Conform to ACI 301 and ACI 347.
  - 1. Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
  - 1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
  - 2. Thickness: 1/2 inch (12 mm).

#### 2.03 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa) yield strength; deformed billet steel bars; unfinished.
- B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- C. Dowels: ASTM A615/A615M, Grade 60 - 60,000 psi (420 MPa) yield strength; smooth steel bars; unfinished.

#### 2.04 CONCRETE MATERIALS

- A. Obtain cementitious materials from same source throughout.
- B. Cement: ASTM C150/C150M, Type II/IIA Portland cement, gray color.
- C. Fine and Coarse Mix Aggregates: ASTM C33/C33M.
- D. Fly Ash: ASTM C618, Class C or F.
- E. Water: Clean and potable, and not detrimental to concrete.
- F. Air-Entraining Admixtures: ASTM C260/C260M.

- G. Chemical Admixtures: ASTM C494/C494M, Type A - Water Reducing, Type C - Accelerating and Type G - Water Reducing, High Range and Retarding.
  - 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

#### 2.05 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1, Class A.
- B. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.
- C. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
- D. Detectable Warning Panels
  - 1. Detectable Warning Panels shall consist of square or rectangular panels with a surface of truncated domes, aligned in a square or radial grid pattern. Panels shall extend the full width of all curb ramp landings, and a minimum of 24 inches in the predominant direction of travel. Panels shall be wet-set; surface applied panels will not be allowed.

#### 2.06 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- D. Concrete Properties:
  - 1. Compressive strength, when tested in accordance with ASTM C39/C39M at {CH#15030} days; {CH#15031}.
  - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 3. Total Air Content: 4 to 7 percent, determined in accordance with ASTM C173/C173M.
  - 4. Maximum Slump: 4 inches (100 mm).

#### 2.07 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Concrete Supplier shall provide a load ticket for each delivery of concrete

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

#### 3.02 SUBBASE

- A. See Section 321123 for construction of base course for work of this Section.

#### 3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole and casting frames to prevent bond with concrete pavement.

- C. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

#### 3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

#### 3.05 REINFORCEMENT

- A. Place reinforcement as indicated.

#### 3.06 COLD AND HOT WEATHER CONCRETING

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

#### 3.07 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. In accordance with ACI specifications, concrete that has not been discharged within 90 minutes from when cementitious materials were first added to water, and/or after drum revolutions have exceeded 300 from when cementitious materials were first added to water, shall be rejected and shall not be incorporated into the work. No payment shall be made for concrete that has been rejected for non-conformance with aforementioned requirements.
- C. Do not place concrete when base surface is saturated or ponding water.
- D. In dry conditions, moisten base course prior to concrete placement. Use appropriate procedures to accomplish moistened base without creating areas of ponding water.
- E. Ensure reinforcement, inserts, embedded parts, formed joints and formed joints are not disturbed during concrete placement.
- F. Install Detectable Warning Panels at curb ramps or where indicated on plans in accordance with Manufacturers recommendations. Ensure full bearing on substrate.
- G. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

#### 3.08 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Place [1/2] inch ([ ] mm) wide expansion joints at 25 foot ([ ] m) intervals and to separate paving from vertical surfaces, footings, foundation and building walls, existing concrete and other components.
  1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch (13 mm) of finished surface.
  2. Secure to resist movement by wet concrete.
  3. All locations requiring expansion joints may not be indicated on plans. Contractor shall ensure that adequate expansion joints are provided at appropriate locations to ensure damage to site improvements does not occur due to expansion and contraction of concrete members.
  4. All expansion joints shall be sealed.
- C. Provide control joints.

1. Joint spacing shall be per plans. Where not explicitly indicated, a minimum spacing of 5 feet shall be used.
2. Between sidewalks and curbs.
3. Between curbs and pavement.
4. Control joints may be tooled or saw cut. Tooled joints shall provide 1/4 inch radius and be cut 1/3 into depth of slab during finishing.

### 3.09 FINISHING

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius ( 6 mm radius).
- C. Curbs and Gutters: Light broom, texture parallel to pavement direction.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### 3.10 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).
- B. Maximum Variation From True Position: 1/4 inch (6 mm).

### 3.11 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
  1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  2. Contractor shall pay for and provide proposed mix design, to be submitted to Engineer for review prior to commencement of concrete operations.
  3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
  4. Contractor shall pay for all additional tests and inspection required due to failing work and/or tests.
- B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples from the first load of each days pour and for every 50 cu yd ( [ ] cu m) or less of each class of concrete placed thereafter.
  1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  2. The cylinders comprising one set will be made from the same sample of concrete and shall be tested at the following schedule: one (1) cylinder tested at seven (7) days and one (1) at twenty-eight (28) days. The third cylinder shall be held by the testing agency until the Owner or Engineer orders it tested or disposed of. If an additional cylinder is cast for cold weather concreting, it shall be tested at twenty-eight (28) days.
  3. Additional cylinders cast at the Contractor's request to facilitate early opening to traffic shall be paid for by the Contractor.
- C. Slump Testing: Slump tests shall be performed in accordance with ASTM C143 for each sample taken. The maximum allowable slump of the concrete mix shall be 4 inches.
- D. Air Entrainment: Air content in accordance with ASTM C231 shall also be tested and recorded for each sample of concrete used in making test cylinders. The air content shall fall within the range of 4 percent to 7 percent.

- E. Test Results: The testing agency shall report test results in writing to the Engineer within 24 hours of test.
- F. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

**3.12 DEFECTIVE CONCRETE**

**3.13 PROTECTION**

- A. Defective concrete is defined as follows:
  - 1. Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
  - 2. Concrete failing to meet specifications for compressive strength, air entrainment, consistency (slump) and/or composition.
  - 3. Concrete that is excessively honey-combed or contains embedded debris.
  - 4. Concrete that is spalling, experiencing surface delamination, and/or any other form of premature degradation.
- B. Any concrete meeting at least one of the above criteria or that does not comply with the requirements of this Section 32 1313 or any other requirements of the contract documents shall be replaced by the Contractor to the satisfaction of the Engineer at no cost to the Owner. Replaced concrete shall be tested at the same schedule as other concrete and such testing shall be incidental.
- C. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- D. Do not permit vehicular traffic over pavement for 7 days minimum or until concrete has reached 75 percent of 28-day compressive strength, as established by cylinder testing data, and until all joints have been sealed.

**END OF SECTION**

**SECTION 321723.13  
PAINTED PAVEMENT MARKINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Parking lot markings, including parking bays, crosswalks, arrows, handicapped symbols and curb markings.
- B. Roadway lane markings.

**1.02 RELATED REQUIREMENTS**

- A. Section 321216 - Asphalt Paving.

**1.03 REFERENCE STANDARDS**

- A. FS TT-P-1952 - Paint, Traffic Black, and Airfield Marking, Waterborne 2015f.
- B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- C. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration Current Edition.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver paint in containers of at least 5 gallons (18 L) accompanied by batch certificate.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

**1.06 FIELD CONDITIONS**

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Materials as required by VTrans Specifications for Construction, latest edition.
- B. Line and Zone Marking Paint: color(s) as indicated.
  - 1. Roadway Markings: As required by authorities having jurisdiction.
  - 2. Parking Lots: Yellow.
  - 3. Handicapped Symbols: Blue.
  - 4. Crosswalks and Turn Arrows: White.
- C. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as



to perform satisfactorily during period for which its use is required.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.

#### **3.02 PREPARATION**

- A. Allow new pavement surfaces to cure.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. If obliteration of existing markings using paint is acceptable in lieu of removal as determined by authorities having jurisdiction; apply the black paint in as many coats as necessary to completely obliterate the existing markings.
- D. Clean surfaces thoroughly prior to installation.
  - 1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
  - 2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.
- E. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.
- F. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.
- G. Temporary Pavement Markings: When required or directed by Engineer , apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
  - 1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
  - 2. At Contractor 's option, temporary marking tape may used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to Owner .

#### **3.03 INSTALLATION**

- A. As required by MUTCD and VTrans Specifications for Construction, latest edition.

#### **3.04 DRYING, PROTECTION, AND REPLACEMENT**

- A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.
- B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.
- C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.
- D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.
- E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Owner .

**END OF SECTION**

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**SECTION 329219  
SEEDING**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Topsoil material.
- B. Section 312200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- C. Section 312323 - Fill: Topsoil material.

**1.02 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Topsoil samples.
- C. Certificate: Certify seed mixture approval by authority having jurisdiction.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

**2.02 SEED MIXTURE**

- A. Seed Mixture Meadow or areas requiring little mowing:
  - 1. Kentucky Blue Grass: 10 percent.
  - 2. Creeping Red Fescue Grass: 35 percent.
  - 3. VNS Turf-Type Tall Fescue: 25 percent.
  - 4. Annual Ryegrass: 15 percent.
  - 5. Perennial Ryegrass: 12 percent.
  - 6. Clover: 0 to 3 percent.
- B. Seed Mixture Lawn and other maintained areas:
  - 1. Creeping Red Fescue Grass: 50 percent.
  - 2. Kentucky Blue Grass: 30 percent.
  - 3. Perennial Ryegrass: 20 percent.

**PART 3 EXECUTION**

**3.01 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches (50 mm) of topsoil.

- E. Lightly water to aid the dissipation of fertilizer.

### 3.02 SEEDING

- A. Meadow or areas requiring little mowing: Apply seed at a rate of 80 lbs per acre evenly in two intersecting directions. Rake in lightly.
- B. Lawn and other maintained areas: Apply seed at a rate of 100 lbs per acre evenly in two intersecting directions. Rake in lightly.
- C. Do not seed areas in excess of that which can be mulched on same day.
- D. Lightly compact seeded areas.
- E. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- F. Immediately following seeding and compacting, apply mulch. Maintain clear of shrubs and trees.
- G. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches (100 mm) of soil.
- H. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches (100 by 100 mm).

**END OF SECTION**

**SECTION 329300  
PLANTS**

**PART 2 PRODUCTS**

**1.01 PLANTS**

- A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

**END OF SECTION**



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**SECTION 330110.58**  
**DISINFECTION OF WATER UTILITY PIPING SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Disinfection of site domestic water lines and site fire water lines specified in Section 331416.

**1.02 RELATED REQUIREMENTS**

- A. Section 331416 - Water Utility Distribution Piping.

**1.03 REFERENCE STANDARDS**

- A. AWWA B300 - Hypochlorites 2010, Addendum 2011.
- B. AWWA B301 - Liquid Chlorine 2010.
- C. AWWA B302 - Ammonium Sulfate 2016.
- D. AWWA B303 - Sodium Chlorite 2010.
- E. AWWA C651 - Disinfecting Water Mains 2014.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Bacteriological report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Initial and 24 hour Coliform bacteria test results for each outlet tested.
  - 7. Certification that water conforms, or fails to conform, to bacterial standards of the Vermont Water Supply Rule.

**1.05 QUALITY ASSURANCE**

- A. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State in which the Project is located.
- B. Submit bacteriologist's signature and authority associated with testing.

**PART 2 PRODUCTS**

**2.01 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate and AWWA B303 Sodium Chlorite.

**PART 3 EXECUTION**

**3.01 DISINFECTION**

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Inject treatment disinfectant into piping system.
- D. Maintain disinfectant in system for 24 hours.

- E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- F. If any of the noted testing must be re-certified by Project Engineer due to system failures, all extra Engineering fees will be paid by the Contractor at no additional cost to the Owner.
- G. Replace permanent system devices removed for disinfection.

**3.02 FIELD QUALITY CONTROL**

- A. Test samples in accordance with AWWA C651.

**END OF SECTION**

**SECTION 330513  
MANHOLES AND STRUCTURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete.

**1.03 REFERENCE STANDARDS**

- A. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections 2015a.
- B. ASTM C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections (Metric) 2015a.
- C. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals 2018.
- D. ASTM C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals (Metric) 2018.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 (ASTM C478M), with resilient connectors complying with ASTM C923 (ASTM C923M).
- B. Mortar and Grout: Type S.

**2.02 CONFIGURATION**

- A. As per Contract Documents.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify items provided by other sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location, and ready for roughing into Work.
- C. Verify excavation for manholes is correct.

**3.02 MANHOLES**

- A. Place stone base pad, level.
- B. Place manhole sections plumb and level, trim to correct elevations.
- C. Position and fit for pipe.
- D. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
- E. Coordinate with other sections of work to provide correct size, shape, and location.

**3.03 MASONRY WORK**

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 inches (200 mm).
- C. Form concave mortar joints.

- D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

**END OF SECTION**

**SECTION 331113  
POTABLE WATER SUPPLY WELL ABANDONMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Well Abandonment

**1.02 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include data indicating material type and installation method complying with State of Vermont Water Supply Division Regulations.
- C. Well abandonment forms as required by the State of Vermont for each well abandoned.

**1.03 DEFINITIONS**

- A. Well: Any hole drilled, driven, bored, excavated, or created by similar method into the earth to locate, monitor, extract, or recharge groundwater where the water table or potentiometric surface is artificially lowered through pumping.
- B. Shallow Water Source: A developed structure to collect groundwater, generally less than 20 feet deep. This includes springs, dug wells, jetted wells, drilled wells, and well points, and other water intake structures which may or may not be under the jurisdiction of the Vermont Well Driller's Rules and Construction Standards.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. As approved by the State of Vermont Water Supply Rule.

**PART 3 EXECUTION**

**3.01 FILLING**

- A. Groundwater sources which are no longer in use or planned for use shall be sealed by such methods as necessary to restore the controlling geologic conditions which existed prior to construction and shall conform to the requirements of the Vermont Water Supply Rule and reiterated below.
- B. Drilled Wells to be abandoned shall:
  - 1. Be sealed to prevent undesirable exchange of water from one aquifer to another.
  - 2. Have fill materials other than cement grout or concrete approved in advance by the Water Supply Division.
  - 3. When filled with cement grout or concrete, these materials shall be applied to the well hole through a pipe, tremie, or bailer, and filled to surface grade. Wells shall be re-filled to surface grade if consolidation of grout occurs.
  - 4. Be disinfected and free from foreign materials.
  - 5. Be disconnected and plugged from the home to prevent any backflow of grout into the home.
  - 6. Topsoil and seed disturbed areas.
- C. Shallow Wells to be abandoned shall:
  - 1. Be disinfected and free from foreign materials.
  - 2. Be disconnected and plugged from the home to prevent any backflow of grout into the home.



3. Remove top lid and casing section 2 feet below grade.
  4. Fill and compact with clean, drainable fill.
  5. Topsoil and seed disturbed areas.
- D. Well abandonment shall be performed only by a Vermont licensed water well driller or monitoring well driller for her or his respective class and in conformance with all Water Supply Division regulations.

**END OF SECTION**

**SECTION 331416**  
**WATER UTILITY DISTRIBUTION PIPING AND APPURTENANCES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water pipe for site conveyance lines.
- B. Pipe valves and Fire Hydrants.
- C. Hydrostatic pressure testing.
- D. Trace Wire

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Concrete for thrust restraints.
- B. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
- C. Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.
- D. Section 330513 - Manholes and Structures.
- E. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

**1.03 REFERENCE STANDARDS**

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2012.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2018.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2014 (Editorial 2017).
- D. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2015.
- E. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2016.
- F. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).
- G. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40 2017.
- H. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter 2015.
- I. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals 1998 (Reapproved 2011).
- J. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Polyethylene of Raised Temperature (PE-RT) Tubing 2018a.
- K. ASTM F2080 - Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe 2018.
- L. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2011 (Amended 2012).
- M. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2010.
- N. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.

- O. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges 2011.
- P. AWWA C502 - Dry-Barrel Fire Hydrants 2014.
- Q. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service 2015.
- R. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances 2017.
- S. AWWA C800 - Underground Service Line Valves and Fittings 2014.
- T. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service 2017.
- U. AWWA C904 - Cross-Linked Polyethylene (PEX) Pressure Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service 2016.
- V. UL 246 - Hydrants for Fire-Protection Service Current Edition, Including All Revisions.

#### 1.04 **SYSTEM PERFORMANCE REQUIREMENTS**

- A. Minimum Working Pressure Ratings: Except where otherwise indicated, the following are minimum pressure requirements for water system piping:
  1. Underground Piping: 200 psig
  2. Underground Piping: Downstream of Fire Department Connections: 200 psig

#### 1.05 **SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, concrete thrust block mix design, and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- E. Operation and Maintenance Data: Upon approval of submittals, furnish Engineer with 3 copies of Manufacturer's drawings and instructions for use in Operation and Maintenance Manual.
- F. Test Reports specified in this specification section.
- G. Name and relevant experience of firm completing water main tapplings.

#### 1.06 **QUALITY ASSURANCE**

- A. Perform Work in accordance with municipality requirements and State of Vermont Natural Resources.
- B. Comply with standards of authorities having jurisdiction for potable water piping and plumbing systems. Include materials, installation, testing, and disinfection.
- C. Product Options: Water systems specialties and accessories are based on specific types, manufacturers, and models indicated. Components by other manufacturers but having equal performance characteristics may be considered, provided deviations in dimensions, operation, and other characteristics do not change design concept or intended performance as judged by Project Engineer and Town Water Department. The burden of proof of equality of products is on Contractor.

#### 1.07 **DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store valves in shipping containers with labeling in place.

- B. Deliver free of damage and store in protected area with labeling in place.
- C. Report any damage, including light surface scratches, to Engineer prior to installation. Repair or replace any coating or component damage as required by Manufacturer and as directed by Engineer.
- D. Protect valves from weather. Store valves indoors and maintain temperature higher than ambient dew point temperature. Support valves off ground or pavement in watertight enclosures when outdoor storage is necessary.
- E. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.
- F. Deliver pipes and tubes with factory applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- G. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

## **PART 2 PRODUCTS**

- A. Protect flanges, fittings, and piping specialties from moisture and dirt.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.
- C. All handling and storage procedures to meet or exceed the requirements of AWWA, M41.

### **2.02 PROJECT CONDITIONS**

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility locating service for area where Project is located.
- B. Verify that water system piping may be installed in compliance with original design and referenced standards.
- C. Site Information: Reports on subsurface condition investigations made during the design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions (between soil borings). Owner assumes no responsibility for interpretations or conclusions drawn from this information. Contractor has the responsibility to make themselves aware of site conditions and perform any testing they deem necessary prior to bid.

### **2.03 SEQUENCING AND SCHEDULING**

- A. Coordinate connection to water main with the Town Water Department and Project Engineer at least 48 hours prior to work.
- B. The Contractor shall notify and obtain permission from the Fire Department having jurisdiction at least 24 hours prior to the shutting down service to any hydrant, and shall notify the Fire Department when service is restored.
- C. Coordinate with pipe materials, sizes, entry locations, and pressure requirements of building fire protection systems piping.
- D. Coordinate with pipe materials, sizes, entry locations, and pressure requirements of building water distribution systems piping.
- E. Coordinate with other utility work and utility companies which may be effected.

### **2.04 GENERAL**

- A. All products or materials that may come into contact with water intended for use in a public water system shall meet the National Sanitary Foundation International (NSF)/American National Standards Institute (ANSI) Standard 61.

## 2.05 WATER PIPE

- A. Ductile Iron Pipe: AWWA C151/A21.51: Ductile iron pipe shall meet the requirements of ANSI/AWWA C151/A51.51, or the latest revision thereof. The thickness class of Ductile Iron pipe shall be C52. All Ductile Iron Pipe shall be cement mortar lined and contain an exterior bituminous seal conforming with AWWA/ANSI C104/A21.4. All water main fittings shall be ductile iron.
  - 1. Fittings: Ductile iron, standard thickness. Ductile Iron fittings shall be manufactured by Sigma, Tyler Union, or approved equal, and shall have a working pressure of 350 pounds per square inch meeting AWWA C153. All Ductile Iron fittings shall be cement mortar lined and contain an exterior bituminous seal conforming with AWWA/ANSI C104/A21.4. All fittings shall be mechanically restrained and have thrust blocking. Thrust blocking shall be of adequate size to prevent movement of pipe and appurtenances when under pressure.
  - 2. Joints: AWWA C111/A21.11, Styrene butadiene rubber (SBR) or vulcanized SBR gasket with rods.
    - a. Fluorocarbon elastomer gaskets if petroleum hydrocarbon and/or chlorinated solvent contaminated soils are encountered.
      - 1) Champion Fluoroelastomer (FKM) or approved equal.
  - 3. Jackets: AWWA C105/A21.5 polyethylene jacket For use when corrosive soils are encountered.
  - 4. Pipe Joints shall be Restrained Mechanical Joint (MJ) type with "Mega-Lug Series 1100" mechanical joint restraint glands as manufactured by EBAA Ton Sales, Inc., "Uni-Flange Series 1400 Wedge Action" mechanical joint restraint glands as manufactured by Ford Meter Box Co. or approved equal, with T-bolt and rubber gaskets.
  - 5. Pipe joints shall be "Field Lock" Gasket System restrained push-on bell and spigot joint type, as manufactured by U.S. Pipe & Foundry Co. or approved equal where indicated in the specifications or project drawings.
  - 6. Pipe shall be 18' or 20' lengths.
  - 7. Mechanical Joint Bolt Requirements: Bolts for mechanical joint fittings, valves, and hydrants shall be Fluorocarbon Bolts and Nuts meeting AWWA C111 and ANSI/ASME B1.1.
  - 8. Pipe Couplers: HYMAX Long Body Coupling, or approved equal.
  - 9. Leakage Clamps: Ford FBC-E Style or Engineer approved equivalent
    - a. Leakage clamps are to be installed at locations where water main is within 50 feet of leach fields and 25 feet of septic tanks.
  - 10. Pipe is to be installed with a minimum of (2) each bronze conductive wedges at every joint.
- B. Copper Tubing: ASTM B88, Type K, Seamless, Annealed Temper, furnished in coils:
  - 1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
  - 2. Joints: Mueller 110 compression connection or approved equal.
- C. Polyethylene Pipe: AWWA C901:

1. Fittings: AWWA C901, molded or fabricated.
  2. Joints: Compression.
  3. Water Service Lines: HDPE water service lines shall be CTS DR11 conforming to ASTM D2737 with minimum working pressure of 200 psi.
  4. HDPE Sleeves: HDPE Sleeve Pipe: Shall be DR17 IPS.
  5. HDPE Mains: HDPE Main Pipe: Shall be DR9 IPS with minimum working pressure of 200 psi.
  6. Each pipe length shall be clearly marked with manufacturer's name or trademark, nominal pipe size, material designation, pressure class, dimensional ratio, quality control code, and AWWA/ASTM designation.
- D. Pipe and Tube Fittings:
1. Refer to Part 3 Article "Piping Applications" for identification of systems where pipe and tube fitting materials specified below are used.
  2. Ductile Iron and Cast Iron Pipe Fittings: AWWA C110, ductile iron or cast iron, 250 psig minimum pressure rating; or AWWA C153, ductile iron compact fittings, 350 psig pressure rating.
- E. Service Connection:
- a. Lining: AWWA C104, cement mortar.
  - b. Gaskets: AWWA C111, rubber.
  2. Ductile Iron Pipe, Grooved End Fittings: ASTM A 47 malleable iron or ASTM A 536 ductile iron, AWWA pipe size, grooved end fittings having cement lining or Food and Drug Administration (FDA) approved interior coating, designed to accept AWWA C606 couplings, for AWWA size grooved end piping joints.
  3. Ductile Iron and Gray Iron Flanged Fittings: AWWA C110, 250 psig minimum pressure rating, with AWWA C104 cement mortar lining.
  4. Bronze Corporation Stops and Valves, ball valve type:
  5. Ductile Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical joint ends conforming to AWWA C110 or AWWA C153. Units have 2 gasketed ball joint sections and 1 or more gasketed sleeve sections, rated for 250 psig minimum working pressure and with FDA approved epoxy interior coating, for offset and expansion indicated.
  6. Ductile Iron Deflection Fittings: Compound coupling fitting with sleeve and flexing sections, gaskets, and restrained joint ends conforming to AWWA C110 or AWWA C153. Units rated for 250 psig minimum working pressure, and with cement lining or FDA approved epoxy interior coating, for up to 20 degrees deflection.
  7. Restrained Joint Ductile Iron Pipe: U.S. Pipe and Foundry Co. TR Flex or Engineer Approved Equal.
    - a. Ford Meter Box Co., Inc. FB 1000-X-Q-NL
  8. Ductile Iron Expansion Joints: 3 piece assembly consisting of telescoping sleeve with gaskets and restrained type, ductile iron bell and spigot end sections conforming to AWWA C110 or AWWA C153. Units rated for 250 psig minimum working pressure, and with cement lining or FDA approved epoxy interior coating, for expansion indicated.
  9. Copper Tube Fittings: ASME B16.22, wrought copper, solder joint pressure type.



F. Anchorages:

1. Clamps, Straps, and Washers: ASTM A 506, steel.
2. Rods: ASTM A 575, steel.
  - a. Regardless of manufacturer all corporations shall be No-Lead and in compliance with NSF-61 and Town Ordinance.
3. Rod Couplings: ASTM A 197, malleable iron.
4. Bolts: ASTM A 307, steel. Fluorocarbon Bolts and Nuts meeting AWWA C111 and ANSI/ASME B1.1.
5. Cast Iron Washers: ASTM A 126, gray iron.
6. Concrete Thrust Blocks: Portland cement concrete mix, 3000 psi.
  - a. Cement: ASTM C 150, Type I.
  - b. Fine Aggregate: ASTM C 33, sand.
  - c. Coarse Aggregate: ASTM C 33, crushed gravel.
  - d. Water: Potable.

G. Pipe Insulation:

1. Buried Insulation Board: Dow Styrofoam Highload 40 meeting ASTM C578 or Engineer approved equal with the following specifications:
  - a. 5.0 R-Value min - Thermal Resistance per inch, ASTM C518, C177, @ 75 degrees mean temp
  - b. 40 psi min Compressive Strength, ASTM D1621
  - c. 0.3 max % by volume, water absorption, ASTM C272
  - d. 1.0 perms water vapor permeance, ASTM E96
  - e. 165 degrees F maximum use temperature
  - f.  $3.5 \times 10^{-5}$  Coefficient of Linear Thermal Expansion
  - g. 60 psi, min Flexural Strength, ASTM C203
  - h. Type VI Complies with ASTM C578
2. Bronze Curb Stops, Valves, and Fittings:
  - a. Curb stops shall be open left, full flow, ball valve type as manufactured by Ford, Mueller, or approved equal with tracer wire nut connection and Quick Joint Coupling.
  - b. Ford Meter Box Co., Inc. B41-xxx-TW-Q-NL
  - c. Ford Meter Box Co., Inc. C84-xx-Q-NL
  - d. Curb stops shall be equipped with a sliding adjustable, cast iron curb box with two-hole cover marked "water". The box shall be arch-type so as to enclose the curb stop and rest on a concrete base and not transfer force to the service or curb stop. Boxes for curb stops larger than 1" shall have a heavy foot piece. Box length shall be adequate to allow a minimum of 4" of overlap of sections with top extended to final grade.
  - e. A 30" stainless steel stationary operating rod shall be affixed to the key of the curb stop with stainless steel cotter pin.
  - f. All curb stops shall be No-Lead.

3. Quick Joint Tee
  - a. Ford Meter Box Co., Inc. T444-xxx-Q-NL.
4. Interior Plumbing
  - a. Backflow Preventors: To meet Town Water Department Specifications.
    - 1) Watts Regulator Co. Dual Check Valve.
  - b. Residential Water Meters 1" to 1.5": To meet Town Water Department Specifications
    - 1) Neptune Water Div., Schlumberger Industries, Inc. T-10 Integrated E-Coder R900i.
  - c. Residential Water Meters 2" to 3": To meet Town Water Department Specifications.
    - 1) Neptune Water Div., Schlumberger Industries, Inc. TRU/FLO Compound Meter Integrated E-Coder R900i with strainer.
  - d. Booster Pumps
    - 1) DuraMAC – Residential Booster
    - 2) Booster pumps shall be rated to provide a minimum of 35 psi additional pressure to the system.
    - 3) Booster Pumps shall be installed with an approved testable double check valve and low pressure cut off switch calibrated to cut off when the incoming service pressure falls below 12 psi.
  - e. Expansion Tanks: Amtrol THERM-X-TROL In Line Model or approved equal.

## 2.06 VALVES

- A. Valves: Manufacturer's name, pressure rating, and year in which manufactured cast on valve body.
- B. Gate Valves 3 Inches (75 mm) and Over:
  1. Manufacturers:
    - a. Kennedy Valve Div., McWane Inc..
    - b. Mueller Co, Grinnell Corp.
    - c. Waterouse Co.
  2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends, control rod, post indicator, valve key, and extension box.
  3. Minimum working pressure of 250 psi. Inlet flange shall be Class 125 conforming to ANSI Specification B 16.1 and outlet connection shall be as specified on Contract Drawings for the type of pipe specified.
  4. Gate Valves shall be open right and an operating rod extension shall be provided where the valve depth exceeds 6 feet.
  5. Gate valves shall have stainless steel (304) nuts and bolts.
- C. Valve Boxes
  1. Buried valves shall have adjustable, flanged, 5.25" diameter, cast iron valve box with flush cover marked "water". The box shall enclose the valve operating nut and stuffing box. Box length shall be adequate to allow a minimum 4" overlap of sections with top extended to final grade.

2. Valve boxes shall be installed to prevent section stops from transferring loads from surface traffic to the valve. Stops shall be a minimum of 4 inches from bottom section.

#### 2.07 HYDRANTS

- A. Hydrants: AWWA C502, UL 246, dry barrel type. Hydrants to have minimum burial of 6', maintain a minimum 15" between bottom of the streamer cap and finish grade, all bolts to be stainless steel (304), and shall be factory painted red conforming to NFPA Standards (contractor to field touch up paint as necessary). Hydrants to open right and contractor to verify fitting requirements with local Water and Fire Departments
  1. Manufacturers:
    - a. Kennedy GUARDIAN.
- B. Hydrant Extensions: Fabricate in multiples of 6 inches (150 mm) with rod and coupling to increase barrel length.
- C. Hose and Streamer Connection: Match sizes with utility company, two hose nozzles , one pumper nozzle.
- D. Hydrant Drains to be plugged in areas of high ground water as defined by the Town Water Department.
- E. Hydrant Markers: All hydrants shall be equipped with a hydrant marker. The hydrant marker shall be approved by the municipality having jurisdiction.

#### 2.08 FLUSHING HYDRANTS

- A. Hydrants to open right and contractor to verify fitting requirements with local Water and Fire Departments.
  1. Manufacturers
    - a. Kupferle ECLIPSE #2 Post type or Engineer Approved Equal
- B. Hydrants to have minimum burial of 6', maintain a minimum 15" between bottom of the streamer cap and finish grade, all bolts to be stainless steel (304), and shall be factory painted red conforming to NFPA Standards (contractor to field touch up paint as necessary).
- C. Hydrant Drains to be plugged in areas of high ground water as defined by the Town Water Department.
- D. Hydrant Markers: All hydrants shall be equipped with a hydrant marker. The hydrant marker shall be approved by the municipality having jurisdiction.

#### 2.09 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 312316.13.
- B. Cover: As specified in Section 312316.13.

#### 2.10 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in Section 033000.
- B. Trace Wire: All non-metallic water main and service lines shall be equipped with blue Trace Wire designed specifically for detecting buried utilities and shall be certified for direct burial applications. Tracer wire shall be a minimum #12 AWG copper clad and connected to a magnesium grounding rod.
  1. Connectors: All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector or two 3-way connectors with a short jumper wire.

- a. Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
    - b. Non locking friction fit, twist on or taped connectors are prohibited.
  - 2. Termination/Access: All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
    - a. All grade level/in-ground access boxes shall be appropriately identified with "water" cast into the cap and shall be color coded.
    - b. A minimum of 2 feet of excess/slack wire is required in all trace wire access boxes after meeting final elevation.
- C. Water Sampling Stations
  - a. All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.
  - b. Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.
  - c. In lieu of trace wire access boxes, trace wire may be terminated at gate valve boxes at the end of lines. If this is done, tracer wire shall be wrapped around the exterior of the valve box to a point 6 inches below grade, and a hole will be drilled in the side of the valve box. The trace wire shall be looped a minimum of 2 feet inside the valve box.
- 2. Spacing: At intervals not less than 500 linear feet, trace wire shall be extended from the mainline with an approved connector, ran to a curb box, and extended to grade. All curb boxes with connected trace wire shall be delineated using a minimum 48-inch polyethylene marker post, color coded per APWA standard for the specific utility being marked.
- 3. Grounding. Trace wire must be properly grounded at all dead ends/stubs. Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20 feet of #14 red HDPE insulated copper clad steel wire connected to anode (minimum 0.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.
  - a. When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.
  - b. When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.
- 4. Kupferle ECLIPSE #88-XC "Extreme Cold" with a lockable cast-aluminum enclosure.
  - a. Where the anode wire will be connected to a trace wire access box, a minimum of 2 feet of excess/slack wire is required after meeting final elevation.

- D. Tapping Sleeve: Ductile Iron Watermain: To be split sleeve design, constructed with two solid half sleeves bolted together. Sleeves shall be constructed of Stainless Steel Type 304 (ASTM A240), and shall have a minimum working pressure of 250 psi.
  - 1. Stainless steel, Model #3490MJ Manufactured by Powerseal Pipeline Products Corporation, or approved equal, with mechanical joint gate valve.
- E. Tapping Tee: HDPE Watermain: Service line connections from new HDPE watermain shall be accomplished with molded electrofusion tapping tees or transition saddles with a minimum working pressure of 200 psi, installed in accordance with the manufacturers recommendations. Direct connections shall not be allowed.
- F. Yard Hydrants: Sanitary Type: Nonfreeze, post type, with nondraining chamber for storing water trapped downstream of inlet valve. Hydrants have 1 inch (25 mm) inlet, integral or field installed vacuum breaker with outlet conforming to ASME B1.20.7, 3/4 11.5NH threads for garden hose, brass or bronze casing, and other parts in contact with water, and are handle or key operated.
  - 1. Body of hydrant is of length required for installation of storage chamber below frost line. Furnish 2 keys for each key operated hydrant.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

#### **3.02 PREPARATION**

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

#### **3.03 TRENCHING**

- A. See the sections on excavation and fill for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required square feet thrust restraint bearing on subsoil.
- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

#### **3.04 PIPING APPLICATIONS**

- A. Refer to Part 2 of this Section for detailed specifications for pipe and fittings products listed below. Use pipe, tube, fittings, and joining methods according to the following applications. Piping in pits and inside building may be joined with flanges or couplings, instead of joints indicated, for grooved end AWWA size piping.

#### **3.05 JOINT CONSTRUCTION**

- A. Ductile Iron Piping Gasketed Joints: Construct joints according to AWWA C600.
- B. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.

#### **3.06 INSTALLATION - PIPE**

- A. Threaded Joints: Thread pipes with tapered pipe threads according to ASME B1.20.1, apply tape or joint compound, and apply wrench to valve ends into which pipes are being threaded.
- B. Ductile Iron, Grooved End Pipe and Fitting Joints: Cut groove pipes. Assemble joints with grooved couplings, gaskets, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

### 3.07 PIPING SYSTEMS COMMON REQUIREMENTS

- A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated except where deviations to layout are approved on coordination drawings.
- B. Install piping at indicated slope.
- C. Maintain separation of water main from sewer piping in accordance with State of Vermont code.
- D. Install components having pressure rating equal to or greater than system operating pressure.
- E. Install piping free of sags and bends.
- F. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- G. Establish elevations of buried piping to ensure not less than [5.5] feet ([\_\_\_\_\_] m) of cover.
- H. Install pipe to indicated elevation to within tolerance of 5/8 inches (16 mm).
- I. Install ductile iron piping and fittings to AWWA C600.
- J. Route pipe in straight line unless otherwise indicated on the plans. Deflections shall not exceed 2 degrees.
- K. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- L. Install tapping sleeve and tapping valve according to manufacturer's installation instructions.
- M. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
- N. Install access fittings to permit disinfection of water system performed under Section 330110.58.
- O. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water service piping.
- P. Install service clamps and corporation stops in size, quantity, and arrangement required by utility company standards and according to manufacturer's installation instructions.
- Q. Install service clamps on pipe to be tapped. Position outlet for corporation stop.
- R. Install corporation stops into service clamps. Install valve with stem pointing up and with cast iron valve box.
- S. Install curb stop in service piping with head pointing up and with cast iron service box.
- T. Install manifold for multiple taps in water main.
- U. Use drilling machine compatible with service clamp and corporate stop. Drill hole in main. Remove drilling machine and connect water service piping.
- V. Comply with requirements of NFPA 24 for materials and installation.



- W. Install copper tube and wrought copper fittings according to CDA No. 404/0 "Copper Tube Handbook."
- X. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- Y. Welding, installation, and fittings of HDPE pipe shall be performed In Accordance With AWWA Standard C906-07 for Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch, and AWWA Standard M55 PE Pipe – Design and Installation.
- Z. Install TR Flex Restrained Joint Ductile Iron Pipe where pipe is installed at an aerial crossing or in a sleeved condition
- AA. Slope water pipe and position drains at low points.
- BB. Install marking tape 18 inches above top of pipe.
- CC. Trace Wire
  - 1. Electrical Conductivity Testing: All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the CONTRACTOR, ENGINEER and CITY prior to acceptance. Continuity testing in lieu of actual line tracing shall not be accepted.
  - 2. Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.
  - 3. Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
  - 4. Trace wire shall be installed at the 3 o'clock or 9 o'clock position and secured (taped/tied) at 5' intervals.
  - 5. Trace wire must be properly grounded as specified.
  - 6. At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire.
  - 7. Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end, ground using an approved waterproof connection to a grounding anode buried at the same depth as the trace wire.
  - 8. All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
  - 9. In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.
  - 10. A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
  - 11. Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.
  - 12. The following products and methods shall be expressly prohibited:
    - a. Uninsulated trace wire.
    - b. Trace wire insulations other than HDPE.

- c. Trace wires not domestically manufactured.
- d. Non-locking, friction fit, twist on or taped connections.
- e. Brass or copper ground rods.
- f. Wire connections utilizing taping or spray-on waterproofing.
- g. Looped wire or continuous wire installations with multiple side-by-side wires or wires in close proximity.
- h. Trace wire wrapped around corresponding utility.
- i. Brass fittings with trace wire connection lugs.
- j. Wire terminations within the roadway.
- k. Trace wire connections to existing conductive utilities.

### 3.08 INSTALLATION - ANCHORAGES

- A. Anchorages: Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

- 1. Gasketed Joint, Ductile Iron Piping: According to AWWA C600.

### 3.09 INSTALLATION - VALVES AND HYDRANTS

- 1. Fire Service Piping: According to NFPA 24.
- B. Apply full coat of asphalt or other acceptable corrosion retarding material to surfaces of installed ferrous anchorage devices.
- C. Set valves on solid bearing concrete block or approved equal. Install valve with stem pointing up and with cast iron valve box.
- D. Install gate valve onto tapping sleeve. Comply with AWWA C600.
- E. Center and plumb valve box over valve. Set box cover flush with finished grade.
- F. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- G. Set hydrants to grade, with nozzles at least 15 inches ([ ] mm) above ground.
- H. Locate control valve minimum 36 inches ([ ] mm) away from hydrant.
- I. Provide a drainage pit 36 inches (900 mm) square by 12 inches ([ ] mm) deep filled with [3/4] inches ([ ] mm) crushed stone. Encase elbow of hydrant in gravel to 6 inches (150 mm) above drain opening. Do not connect drain opening to sewer.
- J. Bronze Corporation Stops and Curb Stops: Comply with manufacturer's installation instructions. Install buried curb stops with head pointed up and with cast iron curb box.

### 3.10 INSTALLATION - CONNECTION TO EXISTING MAIN

- A. Prior to making any connection to an existing water main, the Contractor shall obtain permission and coordinate on the connection schedule with the municipality having jurisdiction.

### 3.11 INSTALLATION - SERVICE CONNECTIONS

- A. Foundation wall penetration shall be three times the diameter of the service line.
- B. Provide sleeve in foundation wall for service main as per plan details. Calk enlarged sleeve watertight.
- C. Anchor service main to interior surface of foundation wall.
- D. Seal service line penetration watertight with link seal.

- E. Modify Internal building plumbing as directed on the Project Drawings. Internal building modifications shall be completed by a Vermont Licensed Plumber in accordance with applicable State and Local plumbing codes.
- F. Contractor shall apply for and purchase all State plumbing and electrical permits.
- G. Install restrained joints for buried piping within 5 feet (1.5 m) of building. Use restrained joint pipe and fittings, thrust blocks, anchors, tie rods and clamps, and other supports at vertical and horizontal offsets.

### 3.12 INSTALLATION - YARD HYDRANT

- A. Install sanitary type yard hydrants in pavement or with concrete anchor as indicated.
- B. Install post type yard hydrants in pavement or with concrete anchor, and make provision for drainage into drywell as indicated.

### 3.13 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Piping Tests: Conduct piping tests after thrust blocks have hardened sufficiently. All tests shall comply with State of Vermont Water Supply Rules. Fill pipeline 24 hours prior to testing and apply test pressure to stabilize system. Use only potable water. Prior to beginning any tests, watermain shall be flushed at a minimum of 3.0 ft/sec to remove particulates. All connections to existing water supply system necessary to obtain flush and test water shall contain adequate cross-connection control devices.
  - 1. Hydrostatic Tests:
    - a. Test at not less than 1 1/2 times working pressure for 2 hours. Minimum test pressure of 200 psi.
    - b. Testing must be witnessed and report filed by a Vermont Licensed Professional Engineer.
    - c. Maximum pipe length to be run per test is not to exceed 1,200 LF unless approved by Project Engineer.
    - d. Contractor shall provide all necessary valves, gauges, pumps, temporary connections, etc. to run the test as part of base bid. Equipment, at a minimum, must consist of a volumetrically calibrated water tank with cover, oil filled pressure gage graduated in feet of water or psi, flexible hoses, leak free valves and gas driven pump with capability to develop 200 psi of discharge pressure.
    - e. Any damage done to the piping will be repaired by the Contractor at no additional cost to the owner.
    - f. The pressure and leakage test shall include all new components of the water system including, but not limited to, valves, fittings, hydrants, and branch lines
  - 2. Polyethylene Hydrostatic Tests:
    - a. During the test procedure, Contractor will not allow test pressure to drop below 5 psi of said test pressure, if it does system shall be pumped up to maintain pressure and water volume recorded.
    - b. No pipe installation shall be accepted if the leakage is greater than that determined by the following
      - 1)  $L = (S \times D \times P^{1/2}) / (148,000)$
      - 2) L = the allowable leakage, in gallons per hour.
      - 3) S = the length of pipe being tested, in feet.

- 4) D = the nominal diameter of the pipe, in inches.
  - 5) P = the average test pressure, in psig.
  - c. All testing be in accordance with State of Vermont Agency of Natural Resources Regulations and AWWA C600, latest revisions.
  - d. Test in accordance with ASTM F2164 – 13, Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure.
- C. Trace Wire Electrical Conductivity Testing: All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the CONTRACTOR, ENGINEER and CITY prior to acceptance. Continuity testing in lieu of actual line tracing shall not be accepted.
1. Conductivity testing shall be performed within one week of pressure testing completion.

### 3.14 CLEANING

- A. Clean and disinfect water distribution piping as follows:
1. Purge/flush new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired to pressure testing and chlorination. Flushing to be in accordance with AWWA C600. If line is being connected to a fire suppression system it needs to meet NFPA24 and 30 and associated NFPA test certifications for flushing and pressure test be completed by Contractor.
  2. After satisfactory pressure test results, system shall be chlorinated in accordance with Vermont Agency of Natural Resources Regulations, AWWA C600 and ANSI/AWWA C651, latest revisions. The chlorination is to be left standing a minimum of 24 hours and a minimum of 2 bacteria tests are to be passed, tests to be taken at least 24 hours apart. The Testing Lab must be Certified by the State of Vermont Department of Health and approved by Project Engineer.
  3. After satisfactory test results, system will be flushed again. The super chlorinated water must be disposed of/treated in accordance with State and Local Regulations. Any special discharge permits/fees are the responsibility of the Contractor.
  4. If any of the noted testing must be re-certified by Project Engineer due to system failures all extra Engineering fees will be paid by the Contractor at no additional cost to the Owner.
- B. Tie-in connections to existing mains shall be sterilized either by immersing in a chlorine solution of 500 ppm for one-half hour or by swabbing with a five percent hypochlorite solution.

**END OF SECTION**

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**SECTION 333113**  
**SANITARY SEWERAGE GRAVITY PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Sanitary sewerage drainage piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to municipal sewers.

**1.02 RELATED REQUIREMENTS**

- A. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.

**1.03 REFERENCE STANDARDS**

- A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).
- B. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications 2014.
- C. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2011.

**PART 2 PRODUCTS**

**2.01 SEWER PIPE MATERIALS**

- A. Provide products that comply with applicable code(s).
- B. Plastic Pipe: ASTM D1785, Schedule 40, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of 4 inches (s), bell and spigot style solvent sealed joint end.
- C. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- D. Couplings: All couplings shall be Max Adaptor AISI 304 Series Stainless Steel or approved equivalent.

**2.02 PIPE ACCESSORIES**

- A. Trace Wire: All non-metallic sewer lines shall be equipped with green Trace Wire designed specifically for detecting buried utilities and shall be certified for direct burial applications. Tracer wire shall be a minimum #12 AWG copper clad imprinted with "Sewer Service" in large letters.
- B. Connectors: All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector or two 3-way connectors with a short jumper wire.
- C. Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
- D. Non locking friction fit, twist on or taped connectors are prohibited.
- E. Marking tape: Install marking tape 2 feet above top of pipe.

**2.03 BEDDING AND COVER MATERIALS**

- A. Pipe Bedding Material: As specified in Section 312323.
- B. Pipe Cover Material: As specified in Section 312323.

**PART 3 EXECUTION**



### 3.01 GENERAL

- A. Perform work in accordance with applicable code(s).

### 3.02 TRENCHING

- A. See Section 312316.13 for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

### 3.03 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
  - 1. Plastic Pipe: Also comply with ASTM D2321.
- B. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).
- C. Connect to building sanitary sewer outlet and municipal sewer system , through installed sleeves.

**END OF SECTION**

**SECTION 334211  
STORMWATER GRAVITY PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Storm drainage piping, fittings, and accessories.
- B. Connection of drainage system to municipal sewers.
- C. Bedding, backfilling and slope protections at pipe end.

**1.02 RELATED REQUIREMENTS**

- A. Section 312316 - Excavation: Excavating of trenches.
- B. Section 312323 - Fill: Bedding and backfilling.
- C. Section 330513 - Manholes and Structures.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories.

**PART 2 PRODUCTS**

**2.01 PIPE MATERIAL**

- A. Corrugated polyethylene pipe, smooth walled, ADS-N12 or approved equal.
- B. Regulatory Requirements: Conform to applicable code for materials and installation of the work of this section.

**2.02 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 312323.
- B. Cover: As specified in Section 312323.

**2.03 ACCESSORIES**

- A. Fill at Pipe Inverts: Riprap as specified in Section 313700.

**PART 3 EXECUTION**

**3.01 TRENCHING**

- A. See Section 312316 - Excavation and Section 312323 - Fill for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

**3.02 INSTALLATION - PIPE**

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
- C. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.
- D. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).
- E. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.
- F. Maximum variation from intended elevation of culvert invert: 1/2 inch.
- G. Maximum offset of pipe from true alignment: 1 inch.

### 3.03 PIPE INVERTS

- A. Place rip rap at pipe inverts, at embankment slopes.
- B. Installed thickness: 12 inches average.

### 3.04 INSTALLATION - CATCH BASINS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

### 3.05 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

## PART 4 MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

- A. If specific items are listed on bid, Engineer will make measurement in accordance with each specific bid item. For lump sum (LS) bid items, measurements will not be made.

### 4.02 PAYMENT

- A. Payments for specific bid items shall be at the unit price bid and shall include all costs for labor, equipment and materials.

**END OF SECTION**

# LEGEND

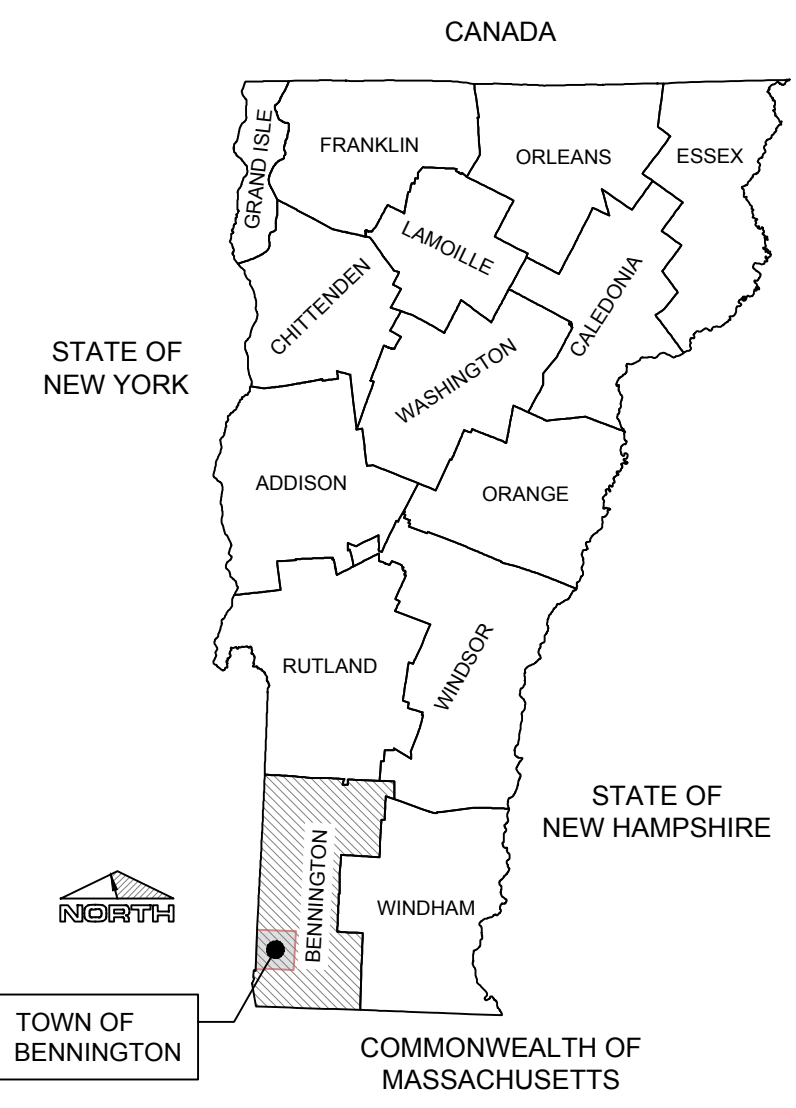
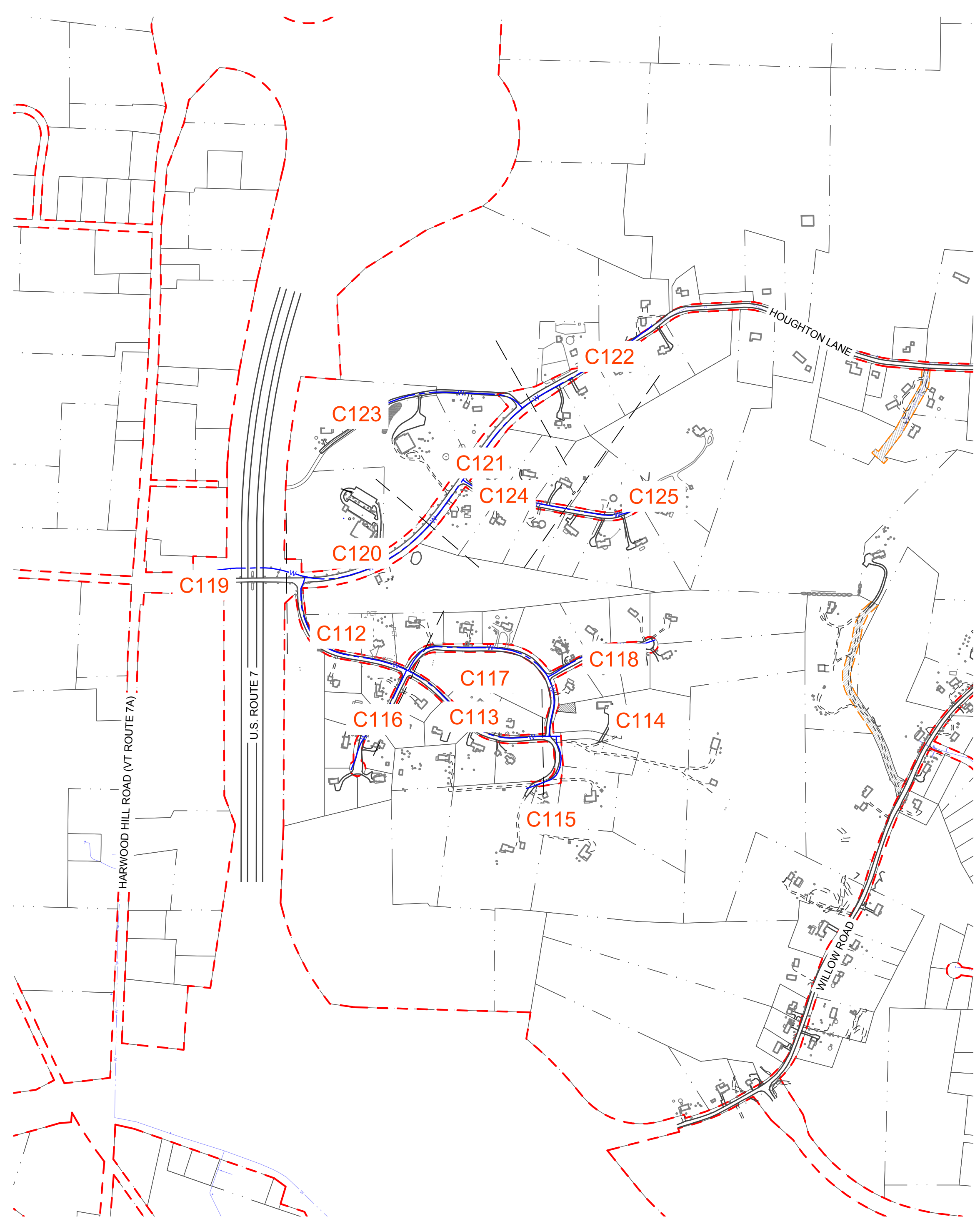
- BENCHMARK
- IRON PIN
- LEDGE PROBE OR BORING
- STATE OR MUNICIPAL RIGHT-OF-WAY
- EASEMENT
- SETBACK
- PROPERTY LINE
- ADJACENT PROPERTY LINE (ABUTTER)
- FENCE LINE
- PROJECT DEMARCATION FENCE
- SILT FENCE
- GUARD RAIL
- BOLLARD
- MAILBOX
- POST
- SIGN
- CATCH BASIN
- DRAINAGE MANHOLE
- STORM DRAIN
- SANITARY SEWER MANHOLE
- SANITARY SEWER
- ARV: AIR RELEASE VALVE (EXISTING)
- ARV: AIR RELEASE VALVE
- WATER SHUT-OFF (EXISTING)
- WATER SHUT-OFF
- GATE VALVE (EXISTING)
- GATE VALVE
- PRV: PRESSURE REDUCING VALVE (EXISTING)
- PRV: PRESSURE REDUCING VALVE
- FIRE HYDRANT (EXISTING)
- FIRE HYDRANT
- FLUSH HYDRANT (EXISTING)
- FLUSH HYDRANT
- SAMPLING STATION
- WELL
- WATER MAIN OR SERVICE (EXISTING)
- WATER MAIN (NEW)
- WATER SERVICE (NEW)
- STREET OR YARD LIGHT
- UTILITY MANHOLE
- UTILITY POLE
- GUY POLE/WIRE
- OVERHEAD UTILITY SERVICE
- UNDERGROUND ELECTRICAL SERVICE
- UNDERGROUND GAS SERVICE
- EDGE OF WATERWAY(OHW)  
RIVER, STREAM, LAKE OR POND
- TREE OR BRUSH LINE
- SHRUB
- DECIDUOUS TREE
- CONIFER TREE
- FLAGGED WETLAND LOCATION
- ROLLED EROSION CONTROL PRODUCT (REC)

NOTE: SOME SYMBOLS MAY NOT APPEAR ON ALL PLANS.

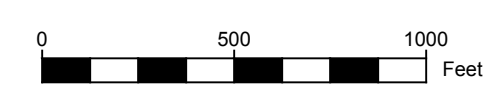
# TOWN OF BENNINGTON MUNICIPAL WATER SYSTEM REMEDIAL EXPANSION PHASE II BENNINGTON, VERMONT

## CONTRACT 6

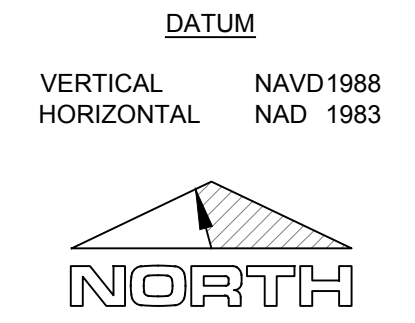
APPLE HILL ROAD/RUSSETT DRIVE/ASTRACHAN DRIVE/MCINTOSH LANE  
CORTLAND LANE/HOUGHTON LANE/MICHAELS DRIVE/SQUAW HILL ROAD



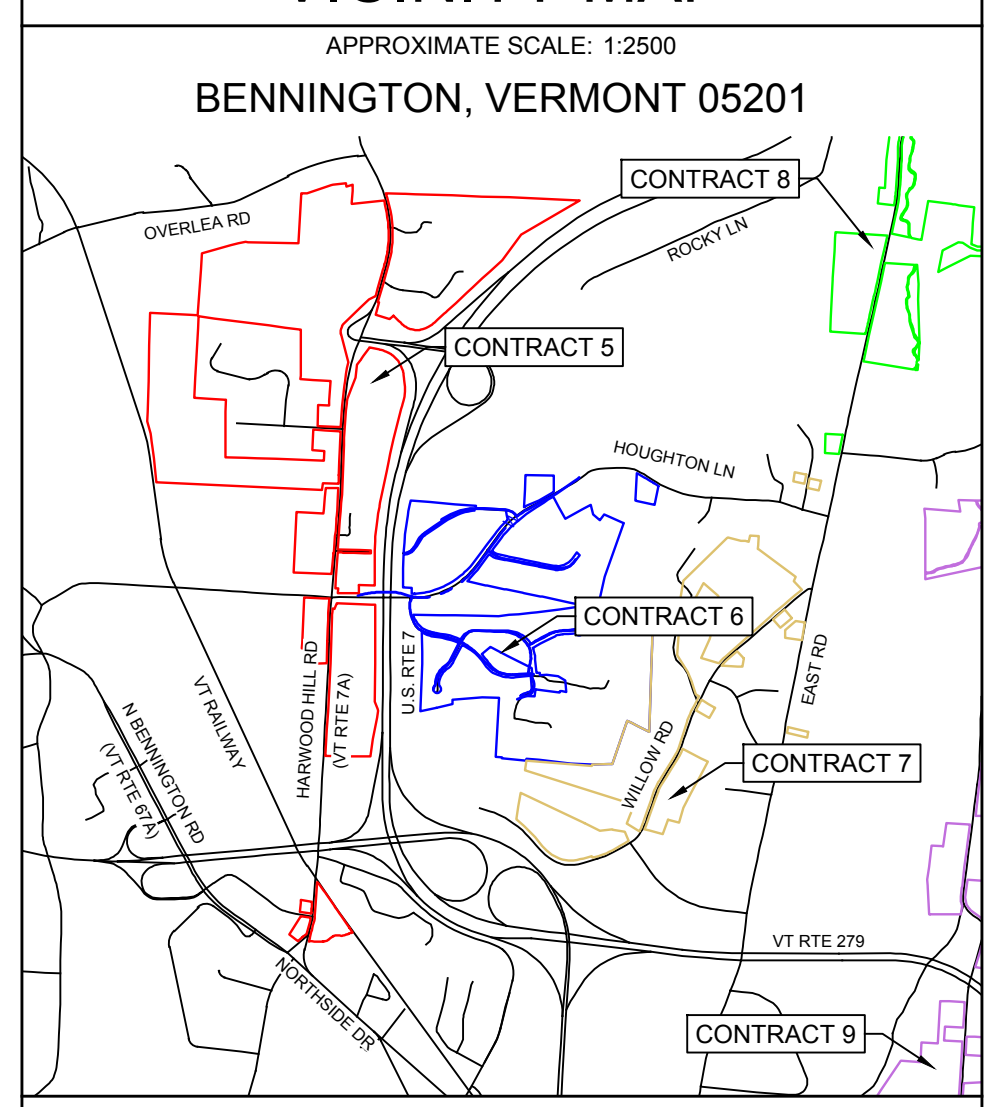
## 1 DISTRICT C COVER SHEET AND KEY PLAN



Scale: 1:500



## VICINITY MAP



## SHEET INDEX

CONTRACT 6	
SHEET NO.	SHEET TITLE
G006	COVER SHEET AND KEY PLAN
C112	PLAN
C112A	PROFILE
C113	PLAN
C113A	PROFILE
C114	PLAN
C114A	PROFILE
C115	PLAN
C115A	PROFILE
C116	PLAN
C116A	PROFILE
C117	PLAN
C117A	PROFILE
C117B	PROFILE
C118	PLAN
C118A	PROFILE
C119	PLAN
C119A	PROFILE
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C122A	PROFILE
C123	PLAN
C123A	PROFILE
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C124A	PROFILE
C125	PLAN
C125A	PROFILE
C501	TRAFFIC CONTROL DETAILS
C502	TRAFFIC CONTROL DETAILS
C503	CONSTRUCTION DETAILS
C504	CONSTRUCTION DETAILS
C505	CONSTRUCTION DETAILS
C506	EPSC DETAILS
C507	STABILIZATION DETAILS
C508	PLUMBING DETAILS
C509	CONNECTION DETAILS
C601	SERVICE ENTRANCE DIAGRAMS
C602	SERVICE ENTRANCE DIAGRAMS
C603	SERVICE ENTRANCE DIAGRAMS
C604	SERVICE ENTRANCE DIAGRAMS
C605	SERVICE ENTRANCE DIAGRAMS
C606	BOOSTED SERVICE ENTRANCE DIAGRAMS

## GENERAL NOTES

- THE CONTRACTOR SHALL ADHERE TO THE FOLLOWING GUIDELINES, UNLESS OTHERWISE NOTED:
- NEW 3/4" CORPORATION STOPS ARE TO BE INSTALLED FOR ALL SERVICES
  - NEW 3/4" K COPPER IS TO BE INSTALLED FROM CORPORATION STOPS TO CURB STOPS
  - NEW 1" HDPE IS TO BE INSTALLED FROM CURB STOPS TO SERVICE ENTRANCES OF ALL STRUCTURES
  - CURB STOPS SHALL BE LOCATED NO LESS THAN 6 FEET NOR MORE THAN 8 FEET FROM EDGES OF ROADWAYS, AND (MINIMUM) 1 FOOT INSIDE STATE OR MUNICIPAL RIGHT-OF-WAYS. AVOID INSTALLING CURB STOPS IN DRIVE SURFACES, WHERE POSSIBLE.
  - IN ACCORDANCE WITH VERMONT WASTEWATER AND POTABLE WATER SUPPLY RULES (04/12/2019), LEAKAGE CLAMPS ARE TO BE INSTALLED AT JOINTS ON WATER MAINS WITHIN 50' OF LEACH FIELDS AND SEPTIC TANKS, AND WITHIN 10' OF SANITARY PIPING. 8 mil POLYSTYRENE SLEEVES ARE TO BE APPLIED TO WATER SERVICES WITHIN 25' OF SANITARY SYSTEMS AND WITHIN 10' OF SANITARY PIPING.

**MSK ENGINEERING AND DESIGN, INC.**  
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BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

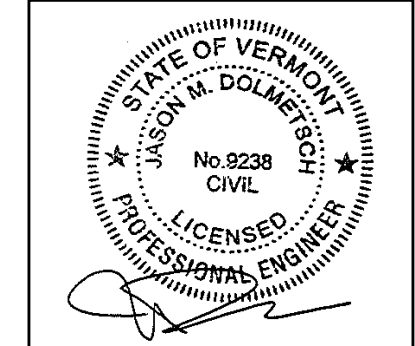
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NO.	DATE

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

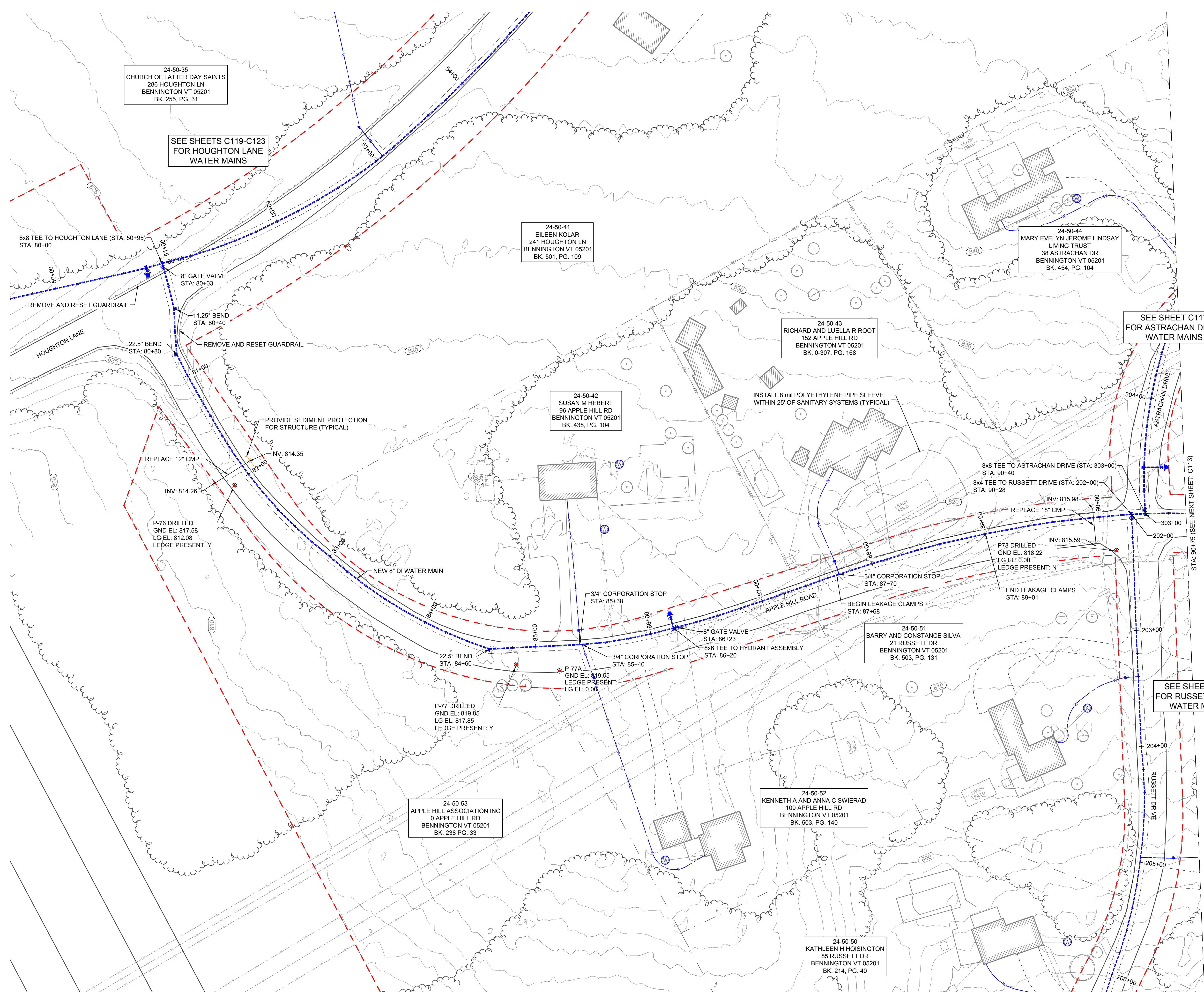
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CONTRACT 6  
COVER SHEET AND  
KEY PLAN

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MSK	JMD

SHEET NUMBER  
**G006**







24-50-35  
CHURCH OF LATTER DAY SAINTS  
286 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 255, PG. 31

SEE SHEETS C119-C123  
FOR HOUGHTON LANE  
WATER MAINS

24-50-41  
EILEEN KOLAR  
241 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 501, PG. 109

24-50-44  
MARY EVELYN JEROME LINDSAY  
LIVING TRUST  
38 ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 454, PG. 104

24-50-43  
RICHARD AND LUELLA R ROOT  
152 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 0-307, PG. 168

24-50-42  
SUSAN M HEBERT  
96 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 438, PG. 104

24-50-51  
BARRY AND CONSTANCE SILVA  
21 RUSSETT DR  
BENNINGTON VT 05201  
BK. 503, PG. 131

24-50-53  
APPLE HILL ASSOCIATION INC  
0 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 238 PG. 33

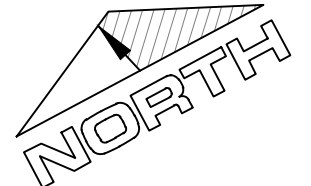
24-50-52  
KENNETH A AND ANNA C SWIERAD  
109 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 503, PG. 140

24-50-50  
KATHLEEN H HOISINGTON  
85 RUSSETT DR  
BENNINGTON VT 05201  
BK. 214, PG. 40

**1 APPLE HILL ROAD**  
(CONTRACT 6)



Scale: 1:40



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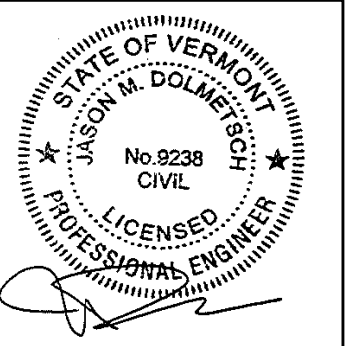
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**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT C  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
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MSK	JMD

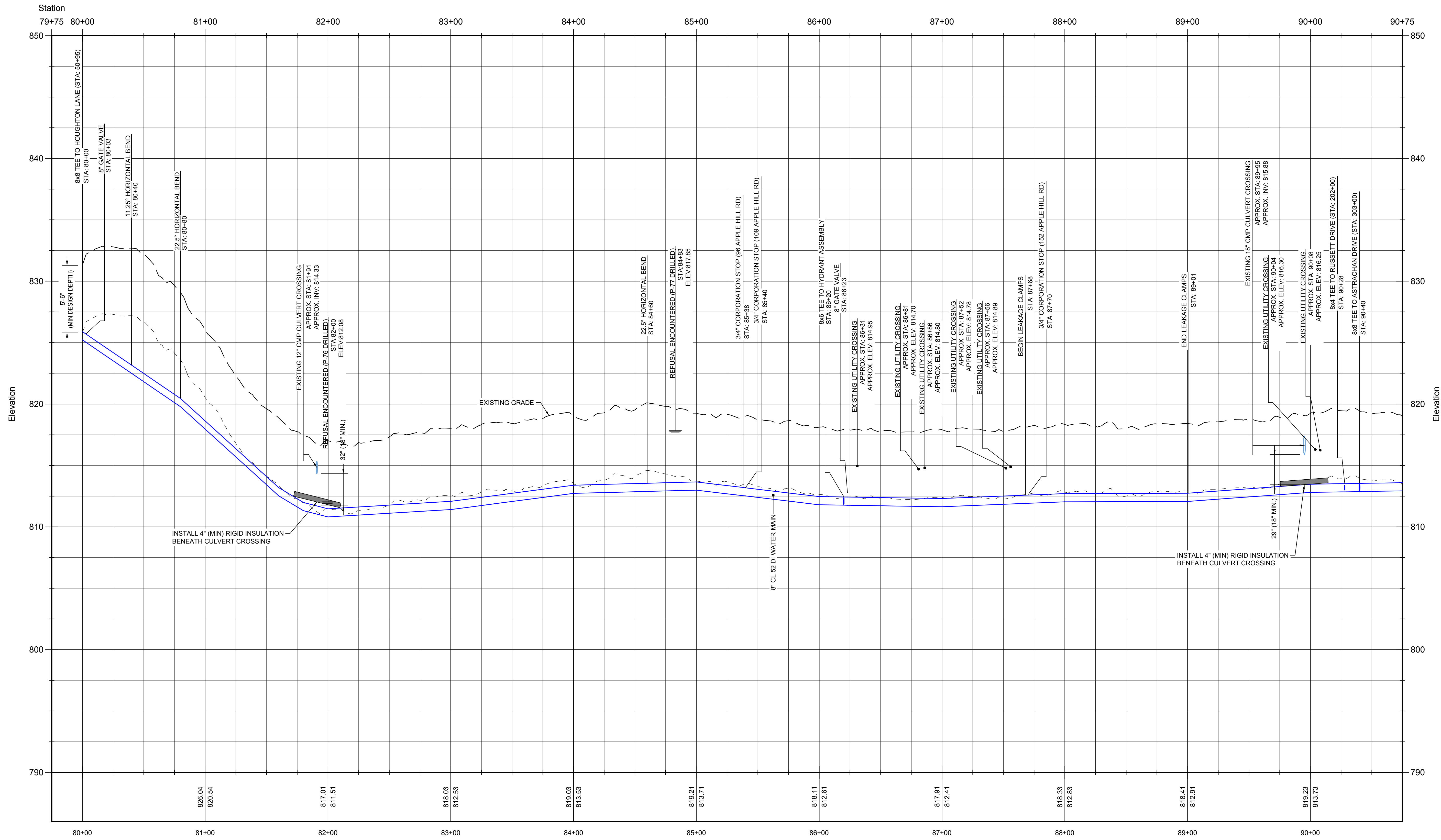
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**C112**



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WL - C2 Apple Hill Rd PROFILE



1 APPLE HILL ROAD  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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BENNINGTON, VERMONT 05201  
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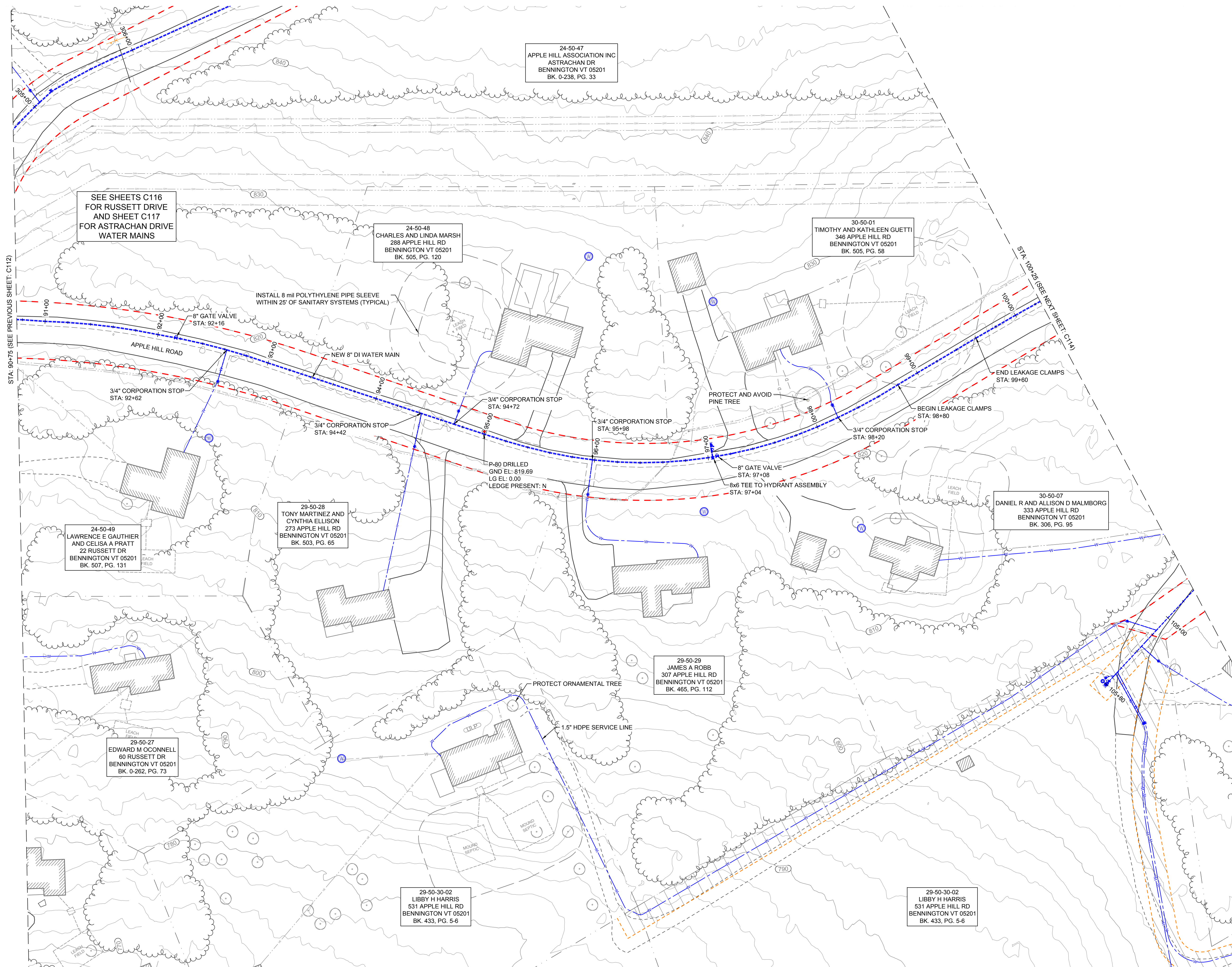
TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

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SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
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SHEET NUMBER  
**C112A**





STA: 90+75 (SEE PREVIOUS SHEET: C112)

STA: 100+25 (SEE NEXT SHEET: C114)

SEE SHEETS C116  
AND SHEET C117  
FOR RUSSETT DRIVE  
AND SHEET C117  
FOR ASTRACHAN DRIVE  
WATER MAINS

24-50-48  
CHARLES AND LINDA MARSH  
288 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 505, PG. 120

30-50-01  
TIMOTHY AND KATHLEEN GUETTI  
346 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 505, PG. 58

24-50-49  
LAWRENCE E GAUTHER  
AND CELISA A PRATT  
22 RUSSETT DR  
BENNINGTON VT 05201  
BK. 507, PG. 131

29-50-28  
TONY MARTINEZ AND  
CYNTHIA ELISON  
273 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 503, PG. 65

30-50-07  
DANIEL R AND ALLISON D MALMBORG  
333 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 306, PG. 95

29-50-27  
EDWARD M O'CONNELL  
60 RUSSETT DR  
BENNINGTON VT 05201  
BK. 0-262, PG. 73

29-50-29  
JAMES A ROBB  
307 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 465, PG. 112

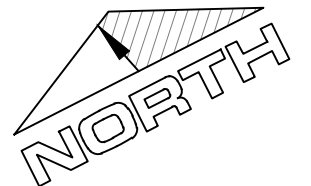
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LIBBY H HARRIS  
531 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 433, PG. 5-6

29-50-30-02  
LIBBY H HARRIS  
531 APPLE HILL RD  
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BK. 433, PG. 5-6

1 APPLE HILL ROAD  
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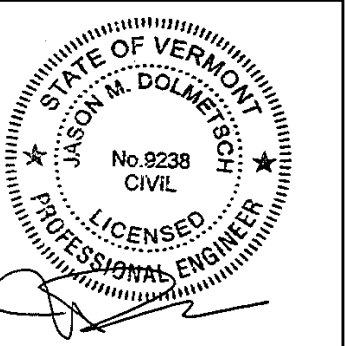
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TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

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SERVICE DISTRICT C  
PLAN

NUMBER	DATE
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MSK	JMD

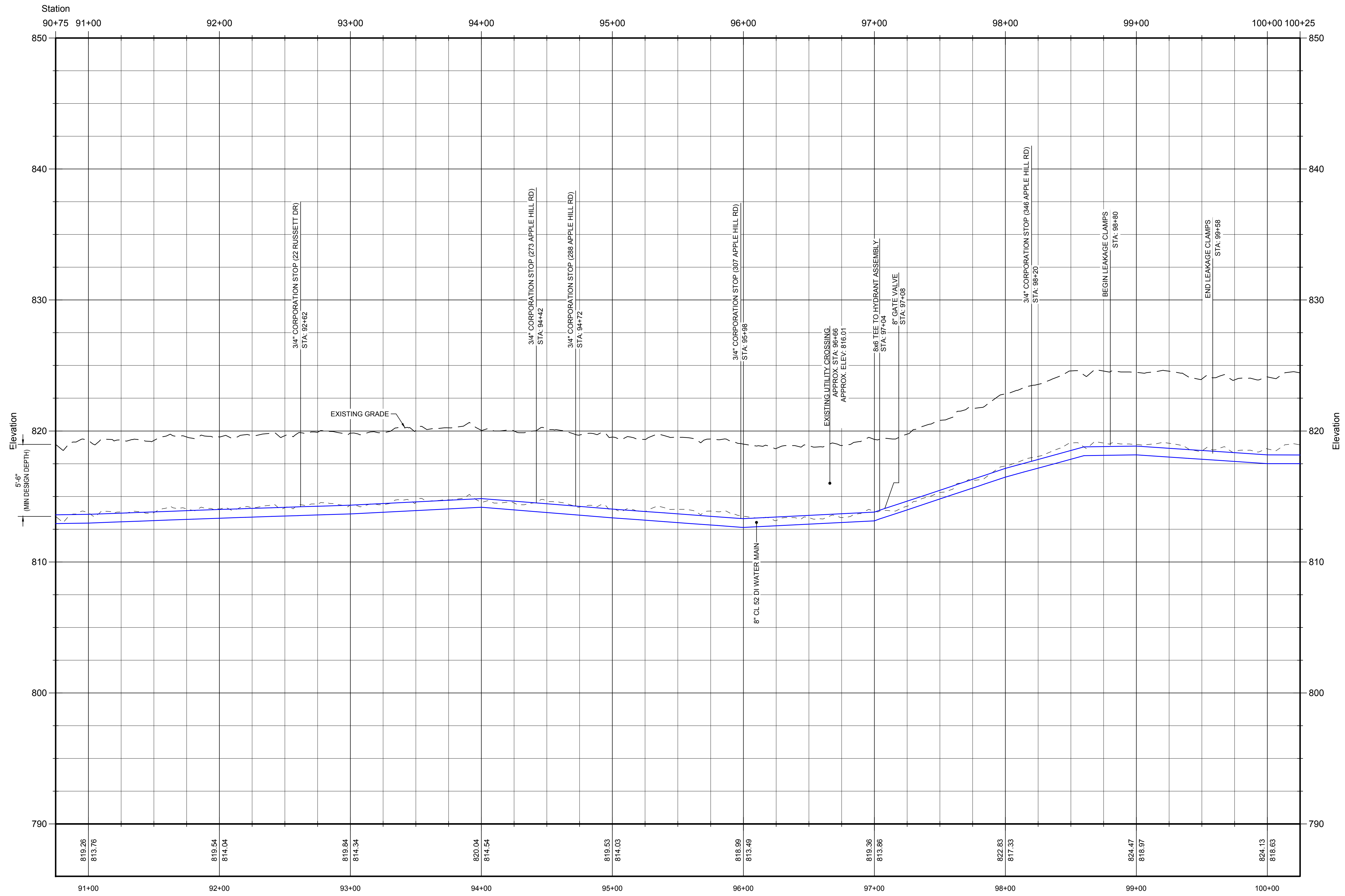
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C113



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WL - C2 Apple Hill Rd PROFILE



1 APPLE HILL ROAD  
(CONTRACT 6)

Scale: 1:40 HORIZONTAL; 1:4 VERTICAL



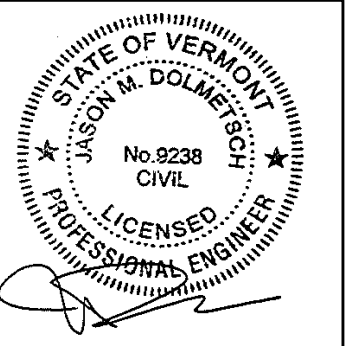
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NO.	DESCRIPTION

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MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

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SERVICE DISTRICT C  
PROFILE

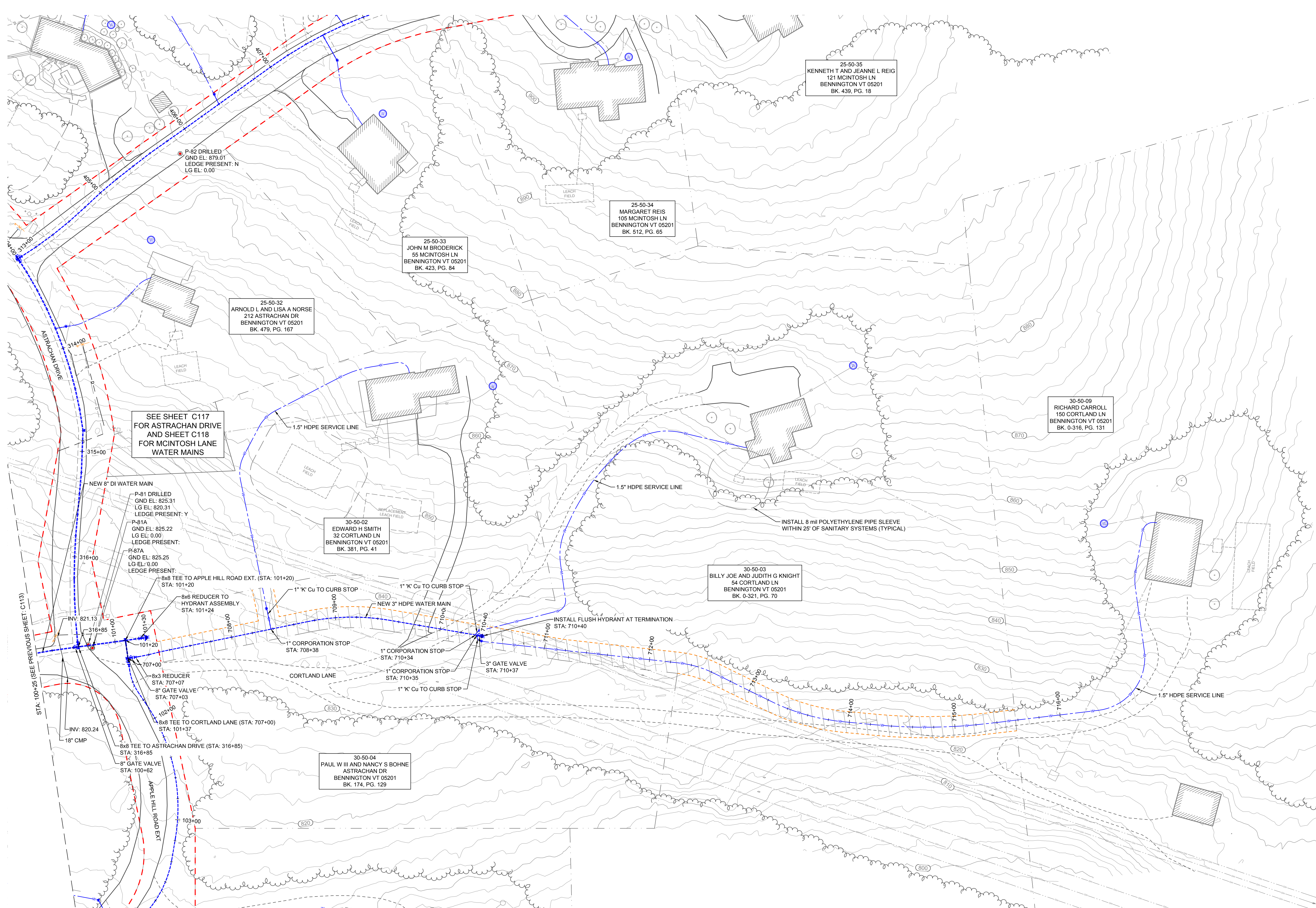
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SHEET NUMBER  
C113A



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SEE SHEET C117 FOR ASTRACHAN DRIVE AND SHEET C118 FOR MCINTOSH LANE WATER MAINS

P-81 DRILLED  
GND EL: 825.31  
LG EL: 820.31  
LEDGE PRESENT: Y

P-81A  
GND EL: 825.22  
LG EL: 0.00  
LEDGE PRESENT:

P-87A  
GND EL: 825.25  
LG EL: 0.00  
LEDGE PRESENT:

8x8 TEE TO APPLE HILL ROAD EXT. (STA: 101+20)  
STA: 101+20

8x6 REDUCER TO HYDRANT ASSEMBLY  
STA: 101+24

1\"/>

1\"/>

1\"/>

1\"/>

1\"/>

8x3 REDUCER  
STA: 707+07

8\"/>

8x8 TEE TO CORTLAND LANE (STA: 707+00)  
STA: 101+37

8x8 TEE TO ASTRACHAN DRIVE (STA: 316+85)  
STA: 316+85

8\"/>

30-50-02  
EDWARD H SMITH  
32 CORTLAND LN  
BENNINGTON VT 05201  
BK. 381, PG. 41

30-50-04  
PAUL W III AND NANCY S BOHNE  
ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 174, PG. 129

25-50-33  
JOHN M BRODERICK  
55 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 423, PG. 84

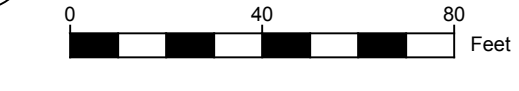
25-50-34  
MARGARET REIS  
105 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 512, PG. 65

25-50-35  
KENNETH T AND JEANNE L REIG  
121 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 439, PG. 18

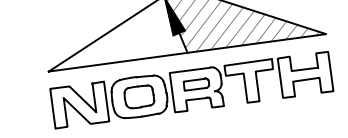
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RICHARD CARROLL  
150 CORTLAND LN  
BENNINGTON VT 05201  
BK. 0-316, PG. 131

30-50-03  
BILLY JOE AND JUDITH G KNIGHT  
54 CORTLAND LN  
BENNINGTON VT 05201  
BK. 0-321, PG. 70

1 CORTLAND LANE  
(CONTRACT 6)



Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

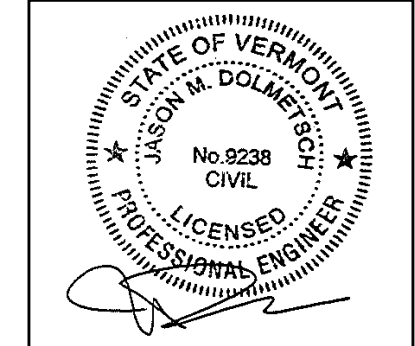
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT C  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

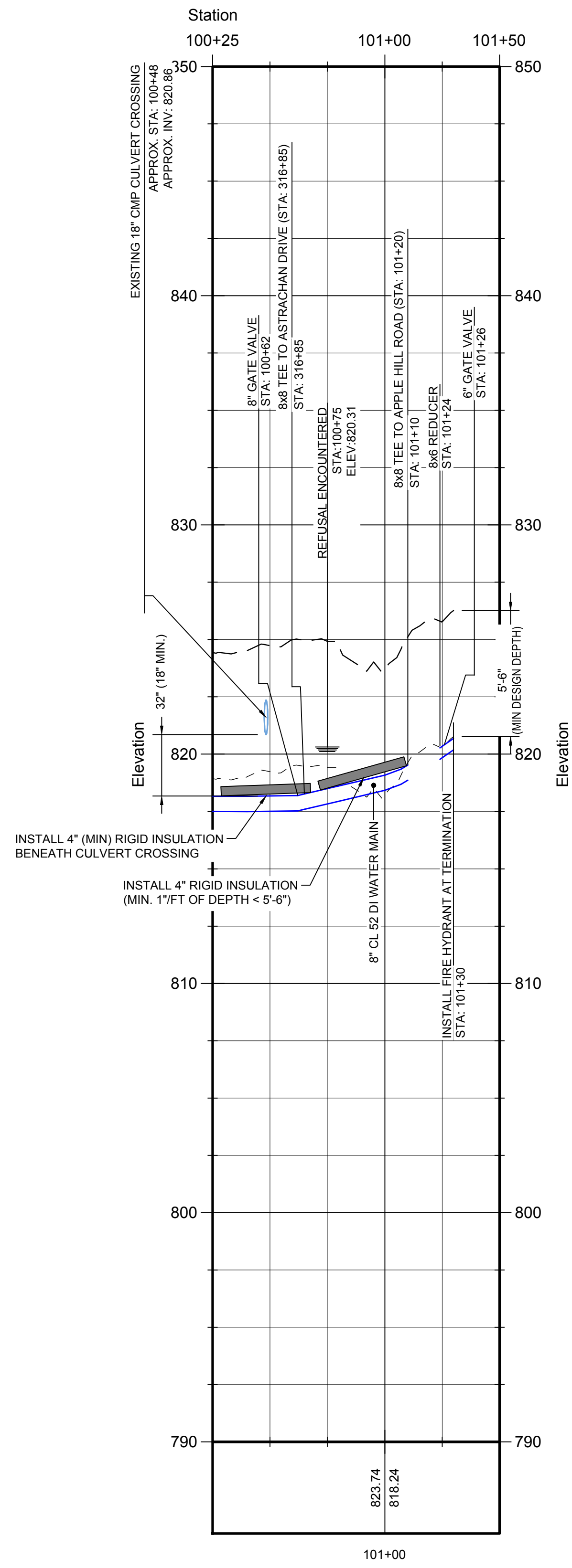
SHEET NUMBER  
**C114**



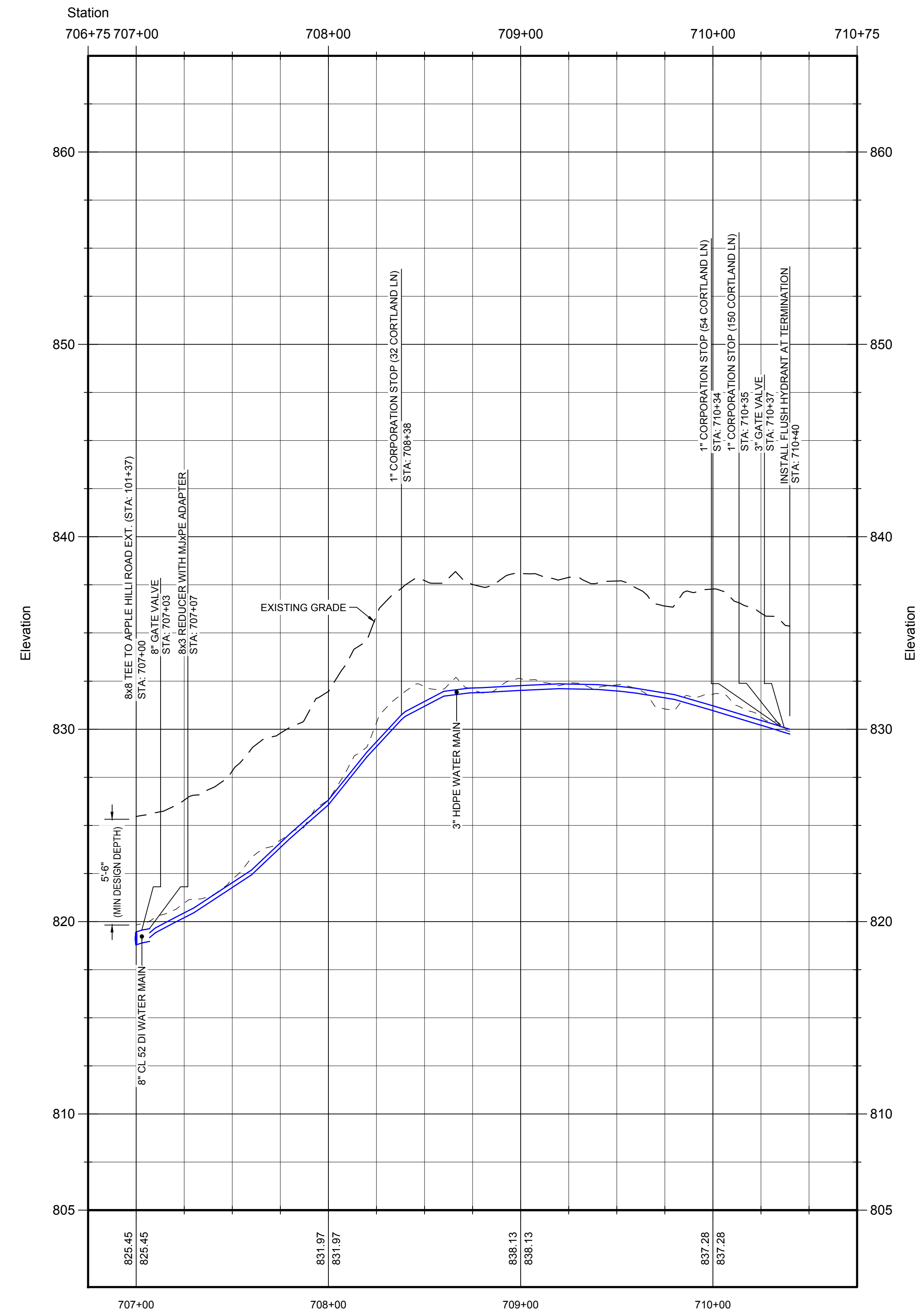
ALL DRAWING DATA IS FROM 2-DIM. PLOTS. DIMENSIONS AND LOCATIONS ARE AS SHOWN ON THESE PLANS UNLESS OTHERWISE NOTED.  
 2 May 2019 17:48:30



WL - C2 Apple Hill Rd PROFILE



WL - C2 Cortland Ln PROFILE



1 APPLE HILL ROAD  
 (CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

1 CORTLAND LANE  
 (CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

MSK ENGINEERING AND DESIGN, INC.  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

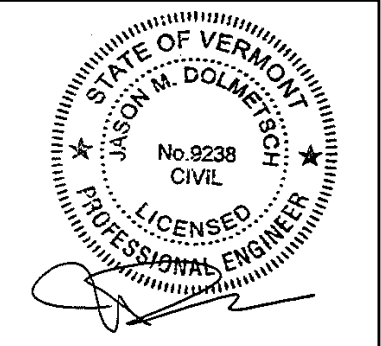
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PROFILE

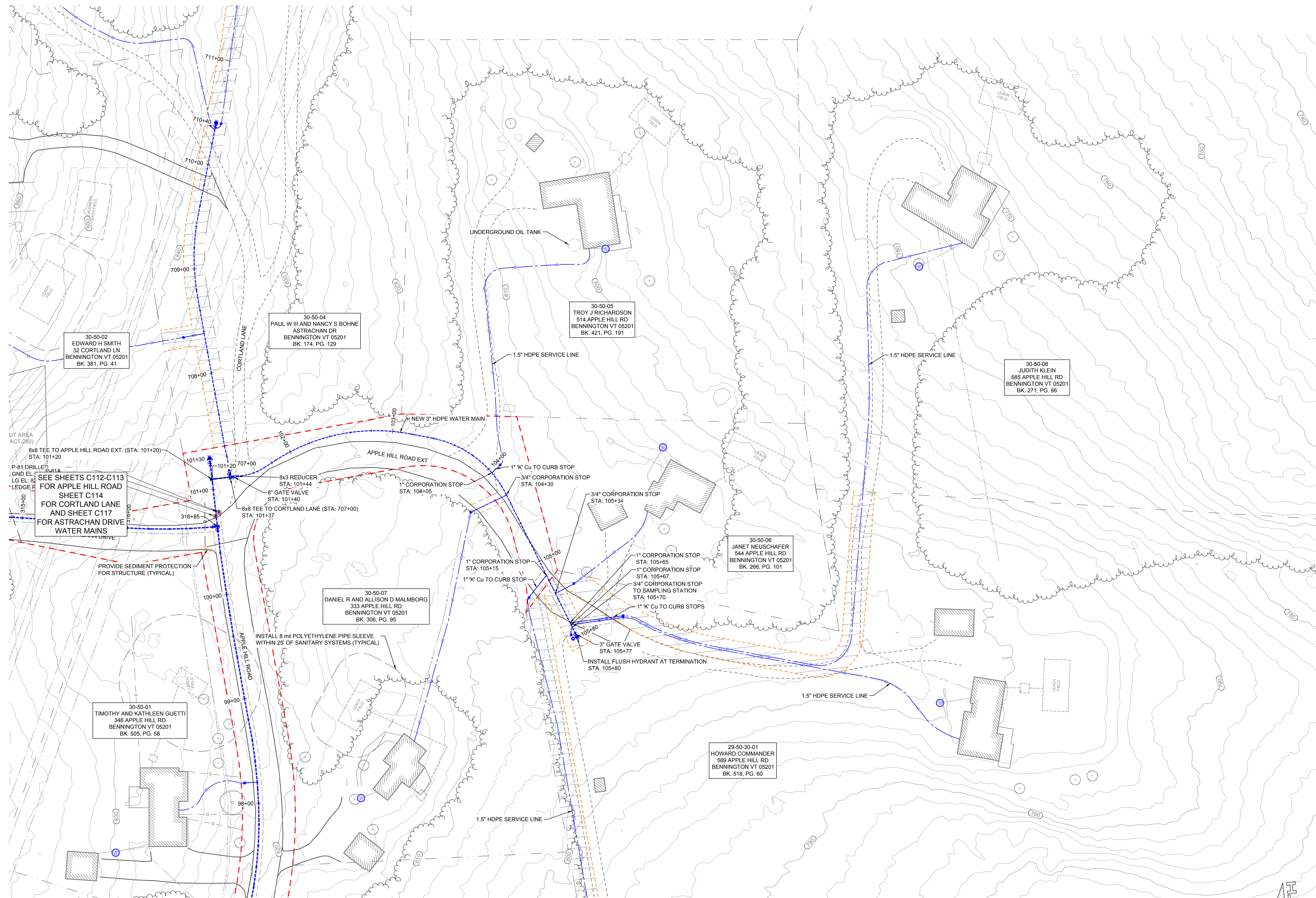
NUMBER	DATE
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DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C114A**

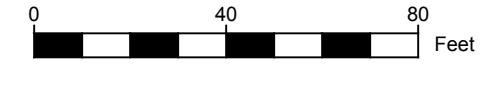


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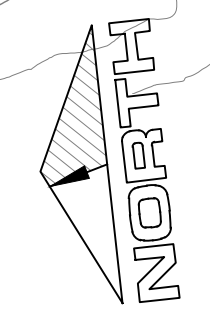




**1 APPLE HILL ROAD EXTENSION**  
(CONTRACT 6)



Scale: 1:40



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P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

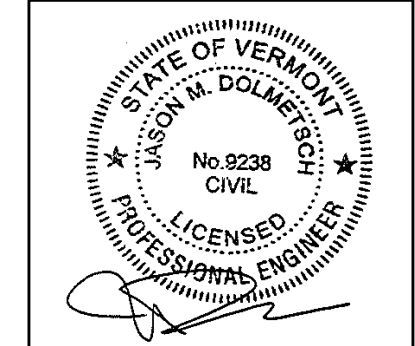
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT C  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

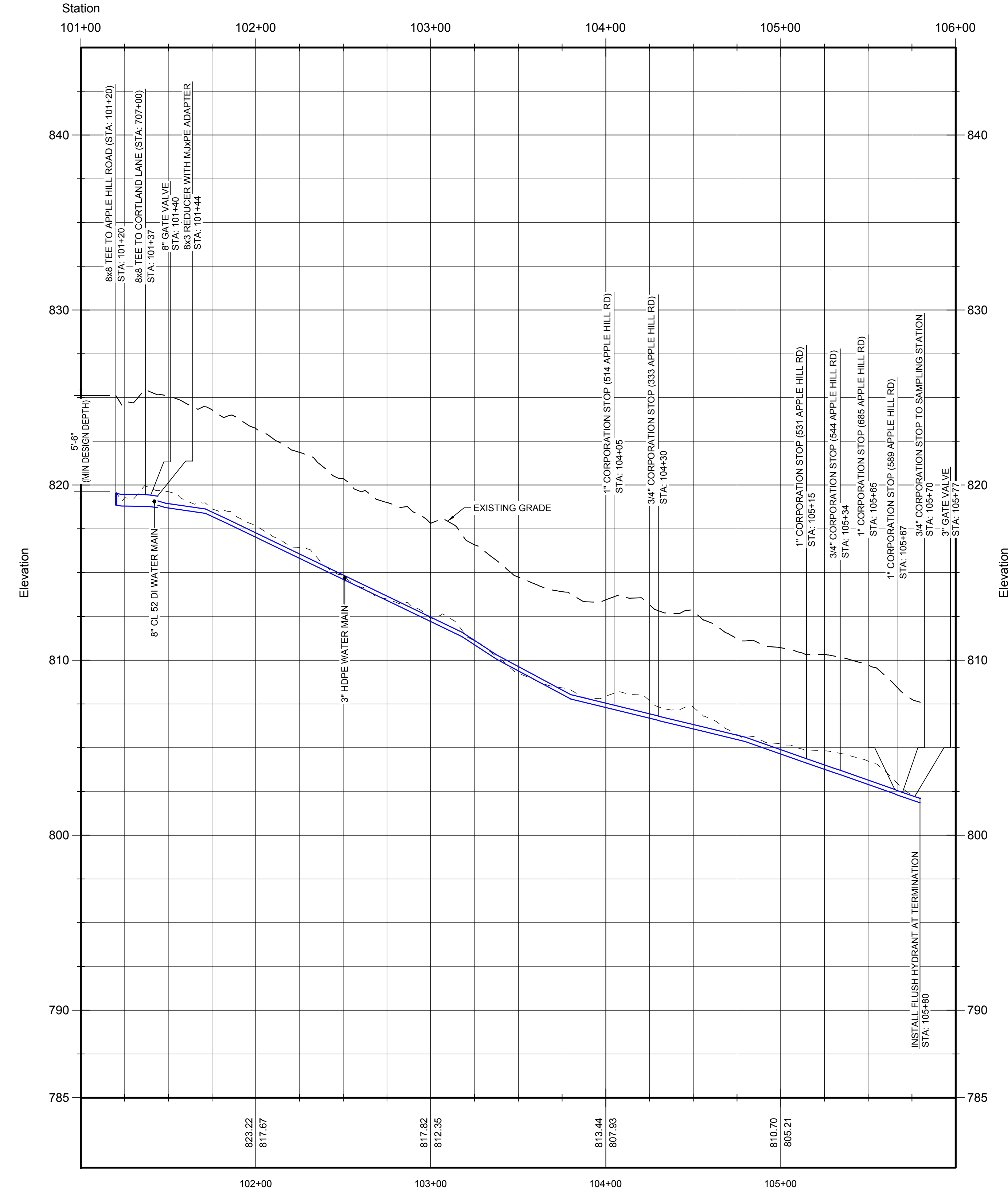
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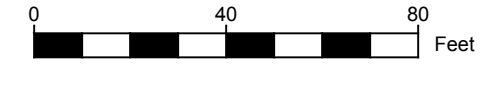
ALL DRAWING DATA IS FROM 2018 PAVED INFORMATION ALBERTA DISTRICT C 1001-019.7 TOWN DISTRICT C APPLE HILL RD EXTENSION  
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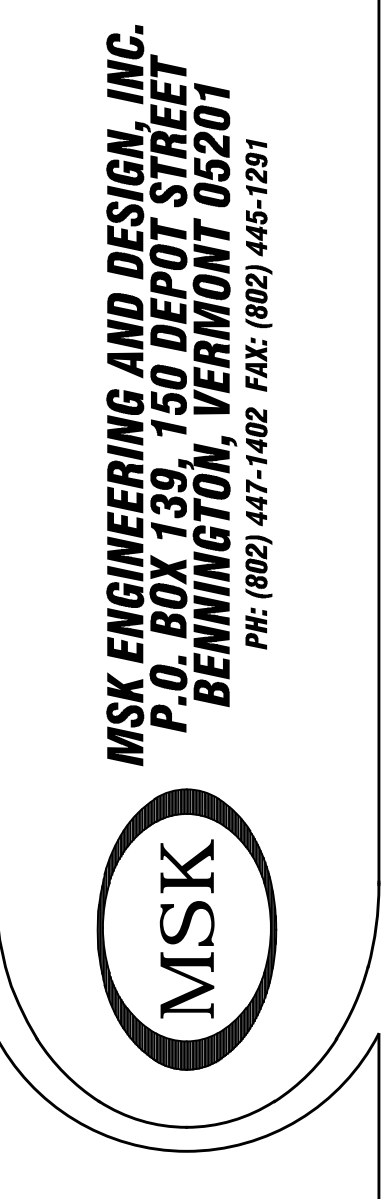
# WL - C2 Apple Hill Rd EXT PROFILE



1 APPLE HILL ROAD  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL



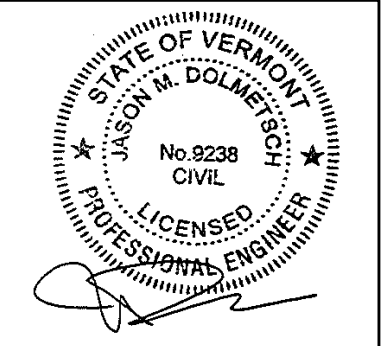
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

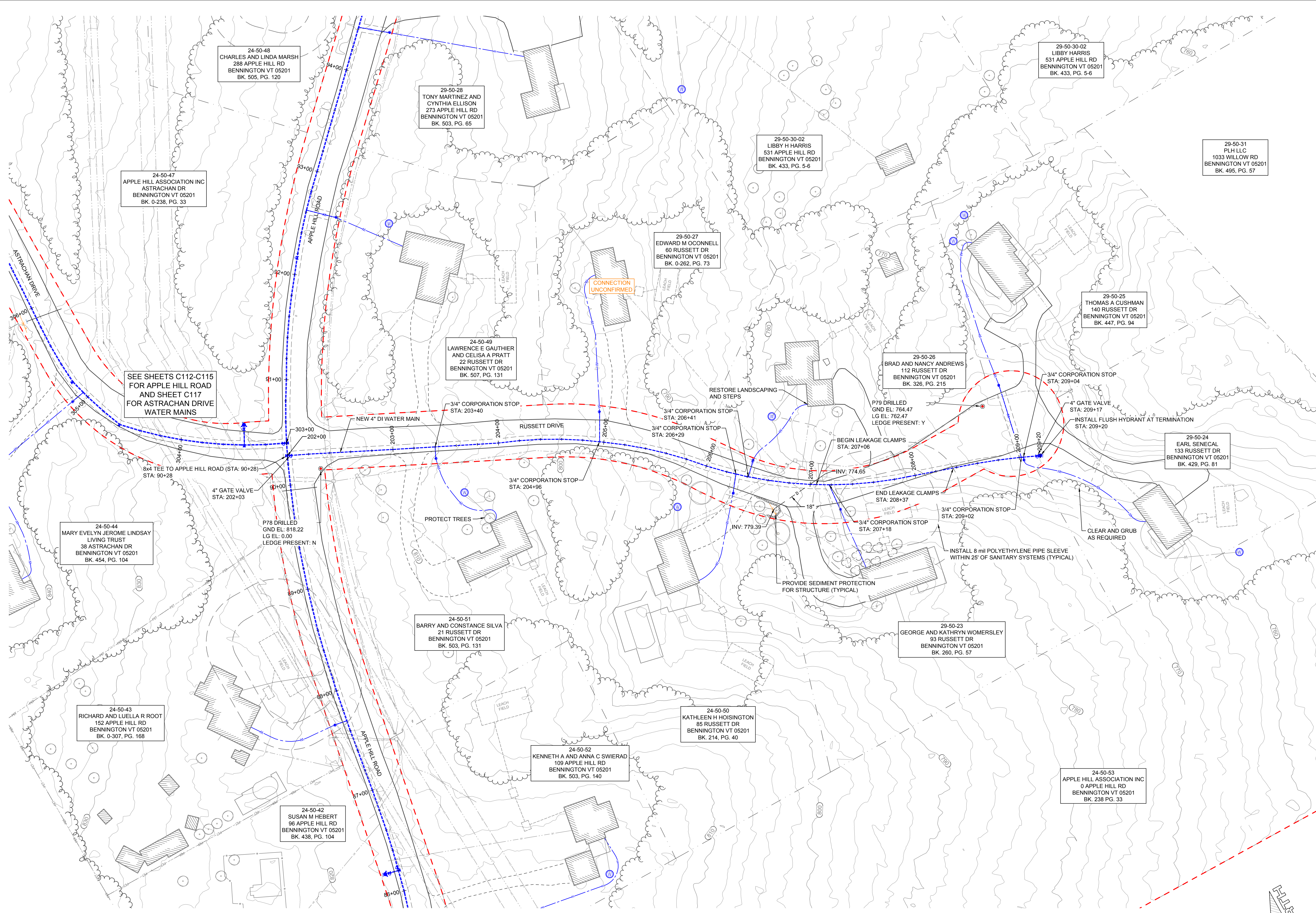
DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C115A**







SEE SHEETS C112-C115  
FOR APPLE HILL ROAD  
AND SHEET C117  
FOR ASTRACHAN DRIVE  
WATER MAINS

CONNECTION  
UNCONFIRMED

24-50-44  
MARY EVELYN JEROME LINDSAY  
LIVING TRUST  
38 ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 454, PG. 104

24-50-48  
CHARLES AND LINDA MARSH  
288 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 505, PG. 120

29-50-28  
TONY MARTINEZ AND  
CYNTHIA ELLISON  
273 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 503, PG. 65

29-50-27  
EDWARD M O'CONNELL  
60 RUSSETT DR  
BENNINGTON VT 05201  
BK. 0-262, PG. 73

29-50-30-02  
LIBBY H HARRIS  
531 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 433, PG. 5-6

29-50-30-02  
LIBBY HARRIS  
531 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 433, PG. 5-6

29-50-31  
PLH LLC  
1033 WILLOW RD  
BENNINGTON VT 05201  
BK. 495, PG. 57

29-50-25  
THOMAS A CUSHMAN  
140 RUSSETT DR  
BENNINGTON VT 05201  
BK. 447, PG. 94

29-50-26  
BRAD AND NANCY ANDREWS  
112 RUSSETT DR  
BENNINGTON VT 05201  
BK. 326, PG. 215

24-50-49  
LAWRENCE E GAUTHIER  
AND CELISA A PRATT  
22 RUSSETT DR  
BENNINGTON VT 05201  
BK. 507, PG. 131

29-50-24  
EARL SENEAL  
133 RUSSETT DR  
BENNINGTON VT 05201  
BK. 429, PG. 81

24-50-51  
BARRY AND CONSTANCE SILVA  
21 RUSSETT DR  
BENNINGTON VT 05201  
BK. 503, PG. 131

29-50-23  
GEORGE AND KATHRYN WOMERSLEY  
93 RUSSETT DR  
BENNINGTON VT 05201  
BK. 260, PG. 57

24-50-43  
RICHARD AND LUELLA R ROOT  
152 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 0-307, PG. 168

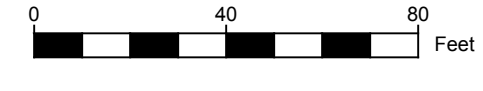
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KATHLEEN H HOISINGTON  
85 RUSSETT DR  
BENNINGTON VT 05201  
BK. 214, PG. 40

24-50-52  
KENNETH A AND ANNA C SWIERAD  
109 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 503, PG. 140

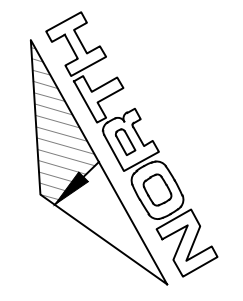
24-50-42  
SUSAN M HEBERT  
96 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 438, PG. 104

24-50-53  
APPLE HILL ASSOCIATION INC  
0 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 238 PG. 33

**1 RUSSETT DRIVE**  
(CONTRACT 6)



Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291



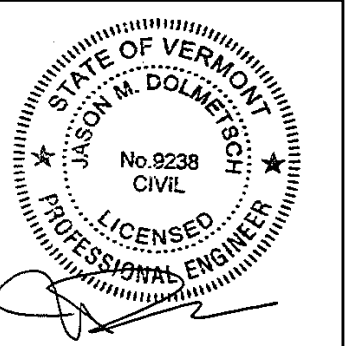
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT C  
PLAN**

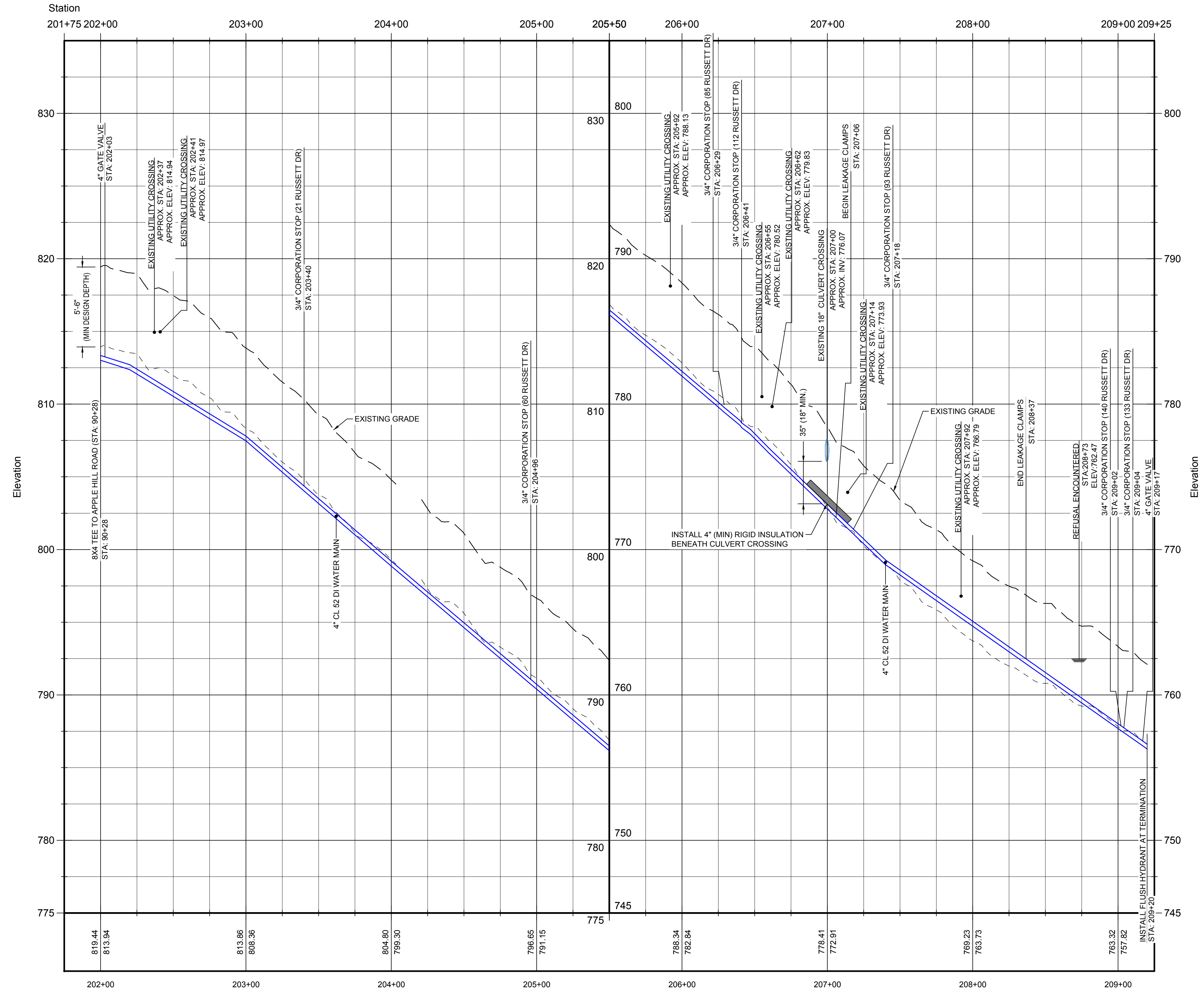
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C116**





WL - C2 Russett Dr PROFILE



1 RUSSETT DRIVE  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

REVISIONS	
NO.	DESCRIPTION

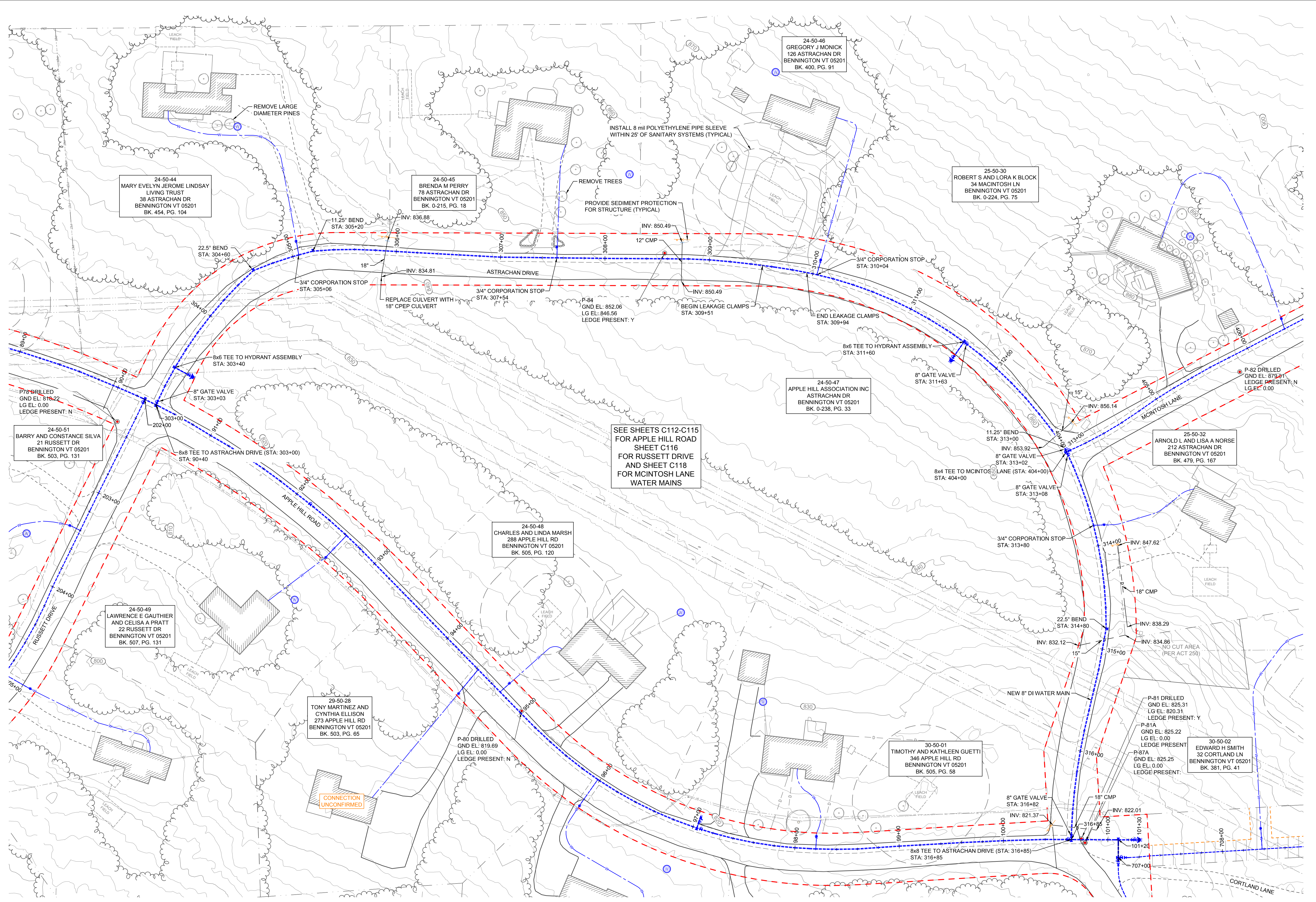
TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C116A**





24-50-44  
MARY EVELYN JEROME LINDSAY  
LIVING TRUST  
38 ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 454, PG. 104

24-50-45  
BRENDA M PERRY  
75 ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 0-215, PG. 18

24-50-46  
GREGORY J MONICK  
126 ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 400, PG. 91

25-50-30  
ROBERT S AND LORA K BLOCK  
34 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 0-224, PG. 75

24-50-51  
BARRY AND CONSTANCE SILVA  
21 RUSSETT DR  
BENNINGTON VT 05201  
BK. 503, PG. 131

24-50-49  
LAWRENCE E GAUTHIER  
AND CELISA A PRATT  
22 RUSSETT DR  
BENNINGTON VT 05201  
BK. 507, PG. 131

29-50-28  
TONY MARTINEZ AND  
CYNTHIA ELLISON  
273 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 503, PG. 65

24-50-48  
CHARLES AND LINDA MARSH  
288 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 505, PG. 120

24-50-47  
APPLE HILL ASSOCIATION INC  
ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 0-238, PG. 33

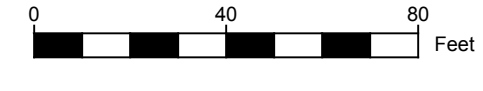
SEE SHEETS C112-C115  
FOR APPLE HILL ROAD  
SHEET C116  
FOR RUSSETT DRIVE  
AND SHEET C118  
FOR MCINTOSH LANE  
WATER MAINS

30-50-01  
TIMOTHY AND KATHLEEN GUETTI  
346 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 505, PG. 58

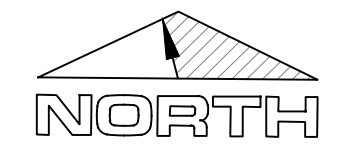
30-50-02  
EDWARD H SMITH  
32 CORTLAND LN  
BENNINGTON VT 05201  
BK. 381, PG. 41

25-50-32  
ARNOLD L AND LISA A NORSE  
212 ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 479, PG. 167

1 ASTRACHAN DRIVE  
(CONTRACT 6)



Scale: 1:40



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P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291



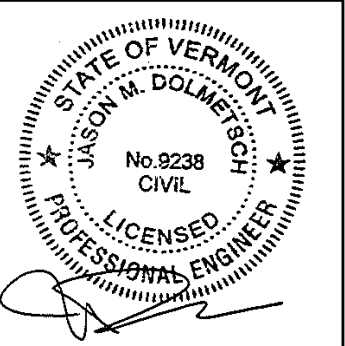
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PLAN

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
C117

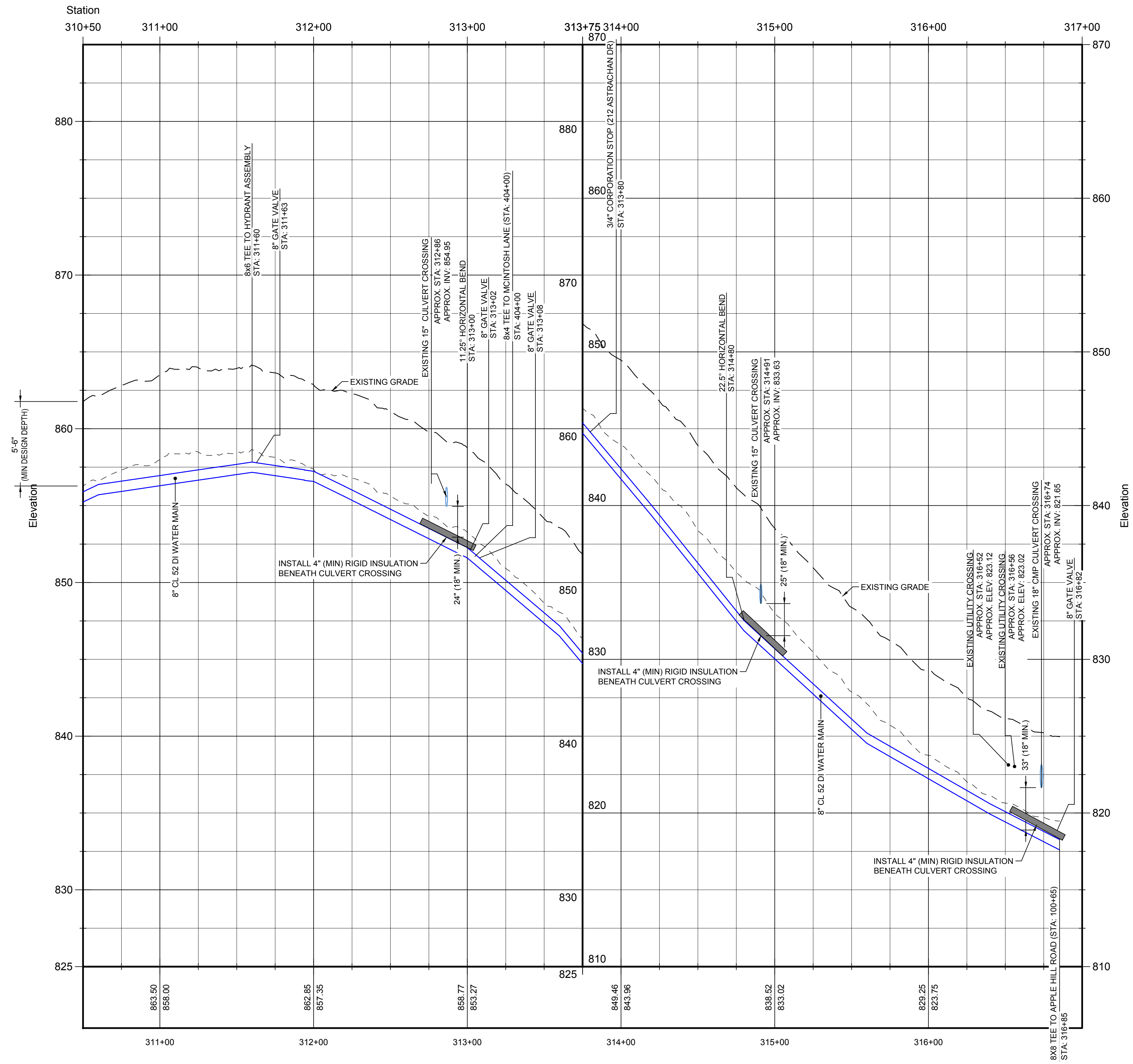


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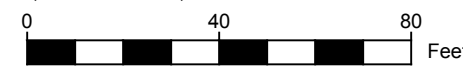




WL - C2 Astrachan Dr PROFILE



1 ASTRACHAN DRIVE  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
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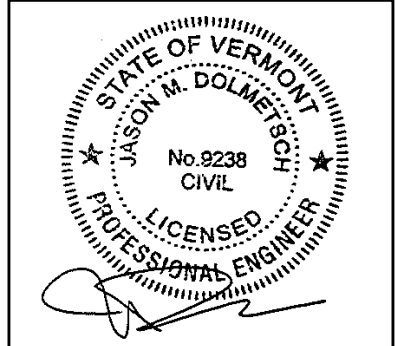
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NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

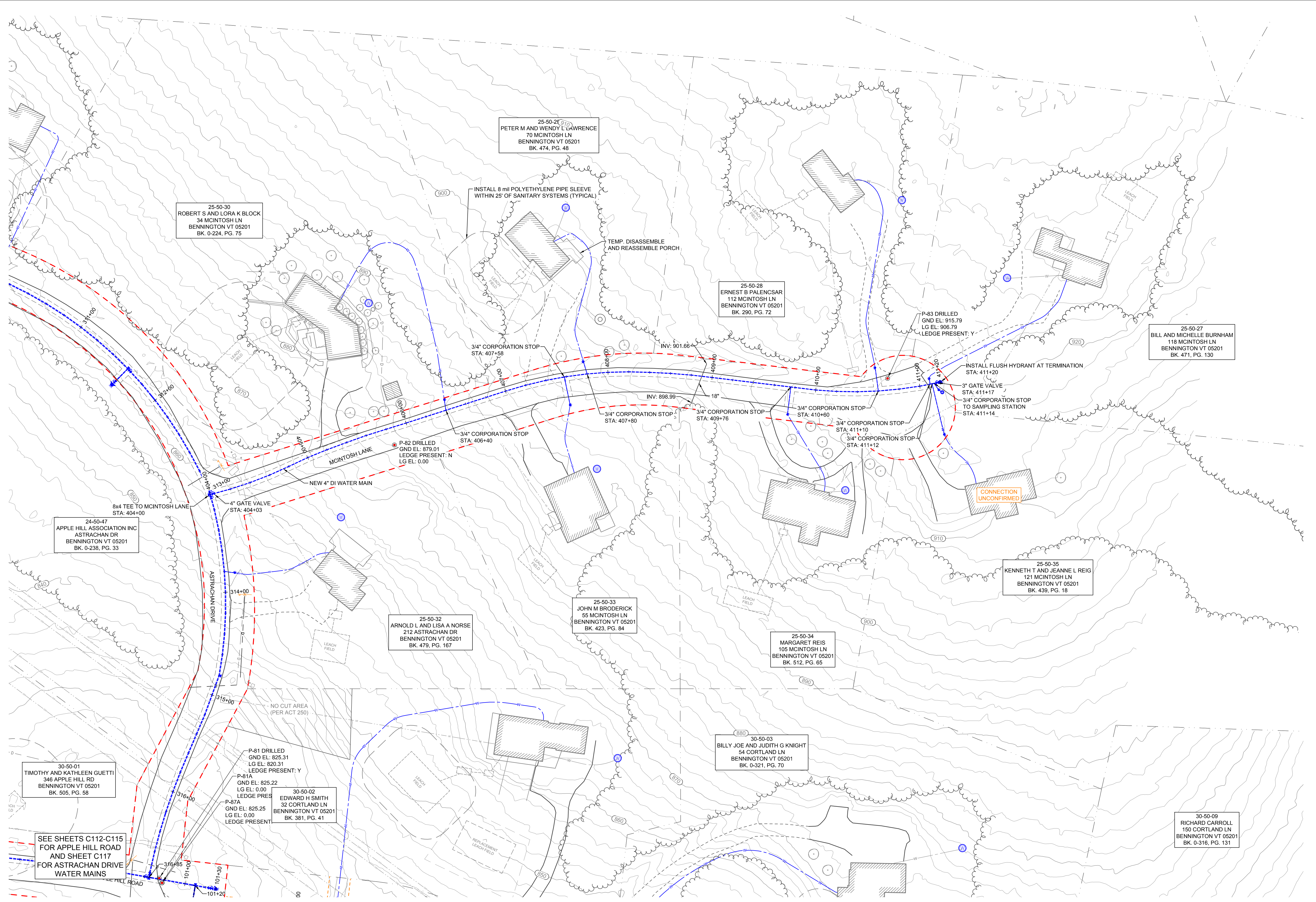
DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C117B**







25-50-30  
ROBERT S AND LORA K BLOCK  
34 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 0-224, PG. 75

25-50-26  
PETER M AND WENDY L LAWRENCE  
70 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 474, PG. 48

25-50-28  
ERNEST B PALENCAR  
112 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 290, PG. 72

25-50-27  
BILL AND MICHELLE BURNHAM  
118 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 471, PG. 130

24-50-47  
APPLE HILL ASSOCIATION INC  
ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 0-238, PG. 33

25-50-32  
ARNOLD L AND LISA A NORSE  
212 ASTRACHAN DR  
BENNINGTON VT 05201  
BK. 479, PG. 167

25-50-33  
JOHN M BRODERICK  
55 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 423, PG. 84

25-50-34  
MARGARET REIS  
105 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 512, PG. 65

25-50-35  
KENNETH T AND JEANNE L REIG  
121 MCINTOSH LN  
BENNINGTON VT 05201  
BK. 439, PG. 18

30-50-01  
TIMOTHY AND KATHLEEN GUETTI  
345 APPLE HILL RD  
BENNINGTON VT 05201  
BK. 505, PG. 58

30-50-02  
EDWARD H SMITH  
32 CORTLAND LN  
BENNINGTON VT 05201  
BK. 381, PG. 41

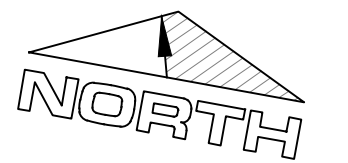
30-50-03  
BILLY JOE AND JUDITH G KNIGHT  
54 CORTLAND LN  
BENNINGTON VT 05201  
BK. 0-321, PG. 70

30-50-09  
RICHARD CARROLL  
150 CORTLAND LN  
BENNINGTON VT 05201  
BK. 0-316, PG. 131

SEE SHEETS C112-C115  
FOR APPLE HILL ROAD  
AND SHEET C117  
FOR ASTRACHAN DRIVE  
WATER MAINS

1 MCINTOSH LANE  
(CONTRACT 6)  
0 40 80 Feet

Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

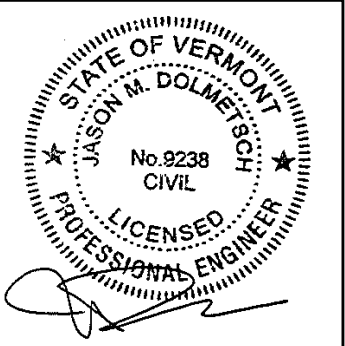
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT C  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

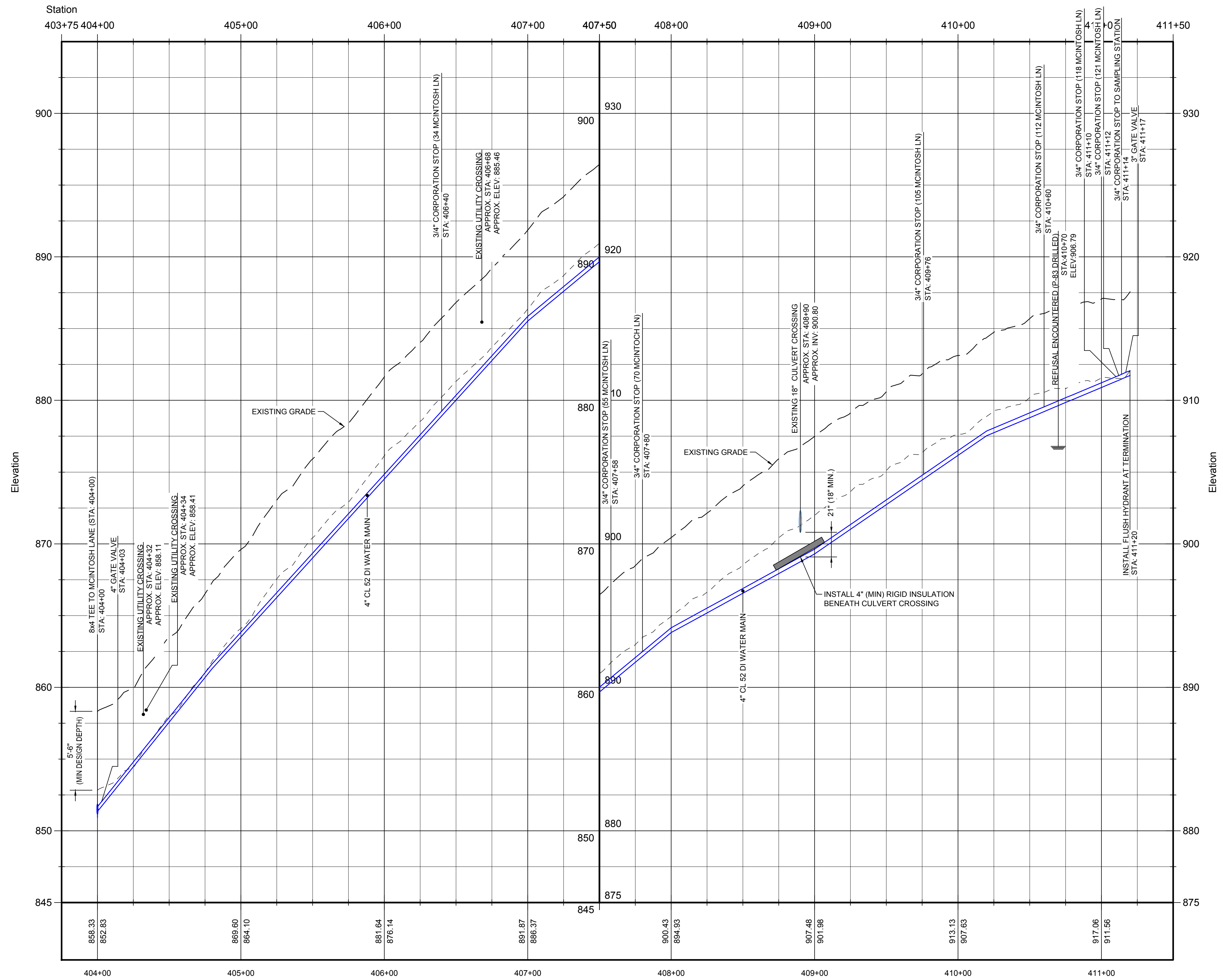
SHEET NUMBER  
**C118**



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# WL - C2 McIntosh Ln PROFILE



**1** MCINTOSH LANE  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1281

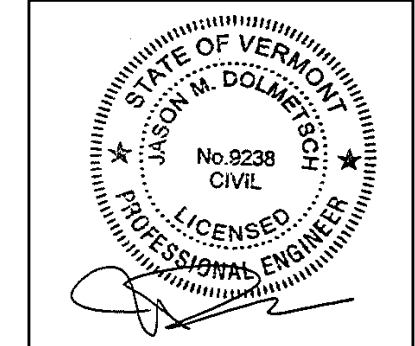
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON**  
**MUNICIPAL WATER SYSTEM**  
**REMEDIAL EXPANSION PHASE II**  
**BENNINGTON, VERMONT**

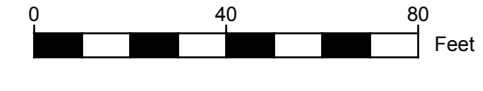
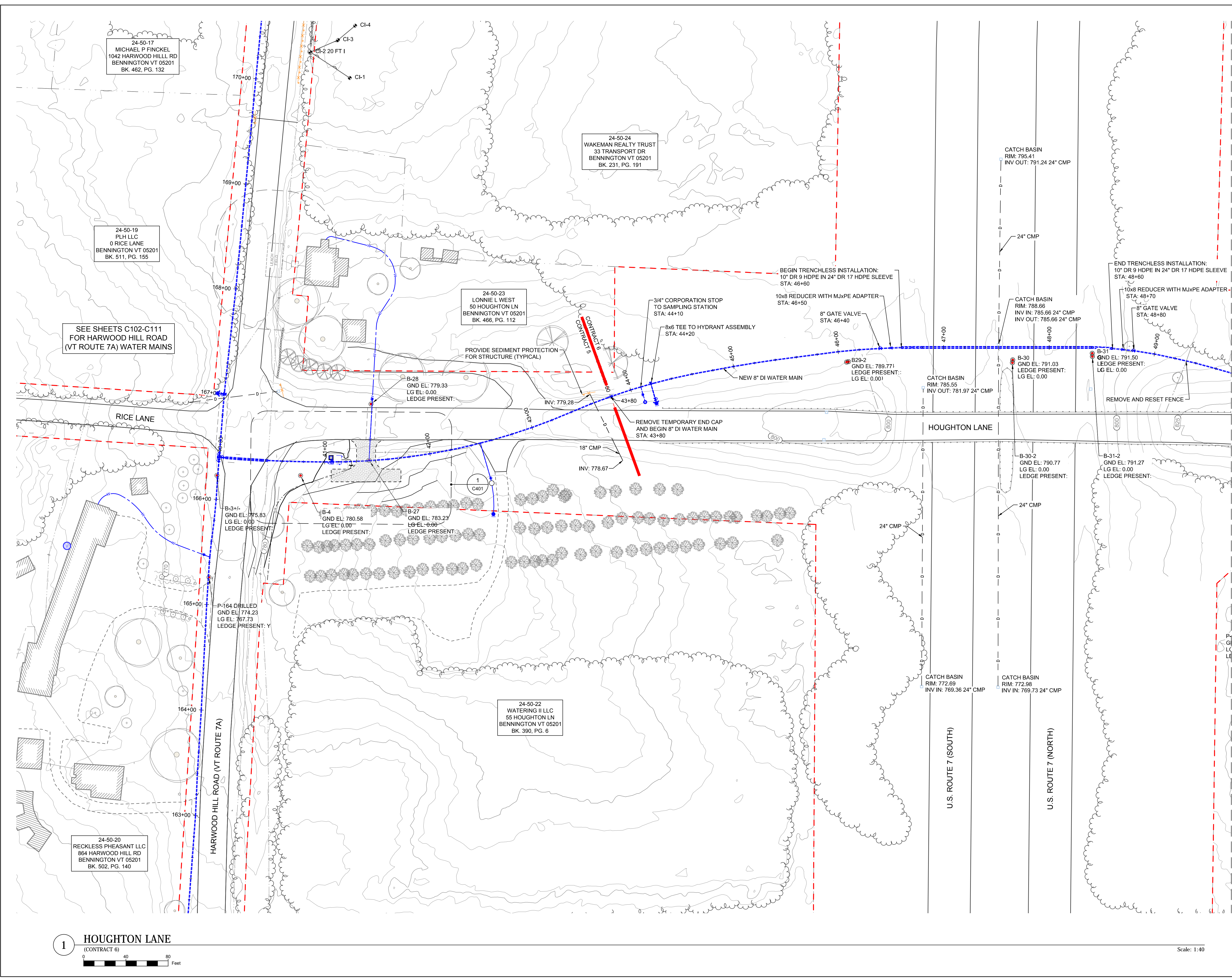
DRAWINGS THIS SHEET  
**SERVICE DISTRICT C**  
**PROFILE**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

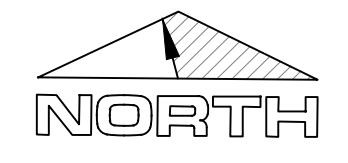
SHEET NUMBER  
**C118A**







Scale: 1:40



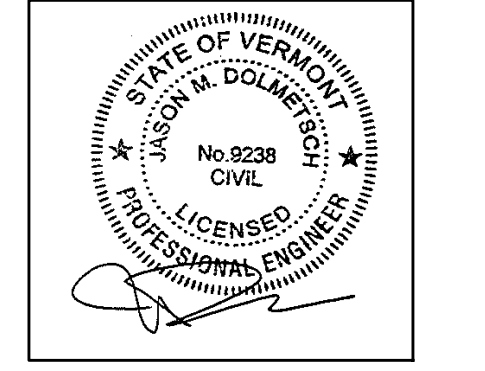
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PLAN

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

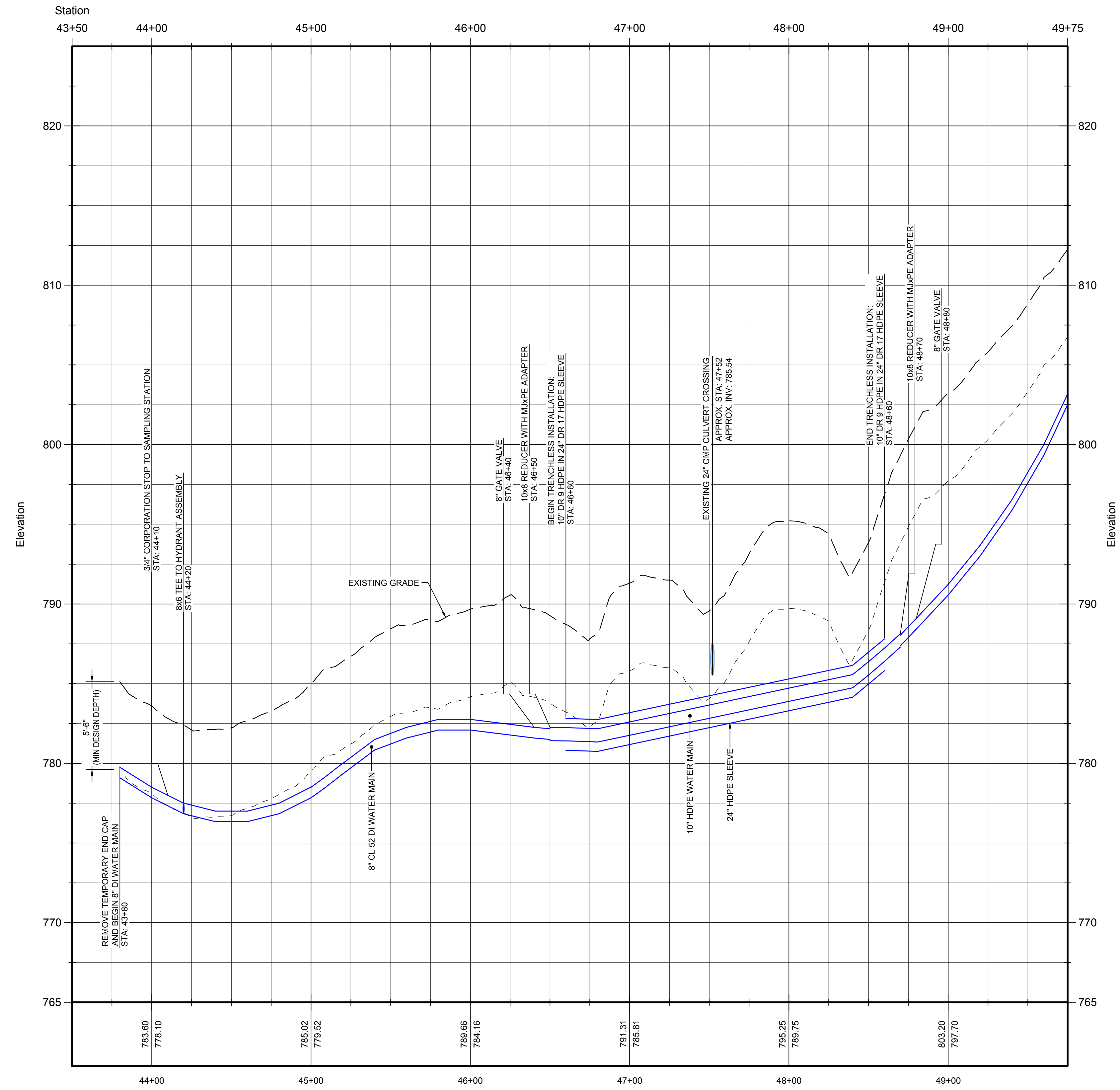
SHEET NUMBER  
**C119**



ALL DRAWING INFORMATION FROM 2018-2019 YEAR INFORMATION ALBERTA DISTRICT C 1001-019.7 TOWN DISTRICT C HOUGHTON LANE  
 2 May 2019 17:02:30



**WL - C3 Houghton Ln PROFILE**



**1** HOUGHTON LANE  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

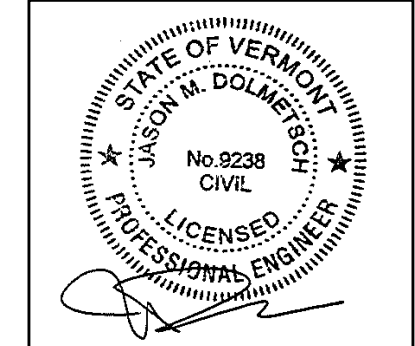
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**SERVICE DISTRICT C  
PROFILE**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C119A**





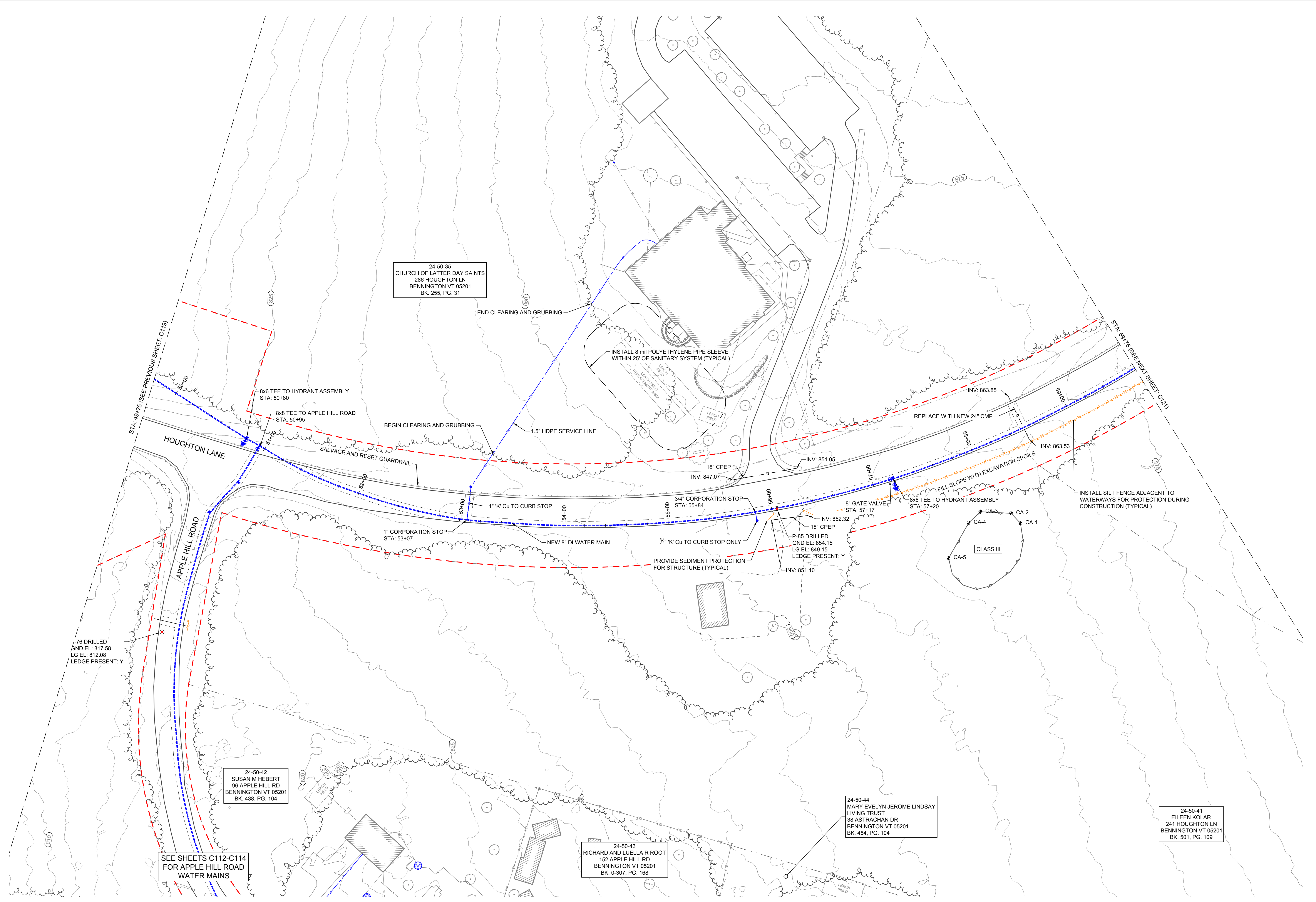
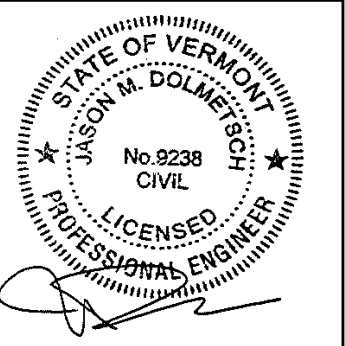
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT**

**SERVICE DISTRICT C  
PLAN**

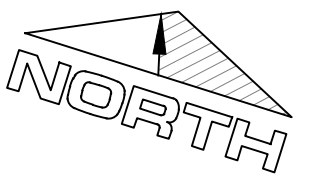
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C120**



**1 HOUGHTON LANE**  
(CONTRACT 6)  
0 40 80 Feet

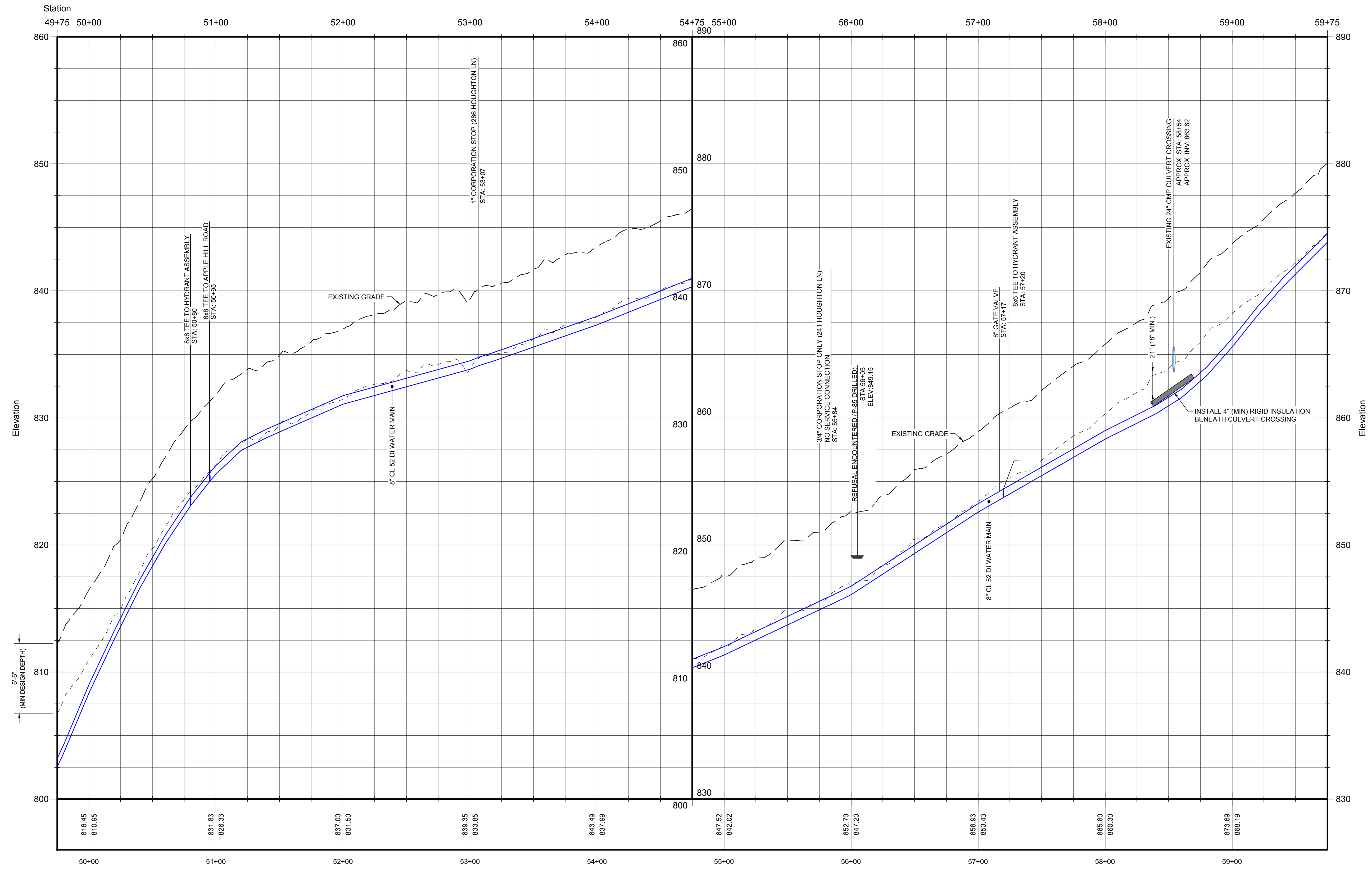
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WL - C3 Houghton Ln PROFILE




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**1** HOUGHTON LANE  
 (CONTRACT 6)

0 40 80 Feet

Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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 BENNINGTON, VERMONT 05201  
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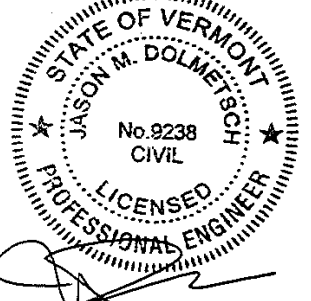
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TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

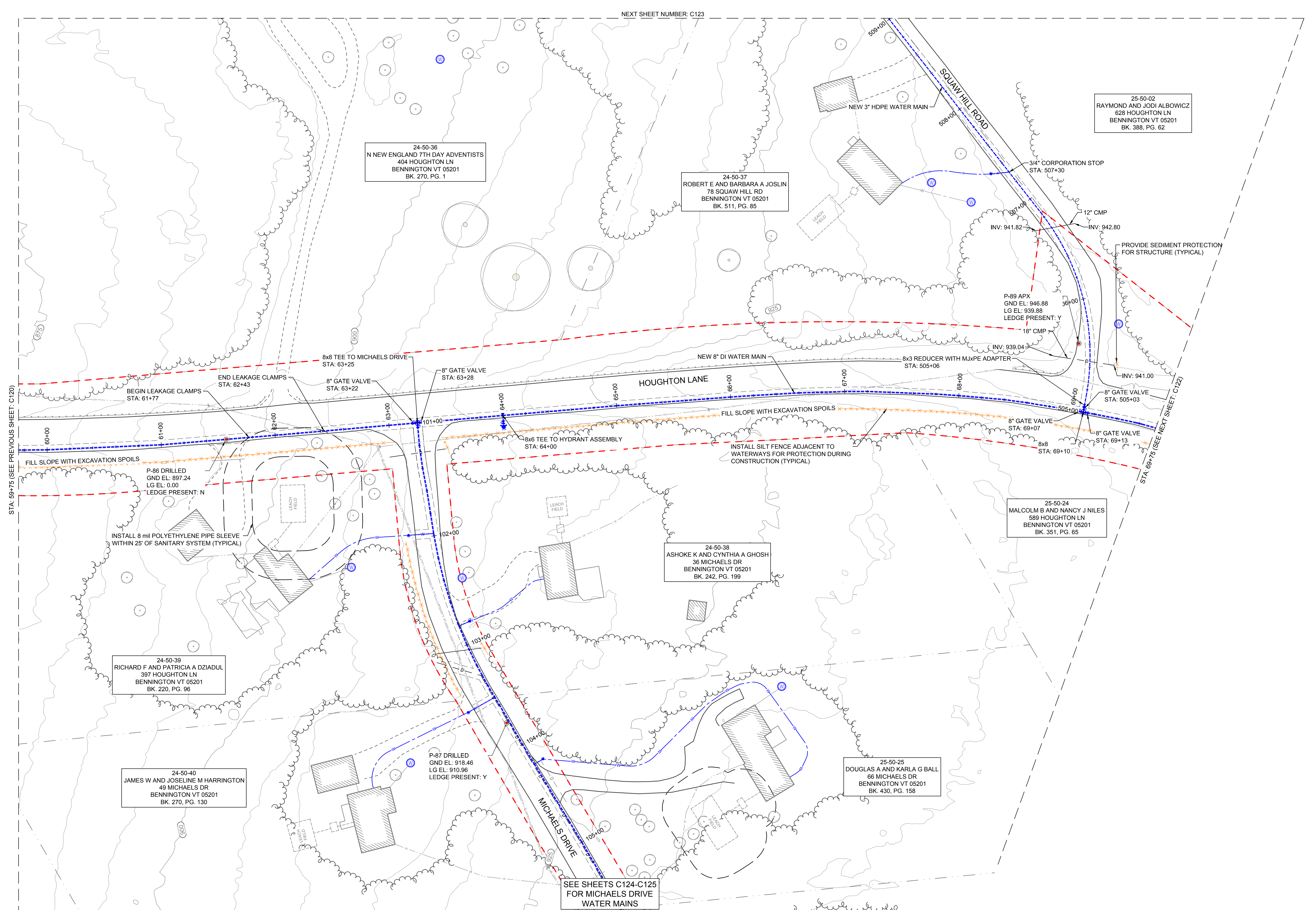
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 SERVICE DISTRICT C  
 PROFILE

NUMBER	DATE
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DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
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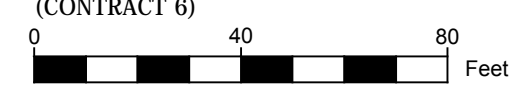


NEXT SHEET NUMBER: C123

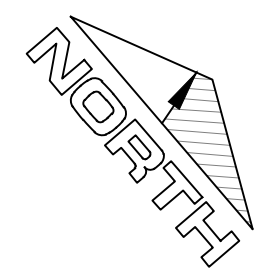
STA. 59+75 (SEE PREVIOUS SHEET, C120)

STA. 69+75 (SEE NEXT SHEET, C122)

1 HOUGHTON LANE  
(CONTRACT 6)



Scale: 1:40



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BENNINGTON, VERMONT 05201  
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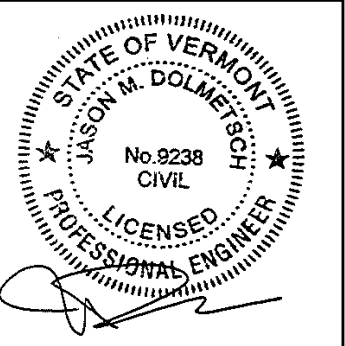
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TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PLAN

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

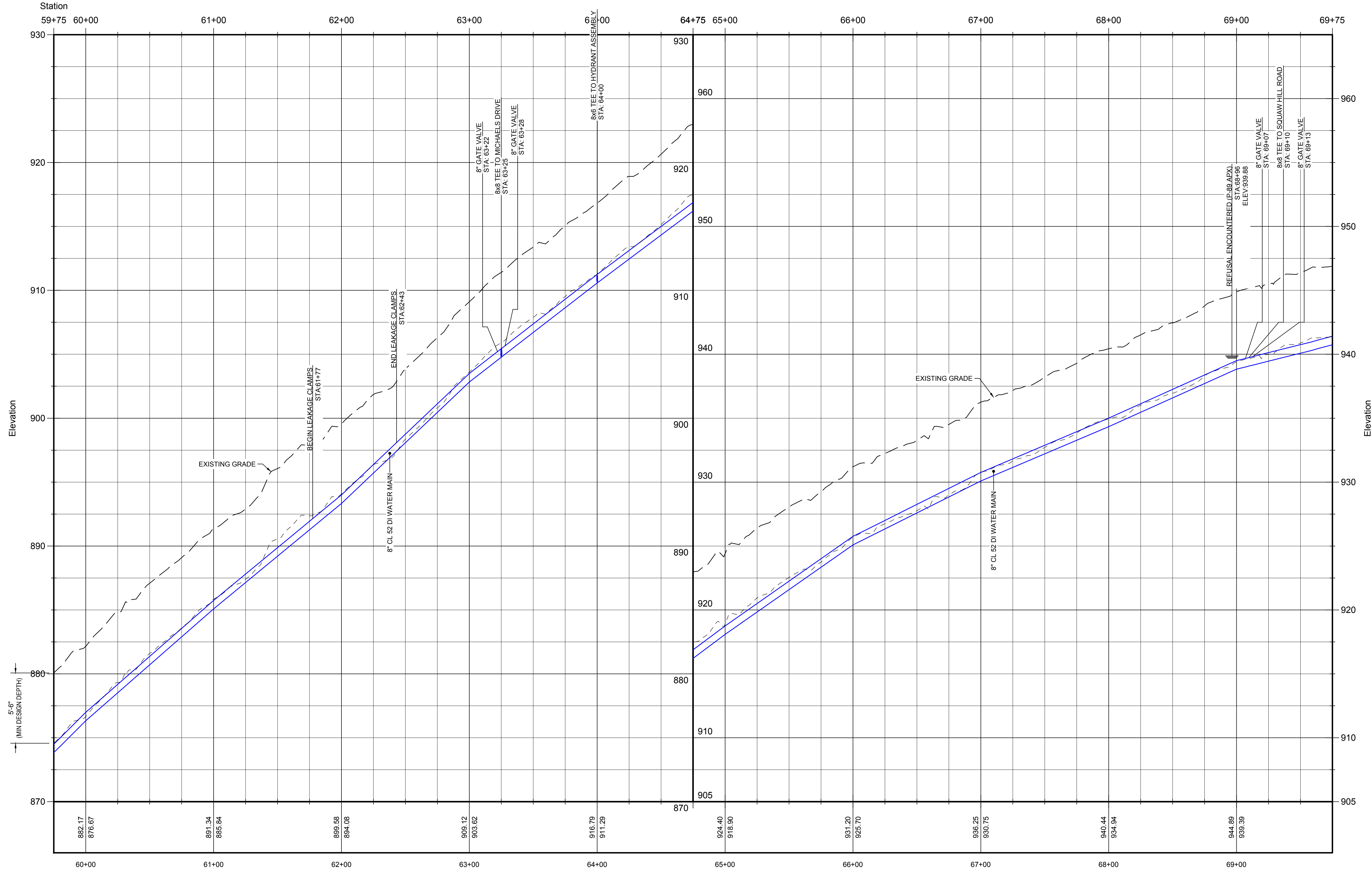
SHEET NUMBER  
**C121**



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WL - C3 Houghton Ln PROFILE



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REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PROFILE

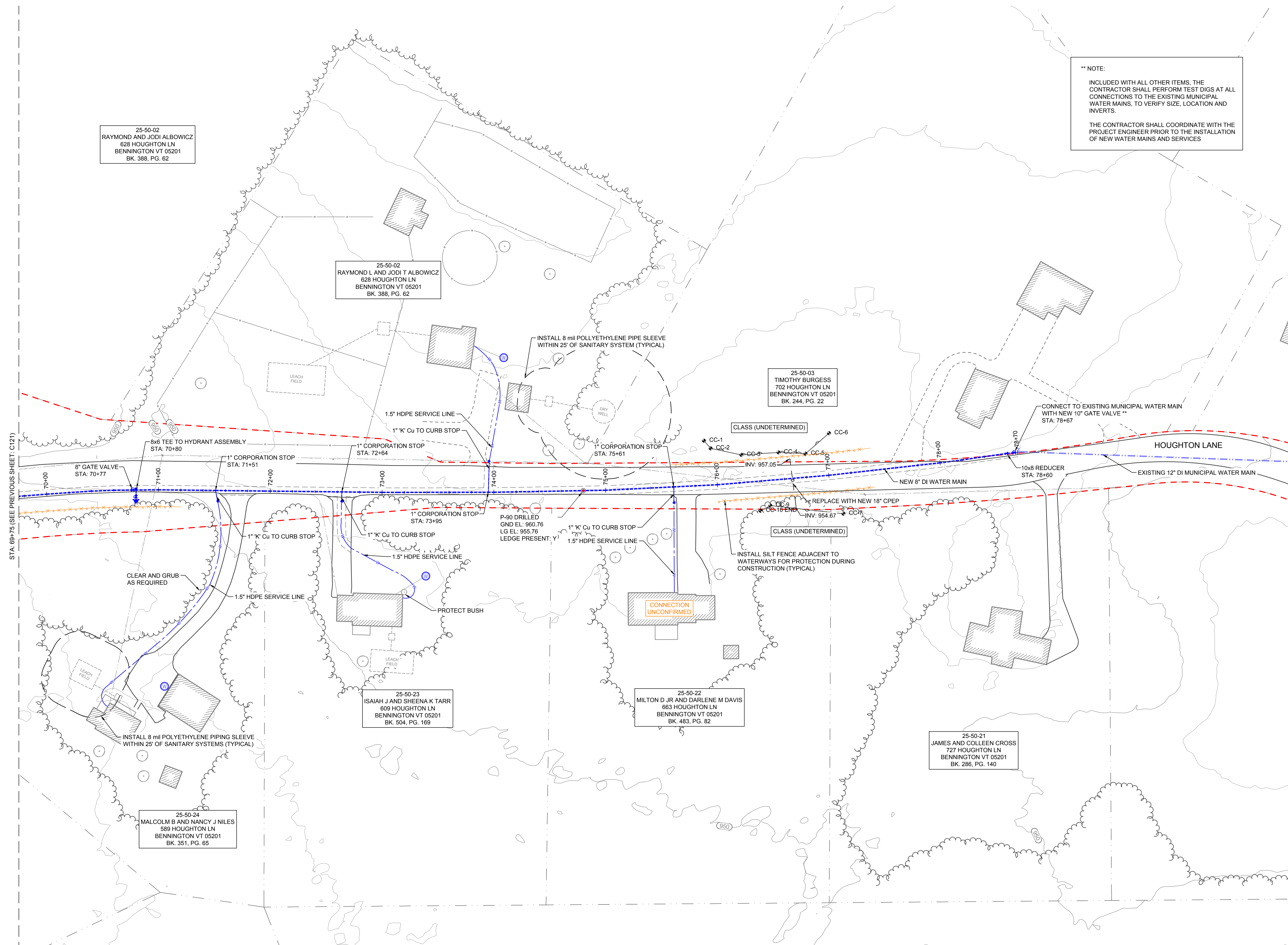
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C121A**

**1** HOUGHTON LANE  
 (CONTRACT 6)

Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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25-50-02  
RAYMOND AND JODI ALBOWICZ  
628 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 388, PG. 62

25-50-02  
RAYMOND L AND JODI T ALBOWICZ  
628 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 388, PG. 62

25-50-03  
TIMOTHY BURGESS  
702 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 244, PG. 22

25-50-23  
ISAIAH J AND SHEENA K TARR  
609 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 504, PG. 169

25-50-22  
MILTON D JR AND DARLENE M DAVIS  
663 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 483, PG. 82

25-50-21  
JAMES AND COLLEEN CROSS  
727 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 286, PG. 140

25-50-24  
MALCOLM B AND NANCY J NILES  
589 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 351, PG. 65

**\*\* NOTE:**  
INCLUDED WITH ALL OTHER ITEMS, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
  
THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

**MSK ENGINEERING AND DESIGN, INC.**  
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BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1281

NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT**

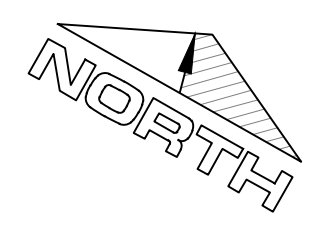
**SERVICE DISTRICT C  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C122**

**1 HOUGHTON LANE**  
(CONTRACT 6)  
0 40 80 Feet

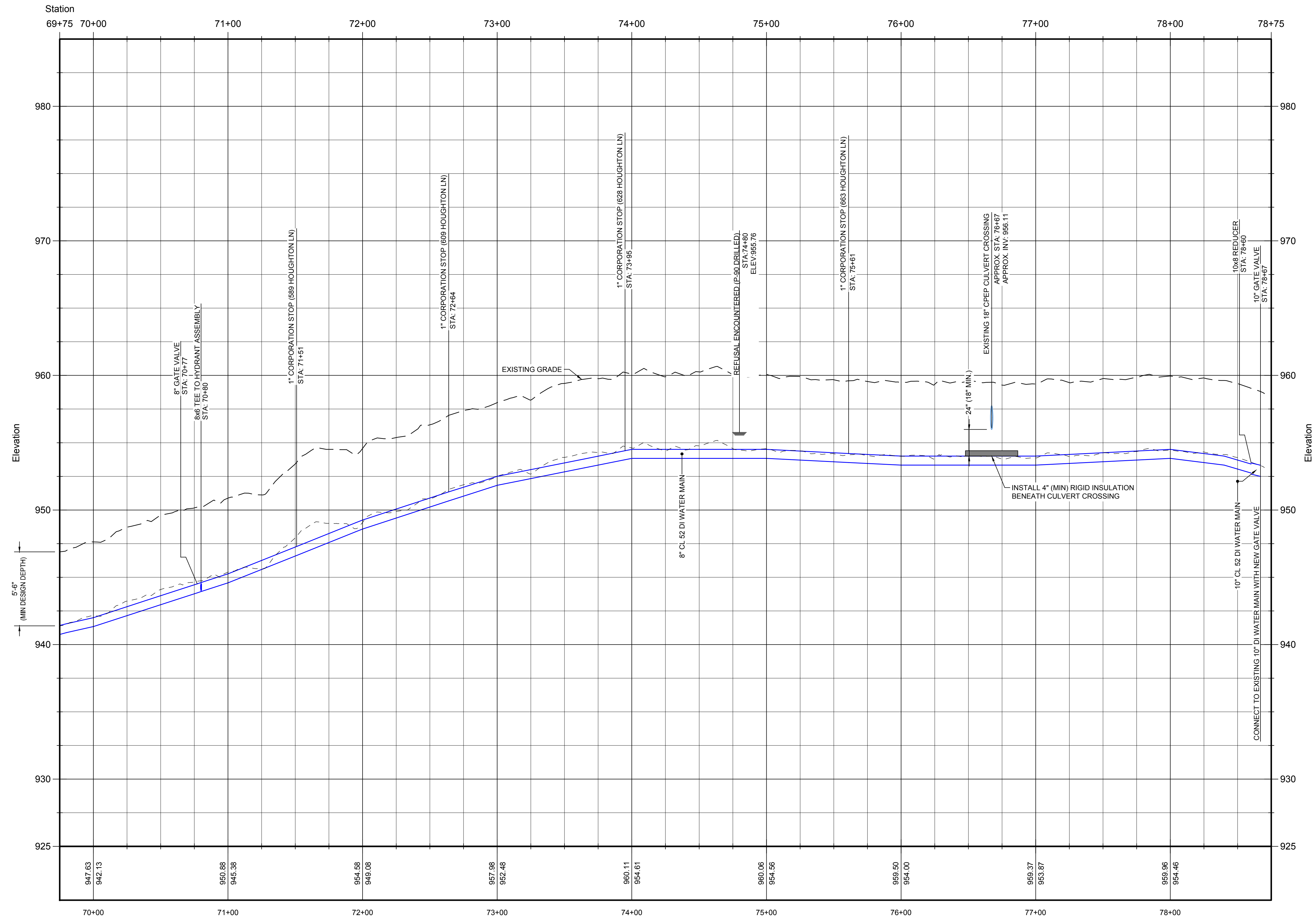
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ALL DRAWING DATA IS FOR INFORMATION ONLY. ANY CHANGES TO THIS DRAWING MUST BE MADE BY THE PROJECT ENGINEER. DATE: 05/14/2019.



WL - C3 Houghton Ln PROFILE



1 HOUGHTON LANE  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

MSK ENGINEERING AND DESIGN, INC.  
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BENNINGTON, VERMONT 05201  
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REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

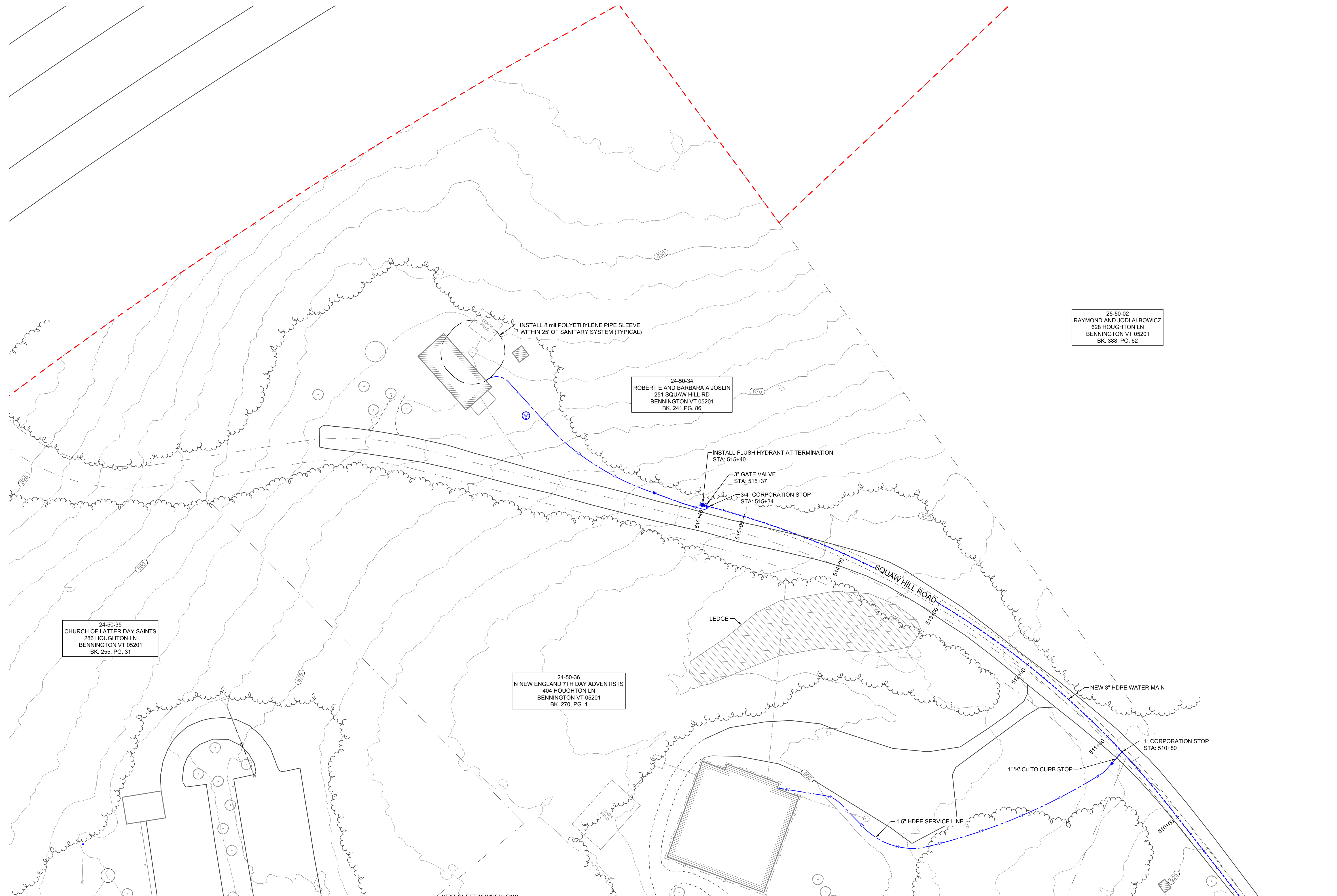
DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
C122A

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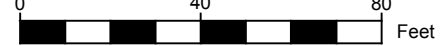
24-50-35  
 CHURCH OF LATTER DAY SAINTS  
 285 HOUGHTON LN  
 BENNINGTON VT 05201  
 BK. 255, PG. 31

24-50-36  
 N NEW ENGLAND 7TH DAY ADVENTISTS  
 404 HOUGHTON LN  
 BENNINGTON VT 05201  
 BK. 270, PG. 1

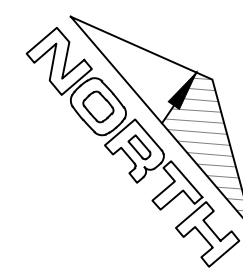
24-50-34  
 ROBERT E AND BARBARA A JOSLIN  
 251 SQUAW HILL RD  
 BENNINGTON VT 05201  
 BK. 241 PG. 86

25-50-02  
 RAYMOND AND JODI ALBOWICZ  
 628 HOUGHTON LN  
 BENNINGTON VT 05201  
 BK. 388, PG. 62

1 SQUAW HILL ROAD  
 (CONTRACT 6)



Scale: 1:40



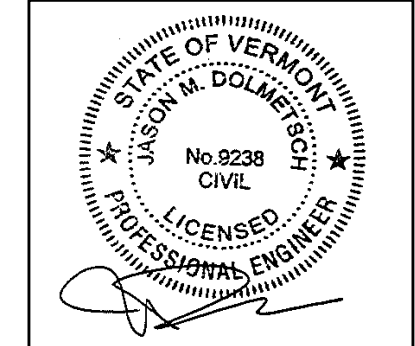
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PLAN

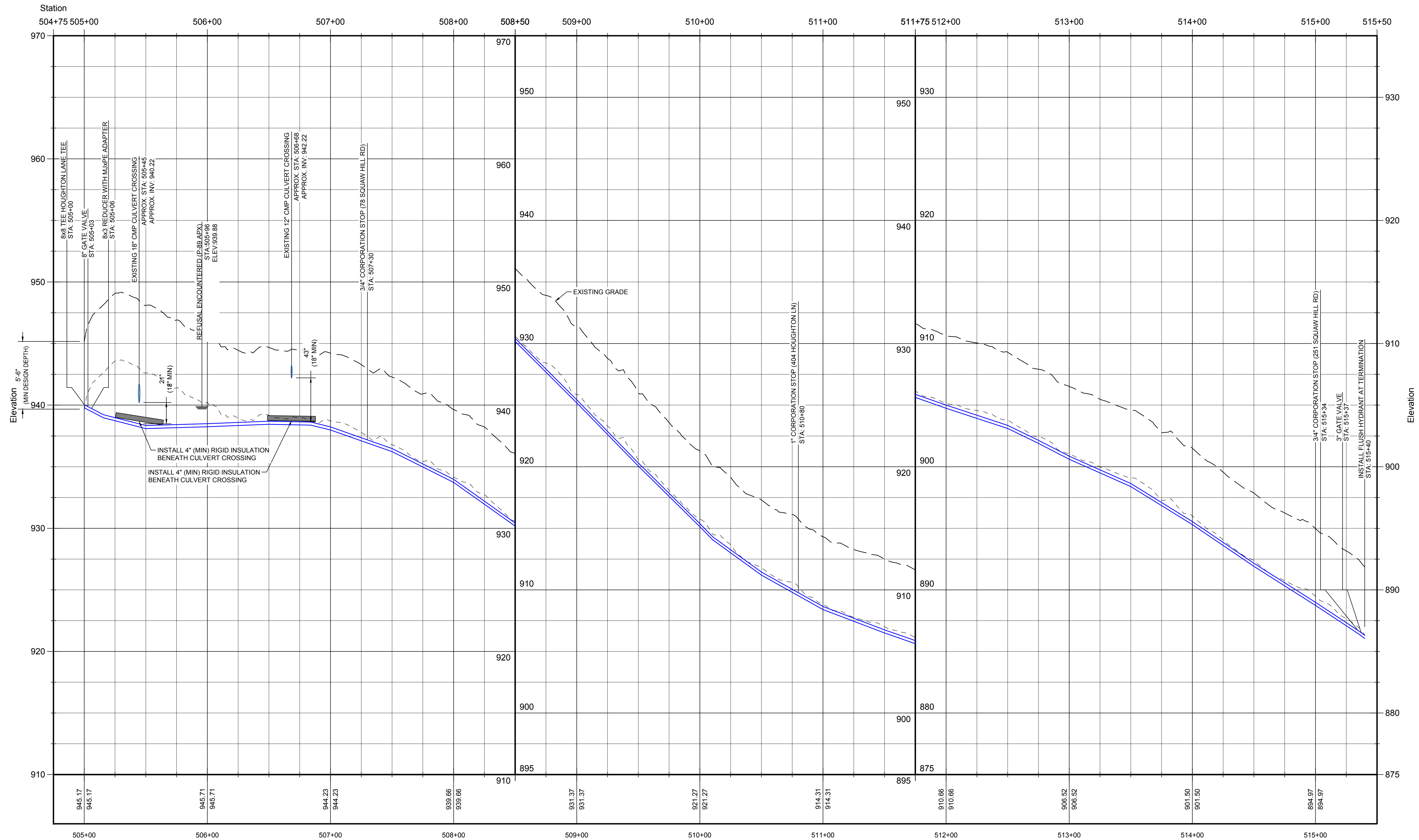
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C123**



**MSK**  
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 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1281

WL - C3 Squaw Hill Rd PROFILE



1 SQUAW HILL ROAD  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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BENNINGTON, VERMONT 05201  
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NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

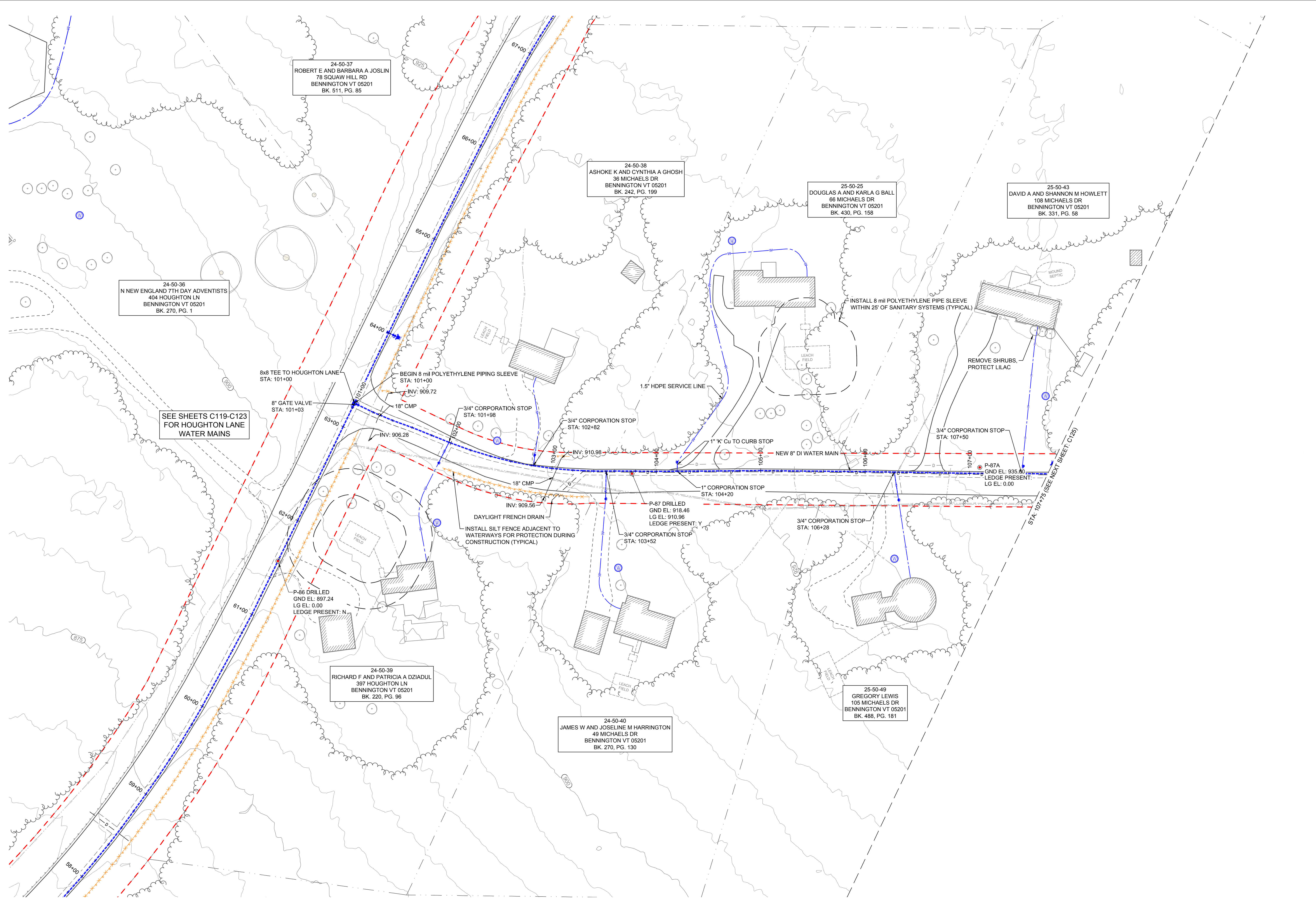
DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

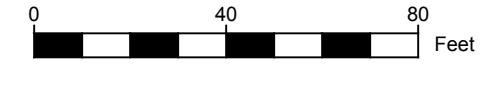
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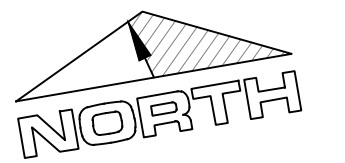




1 MICHAELS DRIVE  
(CONTRACT 6)



Scale: 1:40



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BENNINGTON, VERMONT 05201  
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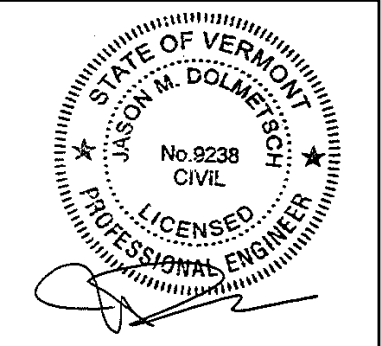
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PLAN

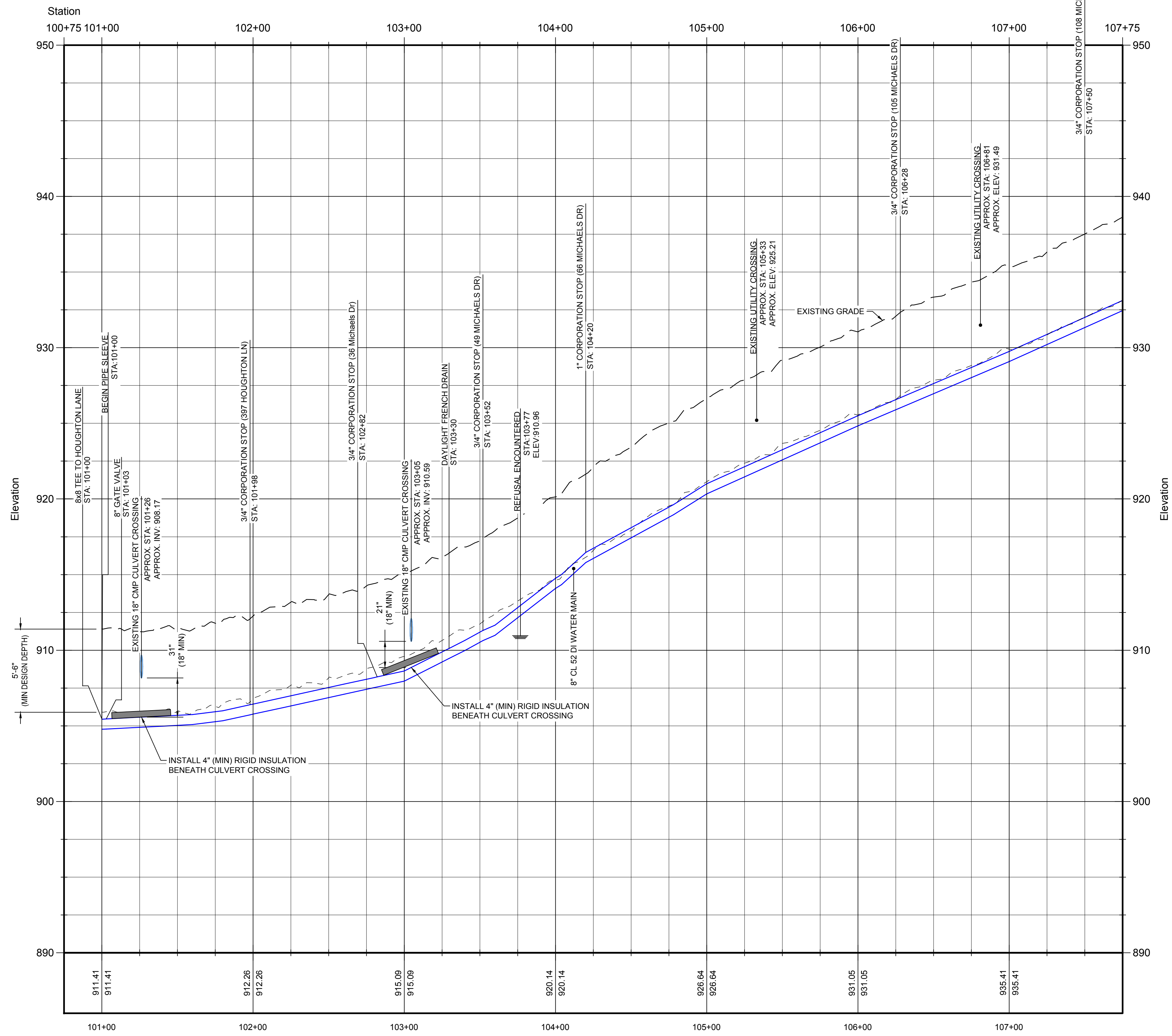
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DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
C124

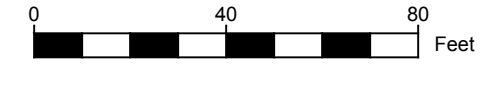




WL - C3 Michaels Dr PROFILE



1 MICHAELS DRIVE  
(CONTRACT 6)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

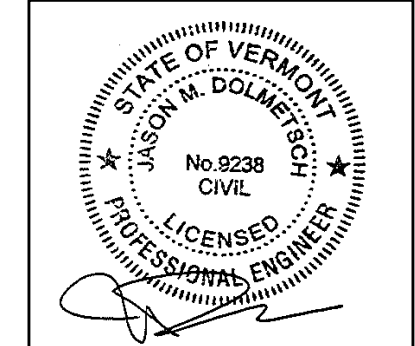
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

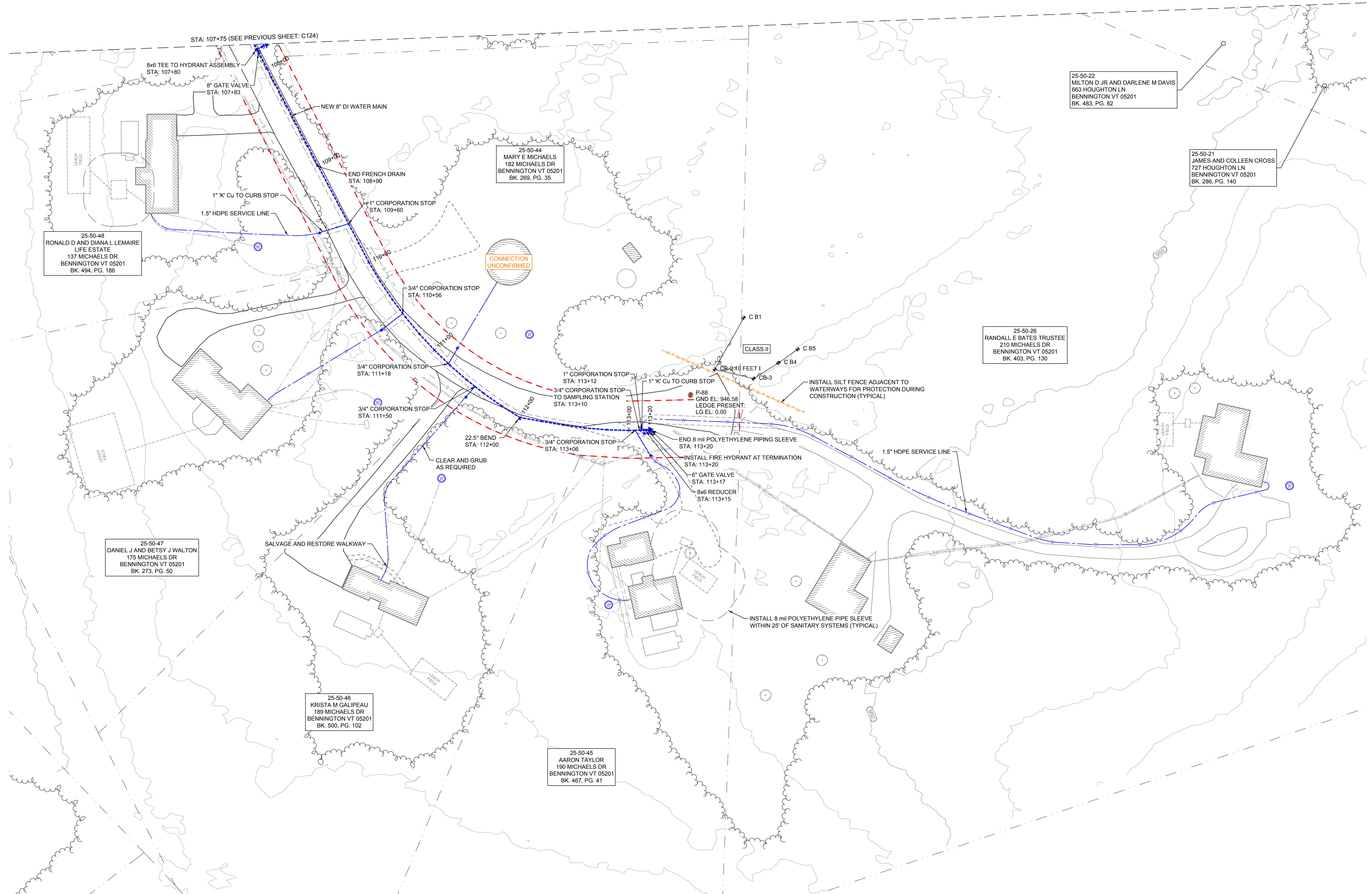
DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

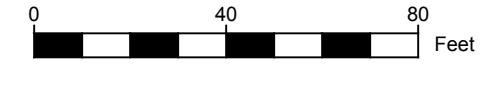
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**C124A**



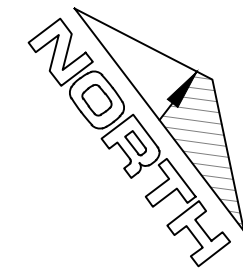




1 MICHAELS DRIVE  
(CONTRACT 6)



Scale: 1:40



25-50-22  
MILTON D JR AND DARLENE M DAVIS  
663 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 483, PG. 82

25-50-21  
JAMES AND COLLEEN CROSS  
727 HOUGHTON LN  
BENNINGTON VT 05201  
BK. 286, PG. 140

25-50-26  
RANDALL E BATES TRUSTEE  
210 MICHAELS DR  
BENNINGTON VT 05201  
BK. 403, PG. 130

25-50-44  
MARY E MICHAELS  
182 MICHAELS DR  
BENNINGTON VT 05201  
BK. 289, PG. 35

25-50-48  
RONALD D AND DIANA L LEMAIRE  
LIFE ESTATE  
137 MICHAELS DR  
BENNINGTON VT 05201  
BK. 494, PG. 186

25-50-47  
DANIEL J AND BETSY J WALTON  
175 MICHAELS DR  
BENNINGTON VT 05201  
BK. 273, PG. 50

25-50-46  
KRISTA N GALPEAU  
189 MICHAELS DR  
BENNINGTON VT 05201  
BK. 500, PG. 102

25-50-45  
AARON TAYLOR  
190 MICHAELS DR  
BENNINGTON VT 05201  
BK. 467, PG. 41

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BENNINGTON, VERMONT 05201  
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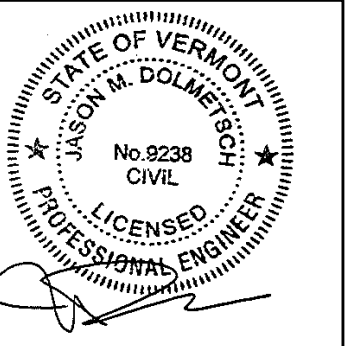
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

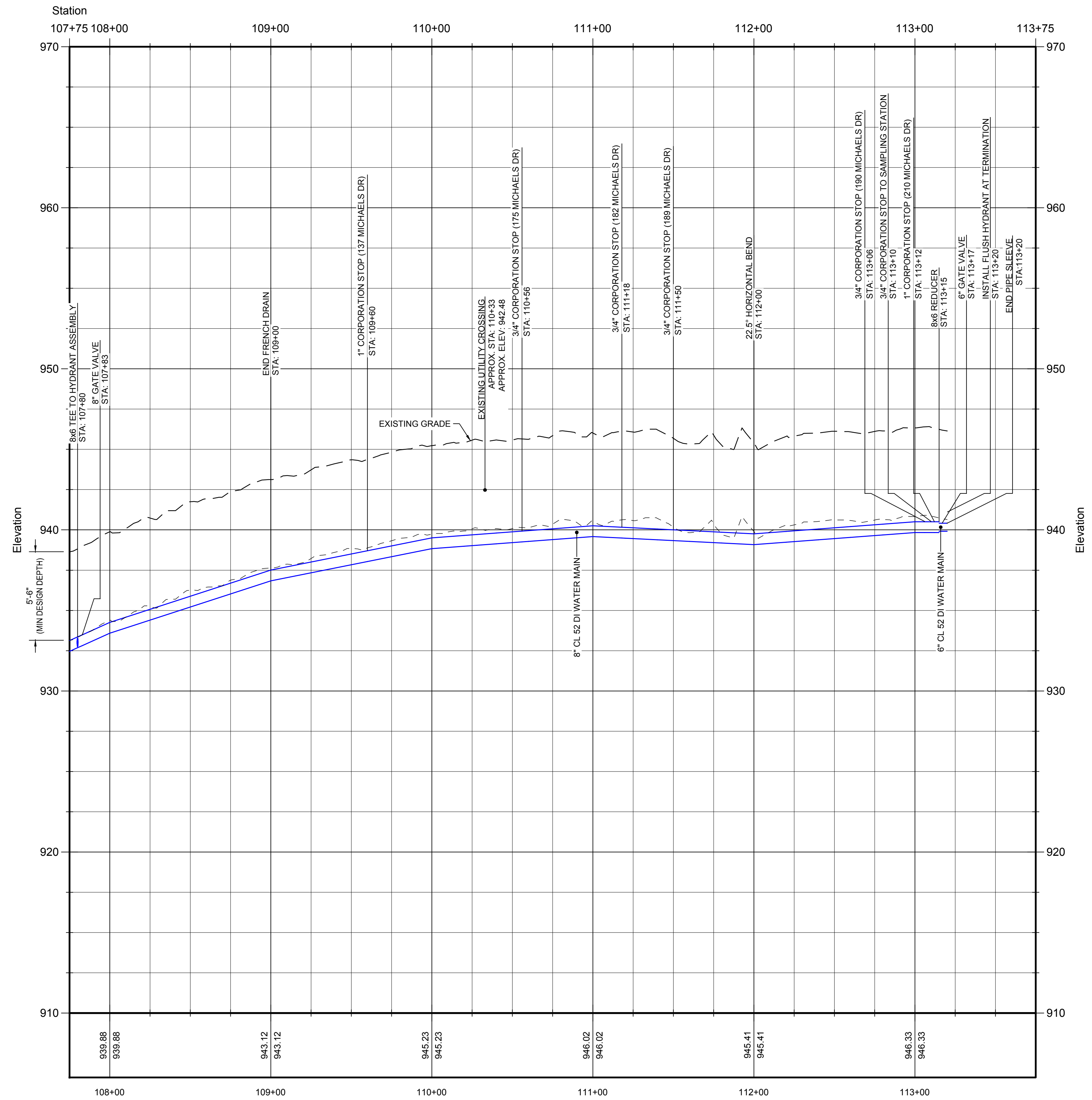
SHEET NUMBER  
**C125**



ALL DRAWING INFORMATION FROM 2013 PERIOD INFORMATION IS UNLESS OTHERWISE NOTED. CONTRACT NO. 1001-019.7 FOR DISTRICT C MUNICIPAL WATER SYSTEM. DATE: 05/14/2019.



WL - C3 Michaels Dr PROFILE



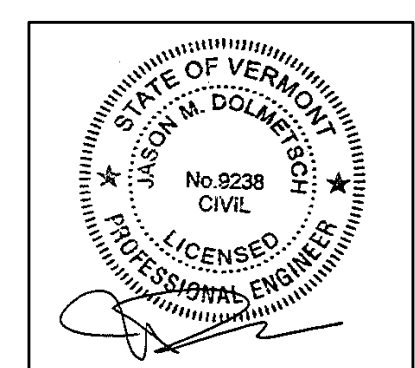
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C125A**











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BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291



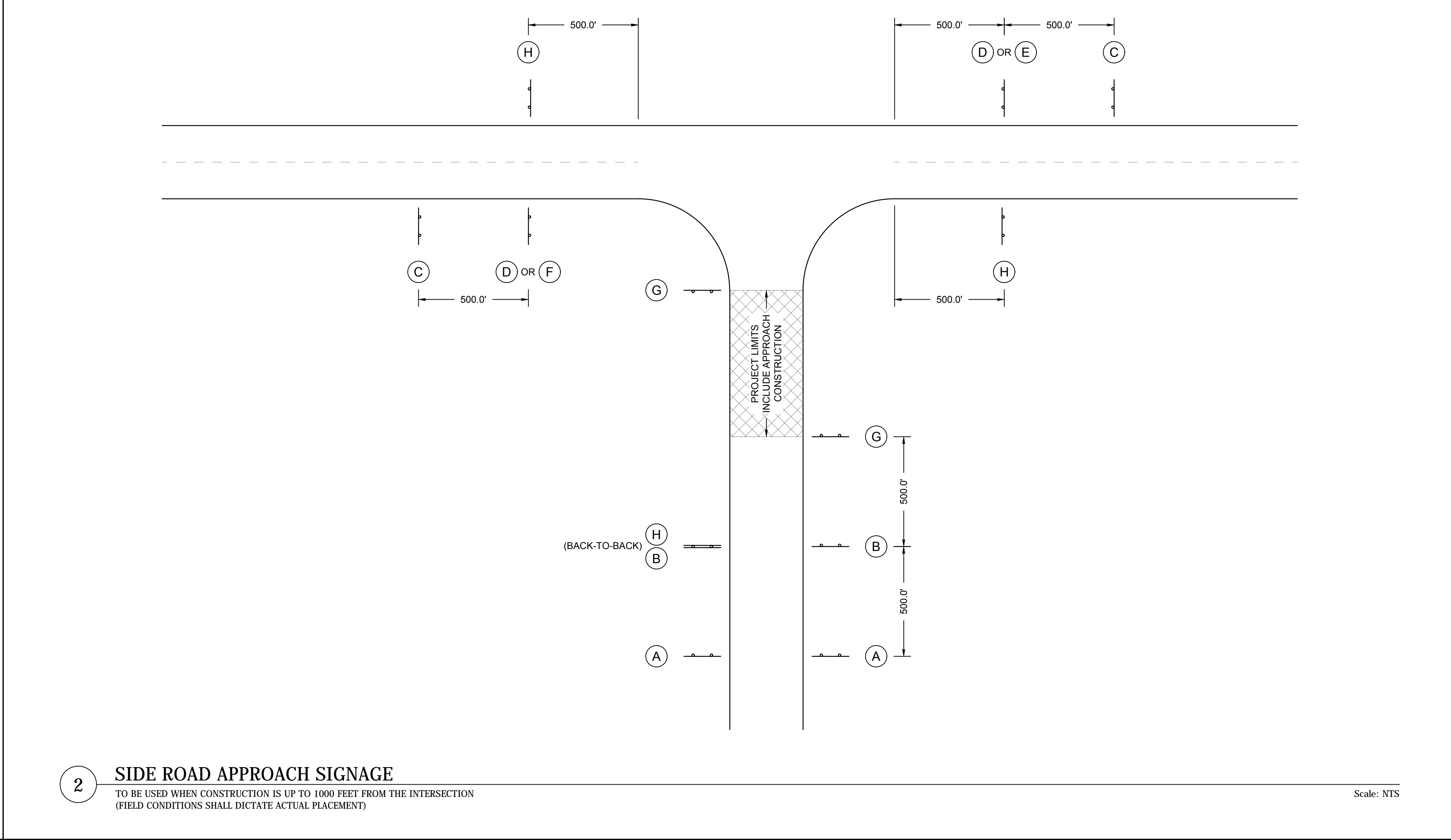
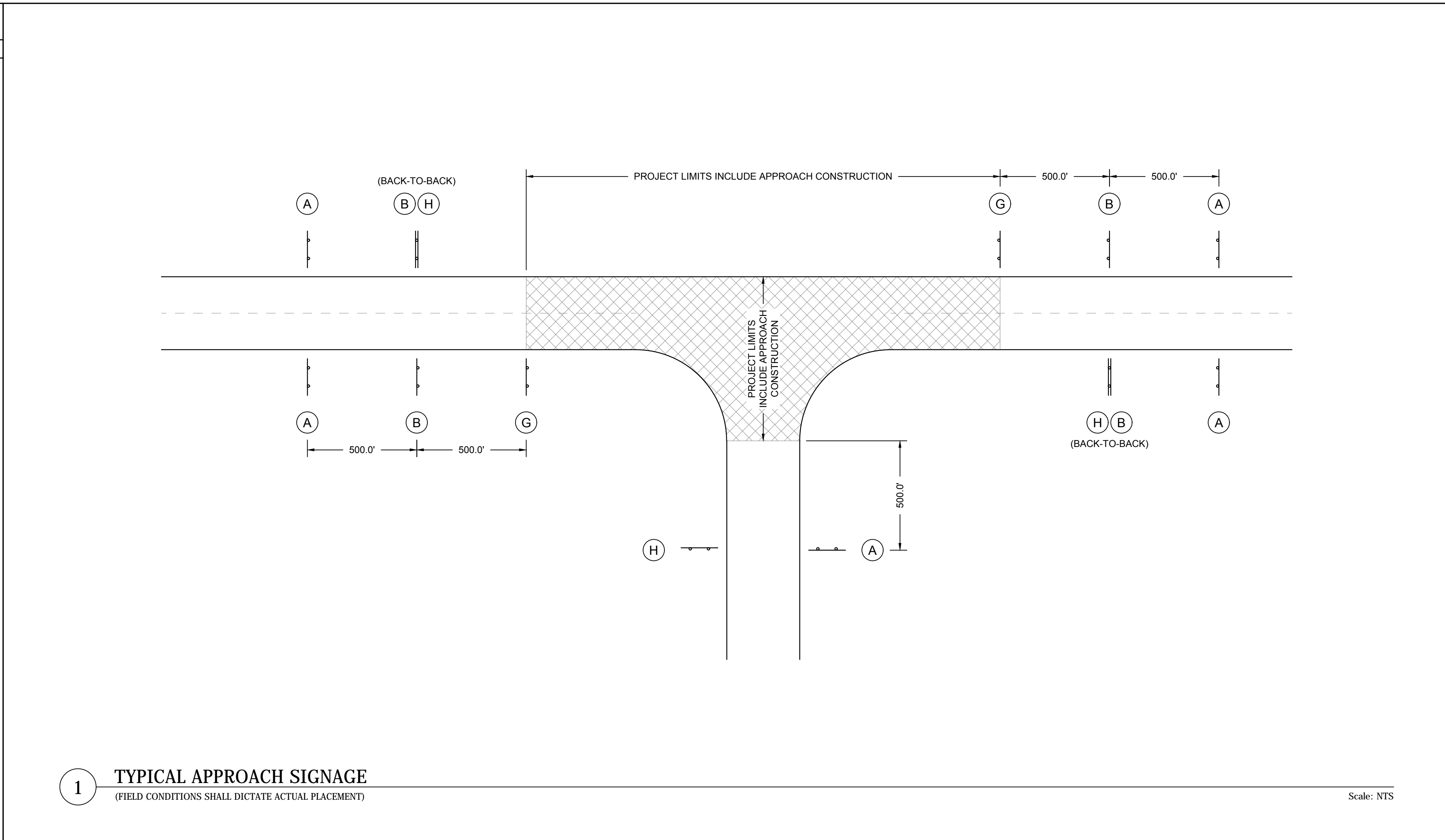
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 2 May 2019 11:06:15

GENERAL NOTES	
TEMPORARY TRAFFIC CONTROL (VERMONT AGENCY OF TRANSPORTATION STANDARD T-1)	
1.	TRAFFIC CONTROL DEVICES NOT DETAILED IN THE VERMONT AGENCY OF TRANSPORTATION (VAOT) "STANDARD DRAWINGS" OR THE PROJECT PLANS SHALL BE IN ACCORDANCE WITH THE CURRENT "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND THE "STANDARD HIGHWAY SIGNS AND MARKINGS" BOOK (SHM), AND THEIR LATEST REVISIONS, PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION (FHWA).
2.	CONSTRUCTION SIGNS SHALL BE ERECTED BEFORE THE START OF ANY WORK AND SHALL BE COVERED UNTIL WORK COMMENCES, DURING PERIODS OF INACTIVITY, OR UPON COMPLETION OF THE WORK. EACH SIGN SHALL BE ERECTED IN A NEAT AND WORKMAN-LIKE MANNER.
3.	DIAMOND SHAPED CONSTRUCTION SIGNS SHALL BE 48 INCH BY 48 INCH.
4.	CONSTRUCTION SIGN COVERS SHALL CONSIST OF A PANEL, PAINTED FLAT BLACK, THE SAME AS THE SIGN IT COVERS. THE PANEL SHALL BE OF WOOD, PLYWOOD, HARDBOARD, OR ANY MATERIAL SATISFACTORY TO THE ENGINEER. NO MATERIAL WILL BE APPROVED THAT WILL DETERIORATE BY EXPOSURE TO THE WEATHER DURING THE PROJECT. MOUNTING OF THE PANEL SHALL BE DONE IN SUCH A WAY AS NOT TO DAMAGE THE SIGN FACE MATERIAL.
5.	SIGNS SHALL BE MAINTAINED IN A CLEAN AND LEGIBLE CONDITION SATISFACTORY TO THE ENGINEER. THEY SHALL BE KEPT PLUMB AND LEVEL, AND ALWAYS PRESENT A NEAT APPEARANCE. DAMAGED, DEFACED, OR DIRTY SIGNS SHALL BE REPAIRED, CLEANED, OR REPLACED, AS ORDERED BY THE ENGINEER.
6.	NO CROSS-BRACING OR BACK-BRACING TO KEEP POSTS PLUMB WILL BE ALLOWED. CONCRETE FOUNDATIONS, COLLARS, OR SOIL BEARING PLATES ARE NOT PERMITTED.
7.	CONSTRUCTION SIGNS INSTALLED ON POSTS SHALL BE SET SECURELY IN THE GROUND ON TWO POSTS. THE BOTTOM OF THE SIGN SHALL BE AT LEAST FIVE FEET ABOVE THE EDGE OF THE PAVEMENT, AND THE NEAREST EDGE OF A SIGN SHALL BE AT LEAST SIX FEET OUTSIDE THE SHOULDER POINT, FOUR FEET OUTSIDE OF GUARDRAIL, OR TWO FEET OUTSIDE CURBING OR SIDEWALK. THE INSTALLATION OF SIGNS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER. IN URBAN AREAS, THE BOTTOM OF THE SIGN SHALL BE AT LEAST SEVEN FEET ABOVE THE SIDEWALK OR EDGE OF PAVEMENT, WHICHEVER IS HIGHER.
8.	PORTABLE SIGNS SHALL BE PLACED ON THE EDGE OF THE ROADWAY AND A MINIMUM OF ONE FOOT ABOVE THE TRAVELED WAY. ALL VEGETATION WHICH INTERFERES WITH THE VISIBILITY OF THE SIGNS SHALL BE REMOVED. WHEN PLACED BEHIND GUARDRAIL, THE BOTTOM OF THE SIGN SHALL BE ABOVE THE TOP OF THE GUARDRAIL.
9.	SIGNS SHALL BE REMOVED UPON THE COMPLETION OF THE WORK AT THE DISCRETION OF THE ENGINEER.
10.	ROLL UP CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ("AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956) TYPE VII, UNLESS OTHERWISE NOTED.
11.	SOLID SUBSTRATE CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ("AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956) TYPE VIII OR IX REQUIREMENTS, UNLESS OTHERWISE NOTED.
12.	WHERE CONSTRUCTION SIGN INSTALLATIONS ARE NOT PROTECTED BY GUARDRAIL OR OTHER APPROVED TRAFFIC BARRIERS, ALL SIGN STANDS AND POST INSTALLATIONS SHALL MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE AASHTO "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION. NO SIGN POSTS SHALL EXTEND OVER THE TOP OF THE SIGN INSTALLED ON SAID POSTS. WHEN ANCHORS ARE INSTALLED, STUBS SHALL NOT BE GREATER THAN FOUR INCHES ABOVE THE EXISTING GROUND.
13.	ROADWAY AND SHOULDER WIDTHS DEPICTED ON THE STANDARD DRAWINGS MAY VARY.
14.	THESE STANDARD DRAWINGS ARE INTENDED TO SERVE AS VTRANS STANDARD OPERATING PROCEDURE. IT IS NOTED THAT COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL WORK ZONE MAY BE MODIFIED, DUE TO FIELD CONDITIONS, AT THE DISCRETION OF THE ENGINEER.


SIGN LEGEND	
(VTRANS STANDARD T-1)	
(A)	 W20-1
(B)	 W20-1
(C)	 VC-869
(D)	 VC-869
(E)	 VC-869
(F)	 VC-869
(G)	 G20-1
(H)	 G20-2

GENERAL NOTES	
CONVENTIONAL ROADS CONSTRUCTION APPROACH SIGNING (VERMONT AGENCY OF TRANSPORTATION STANDARD T-10)	
1.	SIGNS SHOWN ON THIS SHEET ARE INTENDED FOR USE IN PROVIDING ADVANCED WARNING AND INFORMATION ON CONSTRUCTION PROJECTS OVER WHICH TRAFFIC WILL BE MAINTAINED. WHEN ADDITIONAL APPROACH SIGNS OR OTHER TYPES OF ADVANCED SIGNING OR CONTROL ARE NECESSARY, THE PLANS AND/OR SPECIFICATIONS FOR THAT PROJECT WILL GIVE THE DETAILS OF THE SIGNS AND DEVICES REQUIRED. FOR ON-PROJECT CONSTRUCTION SIGNS, REFER TO THE APPROPRIATE STANDARDS SHEETS.
2.	THE "ROAD WORK NEXT xx MILES" SIGN (G20-1) SHALL BE INSTALLED IN ADVANCE OF TEMPORARY TRAFFIC CONTROL ZONES THAT ARE MORE THAN TWO MILES IN LENGTH, OR AS DIRECTED BY THE ENGINEER. DISTANCES SHALL BE STATED TO THE NEAREST WHOLE MILE.
3.	SIGNS SHALL BE LOCATED AS DETAILED ON THIS SHEET, OR AS OTHERWISE SHOWN ON THE PLANS. THE SIGNS SHALL APPEAR AT EACH END OF THE HIGHWAY UNDER CONSTRUCTION, AND ON ALL INTERSECTING PUBLIC HIGHWAYS. THE ENGINEER SHALL DETERMINE THE EXACT LOCATIONS

GENERAL NOTES	
CONSTRUCTION SIGN DETAILS (VERMONT AGENCY OF TRANSPORTATION STANDARD T-28)	
1.	COLORS FOR SIGNS SHALL BE BLACK LEGEND AND BORDER ON FLUORESCENT ORANGE BACKGROUND.
2.	CONSTRUCTION SIGNS SHALL BE 48 INCH BY 48 INCH. IF SOLID SUBSTRATE SIGNS ARE USED, SIGNS SHALL HAVE CORNERS ROUNDED TO A THREE INCH RADIUS.
3.	SIGNS SHALL HAVE 1/4 INCH WIDE BORDERS THAT ARE INDENTED 3/8 INCH FROM THE EDGE OF THE SIGN.
4.	SIGNS SHALL HAVE THE LEGEND CENTERED HORIZONTALLY AND VERTICALLY ON THE SIGN, UNLESS OTHERWISE NOTED.
5.	ALL SIGN DIMENSIONS ARE SHOWN IN INCHES.



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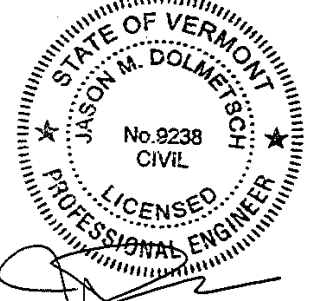
REVISIONS	
NO.	DATE

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**TRAFFIC CONTROL  
DETAILS**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C501**



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# LEGEND

MUTCD TABLE 6H-2: MEANING OF SYMBOLS ON TYPICAL APPLICATION DIAGRAMS

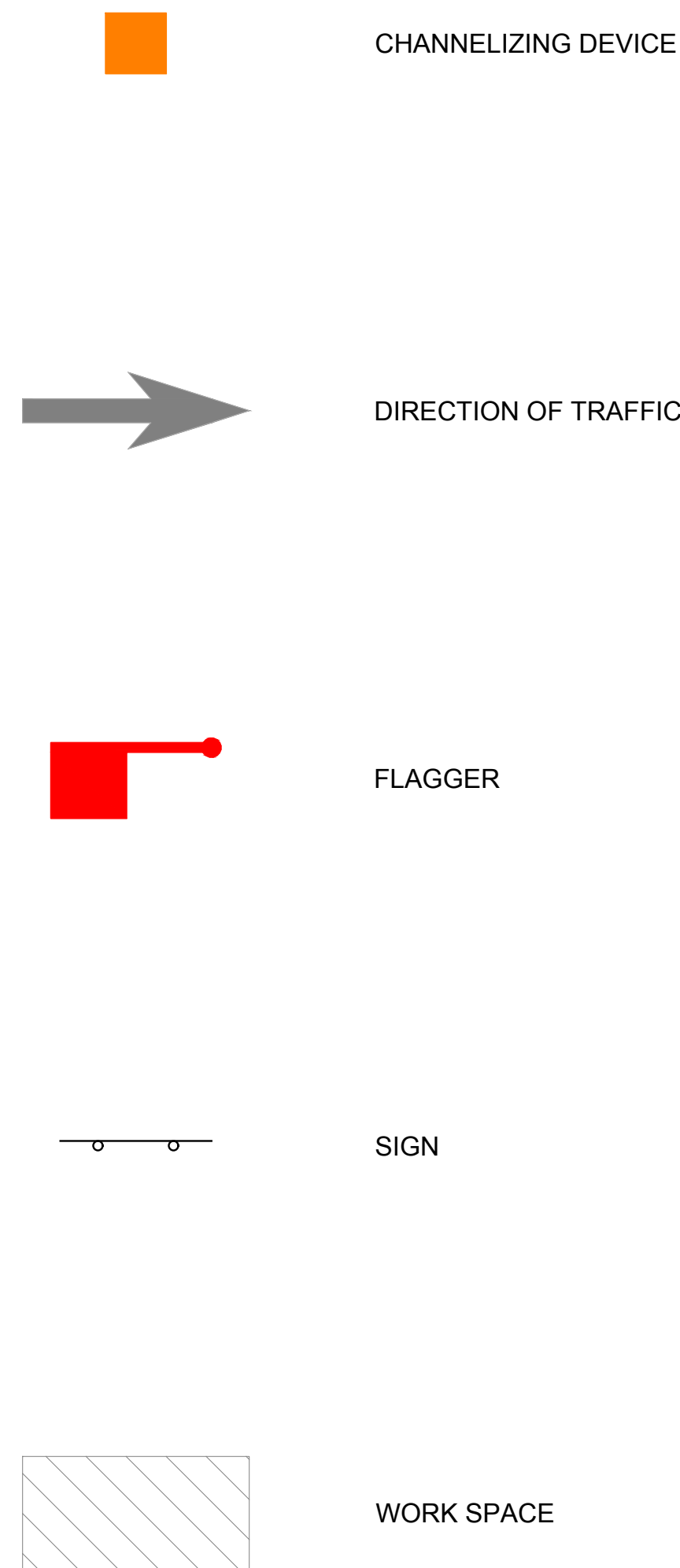


TABLE 6H-3: MEANING OF LETTER CODES ON TYPICAL APPLICATION DIAGRAMS

ROADWAY TYPE	DISTANCE BETWEEN SIGNS **		
	A	B	C
URBAN (LOW SPEED) *	100 FEET	100 FEET	100 FEET
URBAN (HIGH SPEED) *	350 FEET	350 FEET	350 FEET
RURAL	500 FEET	500 FEET	500 FEET
EXPRESSWAY/FREEWAY	1,000 FEET	1,500 FEET	2,640 FEET

\* SPEED CATEGORY TO BE DETERMINED BY HIGHWAY AGENCY  
 \*\* THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN FIGURES 6H-3 AND 6H-10. THE DIMENSION A 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 "FIRST SIGN" IS THE SIGN IN A THREE-SIGN SERIES THAT IS CLOSEST TO THE TEMPORARY TRAFFIC CONTROL (TTC) ZONE. THE "THIRD SIGN" IS THE SIGN THAT IS LOCATED THE FURTHEST UPSTREAM FROM THE TTC ZONE.]

NOTES FOR FIGURE 6H-3: TYPICAL APPLICATION 3 "WORK ON THE SHOULDERS":

GUIDANCE

1. A "SHOULDER WORK" SIGN SHOULD BE PLACED ON THE LEFT SIDE OF THE ROADWAY FOR A DIVIDED OR ONE-WAY STREET ONLY IF THE LEFT SHOULDER IS AFFECTED.

OPTION

2. THE "WORKERS" SYMBOL SIGN MAY BE USED INSTEAD OF "SHOULDER WORK" SIGNS.
3. THE "SHOULDER WORK AHEAD" SIGN ON AN INTERSECTING ROADWAY MAY BE OMITTED WHERE DRIVERS EMERGING FROM THAT ROADWAY WILL ENCOUNTER ANOTHER ADVANCED WARNING SIGN PRIOR TO THIS ACTIVITY AREA.
4. FOR SHORT DURATION OPERATIONS OF 60 MINUTES OR LESS, ALL SIGNS AND CHANNELIZING DEVICES MAY BE ELIMINATED IF A VEHICLE WITH ACTIVATED HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS IS USED.
5. VEHICLE HAZARD WARNING SIGNALS MAY BE USED TO SUPPLEMENT HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS.

STANDARD

6. VEHICLE HAZARD WARNING SIGNALS SHALL NOT BE USED INSTEAD OF THE VEHICLE'S HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS.
7. WHEN PAVED SHOULDERS HAVING A WIDTH OF 8 FEET OR MORE ARE CLOSED, AT LEAST ONE ADVANCED WARNING SIGN SHALL BE USED. IN ADDITION, CHANNELIZING DEVICES SHALL BE USED TO CLOSE THE SHOULDER IN ADVANCE TO DELINEATE THE BEGINNING OF THE WORK SPACE AND DIRECT VEHICULAR TRAFFIC TO REMAIN WITHIN THE TRAVELED WAY.

TABLE 6H-4: FORMULAS FOR DETERMINING TAPER LENGTH

SPEED (S)	TAPER LENGTH (L) IN FEET
40 MPH OR LESS	$L = \frac{WS^2}{50}$
45 MPH OR MORE	$L = WS$

WHERE: L = TAPER LENGTH IN FEET  
 W = WIDTH OF OFFSET IN FEET  
 S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH

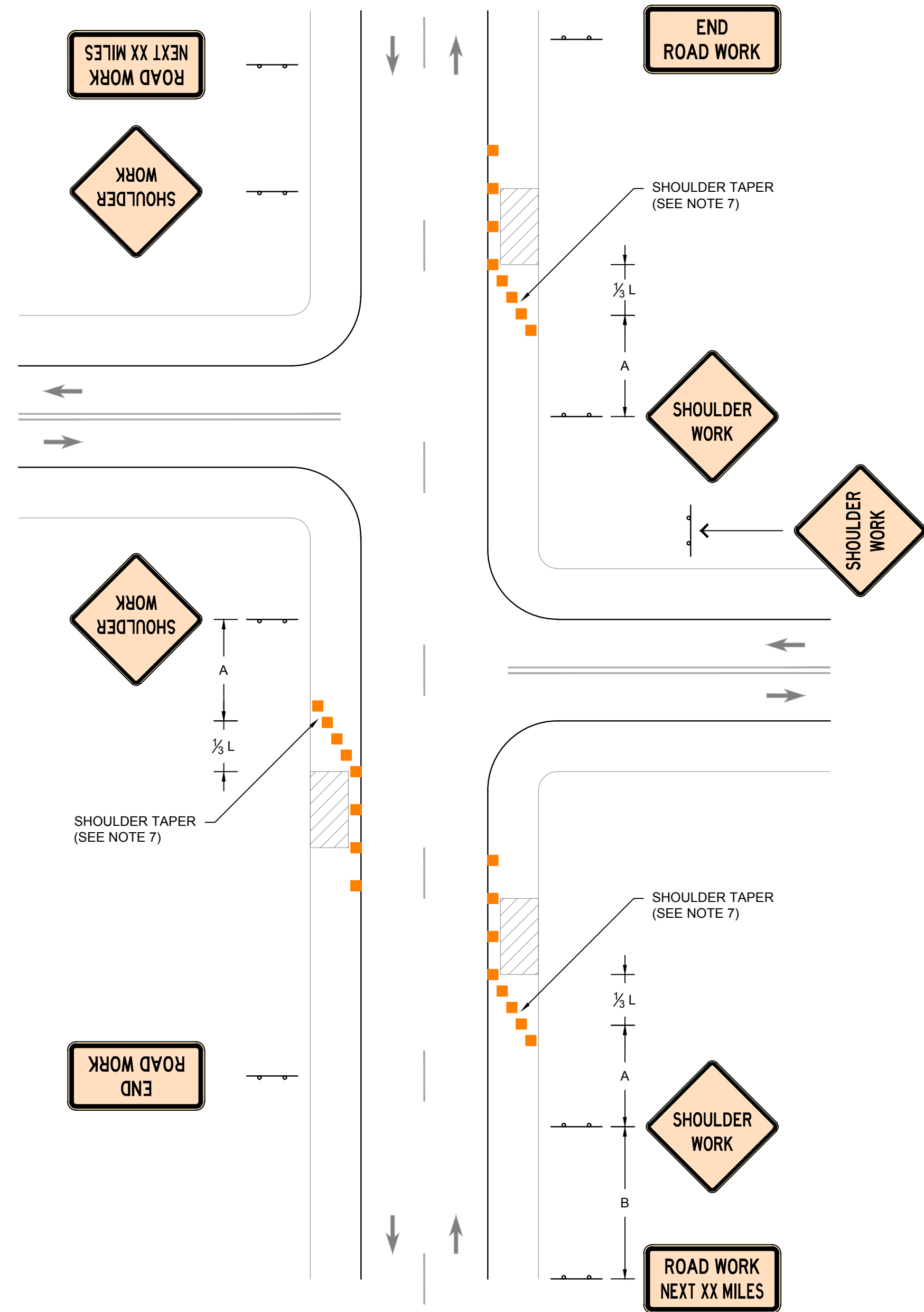
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1

## WORK ON THE SHOULDERS (TA-3)

MUTCD FIGURE 6H-3: TYPICAL APPLICATION 3

Scale: NTS

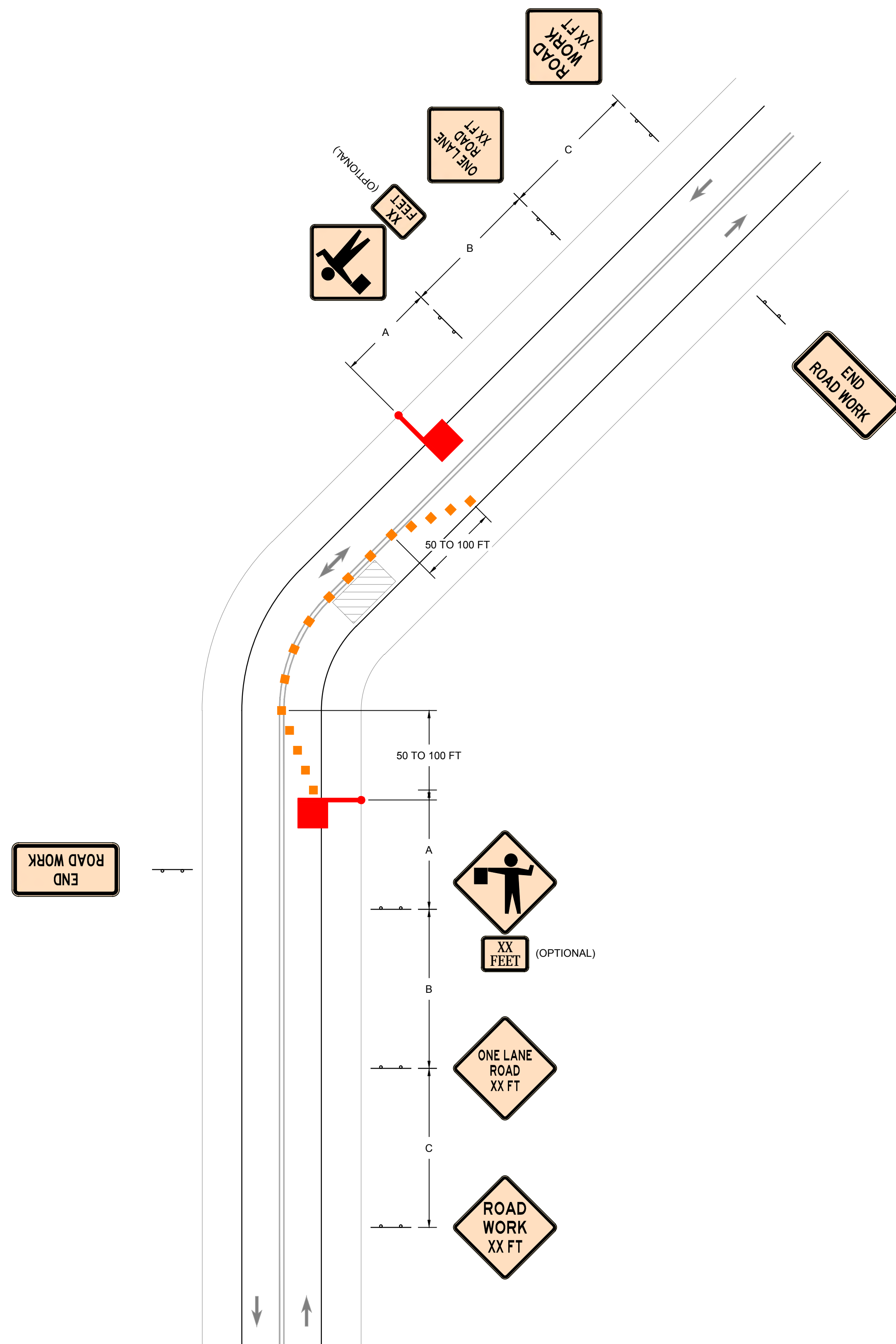


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## LANE CLOSURE ON TWO-LANE ROAD USING FLAGGERS (TA-10)

MUTCD FIGURE 6H-10: TYPICAL APPLICATION 10

Scale: NTS



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NO.	DATE	DESCRIPTION

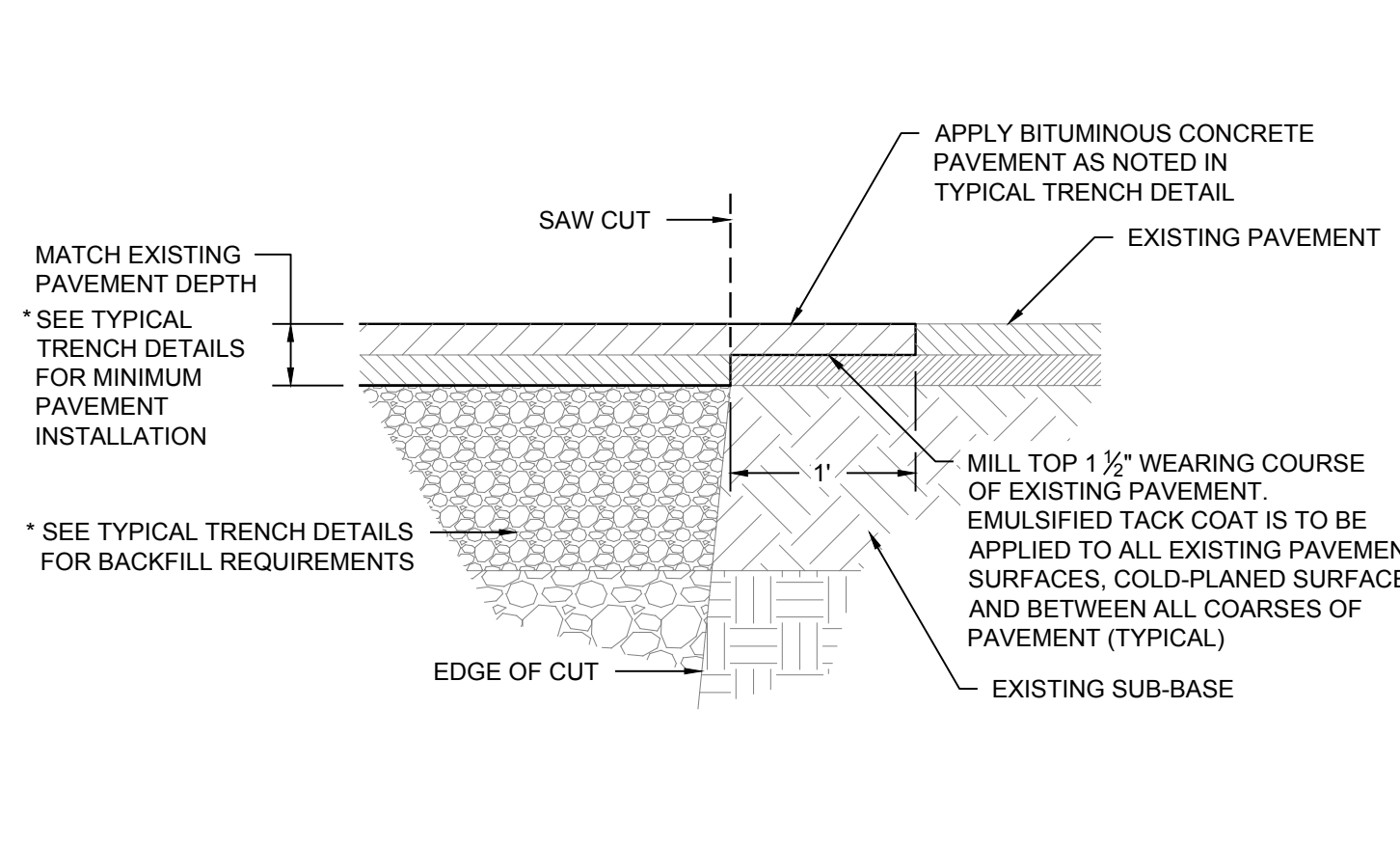
TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 TRAFFIC CONTROL  
 DETAILS

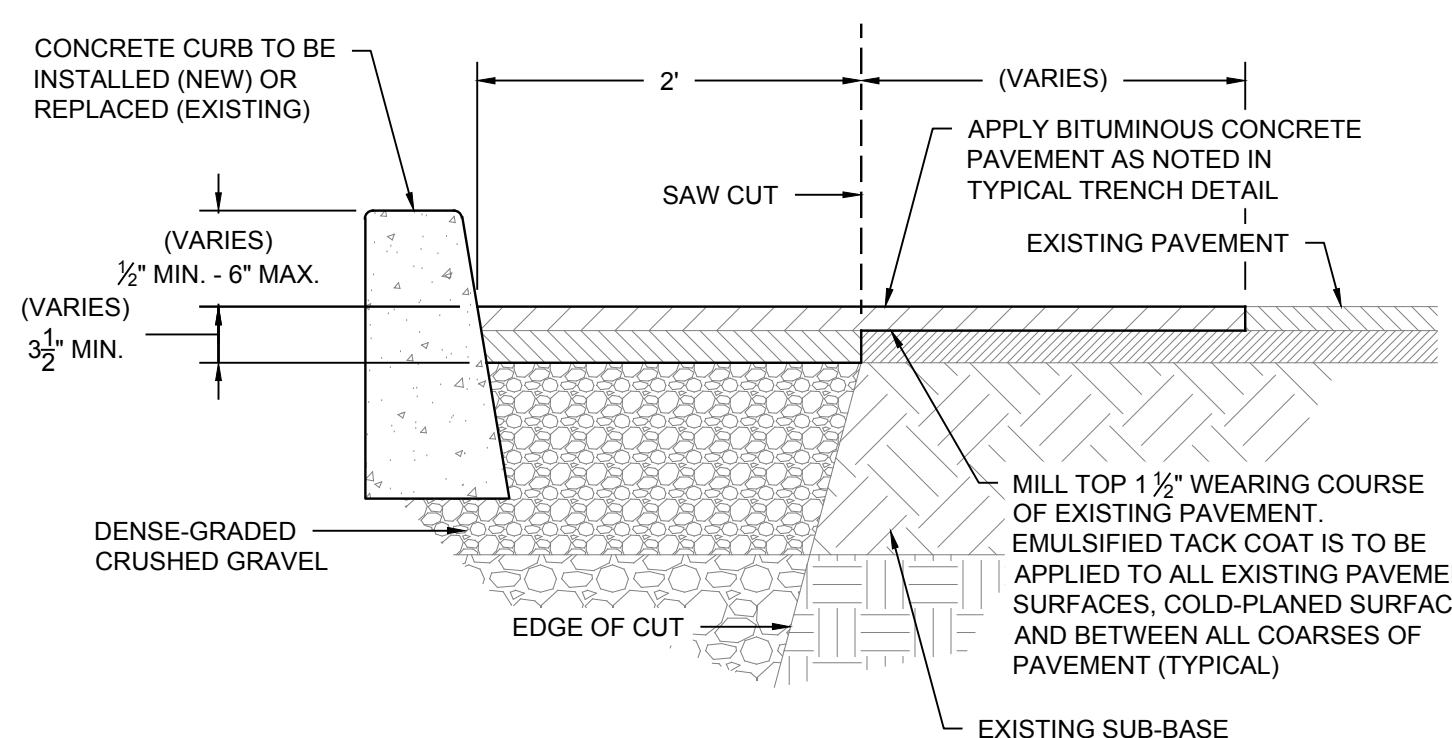
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SHEET NUMBER  
**C502**

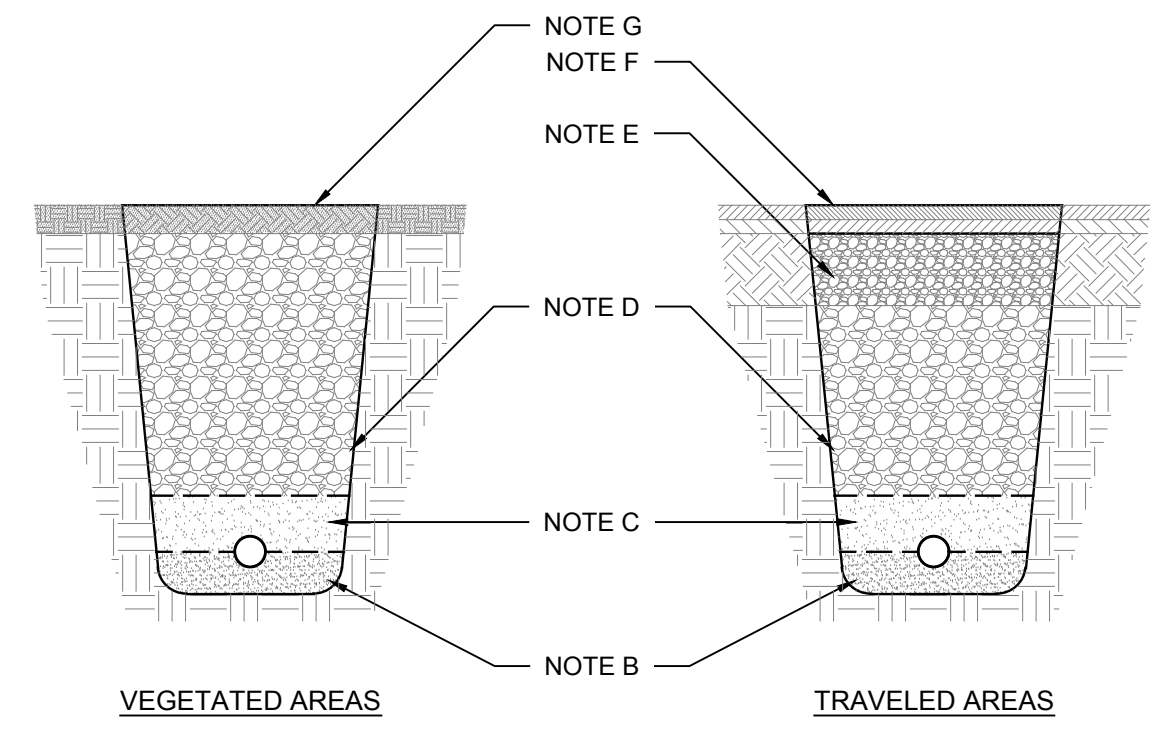




1 PAVEMENT REPAIR DETAIL Scale: NTS



2 PAVEMENT REPAIR DETAIL (AT CURB) Scale: NTS

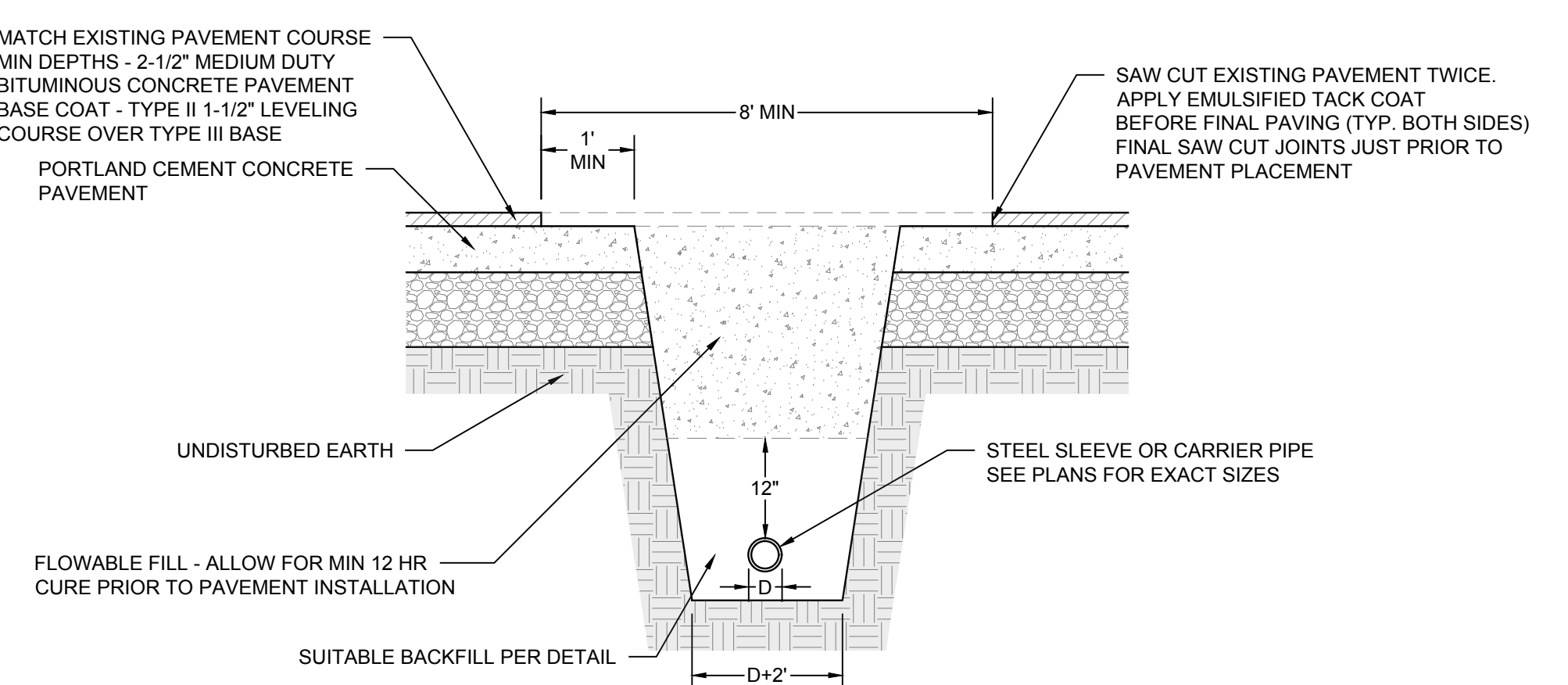


3 TYPICAL TRENCH DETAIL Scale: NTS

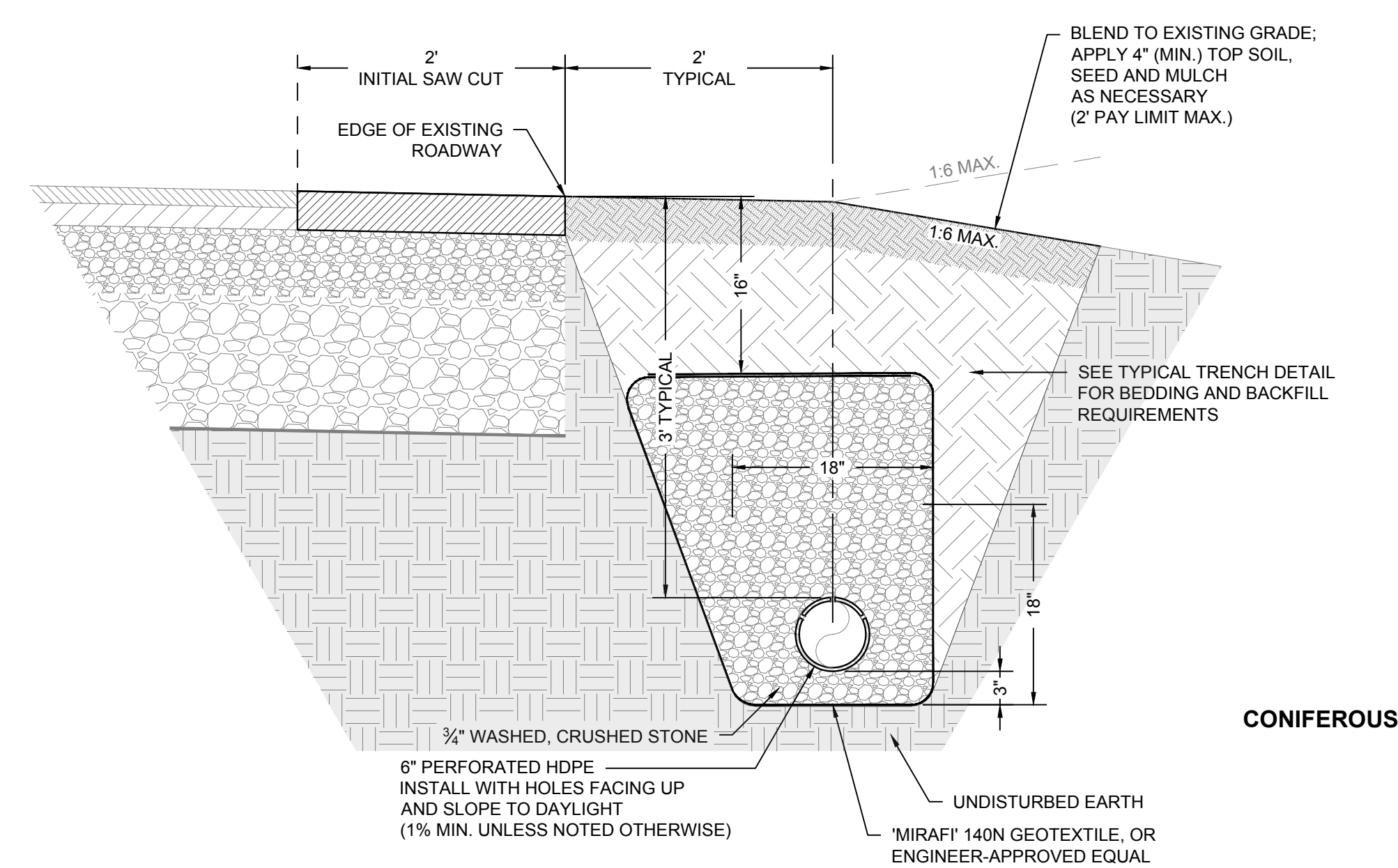
- INSTALLATION SPECIFICATIONS**
- MINIMUM BURIAL DEPTH 5'-6" (4'-0" FOR SEWER). IF CONDITIONS PREVENT MINIMUM BURIAL DEPTH, ALL SECTIONS OF LINE LESS THAN MINIMUM DEPTH IS TO BE INSULATED WITH 1" THICKNESS RIGID FOAM INSULATION PER FOOT LESS THAN MINIMUM (MIN. 2" THICKNESS).
  - BED PIPE IN 6" OF BEDDING MATERIAL. PIPE IS NOT TO BE LAID IN UNCOMPACTED SOIL OR IN WATER. IF IN LEDGE CONDITIONS, BED PIPE IN A MINIMUM OF 6" OF SAND. DO NOT REST PIPE ON LEDGE ROCK.
  - BACKFILL OVER PIPE WITH 12" MINIMUM SAND BEDDING MATERIAL, COMPACTED ENTIRE WIDTH OF TRENCH. BACKFILL WITH 3/4" STONE TO 12" DEPTH IF IN WATER.
  - BACKFILL WITH SATISFACTORY SOIL MATERIAL COMPACTED IN 6" LIFTS TO 95% MAXIMUM DRY DENSITY IN ROADS AND PAVED AREAS, 85% MAXIMUM DRY DENSITY IN LAWN AND GRASSED AREAS.
  - MINIMUM SUB-BASE INSTALLATION:
 

MUNICIPAL ROADWAYS:	12" COARSE-GRADED, CRUSHED GRAVEL
	6" FINE-GRADED, CRUSHED GRAVEL
STATE ROADWAY:	18" COARSE-GRADED, CRUSHED GRAVEL
	6" FINE-GRADED, CRUSHED GRAVEL
DRIVEWAY:	8" COARSE-GRADED, CRUSHED GRAVEL
	6" FINE-GRADED, CRUSHED GRAVEL
  - EDGES OF PAVEMENT MUST BE CUT PRIOR TO EXCAVATION TO PREVENT LIFTING OF REMAINING PAVEMENT, AND FOLLOWING EXCAVATION PRIOR TO PAVEMENT REPAIR, APPLY EMULSION TO EDGE OF EXISTING PAVEMENT PRIOR TO PAVING.
 

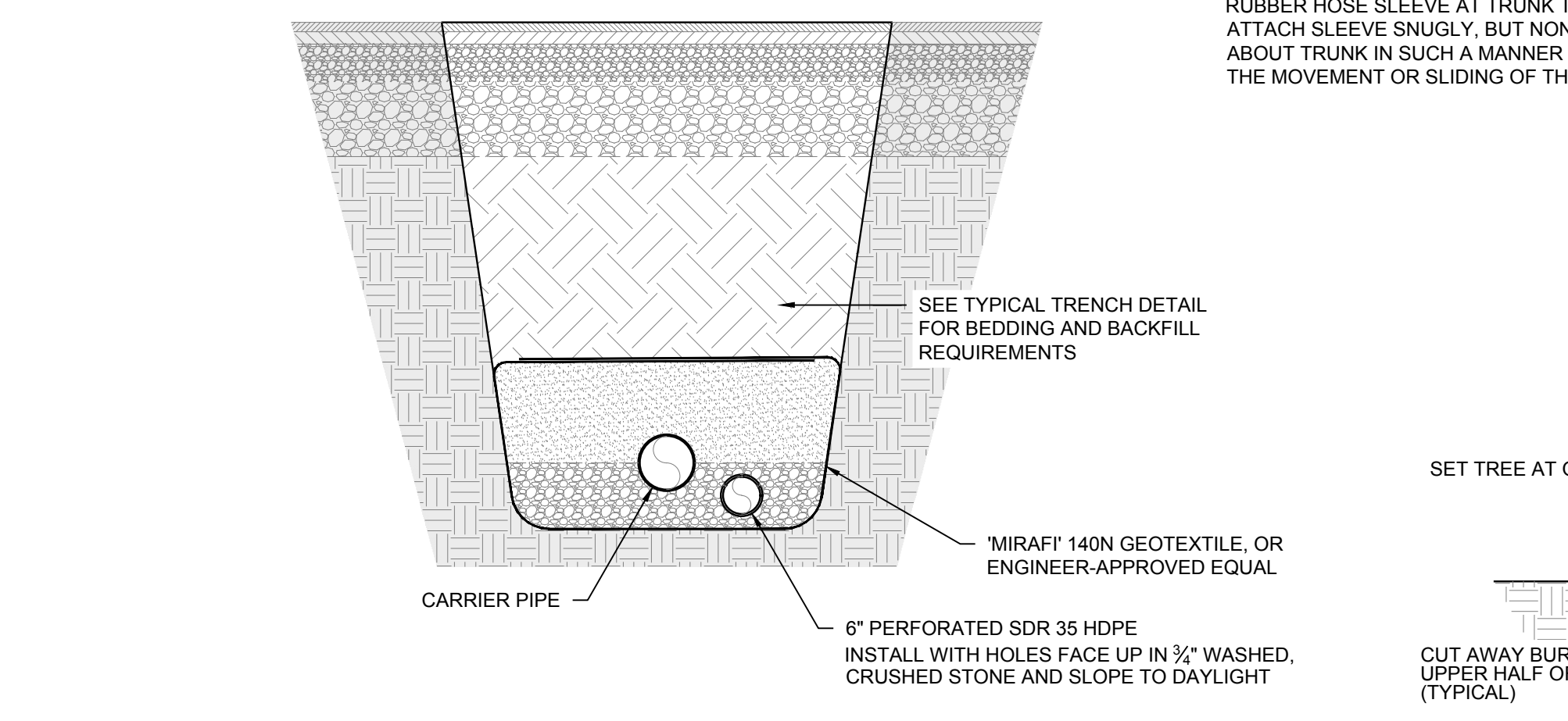
MUNICIPAL PAVEMENT INSTALLATION:	
MUNICIPAL ROADWAY:	TOP: 1.5" TYPE 4
	BASE: 2.5" TYPE 2
STATE ROADWAY:	TOP: 1.5" TYPE 3
	BASE: 2.5" TYPE 2
PAVED DRIVEWAYS:	TOP: 1" TYPE 4
	BASE: 2" TYPE 2
  - 4" MINIMUM TOPSOIL, SEEDED AND MULCHED.



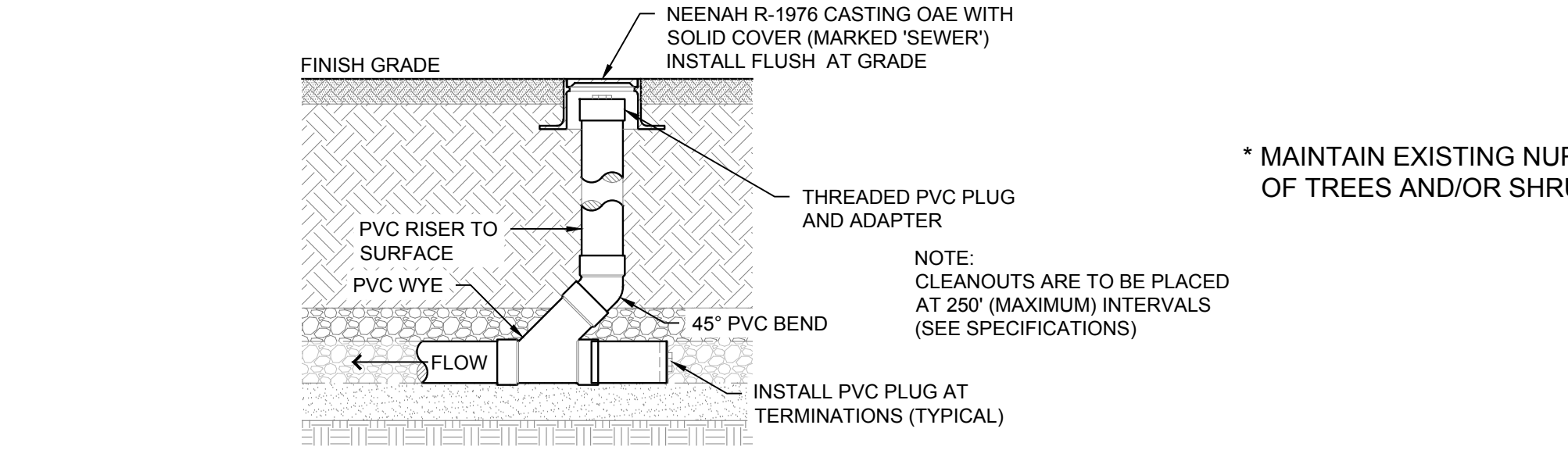
4 OPEN CUT PAVEMENT TRENCH DETAIL - CONCRETE ROADWAY Scale: NTS



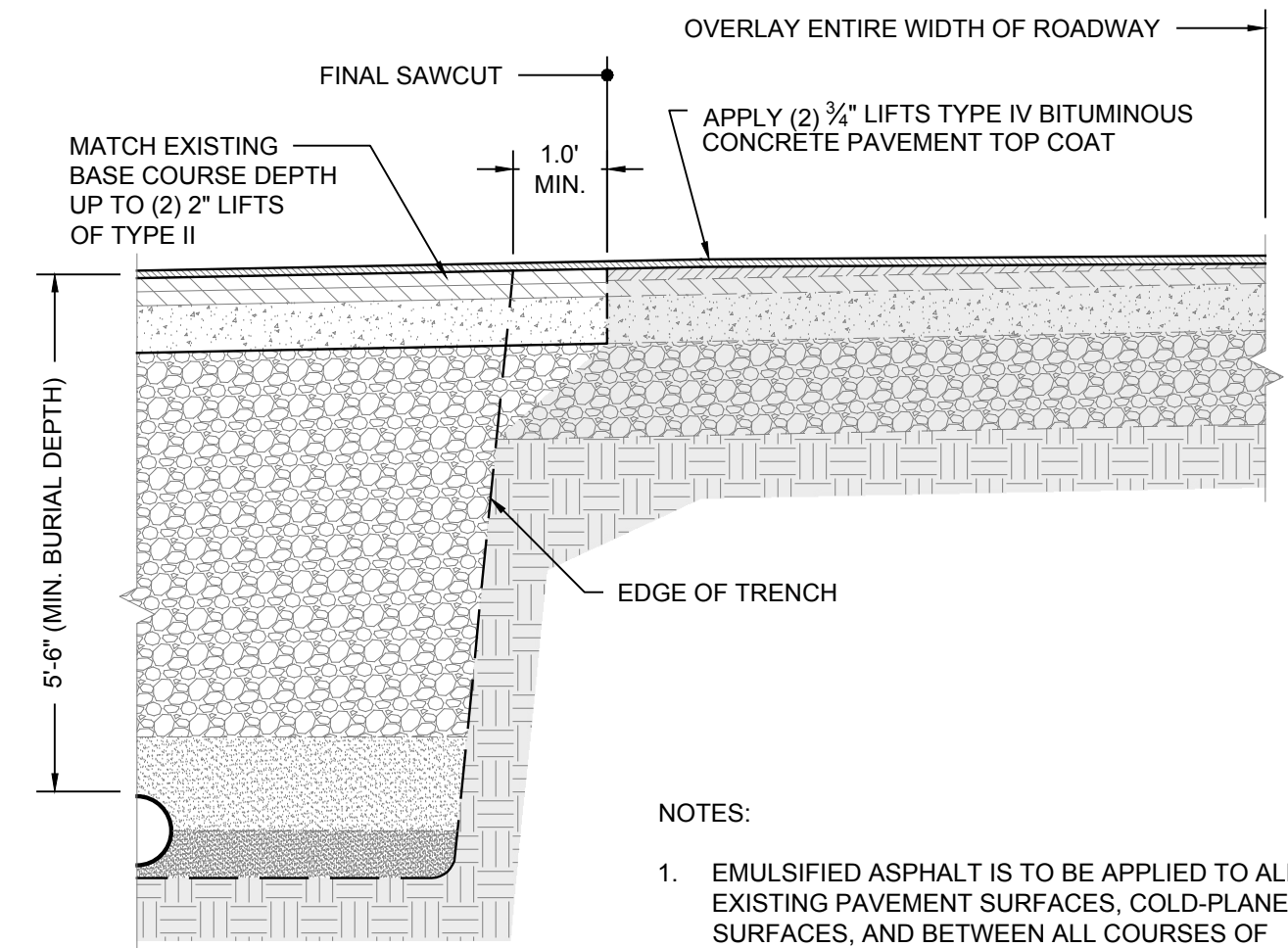
5 FRENCH DRAIN DETAIL Scale: NTS



6 FRENCH DRAIN DETAIL Scale: NTS



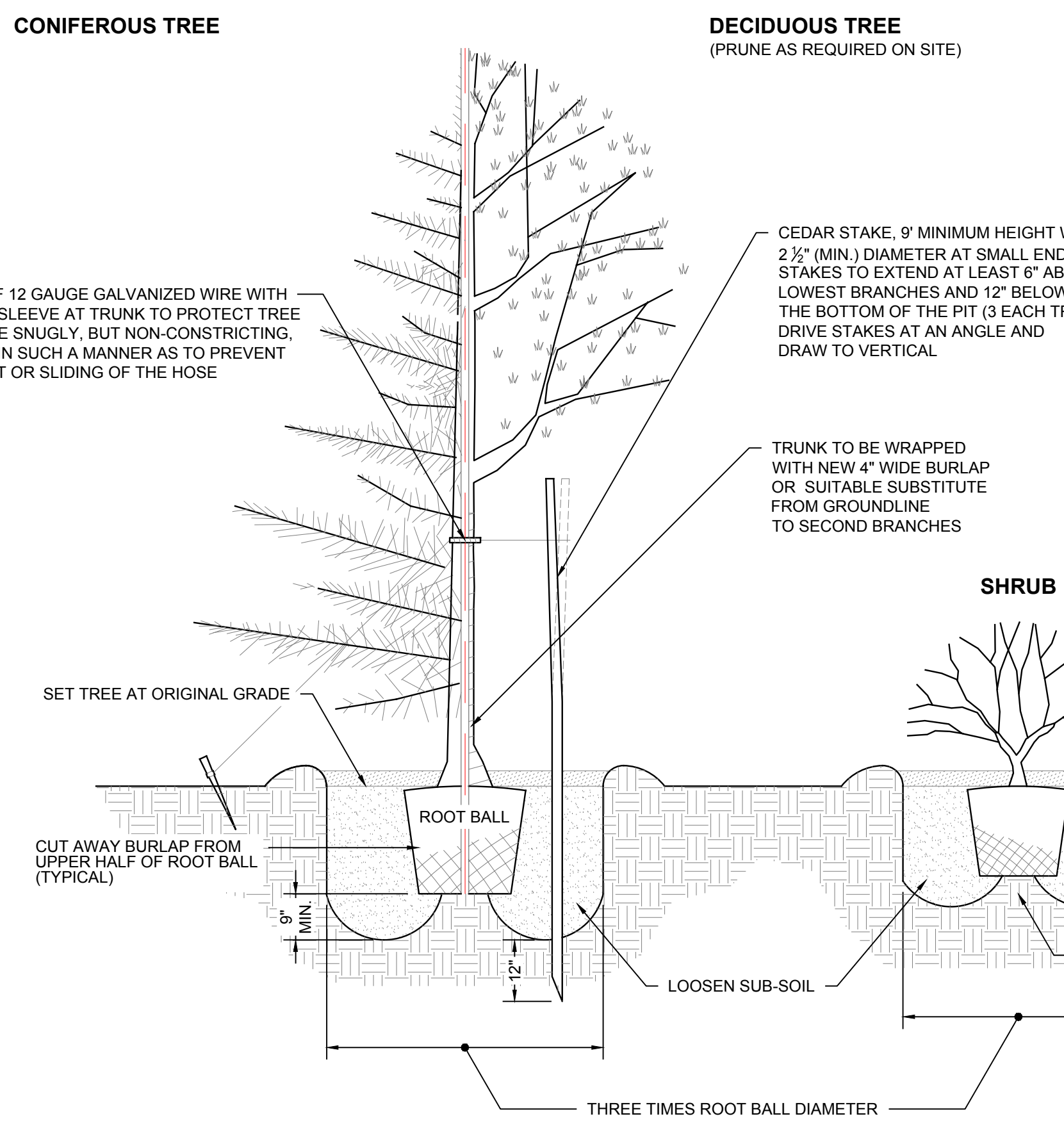
7 TYPICAL IN-LINE CLEANOUT Scale: NTS



8 PAVEMENT REPAIR AND OVERLAY DETAIL Scale: NTS

- NOTES:**
- EMULSIFIED ASPHALT IS TO BE APPLIED TO ALL EXISTING PAVEMENT SURFACES, COLD-PLANED SURFACES, AND BETWEEN ALL COURSES OF PAVEMENT AT A RATE OF 0.08 TO 0.10 GAL/SY, AND 0.04 GAL/SY BETWEEN ALL SUCCESSIVE LIFTS, REGARDLESS OF WHETHER IT IS PAVED ON THE SAME DAY, OR NOT.
  - RESTORE ALL PAVEMENT MARKINGS.

- NOTES:**
- PLANTS ARE TO BE SET PLUMB.
  - DO NOT ALLOW AIR POCKETS TO FORM DURING BACKFILLING.
  - GUY WIRES ARE TO BE REMOVED AT THE END OF THE WARRANTY PERIOD.
  - GENTLY LOOSEN ROOTS AROUND THE EXTERIOR OF THE ROOT BALL.
  - DO NOT PLANT ROOT-BOUND PLANTS. NOTIFY PROJECT MANAGER IMMEDIATELY TO VERIFY CONDITION OF PLANT IF ANY QUESTIONS ARISE.
  - REMOVE ENTIRE CONTAINER FROM ALL PLANTS PRIOR TO PLANTING.
  - TREES TO BE PRUNED SHALL BE REVIEWED IN THE FIELD WITH THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
  - ALL EXISTING TREES MUST BE INVENTORIED BY THE CONTRACTOR WITH THE OWNER'S REPRESENTATIVE PRIOR TO CONSTRUCTION. TREES TO REMAIN MUST BE PROTECTED THROUGHOUT THE DURATION OF CONSTRUCTION.
- THE CONTRACTOR WILL DOCUMENT THE CONDITION OF ALL TREES AND SHRUBS, AND PROVIDE AN INVENTORY TO THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND REPLACEMENT OF ANY TREES OR SHRUBS DAMAGED DURING CONSTRUCTION. TREES AND SHRUBS WILL BE REPLACED AT A SIZE AND SPECIES EQUAL TO, OR GREATER THAN, THE DAMAGED PLANTS.

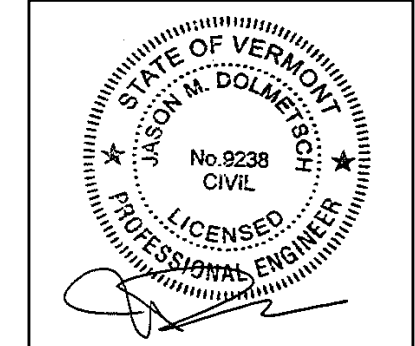


9 TYPICAL PLANTING DETAIL FOR TREES AND SHRUBS Scale: NTS

\* MAINTAIN EXISTING NURSERY GROUND LINE OF TREES AND/OR SHRUBS

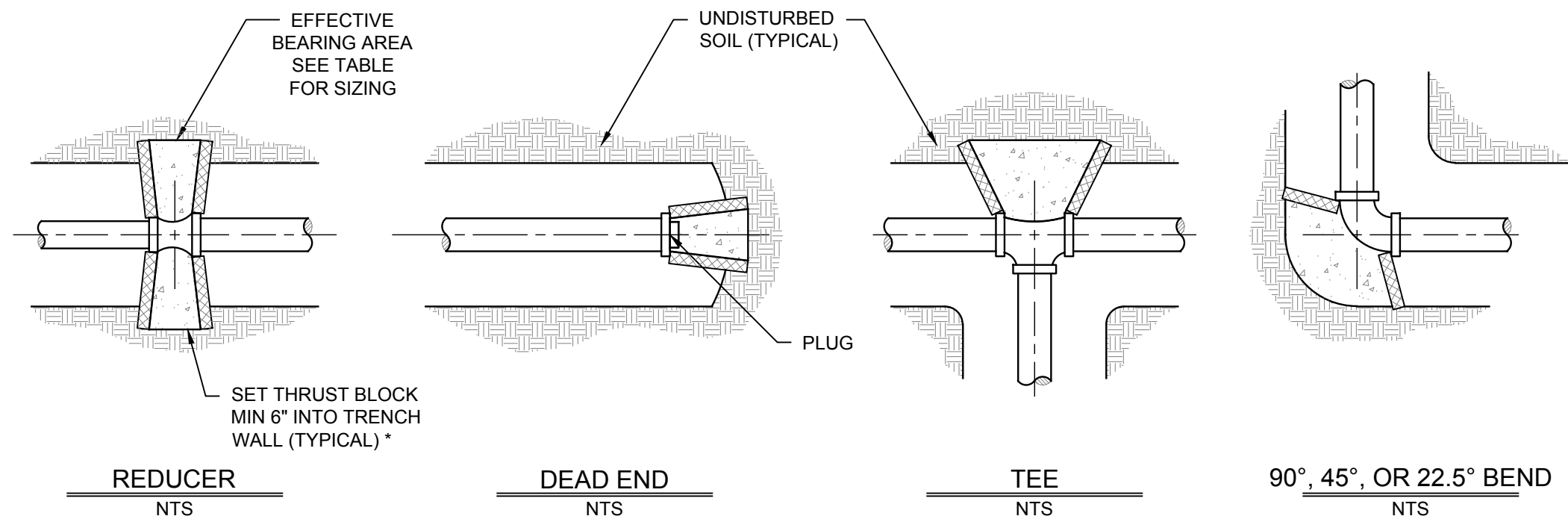
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MINIMUM BEARING SURFACE AREA OF CONCRETE THRUST BLOCKS (IN SQUARE FEET)

REDUCERS		4-8"			10"			12"			SOIL CONDITION	SAFE BEARING LOAD (PSF)				
8x6	10x8	12x8	ENDS AND TEES	90° ELB	45° ELB	22.5° OR LESS	ENDS AND TEES	90° ELB	45° ELB	22.5° OR LESS						
3.0	5.0	6.0	4.0	6.0	3.0	2.0	6.0	8.0	5.0	2.0	8.0	3.0	SOUND SHALE	10000		
3.0	5.0	6.0	4.5	6.5	3.5	2.0	8.0	11.0	6.0	3.0	10.0	14.0	7.5	4.0	CEMENTED GRAVEL AND SAND	4000
7.0	7.0	11.0	7.0	9.0	5.0	3.0	10.0	14.0	7.0	4.0	14.0	19.0	11.0	5.0	COARSE AND FINE COMPACT SAND	3000
8.0	9.0	14.0	15.0	20.0	10.0	5.0	21.0	31.0	15.0	8.0	30.0	40.0	20.0	10.0	MEDIUM CLAY (CAN BE SPADED)	2000
8.0	11.0	16.0	20.0	28.0	15.0	8.0	29.0	41.0	22.0	11.0	41.0	58.0	31.0	16.0	SOFT CLAY	1000

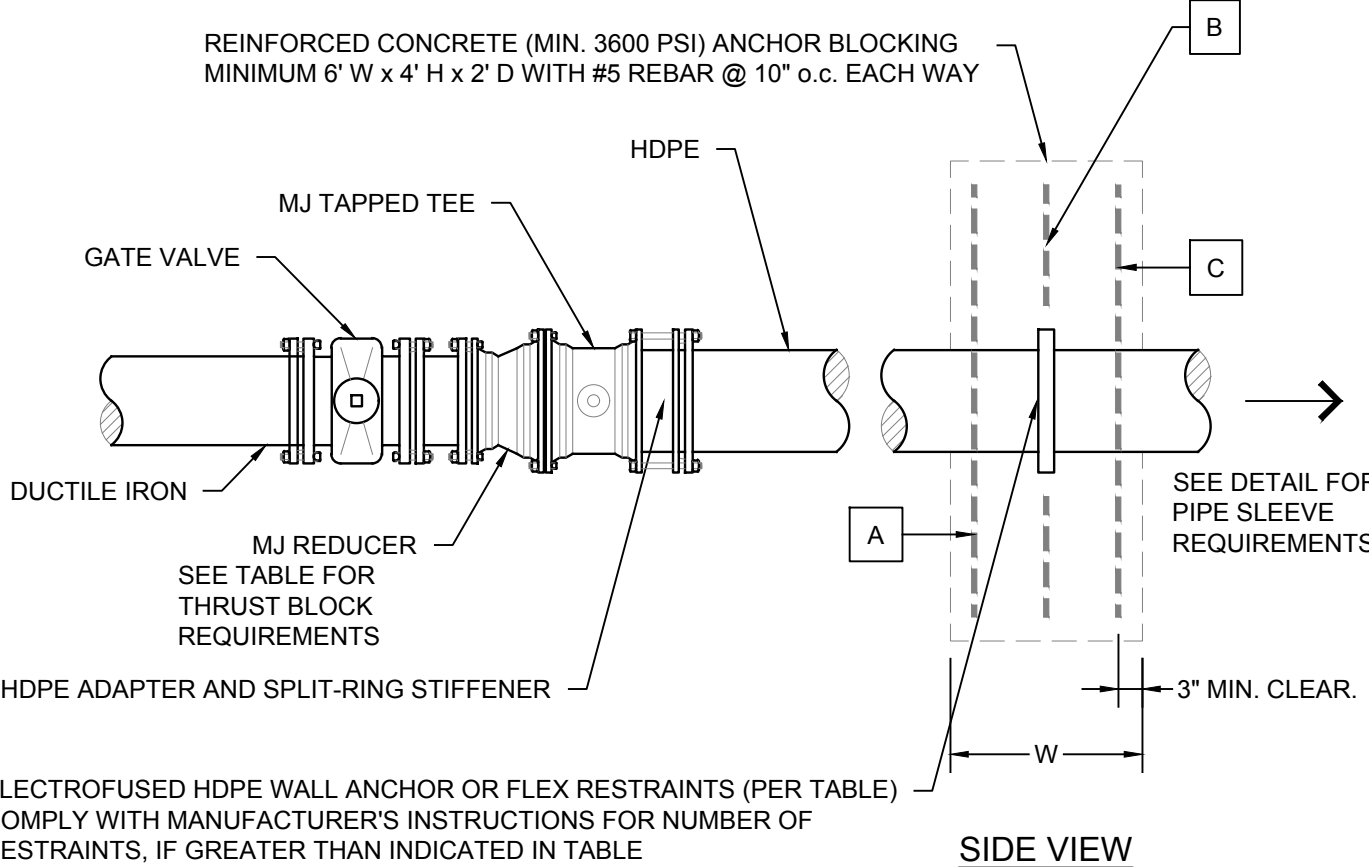
MAXIMUM WATER PRESSURE 300 PSI

\* THRUST BLOCKS ARE NOT REQUIRED AT REDUCERS OF ONE PIPE DIAMETER OR LESS  
 \*\* ALL THRUST BLOCKS ARE TO BE FORMED WITH 2" RIGID FOAM INSULATION TO MEET MINIMUM BEARING SURFACE AREA.  
 NON-FORMED THRUST BLOCKS WILL NOT BE PERMITTED.

**1 TYPICAL CONCRETE THRUST BLOCK DETAIL**

Scale: NTS

NOTES:  
 1. PLACE 3 MIL MINIMUM POLYETHYLENE SHEETING BETWEEN ALL CONCRETE THRUST BLOCKS AND PIPE AND/OR FITTINGS TO PREVENT BONDING



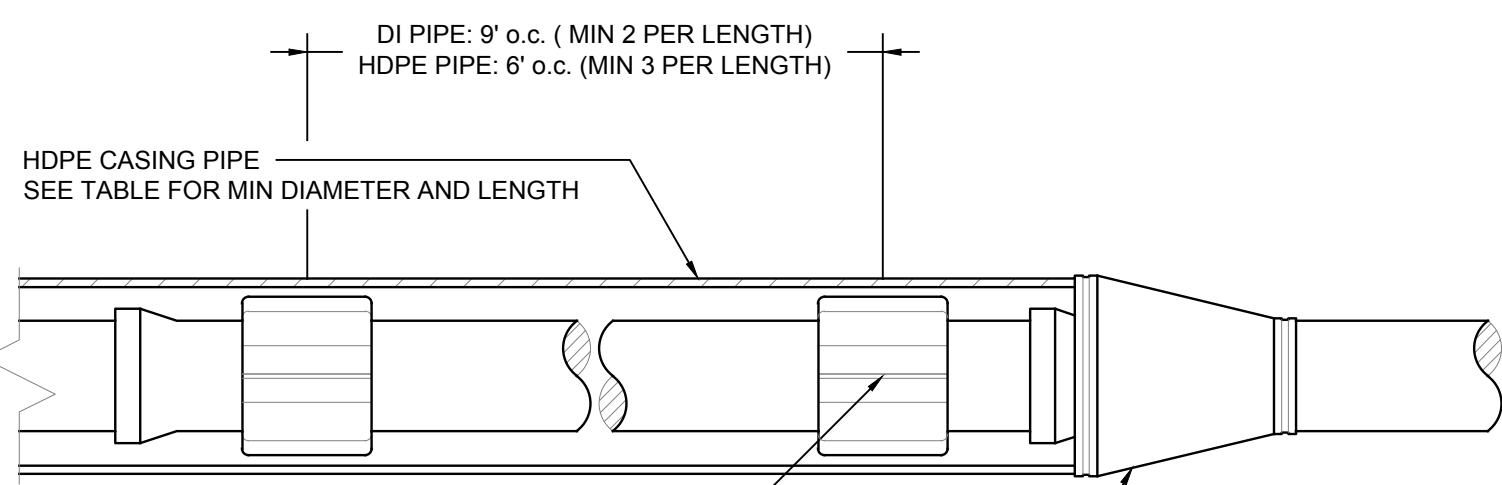
NOTES:

- INSTALL (2) EXTRA HIGH-STRENGTH # 12 - 14 AWG SOLID COPPER TRACER WIRE WITH BLUE 30 mil INSULATION. CONNECT AT DUCTILE IRON PIPE. RUN ABOVE HDPE, AND IN SLEEVE. TRACER WIRE TO BE ELECTRICALLY CONTINUOUS TO BOTH ENDS OF HDPE, AND BONDED TO DUCTILE IRON.
- FLEX RESTRAINTS MUST BE RATED AT 8,000 LBS OF FORCE OR HIGHER
- WHEN DIRECTED BY THE ENGINEER, THE CONCRETE ANCHOR BLOCK SIZE MAY BE ADJUSTED, BASED ON SOIL CLASSIFICATION AND PIPE DIAMETER
- ENGINEER TO CONFIRM ADEQUATE SOIL PRESSURE BEARING CAPACITY FOR CONCRETE ANCHOR BLOCKING
- REINFORCEMENT NOTES
  - FOR 4 TO 10 INCH PIPE, PLACE ONE MAT OF #5 REBAR AT LOCATION "B" AS SHOWN ON DIAGRAM
  - FOR 12 INCH PIPE, PLACE TWO MATS OF #5 REBAR, ONE AT LOCATION "A" AND ONE AT LOCATION "C" AS SHOWN ON THE DIAGRAM

HDPE NOMINAL PIPE SIZE (INCHES)	APPROX. DEAD END THRUST AT 200 PSI WATER PRESSURE		UNDISTURBED SOIL BEARING AREA (SQ FT)	APPROX. SOIL PRESSURE BEARING LOAD (LB/ SQ FT)	MINIMUM WIDTH "W" (INCHES)	APPROXIMATE CONCRETE VOLUME	
	DI PIPE: 9' o.c. (MIN 2 PER LENGTH)	HDPE PIPE: 6' o.c. (MIN 3 PER LENGTH)				CUBIC FT	CUBIC YARDS
4	2,130	15	142	10	20	0.74	
6	4,616	15	308	10	20	0.74	
8	7,823	15	522	12	24	0.89	
10	12,153	15	810	12	24	0.89	
12	17,094	15	1,140	14	28	1.04	

**2 TYPICAL HDPE TRANSITION DETAIL**

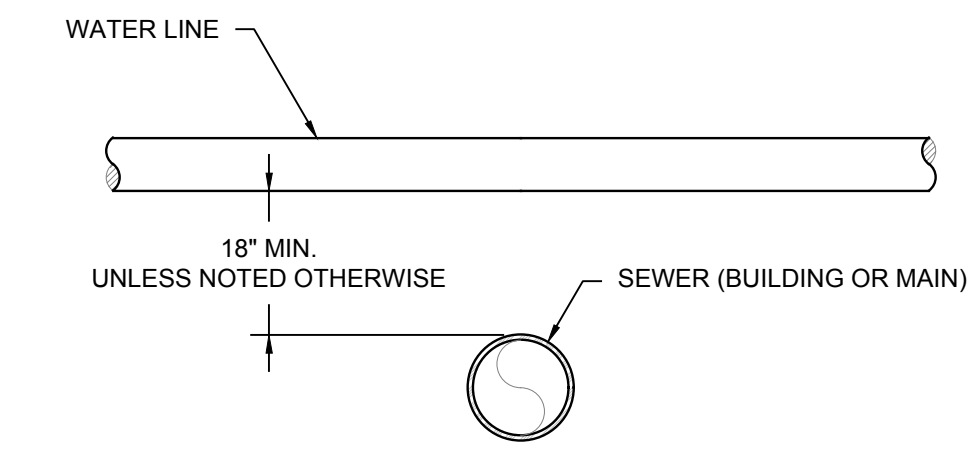
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CARRIER DIA	CASING DIAM.ATL	MIN THICKNESS
3/4\"/>		
2\"/>		
3\"/>		
4\"/>		
6\"/>		
8\"/>		
10\"/>		
10\"/>		

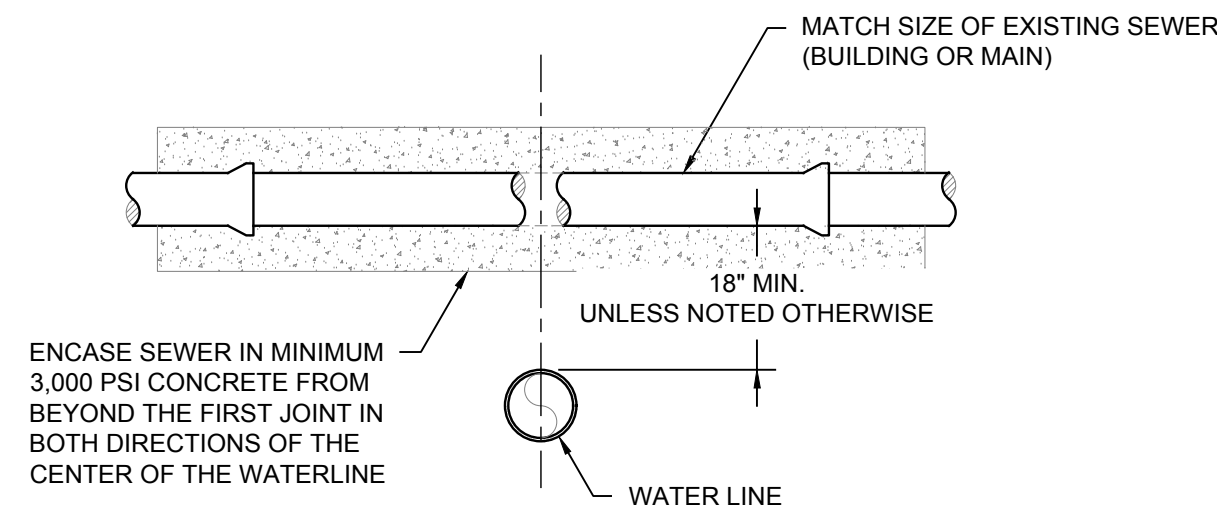
**3 SLEEVE PIPE DETAIL**

Scale: NTS



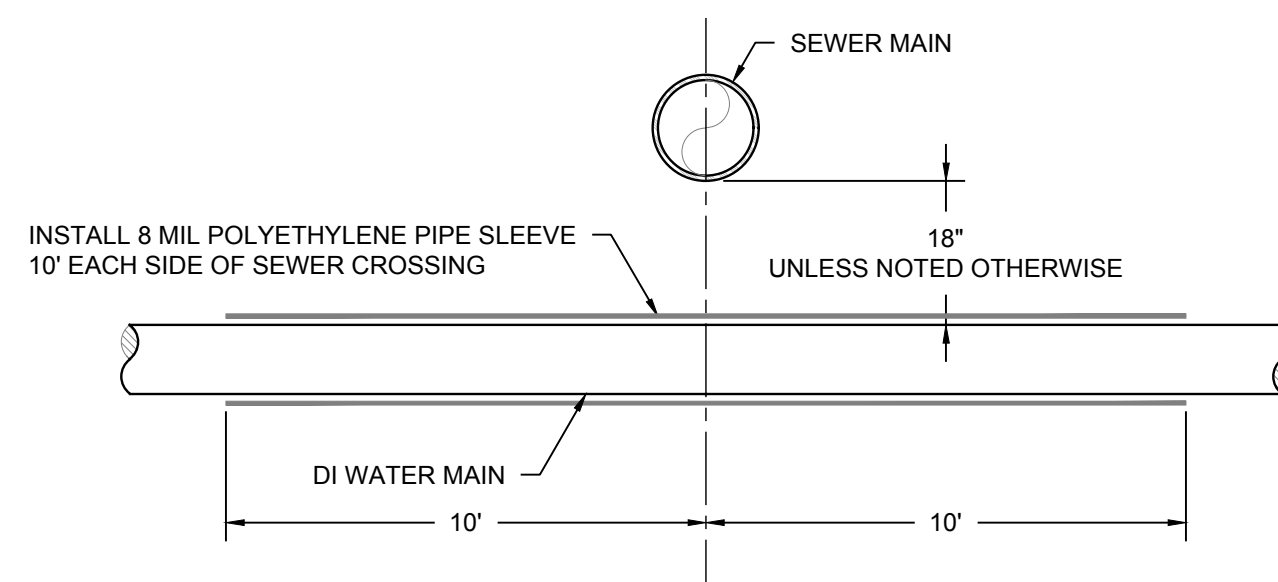
**4 WATER CROSSING SEWER - ABOVE**

Scale: NTS



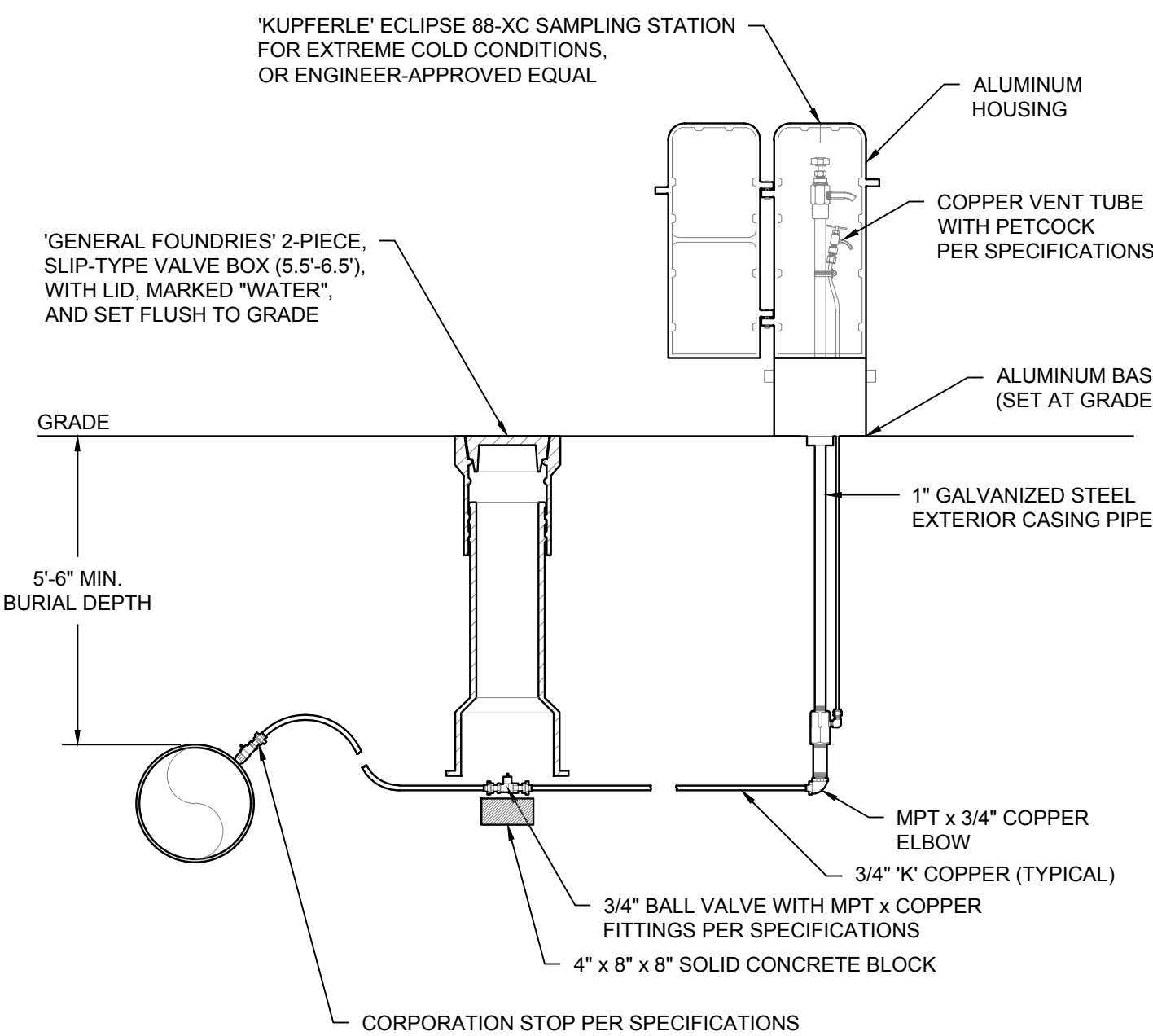
**5 WATER CROSSING SEWER - BELOW**

Scale: NTS



**6 WATER CROSSING SEWER - BELOW**

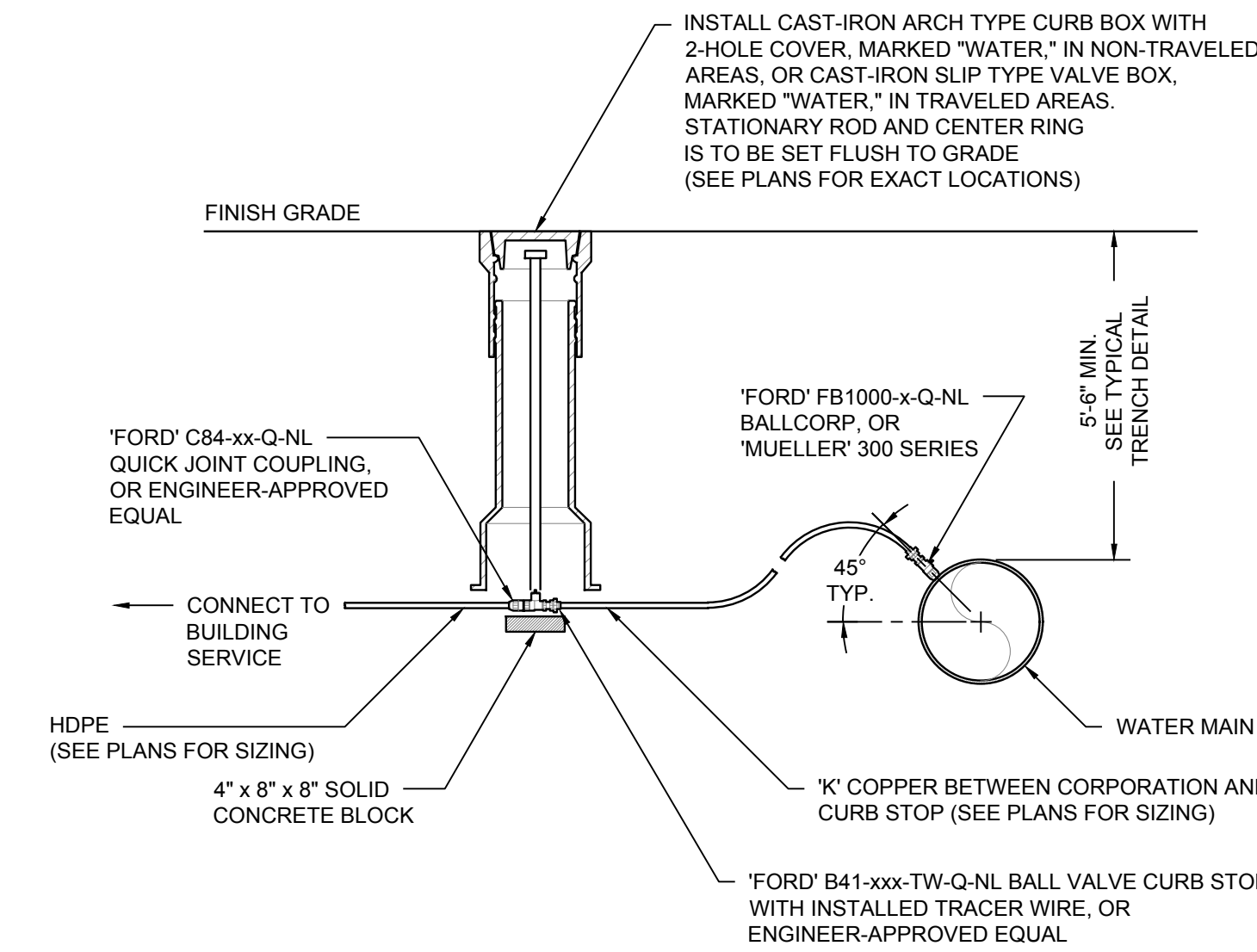
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**7 TYPICAL SAMPLING STATION DETAIL**

Scale: NTS

- SAMPLING STATIONS ARE TO HAVE A 5'-6" MINIMUM BURIAL DEPTH, WITH 3/4" FIP INLET AND 3/4" HOSE OR UNTHREADED NOZZLE
- ALL STATIONS ARE TO BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE ALUMINUM-CAST HOUSING, AND ARE TO INCLUDE THE MANUFACTURER'S VACUUM PUMP SYSTEM
- WHEN OPENED, THE STATION MUST REQUIRE NO KEY FOR OPERATION, AND THE WATER WILL FLOW IN AN ALL BRASS WATERWAY
- ALL WORKING PARTS WILL ALSO BE OF BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING
- EXTERIOR PIPING ARE TO BE BRASS OR GALVANIZED
- A COPPER VENT TUBE WILL ENABLE EACH STATION TO BE PUMPED FREE OF STANDING WATER TO PREVENT FREEZING AND TO MINIMIZE THE GROWTH OF BACTERIA
- THE ECLIPSE No. 88-XC SAMPLING STATION, FOR EXTREME COLD CONDITIONS, WILL BE MANUFACTURED BY KUPFERLE FOUNDRY, ST. LOUIS, MO 63102

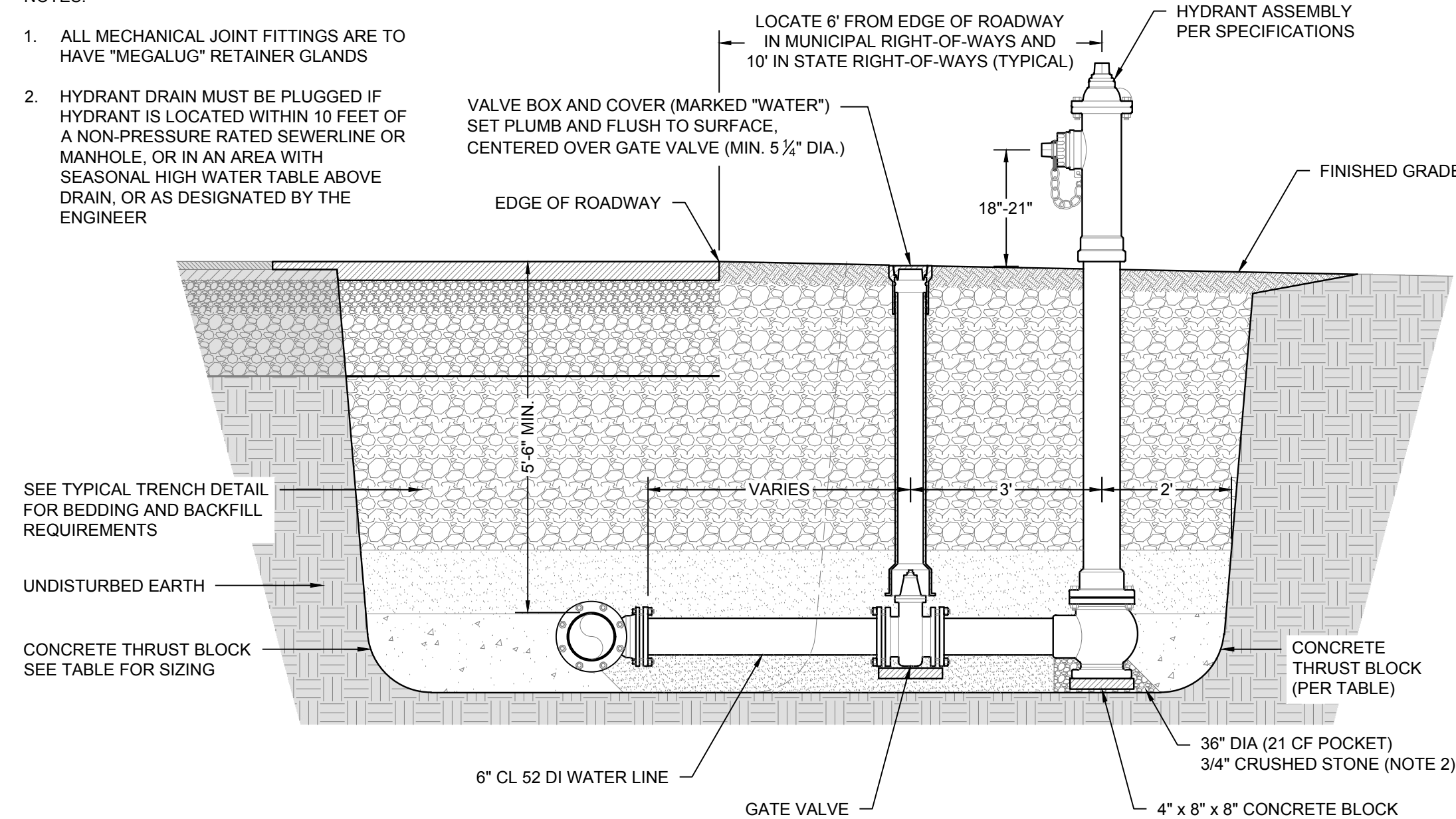


**8 TYPICAL CURB STOP**

Scale: NTS

NOTES:

- ALL MECHANICAL JOINT FITTINGS ARE TO HAVE "MEGALUG" RETAINER GLANDS
- HYDRANT DRAIN MUST BE PLUGGED IF HYDRANT IS LOCATED WITHIN 10 FEET OF A NON-PRESSURE RATED SEWERLINE OR MANHOLE, OR IN AN AREA WITH SEASONAL HIGH WATER TABLE ABOVE DRAIN, OR AS DESIGNATED BY THE ENGINEER

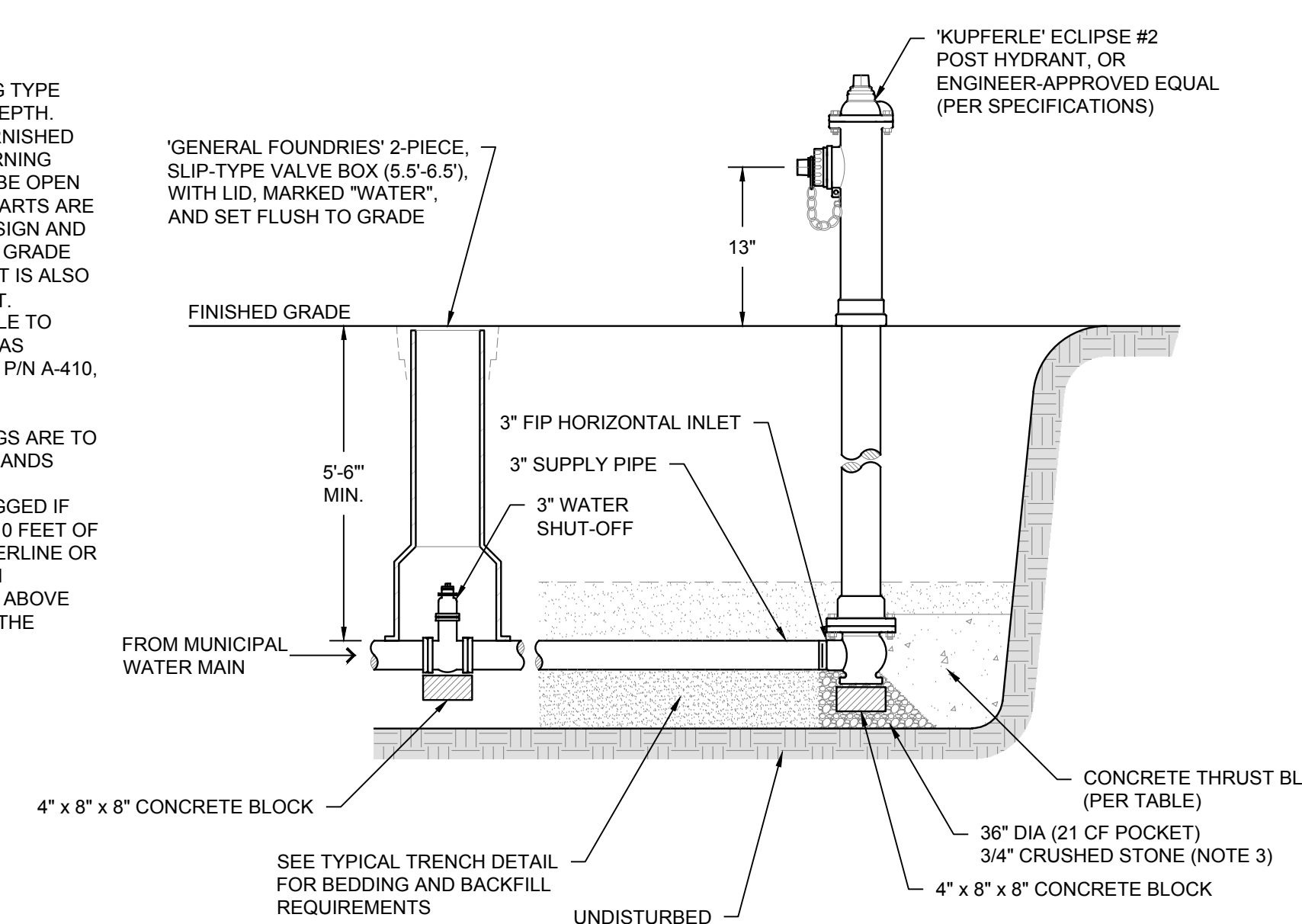


**9 HYDRANT ASSEMBLY DETAIL**

Scale: NTS

NOTES:

- POST HYDRANTS ARE TO BE NON-FREEZING, SELF-DRAINING TYPE WITH A 5'-6" MINIMUM BURIAL DEPTH. THESE HYDRANTS WILL BE FURNISHED WITH A 3" FIP INLET, A NON-TURNING OPERATING ROD, AND ARE TO BE OPEN TO THE RIGHT. ALL WORKING PARTS ARE TO BE BRONZE TO BRONZE DESIGN AND BE SERVICEABLE FROM ABOVE GRADE WITHOUT DIGGING. THE OUTLET IS ALSO TO BE BRONZE AND BE 2 1/2" NST. HYDRANTS ARE TO BE LOCKABLE TO PREVENT UNAUTHORIZED USE AS MANUFACTURED BY MUELLER, P/N A-410, OR APPROVED EQUAL.
- ALL MECHANICAL JOINT FITTINGS ARE TO HAVE "MEGALUG" RETAINER GLANDS
- HYDRANT DRAIN MUST BE PLUGGED IF HYDRANT IS LOCATED WITHIN 10 FEET OF A NON-PRESSURE RATED SEWERLINE OR MANHOLE, OR IN AN AREA WITH SEASONAL HIGH WATER TABLE ABOVE DRAIN, OR AS DESIGNATED BY THE ENGINEER



**10 FLUSH HYDRANT DETAIL**

Scale: NTS

MSK ENGINEERING AND DESIGN, INC.  
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 BENNINGTON, VERMONT 05201  
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NO.	DATE	DESCRIPTION

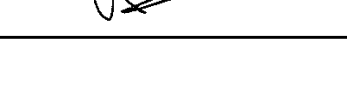
TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

CONSTRUCTION  
 DETAILS

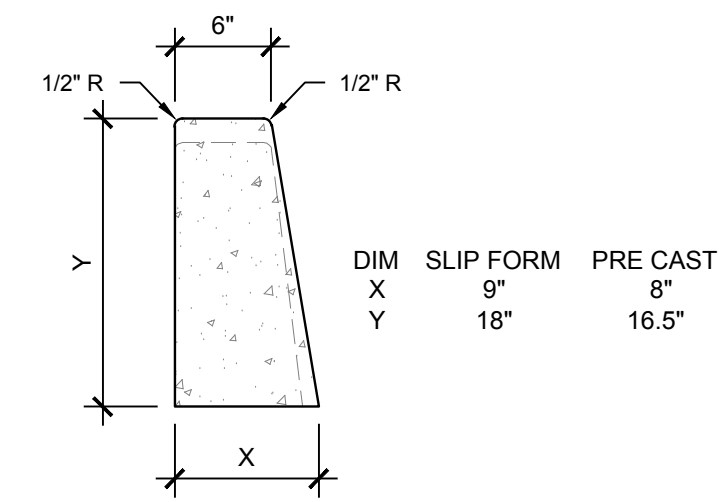
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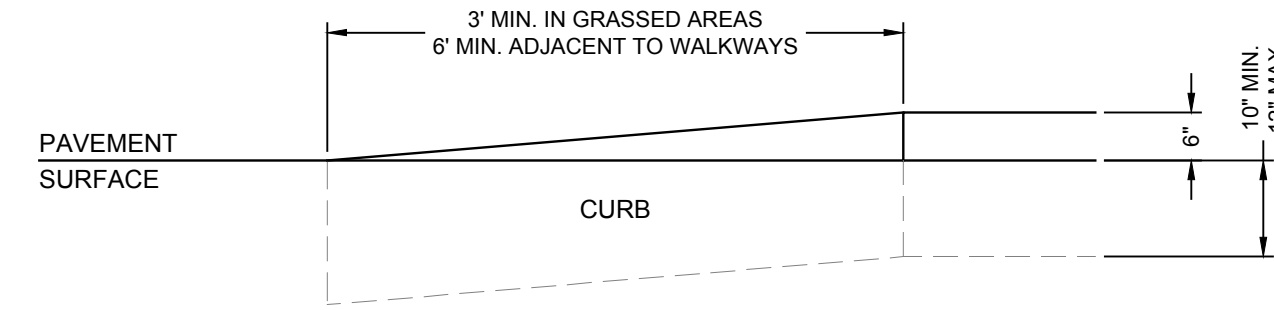
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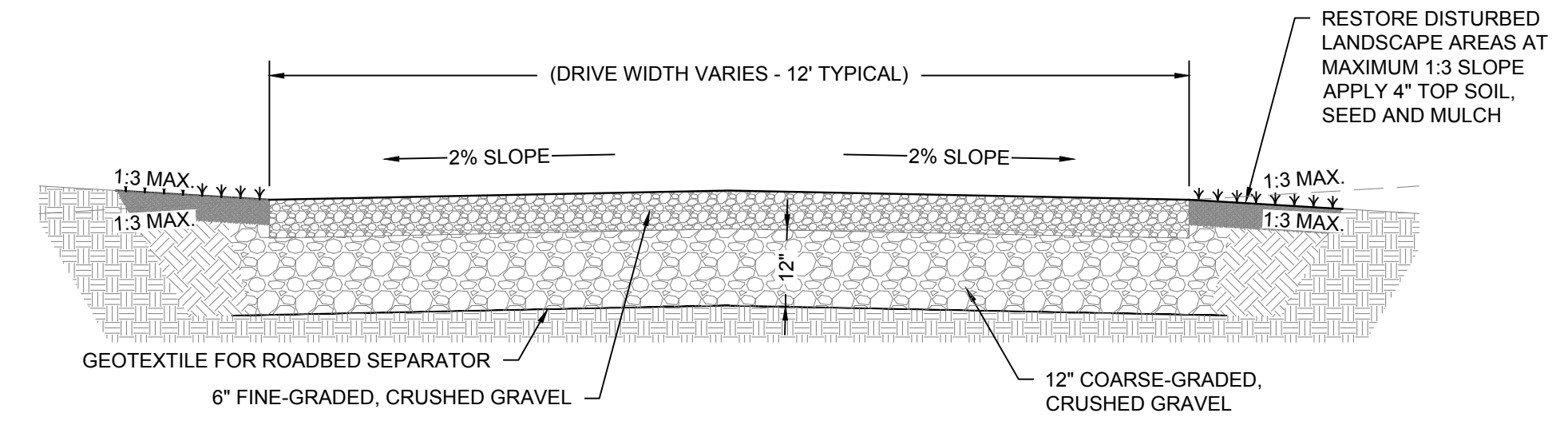
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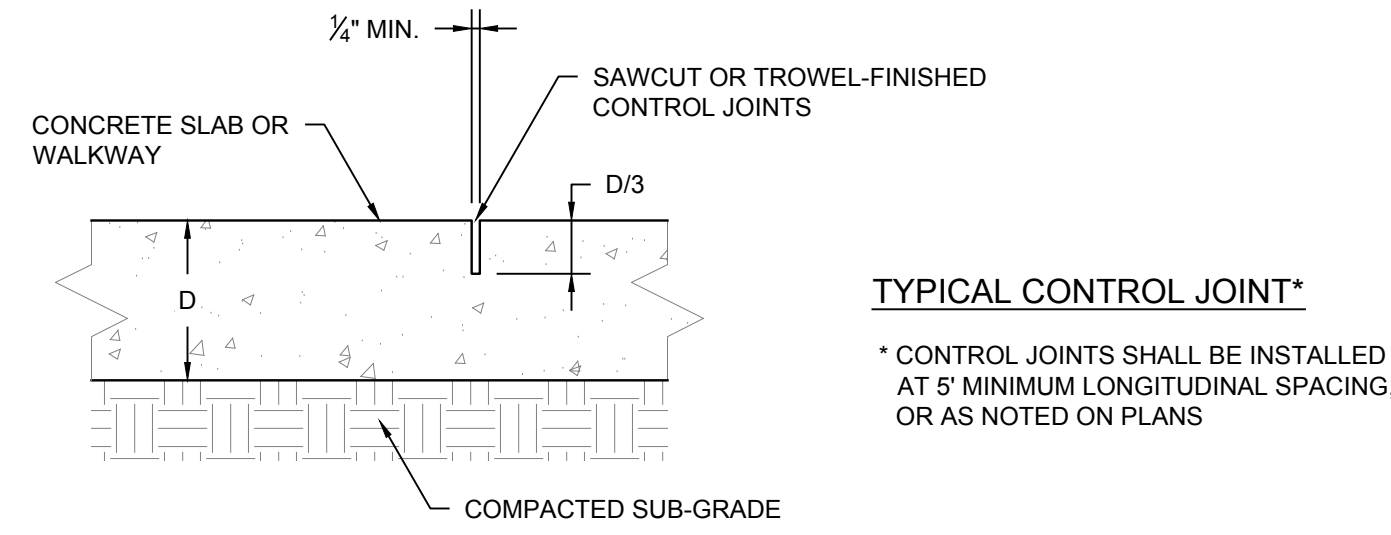
**1 TYPICAL CURB**  
TYPE B NTS



**2 CURB - TAPERED END DETAIL**  
NTS



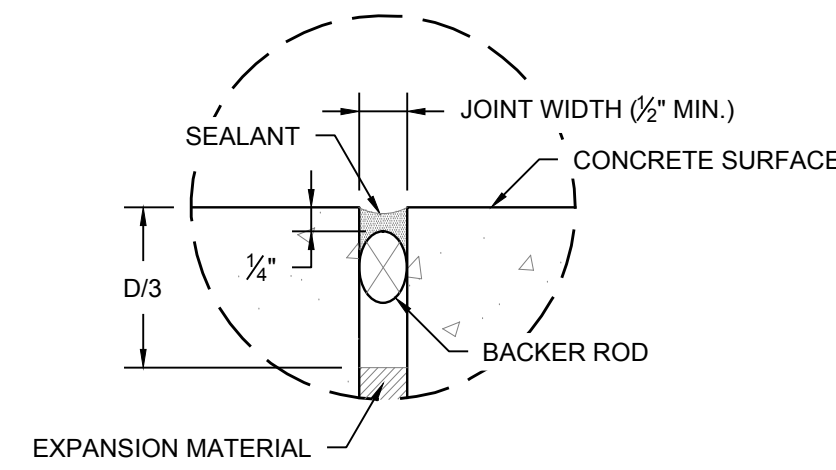
**9 TYPICAL GRAVEL DRIVE**  
Scale: NTS



**TYPICAL CONTROL JOINT\***  
\* CONTROL JOINTS SHALL BE INSTALLED AT 5' MINIMUM LONGITUDINAL SPACING, OR AS NOTED ON PLANS

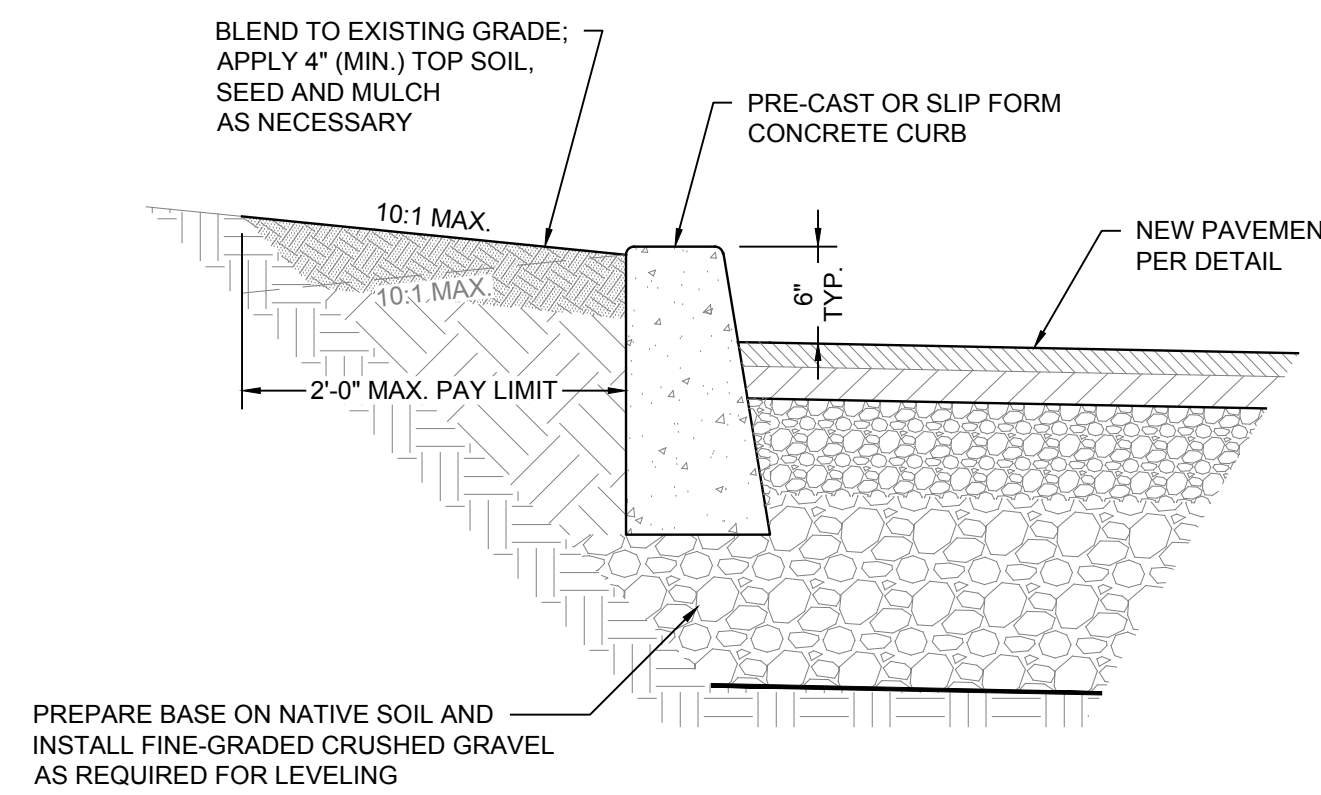
D = DEPTH OF CONCRETE

**TYPICAL EXPANSION JOINT (WITH SEAL)**

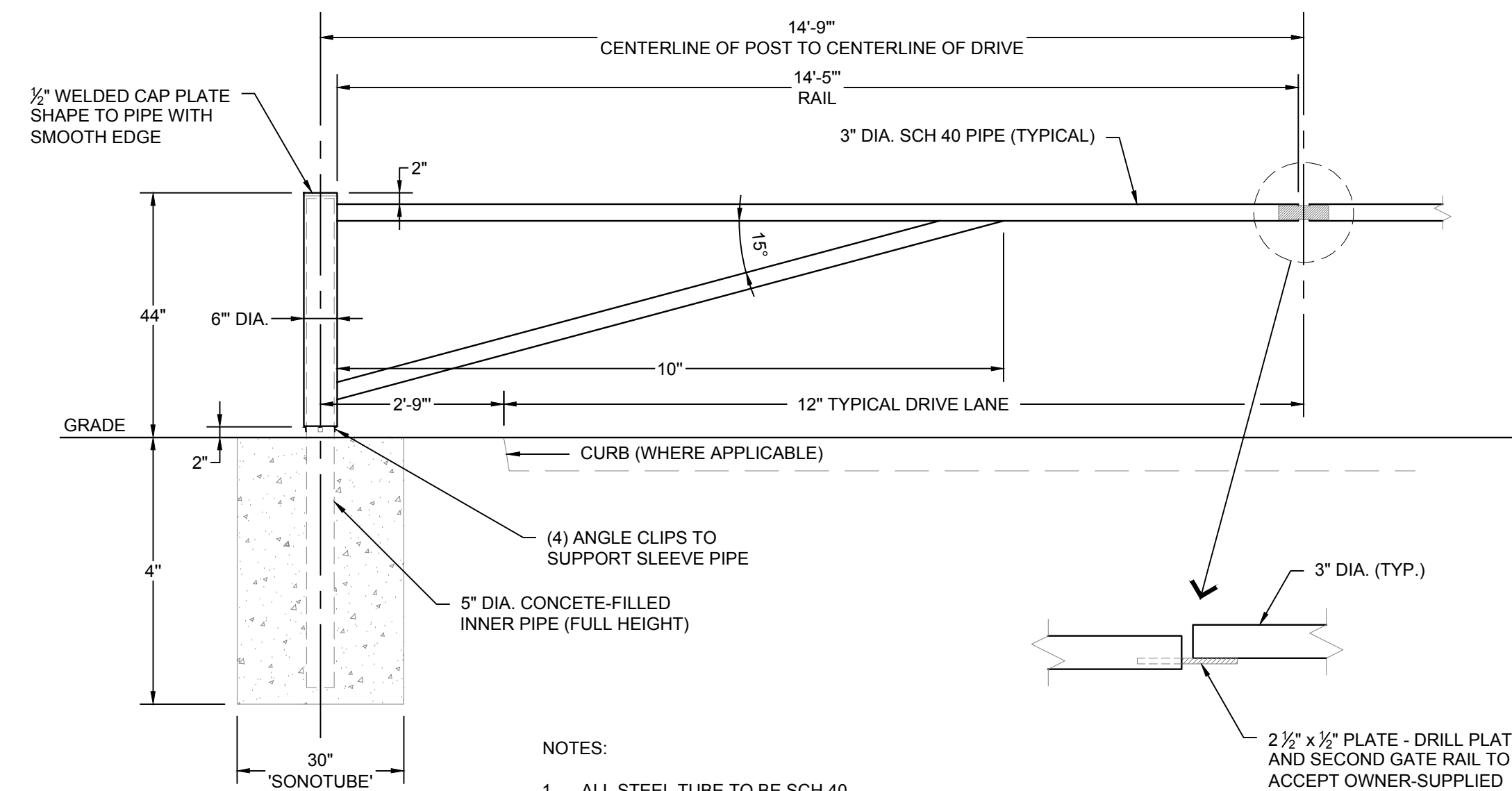


PRE-FORMED EXPANSION JOINT FILLER SHALL BE INSTALLED FOR THE FULL THICKNESS OF THE WALKWAY AND SHALL BE USED AT ALL JOINTS BETWEEN NEW WALKWAYS, EXISTING WALKWAYS, AND OTHER CONCRETE APPURTENANCES. EXPANSION JOINT SPACING SHALL NOT EXCEED 25' IN NEW CONSTRUCTION.

**3 TYPICAL CONCRETE JOINT DETAILS**  
Scale: NTS

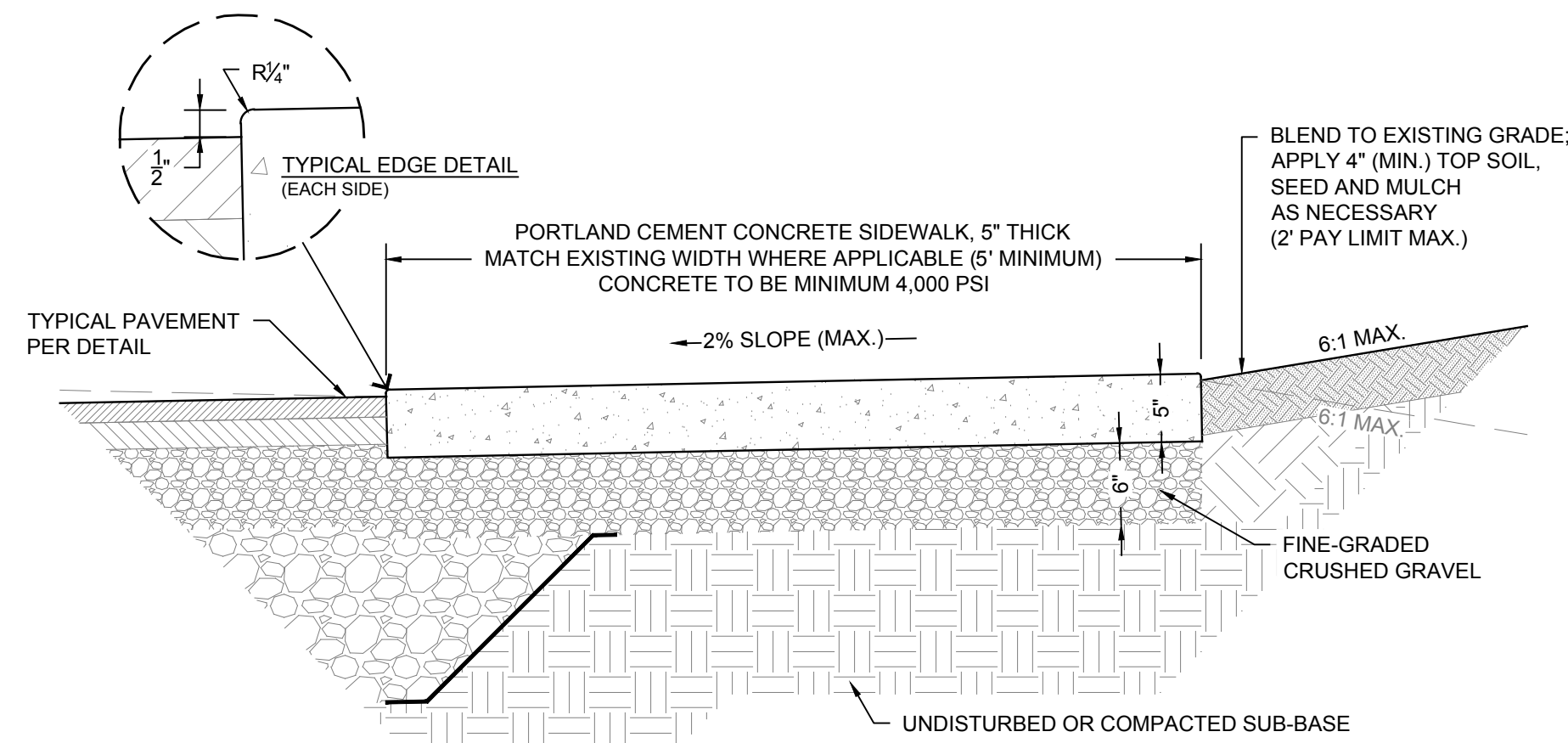


**4 TYPICAL CURB DETAIL**  
TYPE B Scale: NTS

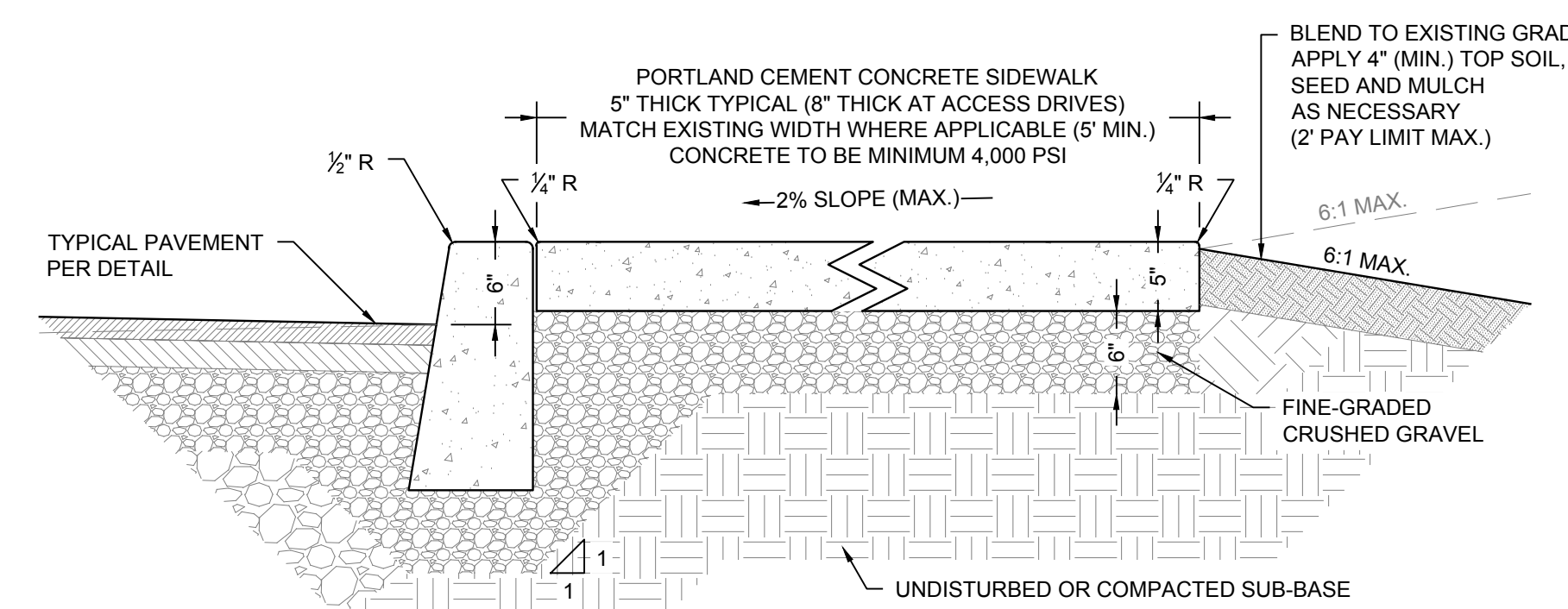


**10 TYPICAL STEEL GATE DETAIL**  
NTS

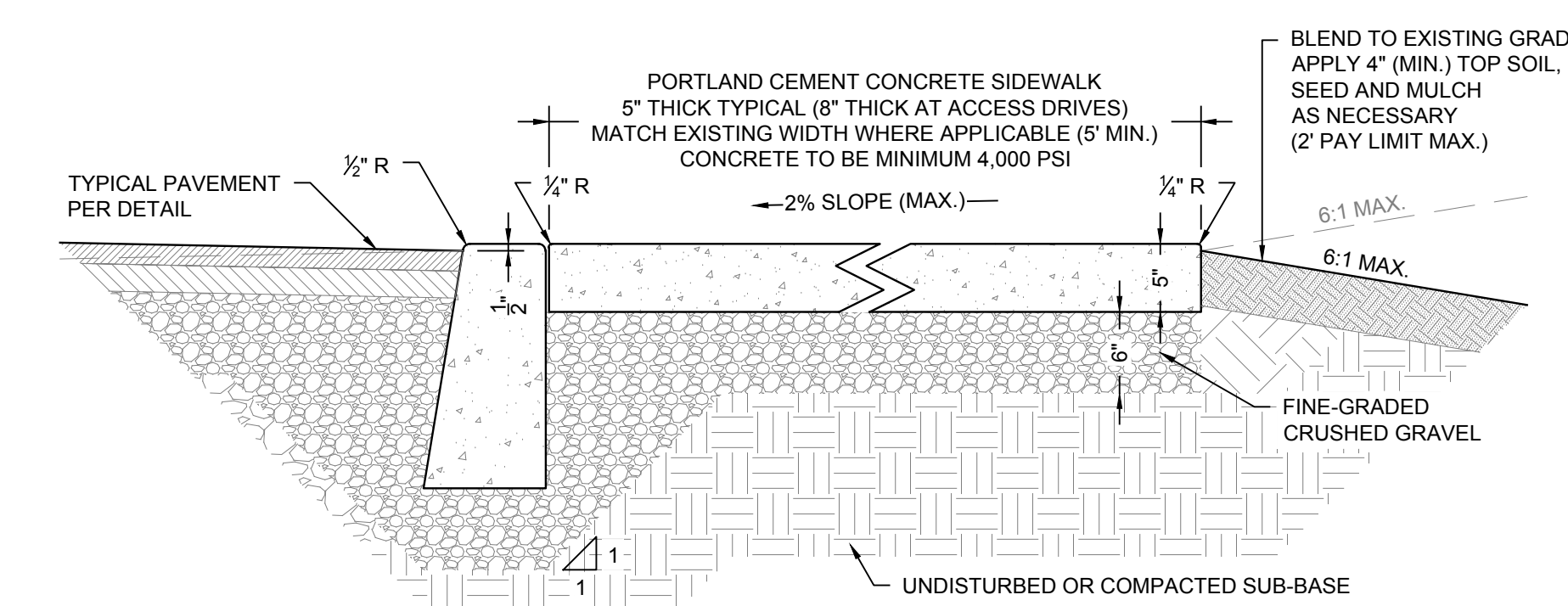
- NOTES:
1. ALL STEEL TUBE TO BE SCH 40
  2. APPLY PRIMER AND (2) COATS ENAMEL PAINT (COLOR TO BE SELECTED BY OWNER)



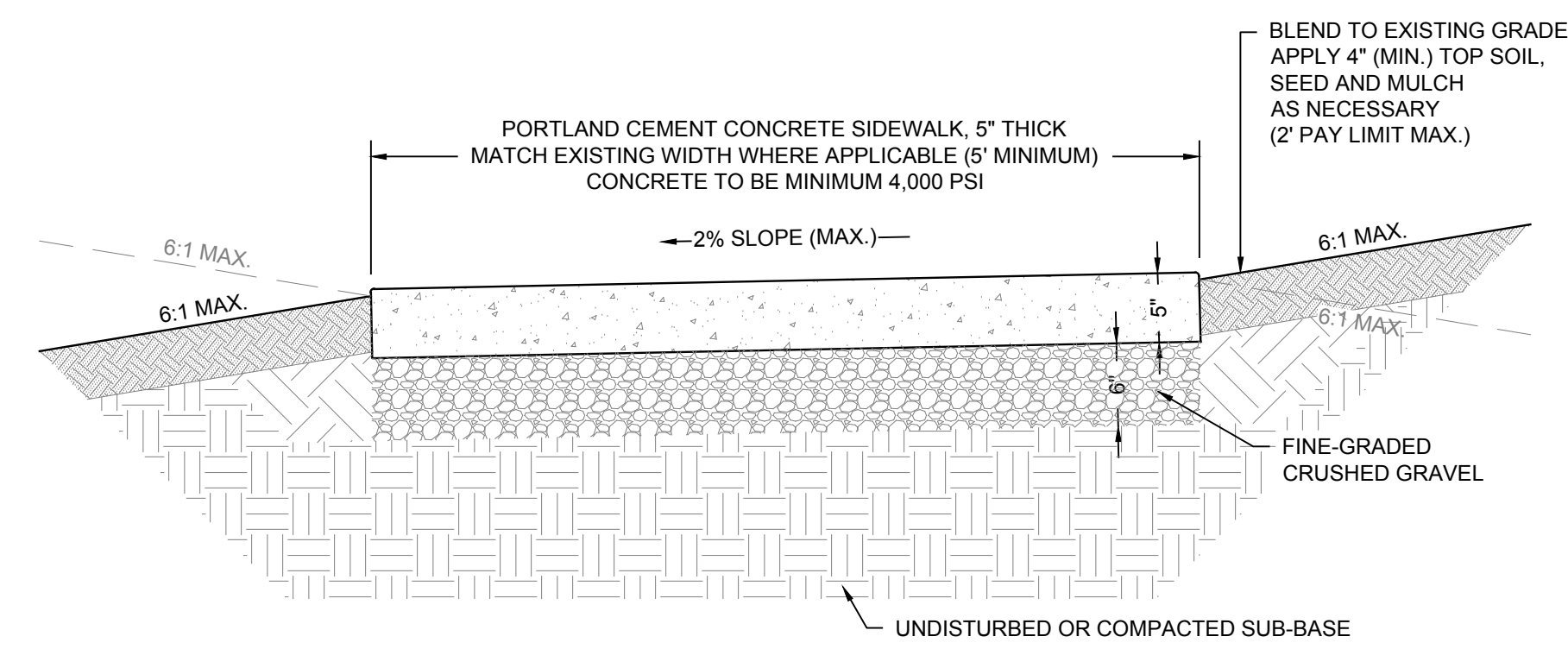
**5 TYPICAL CONCRETE WALKWAY DETAIL**  
Scale: NTS



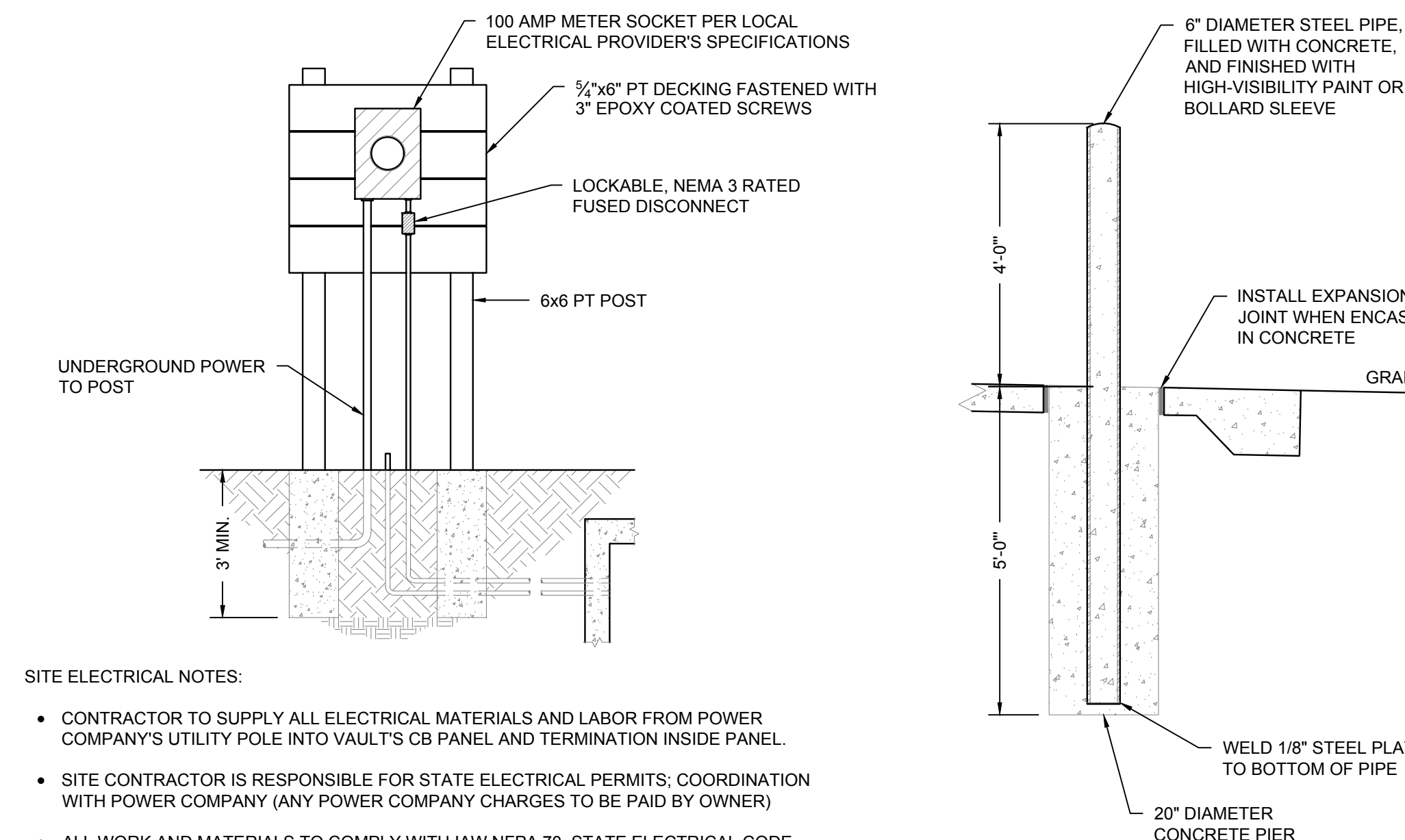
**6 TYPICAL CONCRETE WALKWAY DETAIL (WITH CURB)**  
Scale: NTS



**7 TYPICAL CONCRETE WALKWAY DETAIL (WITH FLUSH CURB)**  
Scale: NTS

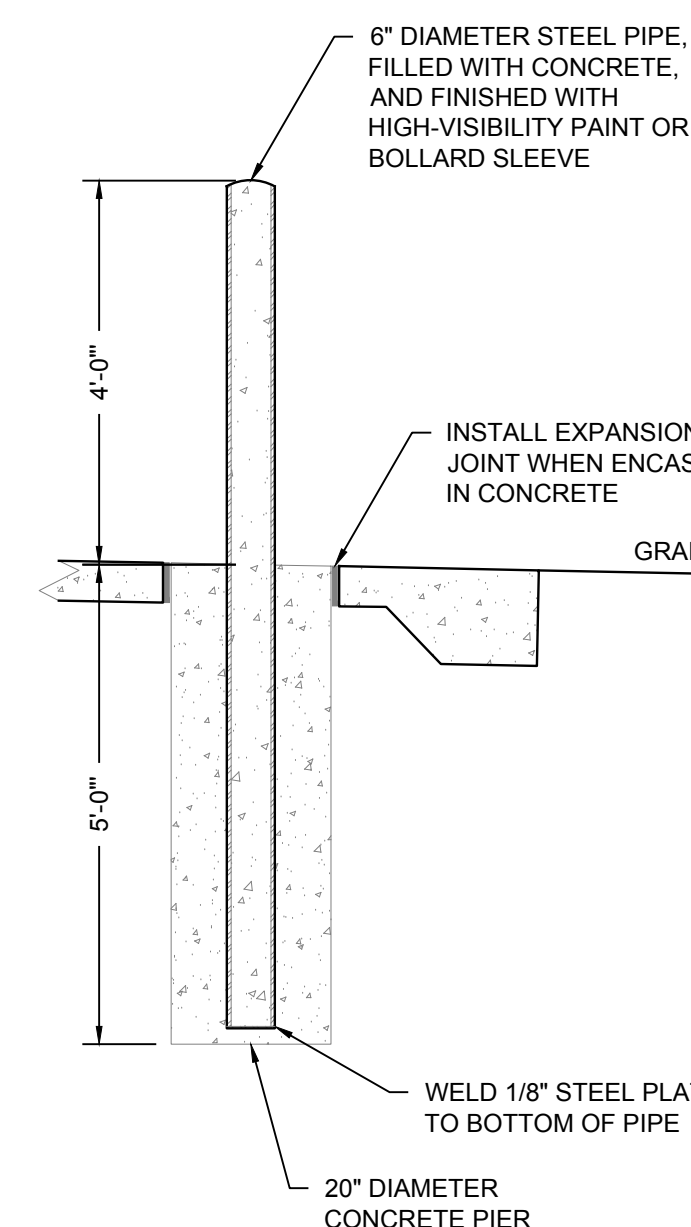


**8 TYPICAL CONCRETE WALKWAY DETAIL**  
Scale: NTS



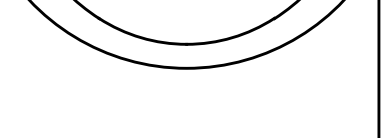
- SITE ELECTRICAL NOTES:
- CONTRACTOR TO SUPPLY ALL ELECTRICAL MATERIALS AND LABOR FROM POWER COMPANY'S UTILITY POLE INTO VAULT'S CB PANEL AND TERMINATION INSIDE PANEL.
  - SITE CONTRACTOR IS RESPONSIBLE FOR STATE ELECTRICAL PERMITS, COORDINATION WITH POWER COMPANY (ANY POWER COMPANY CHARGES TO BE PAID BY OWNER)
  - ALL WORK AND MATERIALS TO COMPLY WITH IAW NFPA 70, STATE ELECTRICAL CODE, AND POWER COMPANY SPECIFICATIONS/REQUIREMENTS

**11 ELECTRIC SERVICE PANEL DETAIL**  
Scale: NTS



**12 BOLLARD DETAIL**  
Scale: NTS

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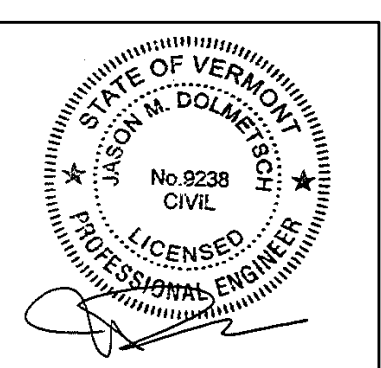
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT**

**CONSTRUCTION  
DETAILS**

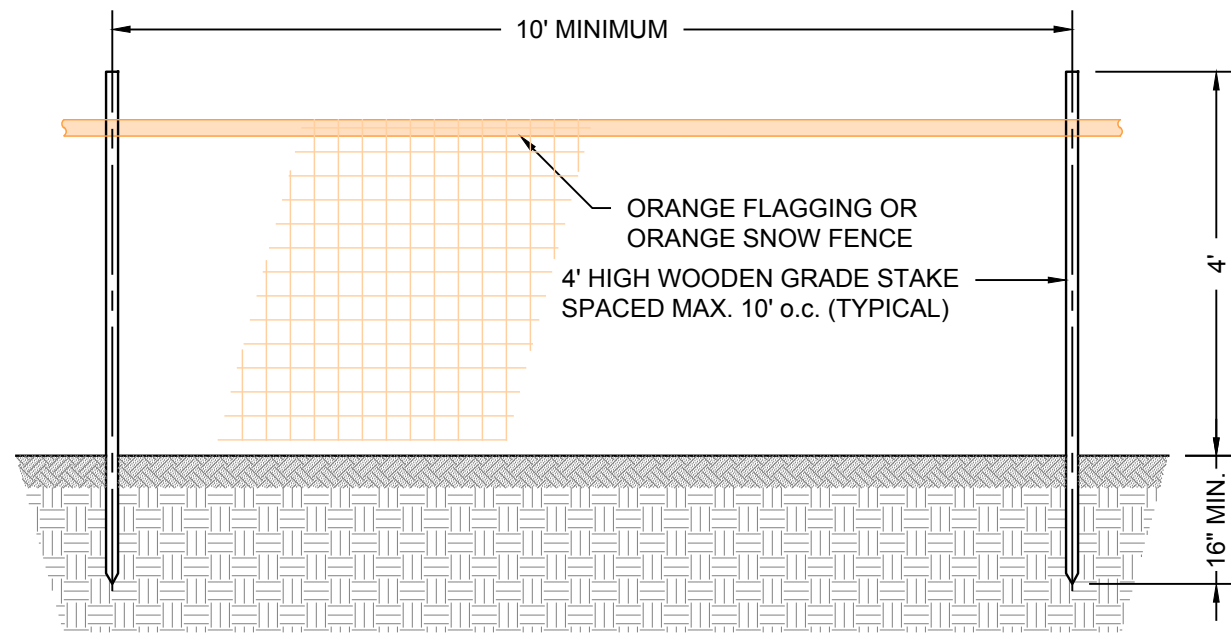
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1001-019.7	05-14-2019
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MSK	JMD

SHEET NUMBER  
**C505**



ALL DRAWING DATA/NOTES/DETAILS SHALL BE IN ACCORDANCE WITH THE LATEST EDITIONS OF THE CONSTRUCTION DETAILS. DATE: 05-14-2019

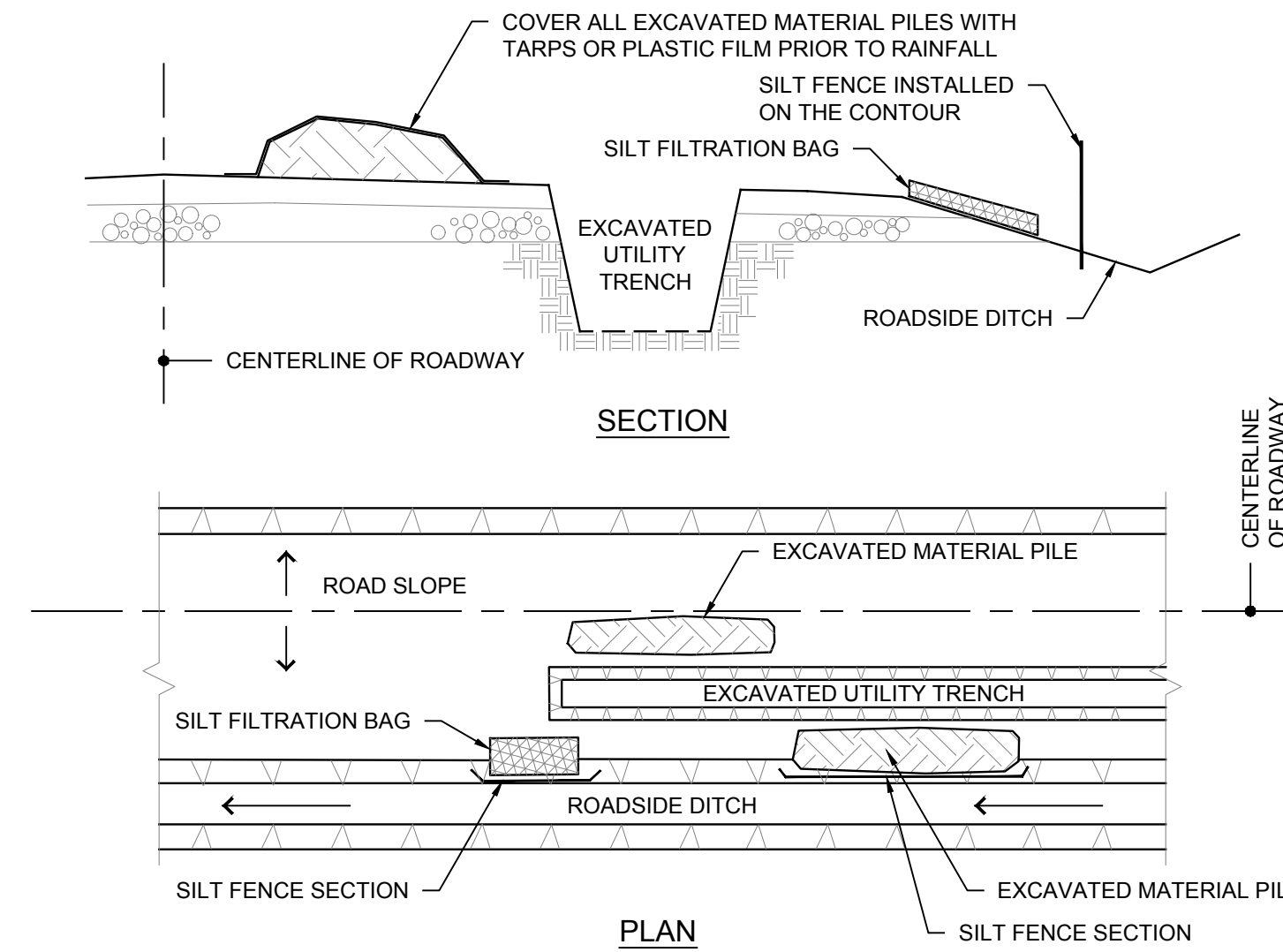




**1 TYPICAL PROJECT DEMARCATION FENCE**  
Scale: NTS

**GENERAL NOTES**

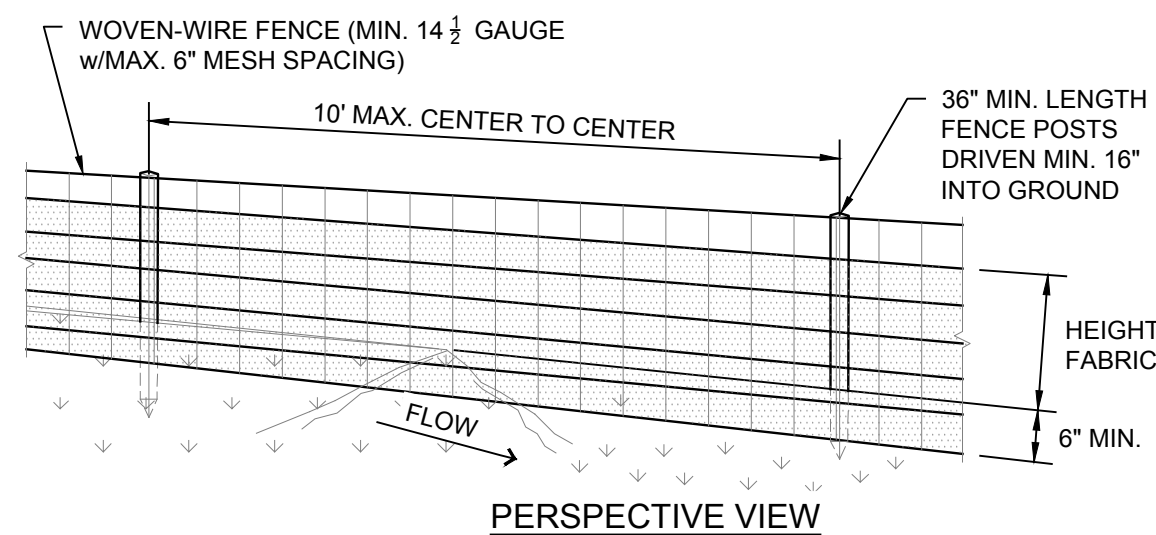
- THIS PROJECT IS PERMITTED UNDER AN INDIVIDUAL STORMWATER CONSTRUCTION PERMIT.
- SOIL DISTURBANCE IS TO BE LIMITED TO FIVE ACRES, OR LESS, AT ANY ONE TIME.
- THE OSPC IS RESPONSIBLE FOR ALL SITE INSPECTIONS AND AMENDING THE EROSION PROTECTION AND SEDIMENT CONTROL (EPSC) PLAN.
- INSPECTIONS TO BE CONDUCTED EVERY 7 DAYS AND WITHIN 24 HOURS OF STORM EVENTS RESULTING IN STORMWATER DISCHARGE FROM THE PROJECT SITE.
- THE OSPC MUST COMPLETE THE VTDEC FORM "CGP-9020 INSPECTION REPORT."
- AT THE END OF EACH WORK DAY:
  - GRADED AREAS ARE TO DRAIN TOWARD SWALES.
  - EXCAVATED AREAS SHALL BE SELF-CONTAINED AND BE OF A DEPTH OF TWO FEET OR GREATER.
  - MATERIAL SHALL NOT BE LEFT STOCKPILED, EXCEPT WITHIN STAGING AREAS, AND SHALL BE STABILIZED.
- ALL TRENCH DEWATERING ACTIVITIES MUST BE DISCHARGED INTO SWALES.
- ADEQUATE STABILIZATION MATERIAL IS TO BE STORED ON SITE AT ALL TIMES.
- THE WINTER CONSTRUCTION SEASON IS DEFINED AS THE PERIOD FROM OCTOBER 15 THROUGH APRIL 15.
- ALL SEEDING IS TO OCCUR BEFORE SEPTEMBER 15 OR SUITABLE ROLLED EROSION CONTROL PRODUCTS (RECP) SHALL BE USED.
- WORK PERFORMED BELOW THE ORDINARY HIGH WATER (OHW) LEVEL SHALL BE COMPLETED IN ACCORDANCE WITH THE ARMY CORP GENERAL PERMIT AND THE STATE OF VERMONT STREAM ALTERATION PERMIT AND IS NOT COVERED UNDER THE STORMWATER CONSTRUCTION PERMIT.
- ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR PERMANENT STABILIZATION WITHIN 7 DAYS OF THE INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY. THE FOLLOWING EXCEPTIONS APPLY:
  - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST WITHIN THE SAME 24 HOUR TIME PERIOD.
  - STABILIZATION NOT REQUIRED IF THE WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION WITH A DEPTH OF TWO FEET OR GREATER.



**CONSTRUCTION SPECIFICATIONS**

- UTILITY TRENCH EXCAVATION NOT TO EXCEED 500 LINEAR FEET OF OPEN TRENCH AT ANY ONE TIME.
- EXCAVATED SOIL MATERIAL SHOULD BE PLACED ON UPHILL SIDE, BUT NOT ON THE EDGE, OF THE TRENCH. ENCIRCLE PILES WITH SILT FENCE SECTIONS IF EXCAVATED MATERIAL IS ON THE DOWNHILL SIDE OF TRENCH.
- TRENCH DEWATERING ACTIVITIES MUST DISCHARGE INTO A SILT FILTRATION BAG OF WOVEN OR NON-WOVEN GEOTEXTILE. CONTRACTOR TO MONITOR BAG THROUGHOUT PUMPING OPERATIONS. SILT FENCE SECTION TO SURROUND DOWN SLOPE SIDE OF SILT FILTRATION BAG, DO NOT BLOCK FLOW OF RUNOFF WITHIN THE DITCH.
- EXCAVATED SOIL FROM TRENCH MUST BE PREVENTED FROM MIGRATING TO ADJACENT PROPERTY, CATCH BASINS, ROADSIDE DITCHES, OR RECEIVING WATERS. IF EXCAVATED SOIL MIGRATES, CLEAN UP IMMEDIATELY.
- EXCAVATED SOIL FROM THE TRENCH TO BE ENCLOSED WITH SILT FENCE SECTIONS, TO BE ACCESSED FROM PAVEMENT OVER A STONE TRACKING PAD, AND TO BE LOCATED MORE THAN 50 FEET FROM ANY RECEIVING WATERS.
- EXCAVATED SOIL FROM THE TRENCH TO BE COMPLETELY COVERED BY TARPS OR PLASTIC FILM DURING ALL RAINFALL EVENTS AND AT ANY TIME CONSTRUCTION ACTIVITIES ARE SUSPENDED DUE TO THE WEATHER.
- ACCUMULATED SOIL ON PAVEMENT TO BE SWEEPED PRIOR TO ALL FORECASTED RAINFALL EVENTS. ROADWAY TO BE SWEEPED AT END OF THE WORK DAY IF TRENCH EXCAVATION IS WITHIN 50' OF ANY RECEIVING WATER.
- WITHIN 24 HOURS OF BACKFILLING ANY TRENCH SECTION ON EXISTING PAVEMENT, A MINIMUM 6" LAYER OF COMPACTED SUB-BASE GRAVEL SHALL BE PLACED AS THE TOP COURSE OF MATERIAL. IF TRENCH IS WITHIN AN UNPAVED AREA, HAY OR STRAW MULCH MATERIAL AND GRASS SEED SHALL BE PLACED OVER DISTURBED AREAS WITHIN 24 HOURS OF BACKFILLING TRENCH SECTION. SEEDING TO BE TEMPORARY OR PERMANENT.

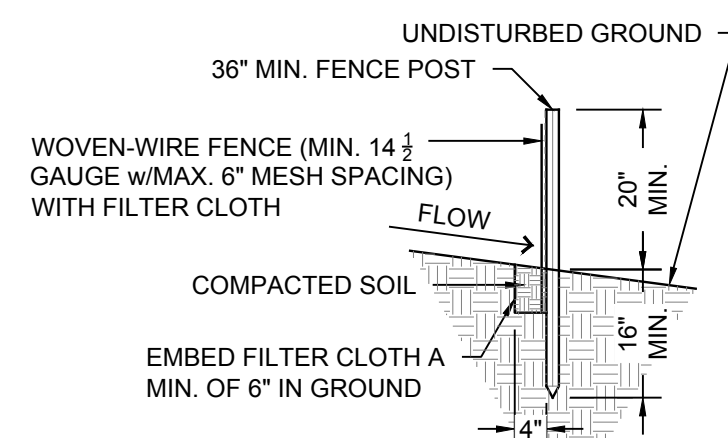
**3 TYPICAL UTILITY TRENCH INSTALLATION DETAIL**  
Scale: NTS



**PERSPECTIVE VIEW**

**CONSTRUCTION SPECIFICATIONS**

- WOVEN-WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL, EITHER "T" OR "U" TYPE, OR HARDWOOD.
- FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN-WIRE FENCE WITH TIES, SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN-WIRE, 6" MAXIMUM MESH OPENING.
- WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, "MIRAFI" 100X, "STABILINKA" T140N, OR APPROVED EQUIVALENT.
- PRE-FABRICATED UNITS SHALL BE "GEOFAB", "ENVIROFENCE", OR APPROVED EQUIVALENT.
- MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.



**SECTION VIEW**

**2 TYPICAL SILT FENCE**  
Scale: NTS

**EROSION PREVENTION/SEDIMENT CONTROL (EPSC) NOTES**

- SEDIMENT BASINS/TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS, STABILIZED CONSTRUCTION ENTRANCES, AND OTHER MEASURES CONSTRUCTED AS THE INITIAL STEP IN ANY LAND DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
- CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME, OR SLOPE DRAIN STRUCTURE.
- WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED AND SHALL CONVEY CLEAN RUNOFF IN A NON-EROSIVE MANNER TO AN OUTLET.
- BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE AND RECEIVING CHANNEL.
- UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS AND OTHER APPLICABLE CRITERIA: NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME, EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
- ALL SEDIMENT REMOVED FROM SEDIMENT CONTROL PRACTICES AS A PART OF MAINTENANCE SHALL BE DISPOSED OF IN AN AREA THAT IS: LESS THAN 5% IN SLOPE AND SUFFICIENTLY VEGETATED; A MIN. 100 FT FROM ANY DOWNSLOPE WATER BODY OR CONVEYANCE TO A WATER BODY (STORM DRAIN INLET OR DITCH); PERMANENTLY STABILIZED IMMEDIATELY AFTER DISPOSAL.
- DISTURBED AREAS BORDERING AND DRAINING TO ANY ROADWAY MUST HAVE AN APPROPRIATE SEDIMENT BARRIER SPANNING THE DISTURBANCE EDGE TO PREVENT MIGRATION OF SEDIMENT.
- ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR PERMANENT STABILIZATION WITHIN 14 DAYS OF THE INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY. THE FOLLOWING EXCEPTIONS APPLY:
  - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE SAME AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST FOR THE NEXT 24 HOURS.
  - STABILIZATION IS NOT REQUIRED IF THE WORK IS OCCURRING IN A SELF-CONTAINED EXCAVATION (I.E. NO OUTLET) WITH 2 FT OR GREATER DEPTH (E.G. FOUNDATION EXCAVATION, UTILITY TRENCHES).
- MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. EXCEPT AS NOTED BELOW, ALL SITES SHALL BE SEEDED AND STABILIZED WITH EROSION CONTROL MATERIALS, SUCH AS MULCH OR ROLLED EROSION CONTROL PRODUCTS, INCLUDING AREAS WHERE CONSTRUCTION HAS BEEN SUSPENDED OR SECTIONS COMPLETED:
  - ON THE CUT SIDE OF ROADS, DITCHES SHALL BE STABILIZED IMMEDIATELY WITH ROCK RIP-RAP OR OTHER NON-ERODIBLE LINERS (E.G. RECP), OR IF APPROPRIATE, VEGETATIVE MEASURES (SOD).
  - FOR ACTIVE CONSTRUCTION AREAS SUCH AS BORROW OR STOCKPILE AREAS, ROADWAY IMPROVEMENTS AND AREAS WITHIN 50 FT. OF A BUILDING UNDER CONSTRUCTION, A PERIMETER SEDIMENT CONTROL SYSTEM CONSISTING, FOR EXAMPLE, OF SILT FENCING, SHALL BE INSTALLED AND MAINTAINED TO CONTAIN SOIL. EXPOSED DISTURBED AREAS ADJACENT TO A CONVEYANCE THAT PROVIDES RAPID OFFSITE DISCHARGE OF SEDIMENT, SUCH AS A CUT SLOPE AT AN ENTRANCE, SHALL BE COVERED WITH PLASTIC OR GEOTEXTILE TO PREVENT SOIL LOSS UNTIL STABILIZED. STABILIZED CONSTRUCTION ENTRANCES WILL BE MAINTAINED TO CONTROL VEHICLE TRACKING MATERIAL OFF SITE.
  - PERMANENT SEEDING SHALL ONLY BE UNDERTAKEN IN THE SPRING FROM APRIL THROUGH MAY, AND IN LATE SUMMER AND EARLY FALL UNTIL SEPTEMBER 15, EXCEPT THAT PERMANENT SEEDING MAY BE UNDERTAKEN DURING THE SUMMER IF PLANS PROVIDE FOR ADEQUATE WATERING. DURING THE PEAK SUMMER MONTHS AND AFTER SEPTEMBER 15, IF SEEDING IS FOUND TO BE IMPRACTICABLE, AN APPROPRIATE TEMPORARY STABILIZATION IS STRAW/HAY MULCH OR WOODCHIPS.
  - TEMPORARY SEDIMENT TRAPPING DEVICES SHALL NOT BE REMOVED UNTIL PERMANENT STABILIZATION IS ESTABLISHED IN ALL CONTRIBUTORY DRAINAGE AREAS. SIMILARLY, STABILIZATION OF CONTRIBUTING DRAINAGE AREAS SHALL BE ESTABLISHED PRIOR TO CONVERTING SEDIMENT TRAPS/ BASINS INTO PERMANENT (POST-CONSTRUCTION) STORMWATER MANAGEMENT PRACTICES.
  - STABILIZATION MEASURES, TEMPORARY OR PERMANENT, SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
  - UPON COMPLETION, ALL SLOPES STEEPER THAN 3:1 (H:V) OR 33.3%, PERIMETER DIKE/SWALES, SEDIMENT BASINS OR TRAPS, AND EMBANKMENTS SHALL BE IMMEDIATELY STABILIZED WITH SOD, SEED & ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES (RECP). **AREAS OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM SHALL NOT BE DISTURBED.**
- IN ADVANCE OF A PREDICTED RAINFALL OR SNOWMELT EVENT, ALL MANAGEMENT PRACTICES APPROPRIATE TO CURRENT AREAS OF DISTURBANCE MUST BE INSPECTED AND REPAIRED AS NECESSARY TO ENSURE PROPER OPERATING CONDITION. IF NECESSARY TO PREVENT SEDIMENT DISCHARGE FROM THE CONSTRUCTION SITE TO WATERS OF THE STATE, THIS WILL INCLUDE TEMPORARY STABILIZATION OF ALL DISTURBED SOILS ON THE SITE IN ADVANCE OF THE ANTICIPATED RUNOFF PERIOD.
- ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER TEMPORARY MEASURES ARE NO LONGER NEEDED.

**REQUIREMENTS FOR WINTER SHUTDOWN**

**FOR PROJECTS COMPLETING EARTH DISTURBANCE ACTIVITIES PRIOR TO THE BEGINNING OF THE WINTER PERIOD (OCTOBER 15), THE FOLLOWING ARE REQUIREMENTS OF THE EPSC PLAN:**

- FOR AREAS TO BE STABILIZED BY VEGETATION, SEEDING TO BE COMPLETED NO LATER THAN SEPTEMBER 15TH TO ENSURE ADEQUATE GROWTH AND COVER PRIOR TO THE WINTER PERIOD.
- FOR AREAS TO BE STABILIZED BY NONVEGETATIVE METHODS, STABILIZATION OF THESE AREAS OF DISTURBANCE WITHOUT VEGETATIVE COVER MUST OCCUR NO LATER THAN OCTOBER 15TH.
- FOR AREAS TO BE STABILIZED BY MULCH, DOUBLE THE REGULAR COVERAGE RATE, OR ROUGHLY 2 INCHES OF STRAW/HAY MULCH WITH 100% COVERAGE, WILL BE APPLIED ON ALL DISTURBANCES. MULCH WILL BE ANCHORED TO PREVENT MIGRATION OF MATERIAL THROUGHOUT THE WINTER PERIOD.

**REQUIREMENTS FOR WINTER CONSTRUCTION**

**FOR PROJECTS INVOLVING EARTH DISTURBANCE WITHIN THE WINTER PERIOD (AFTER OCTOBER 15 AND BEFORE APRIL 15), THE FOLLOWING ARE REQUIREMENTS OF THE EPSC PLAN:**

- ENLARGE ACCESS ROUTES TO ACCOMMODATE SNOW REMOVAL ACTIVITY. STABILIZE WITH STONE.
- LIMIT OF DISTURBANCE MOVED/REPLACED TO REFLECT BOUNDARY OF ANTICIPATED WINTER WORK.
- A SNOW MANAGEMENT PLAN INCLUDING ADEQUATE STORAGE LOCATIONS AND CONTROL OF SNOWMELT, REQUIRING CLEARED SNOW TO BE STORED DOWN GRADIENT OF ALL AREAS OF EARTH DISTURBANCE AND PROHIBITING STORAGE OF SNOW WITHIN STORMWATER TREATMENT STRUCTURES.
- A MINIMUM 25 FOOT BUFFER TO BE MAINTAINED FROM PERIMETER CONTROLS SUCH AS SILT FENCE, TEMPORARY SWALES OR PERIMETER DIKES TO ALLOW FOR SNOW CLEARING/MAINTENANCE.
- IN AREAS OF DISTURBANCE WITHIN 100 FT OF A RECEIVING WATER, SILT FENCE TO BE REINFORCED OR USED WITH PERIMETER DIKES OR OTHER PRACTICES RESISTANT TO THE FORCES OF SNOW LOADS.
- DRAINAGE STRUCTURES TO BE MONITORED TO REMAIN OPEN AND FREE OF SNOW AND ICE DAMS.
- INSTALL SILT FENCE SECTIONS, HAY BALE DIKES, PERIMETER DIKE/SWALES, WATERBARS, AND OTHER PRACTICES REQUIRING AN ASSOCIATED EARTH DISTURBANCE PRIOR TO GROUND FREEZING.
- MULCH STABILIZATION MEASURES TO BE USE OF DOUBLE THE STANDARD RATE OF COVERAGE.
- ALL MULCH MUST BE ANCHORED WITH AN APPROVED METHOD TO PREVENT REMOVAL BY WIND.
- TO ENSURE COVER OF DISTURBED SOIL IN ADVANCE OF A MELT EVENT, AREAS OF DISTURBED SOIL MUST BE STABILIZED AT THE END OF EACH WORK DAY, WITH THE FOLLOWING EXCEPTIONS:
  - IF NO PRECIPITATION, RAIN OR SNOW, WITHIN 24 HOURS IS FORECASTED AND WORK WILL RESUME IN THE SAME DISTURBED AREA WITHIN 24 HOURS, DAILY STABILIZATION IS NOT NECESSARY.
  - IF THE DISTURBED AREAS WILL COLLECT AND RETAIN RUNOFF, SUCH AS HOUSE FOUNDATIONS OR OPEN UTILITY TRENCHES, DAILY STABILIZATION IS NOT NECESSARY UNTIL EXCAVATION BACKFILLING OCCURS.
  - PRIOR TO STABILIZATION, REMOVE SNOW OR ICE TO LESS THAN 1" THICKNESS ABOVE THE SOIL.
- STONE STABILIZATION (8" THICK) AT ACCESS POINTS FOR CONSTRUCTION VEHICLE TRAFFIC, I.E. FROM THE PAVEMENT TO THE BUILDING PUT A 15' WIDE PATH ON TOP OF THE PROPOSED DRIVEWAY.

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REVISIONS

NO. DATE DESCRIPTION

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REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

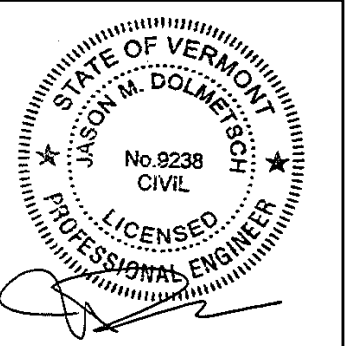
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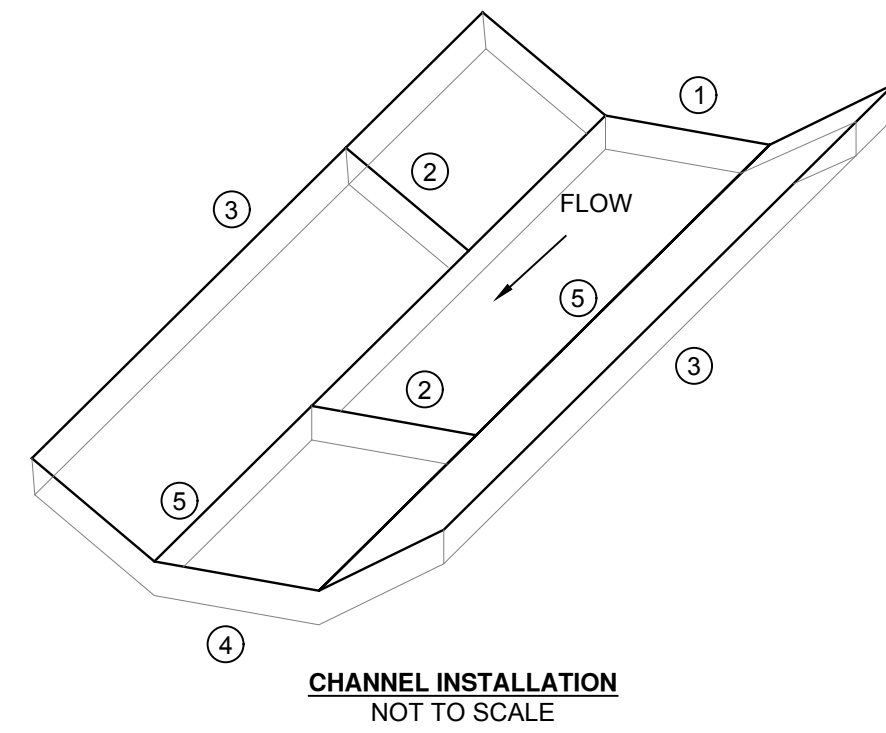
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DRAWN	CHECKED
MSK	JMD

SHEET NUMBER

C506

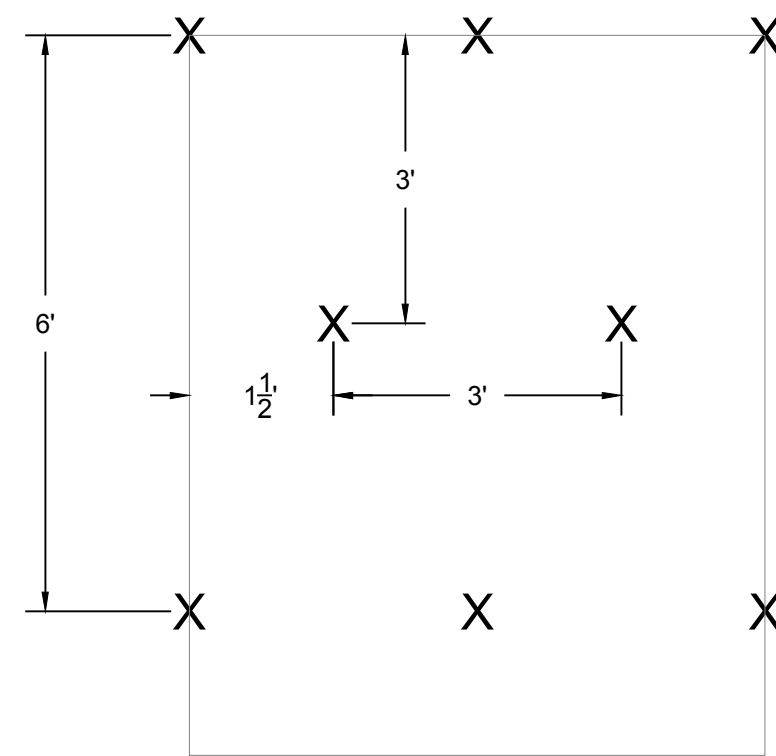






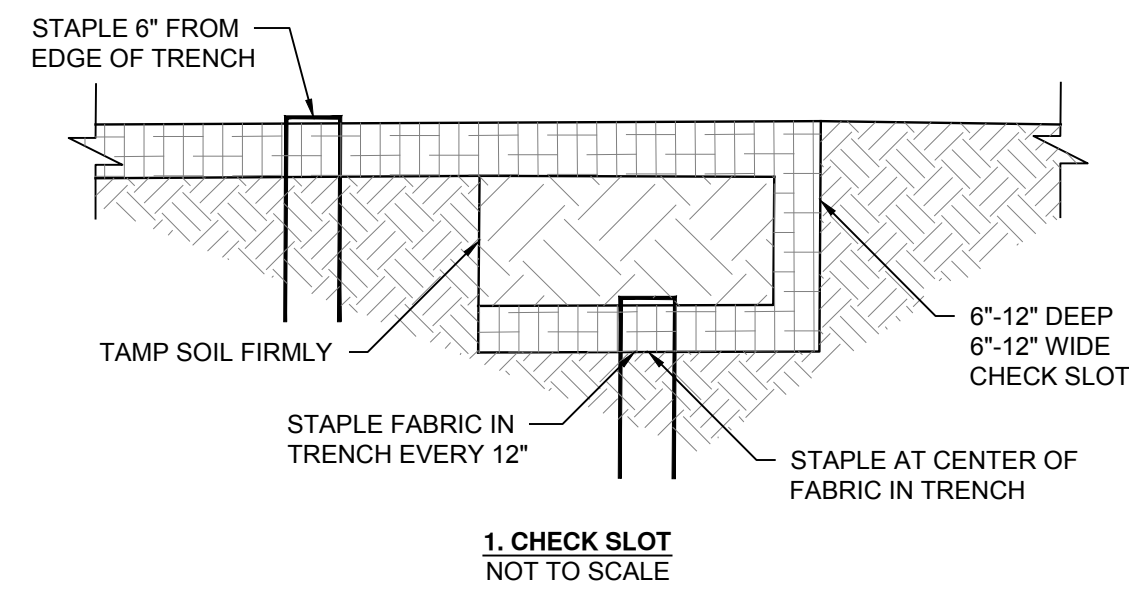
**CONSTRUCTION SPECIFICATIONS**

- INSTALL RECP ON ALL SLOPES 3:1 OR GREATER AND IN CHANNELS
- METAL STAPLES TO BE UNGALVANIZED U-SHAPED WIRE WITH 2" CROWN AND 6" TO 8" LONG LEG. SET STAPLE INTO THE FABRIC FLUSH WITH SURROUNDING SOIL. MAY BE MANUALLY OR MECHANICALLY HAMMERED DOWN.
- METAL STAPLES ARE TO BE PLACED ALTERNATIVELY, IN COLUMNS ~ 2' APART AND IN ROWS ~ 3' APART. APPROXIMATELY 175 STAPLES ARE REQUIRED PER 4' x 225' ROLL OF MATERIAL AND ABOUT 125 STAPLES ARE REQUIRED PER 4' x 150' ROLL OF MATERIAL. ACTUAL STAPLE AMOUNTS VARY BASED UPON SOIL CONDITIONS.
- DISTURBED AREA SHALL BE SMOOTHLY GRADED TO ENSURE CLOSE CONTACT BETWEEN RECP AND GROUND. REMOVE LARGE STONES AND WOODY DEBRIS THAT WILL PREVENT RECP FROM CONTACTING THE GROUND.
- EROSION CONTROL MATERIAL SHALL BE PLACED LOOSELY OVER GROUND SURFACE. DO NOT STRETCH.
- ENSURE EROSION CONTROL MATERIAL ROLLS ARE UNRAVELED DOWN SLOPE IN A CONTROLLED FASHION.
- ALL RECP TERMINAL ENDS AND TRANSVERSE LAPS SHALL BE STAPLED AT APPROXIMATELY 12" INTERVALS.

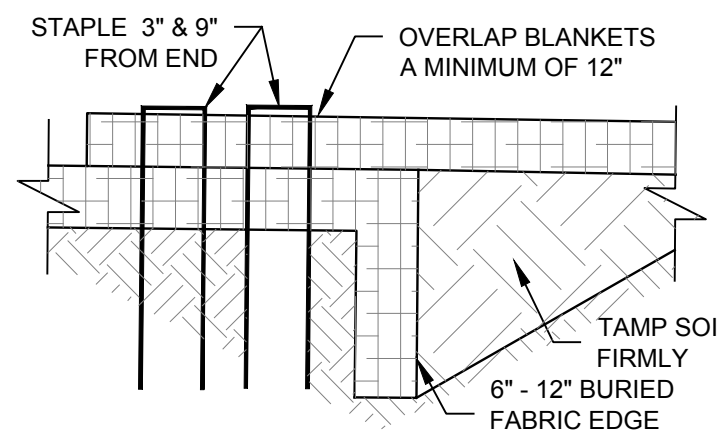


1.2 STAPLES/YD<sup>2</sup>  
3:1 SLOPES

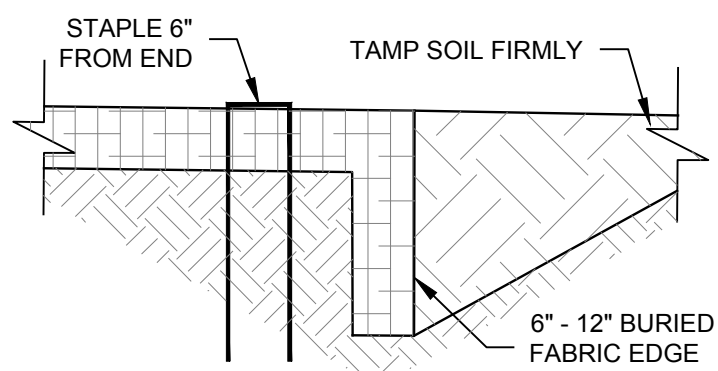
STAPLE PATTERN  
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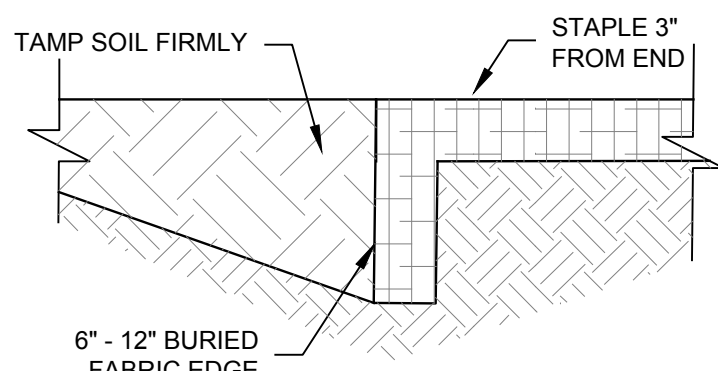
1. CHECK SLOT  
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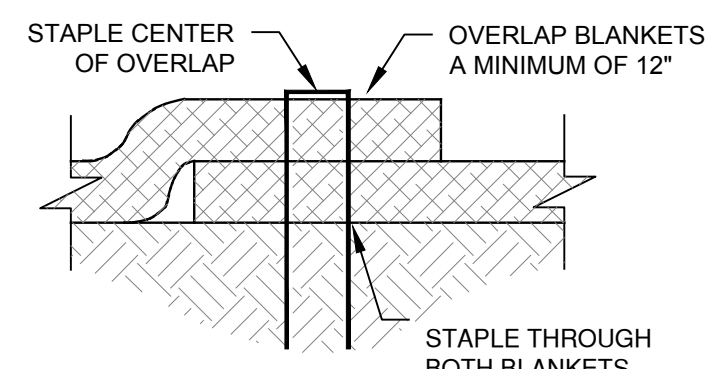
2. JUNCTION SLOT  
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3. ANCHOR SLOT  
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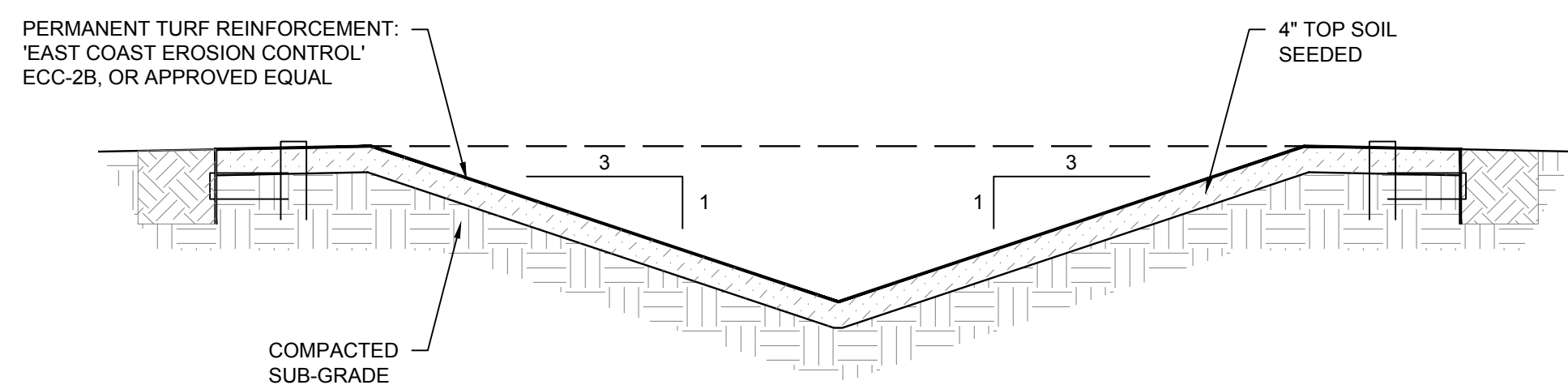
4. TERMINAL FOLD  
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5. LAP JOINT  
NOT TO SCALE

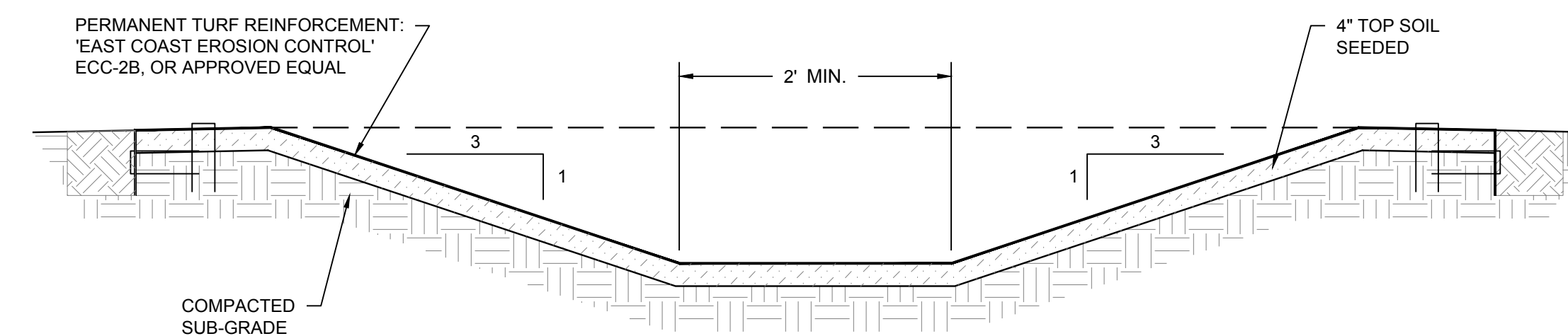
**1 ROLLED EROSION CONTROL PRODUCT (RECP) - TYPICAL**

Scale: NTS



**2 TURF REINFORCEMENT SWALE DETAIL**

Scale: NTS



**3 TURF REINFORCEMENT SWALE DETAIL**

Scale: NTS

**STABILIZATION NOTES**

**TEMPORARY SEEDING**

**PREPARATION:** RUNOFF CONTROL PRACTICES MUST BE INSTALLED PRIOR TO STABILIZATION AS APPROPRIATE FOR THE SITE CONDITIONS. THE AREA MUST BE ROUGH GRADED AND SLOPES PHYSICALLY STABLE. LARGE DEBRIS AND ROCKS SHOULD BE REMOVED. AREA MUST BE SEEDED WITHIN 24 HOURS OF PREVIOUS DISTURBANCE OR SCARIFICATION OF SOIL SURFACE WILL BE NECESSARY PRIOR TO SEEDING.

**SEED TYPE:** IF: SPRING OR SUMMER OR EARLY FALL, THEN SEED THE AREA WITH REGIONAL RYEGRASS (ANNUAL OR PERENNIAL) AT 20 LBS PER ACRE (APPROXIMATELY 0.5 LBS/1,000 SF OR USE 1 LB/1,000 SF). IF: LATE FALL OR EARLY WINTER, THEN SEED CERTIFIED 'AROSTOOK' WINTER RYE (CEREAL RYE) AT 90 LBS PER ACRE (2.0 LBS/1,000 SF).

**METHOD OF SEEDING:** ANY SEEDING METHOD MAY BE USED THAT WILL PROVIDE UNIFORM APPLICATION OF SEED ON THE AREA AND RESULT IN RELATIVELY GOOD SOIL TO SEED CONTACT. HAND SEEDING IS RECOMMENDED FOR AREAS OF THE SITE THAT CAN NOT BE ACCESSED WITH EQUIPMENT DUE TO SOIL MOISTURE.

**MULCHING:** MULCHING OVER SEED IS REQUIRED. MULCH THE AREA WITH HAY OR STRAW AT 2 TONS/ACRE (90 LBS/1,000 SF OR 2 BALES/1,000 SF). WOOD FIBER (CELLULOSE) HYDROMULCH OR SIMILAR SPRAYABLE PRODUCTS APPROVED FOR EROSION CONTROL MAY BE USED IF APPLIED ACCORDING TO THE MANUFACTURERS' SPECIFICATION BUT AT A MINIMUM OF 50 LBS/1,000 SF.

**ANCHORING:** MULCH ANCHORING WILL BE REQUIRED IN AREAS OF HIGH WIND, CONCENTRATED FLOWS OF RUNOFF, AND AREAS SEEDED BETWEEN OCTOBER 15 AND APRIL 15, I.E. DURING WINTER CONSTRUCTION.

**IRRIGATION:** WATERING OF SEED MAY BE IDEAL DURING SUMMER MONTHS TO ENSURE GERMINATION OF SEED.

**INSPECTION:** INSPECT AREAS EVERY 7 DAYS AND AFTER RAINFALL EVENTS RESULTING IN RUNOFF FROM THE SITE. DOCUMENT AREAS OF SIGNIFICANT EROSION (RILLS & GULLIES) AND/OR LOSS OF VEGETATIVE COVER.

**MAINTENANCE:** KEEP VEHICLES AND EQUIPMENT OFF OF MULCHED AND SEEDED AREAS TO PREVENT DISTURBANCE OF STABILIZED AREAS. RILLS AND GULLIES MUST BE REGARDED PRIOR TO PLACEMENT OF ADDITIONAL SEED AND MULCH. SCARIFY, SEED, AND MULCH BARE AREAS TO PREVENT CONTINUED EROSION.

**TEMPORARY MULCHING**

**PREPARATION:** SITE PREPARATION PRIOR TO MULCHING REQUIRES THE INSTALLATION OF NECESSARY EROSION CONTROL OR RUNOFF CONTROL PRACTICES AND DRAINAGE SYSTEMS. SLOPE, GRADE AND SMOOTH THE SITE TO FIT THE NEEDS OF SELECTED MULCH PRODUCTS. REMOVE ALL UNDESIRABLE STONES AND OTHER DEBRIS TO MEET THE NEEDS OF ANTICIPATED LAND USE AND EXPECTED MAINTENANCE REQUIRED.

**NOTE:** THE BEST COMBINATION FOR GRASS/LEGUME ESTABLISHMENT IS STRAW (CEREAL GRAIN) MULCH APPLIED AT 2 TON/ACRE (90 LBS/1,000 SF) AND ANCHORED IMMEDIATELY WITH WOOD FIBER MULCH (HYDROMULCH) AT 500 - 750 LBS/ACRE (11 - 17 LBS/1,000 SF).

MULCH MATERIAL	RATE PER 1,000 SF	COVERAGE	ANCHORING
WOOD CHIPS OR SHAVINGS	500-900 LBS	2" TO 7"	NONE
WOOD FIBER CELLULOSE	50 LBS BAG	100%	TACKIFIER
GRAVEL, CRUSHED STONE	9 CUBIC YARDS	3" TO 6"	COMPACTED
HAY OR STRAW	90-100 LBS, 2-3 BALES	90%	VARIOUS
JUTE/EXCELSIOR/COIR	VARIOUS SIZED ROLLS	100%	STAPLES
WELL AGED COMPOST	3-9 CUBIC YARDS	1" TO 3"	NONE

**ANCHORING METHODS:** BIODEGRADABLE NETTING - STAPLE TO GROUND AS PER MANUFACTURER'S SPECIFICATIONS. CRIMPING - USE DISKS OR TRACKS ALONG THE CONTOUR TO EMBED THE MULCH INTO THE SOIL. CELLULOSE OVERSPRAY - HYDROMULCH WOOD FIBERS AT 500 LBS PER ACRE. HAS GREEN DYE TACKIFIERS - USE HYDROSEEDER TO MIX AND SPRAY CHEMICALS, APPLY WITH WOOD FIBER MULCH

\*TO ALLOW FOR PROPER CURING OF THESE CHEMICALS, TACKIFIERS MAY ONLY BE APPLIED IF RAINFALL IS NOT PREDICTED WITHIN 24 HRS AND SOIL TEMPERATURES ARE HIGHER THAN 45° F. DO NOT APPLY TACKIFIERS WITHIN 50 FEET OF ANY SURFACE WATER OR UPON VEGETATION, BUILDINGS, VEHICLES, AND/OR EQUIPMENT. TACKIFIERS WITH KNOWN AQUATIC TOXICITY ARE PROHIBITED.

**PERMANENT SEEDING**

**PREPARATION:** ALL WATER CONTROL MEASURES WILL BE INSTALLED AS NEEDED PRIOR TO FINAL GRADING AND SEEDBED PREPARATION. ANY SEVERELY COMPACTED SECTIONS WILL REQUIRE CHISELING OR DISKING TO PROVIDE AN ADEQUATE ROOTING ZONE, TO A MINIMUM DEPTH OF 12". THE SEEDBED MUST BE PREPARED TO ALLOW GOOD SOIL TO SEED CONTACT, WITH THE SOIL NOT TOO SOFT AND NOT TOO COMPACT. ADEQUATE SOIL MOISTURE MUST BE PRESENT TO ACCOMPLISH THIS. IF SURFACE IS POWDER DRY OR STICKY WET, POSTPONE OPERATIONS UNTIL MOISTURE CHANGES TO A FAVORABLE CONDITION. IF SEEDING IS ACCOMPLISHED WITHIN 24 HOURS OF FINAL GRADING, ADDITIONAL SCARIFICATION IS NOT NEEDED. REMOVE ALL STONES AND OTHER DEBRIS FROM THE SURFACE THAT ARE GREATER THAN 4 INCHES, OR THAT WILL INTERFERE WITH FUTURE MOWING OR MAINTENANCE.

**AMENDMENTS:** SOIL AMENDMENTS MUST BE INCORPORATED INTO THE UPPER 2 INCHES OF SOIL. THE SOIL SHOULD BE TESTED TO DETERMINE THE AMOUNTS OF AMENDMENTS NEEDED. APPLY GROUND AGRICULTURAL LIMESTONE TO ATTAIN A PH OF 6.0 IN THE UPPER 2 INCHES OF SOIL. IF SOIL MUST BE FERTILIZED BEFORE RESULTS OF A SOIL TEST ARE OBTAINED TO DETERMINE FERTILIZER NEEDS, USE COMMERCIAL FERTILIZER AT 600 LBS PER ACRE OF 5-10-10 OR EQUIVALENT. IF MANURE IS USED, APPLY QUANTITY TO MEET THE NUTRIENTS OF THE ABOVE FERTILIZER. THIS REQUIRES AN APPROPRIATE MANURE ANALYSIS PRIOR TO APPLYING TO THE SITE. DO NOT USE IN AREAS OF CONCENTRATED WATER FLOW.

**GENERAL SEED MIXTURES:**

SEED MIXTURES MAY VARY DEPENDING ON LOCATION WITHIN THE STATE AND TIME OF SEEDING. GENERALLY, WARM SEASON GRASSES SHOULD ONLY BE SEEDED DURING EARLY SPRING, APRIL TO MAY. THESE GRASSES ARE PRIMARILY USED FOR VEGETATING EXCESSIVELY DRAINED SANDS AND GRAVELS. OTHER GRASSES MAY BE SEEDED ANY TIME OF THE YEAR WHEN THE SOIL IS NOT FROZEN AND IS WORKABLE. WHEN LEGUMES LIKE CLOVER ARE INCLUDED, SPRING SEEDING IS PREFERRED. ACTUAL GRASS SEED SPECIES USED ON THE SITE TO BE DETERMINED BY THE HOMEOWNER AND/OR LANDSCAPE PROFESSIONAL AND WILL REFLECT THE ULTIMATE LAND USE.

GRASS SPECIES	LBS/ACRE	LBS/1,000 SF	COMMENTS
COMMON WHITE CLOVER	8	0.20	ADD INOCULATES
TALL FESCUE	10	0.25	'REBEL' VARIETY
CREeping RED FESCUE	20	0.45	'PENNLAWN' VARIETY
PERENNIAL RYEGRASS	5	0.10	'PENNFINE' VARIETY

**TIME OF SEEDING:** THE OPTIMUM TIMING FOR THE GENERAL SEED MIXTURE IS EARLY SPRING. PERMANENT SEEDINGS MAY BE MADE ANY TIME OF YEAR IF PROPERLY MULCHED AND ADEQUATE MOISTURE IS PROVIDED. LATE JUNE THROUGH EARLY AUGUST IS NOT A GOOD TIME TO SEED, BUT MAY FACILITATE COVERING THE LAND WITHOUT ADDITIONAL DISTURBANCE IF CONSTRUCTION IS COMPLETED. PORTIONS OF THE SEEDING THAT FAIL DUE TO DROUGHT/HEAT MAY BE RE-SEEDED IN LATE SUMMER, FALL, OR SPRING.

**METHOD OF SEEDING:** BROADCASTING, DRILLING, CULTIPACK TYPE SEEDING, OR HYDROSEEDING ARE ACCEPTABLE METHODS. PROPER SOIL TO SEED CONTACT IS KEY TO SUCCESSFUL GERMINATION.

**MULCHING:** MULCHING IS ESSENTIAL TO OBTAIN A UNIFORM STAND OF SEEDED PLANTS. OPTIMUM BENEFITS OF MULCHING NEW SEEDINGS ARE OBTAINED WITH THE USE OF SMALL GRAIN STRAW APPLIED AT A RATE OF 2 TONS PER ACRE, AND ANCHORED WITH AN OVERSPRAY OF HYDROMULCH AND/OR TACKIFIER.

**IRRIGATION:** WATERING MAY BE ESSENTIAL TO ESTABLISH A NEW SEEDING WHEN A DROUGHT CONDITION OCCURS SHORTLY AFTER A NEW SEEDING EMERGES. IRRIGATION IS A SPECIALIZED PRACTICE AND CARE MUST BE TAKEN NOT TO EXCEED THE APPLICATION RATE FOR THE SOIL OR SUBSOIL. WHEN DISCONNECTING IRRIGATION PIPE, BE SURE PIPES DO NOT CAUSE EROSION.

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
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NO.	DATE	DESCRIPTION

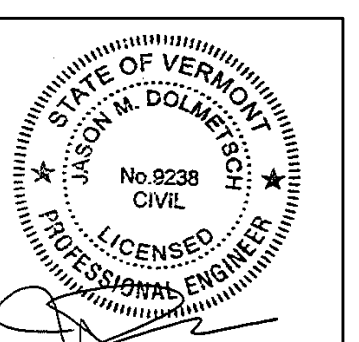
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MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

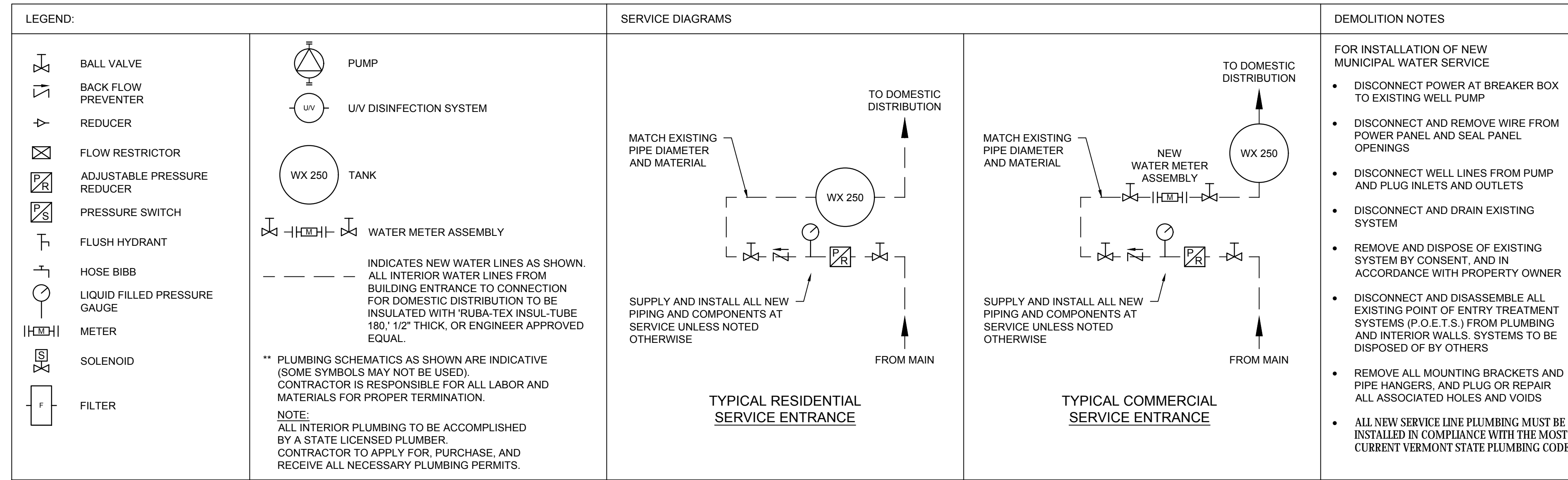
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DETAILS

NUMBER	DATE
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DRAWN	CHECKED
MSK	JMD

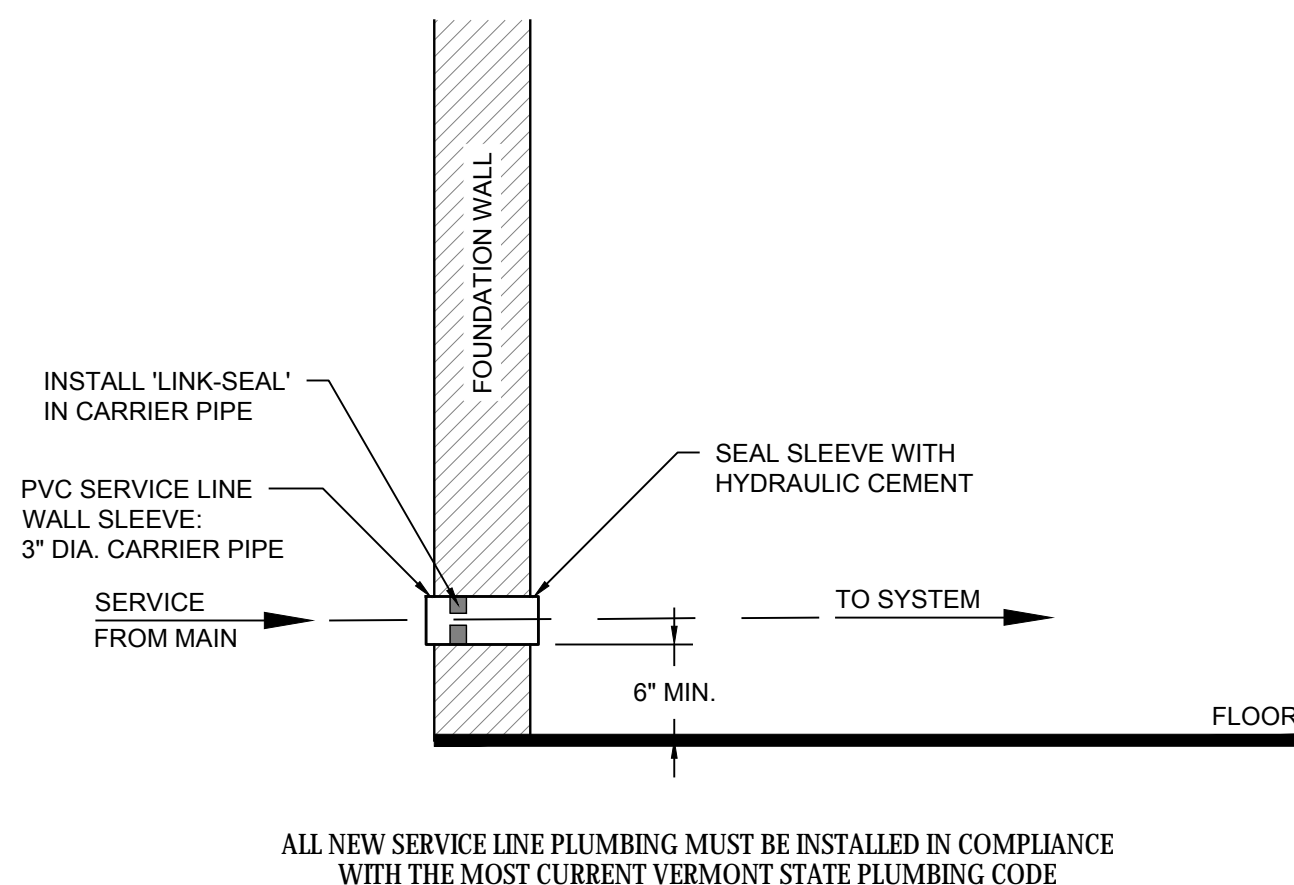
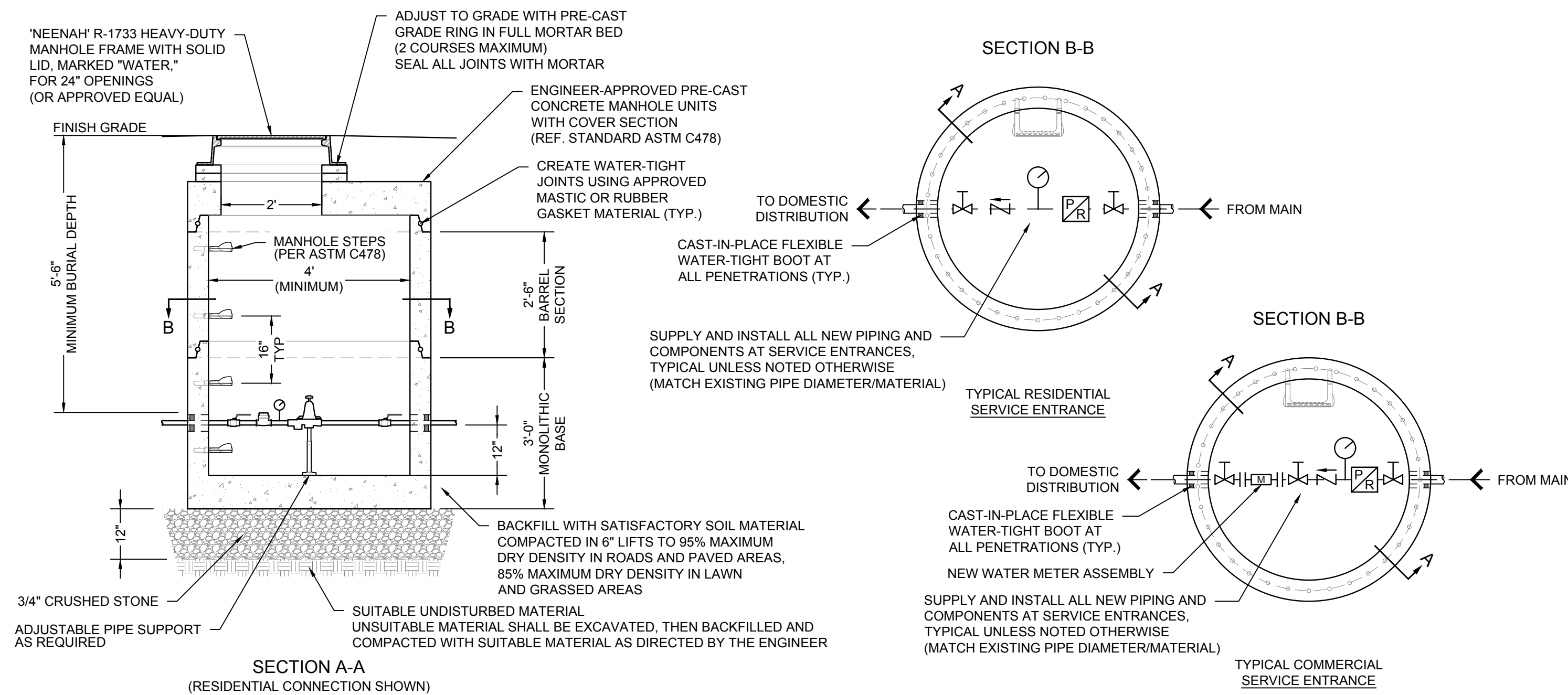
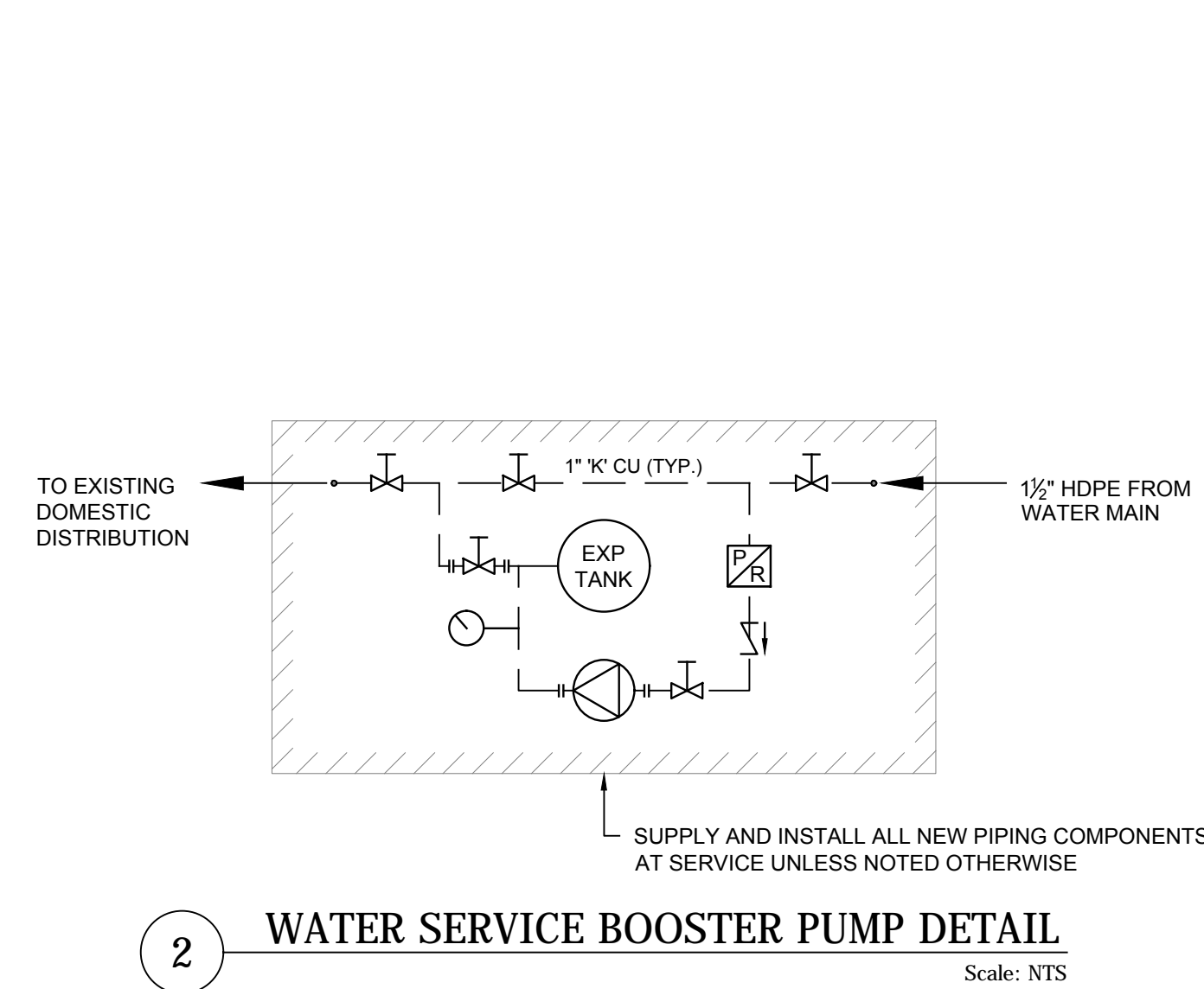
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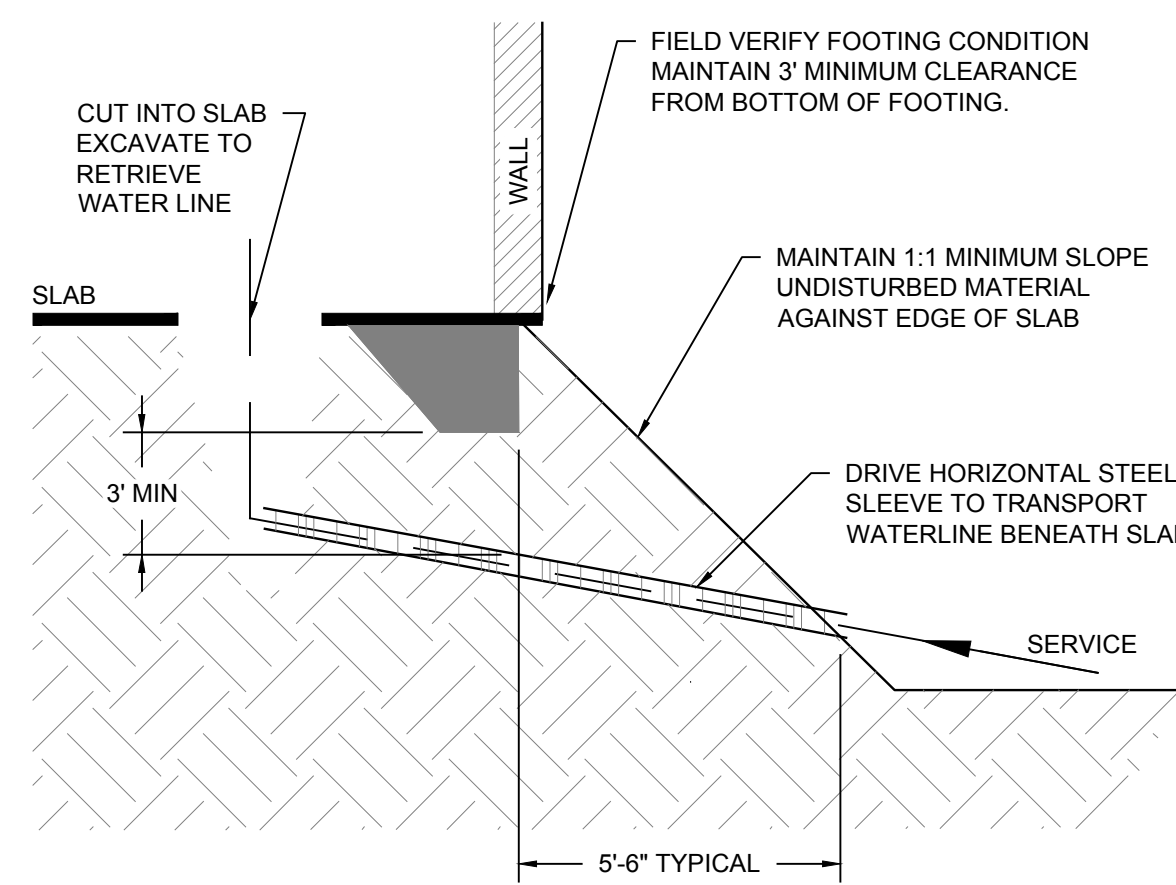




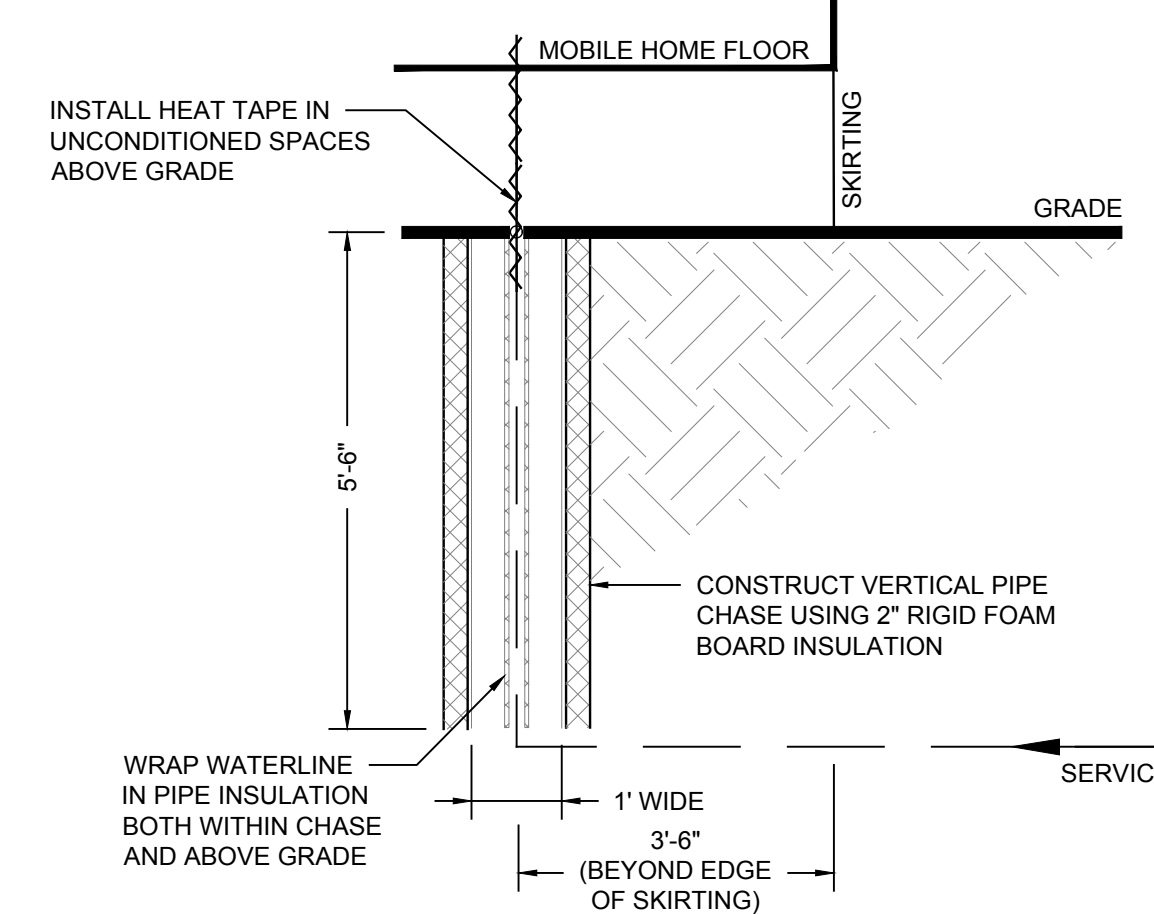
**1 PLUMBING LEGEND AND TYPICAL WATER SERVICE ENTRANCE DETAILS**  
Scale: NTS



ALL NEW SERVICE LINE PLUMBING MUST BE INSTALLED IN COMPLIANCE WITH THE MOST CURRENT VERMONT STATE PLUMBING CODE



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NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

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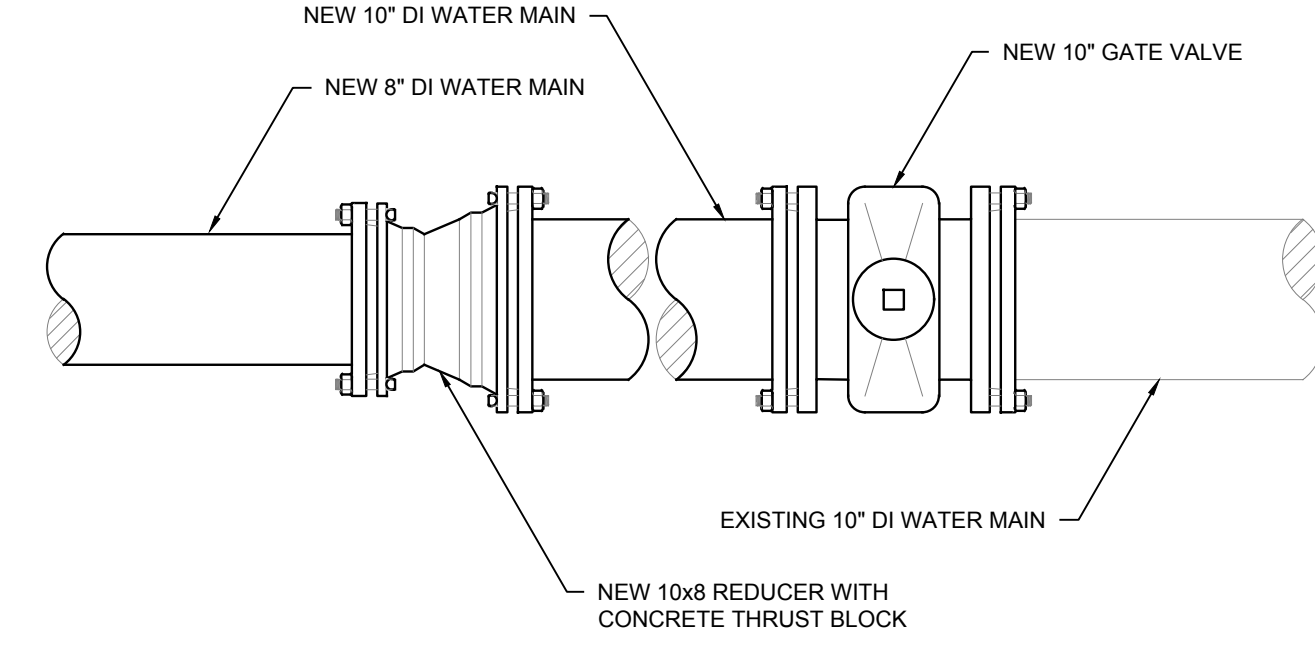
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1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER

**C508**

PLUMBING DETAIL (1001-019.7) FROM REMEDIATION OF LAKEVERMONT MUNICIPAL WATER SYSTEM  
 2 May 2019 09:59



**1** CONNECTION TO EXISTING MUNICIPAL WATER MAIN  
HOUGHTON LANE  
Scale: NTS

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REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

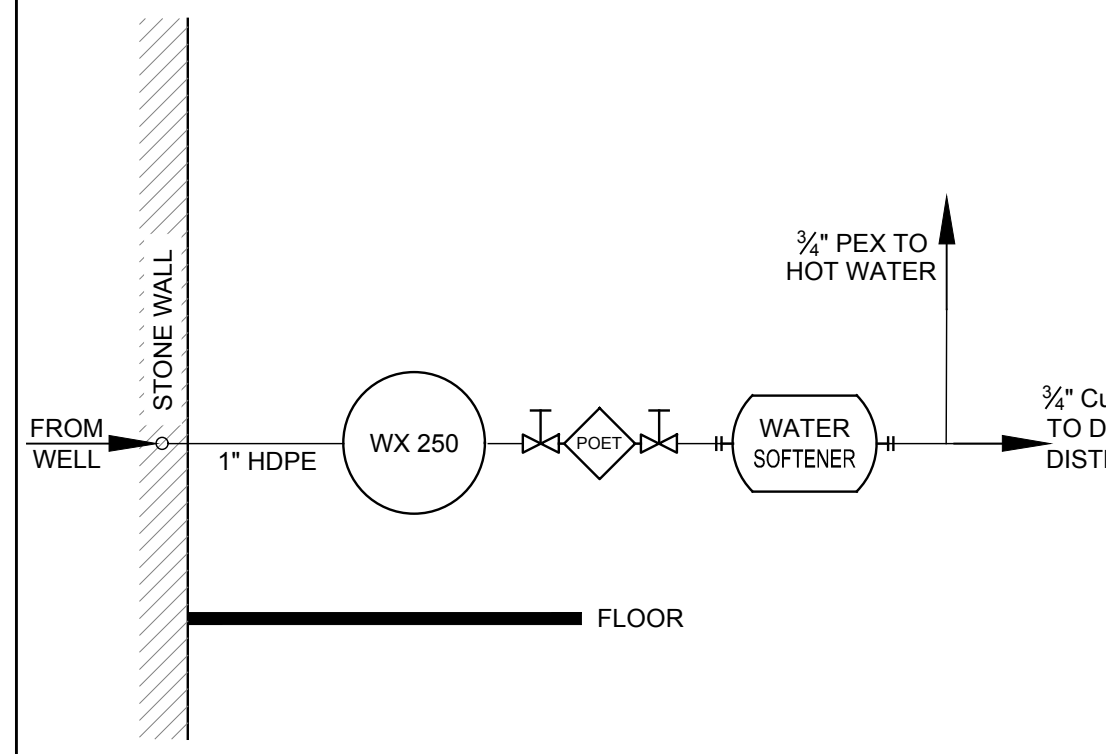
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**CONTRACT 6  
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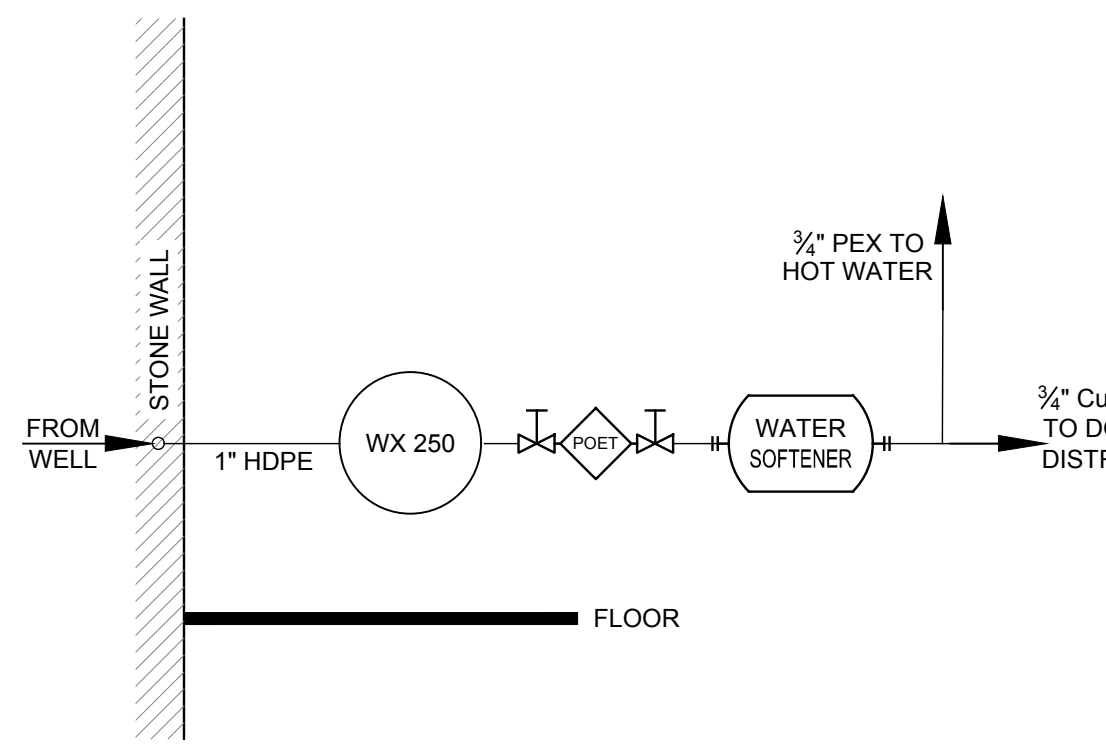
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MSK	JMD

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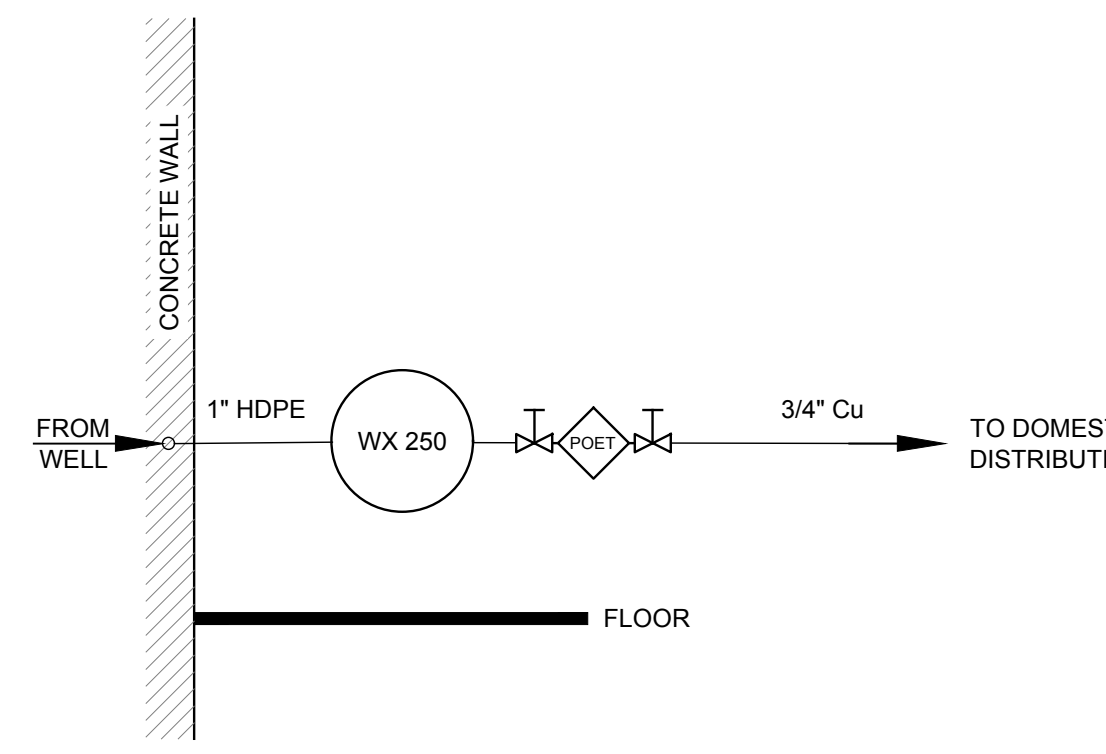
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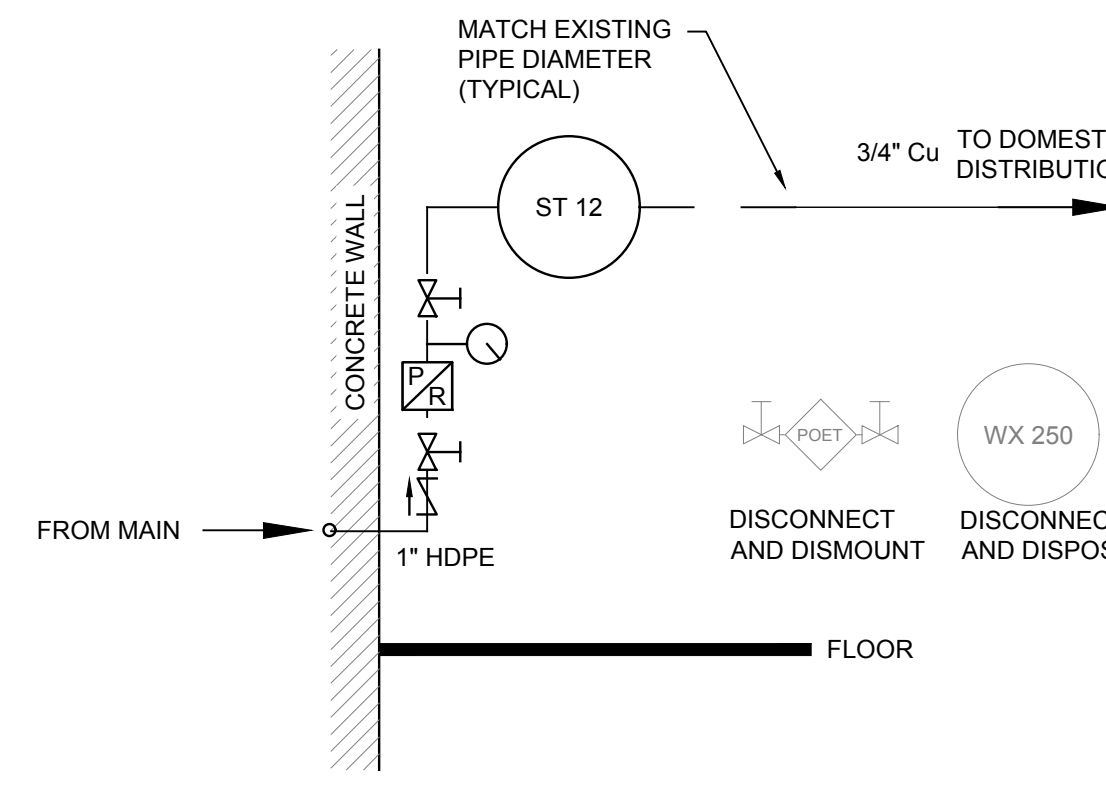
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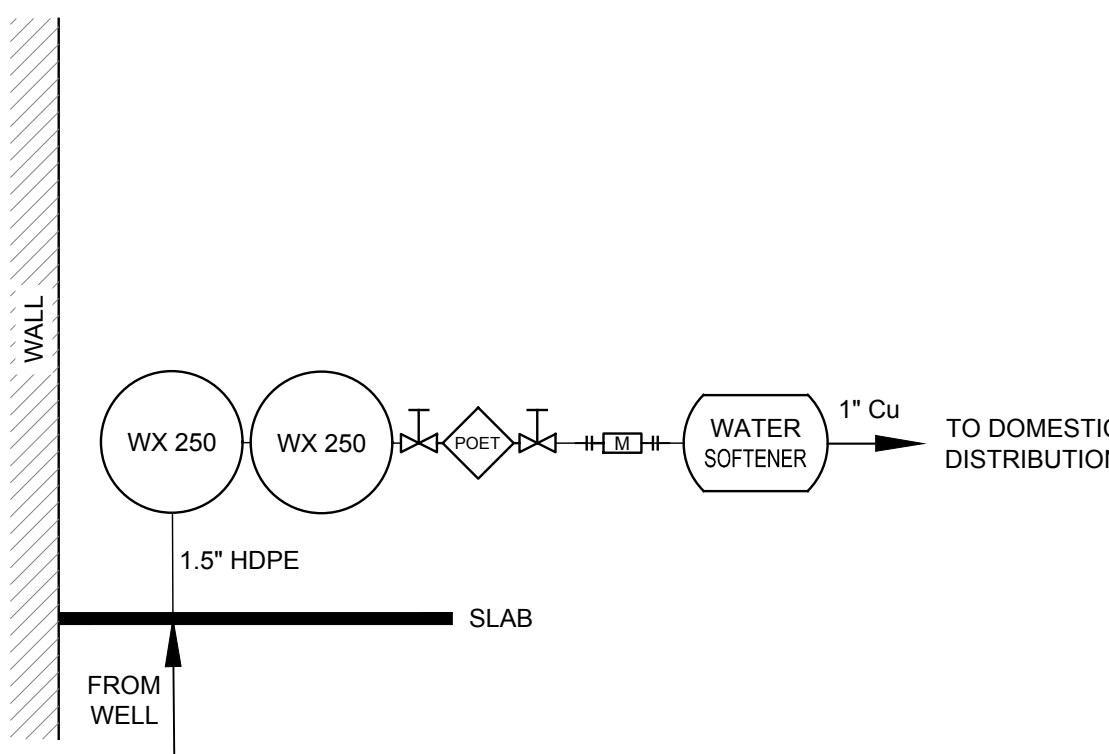
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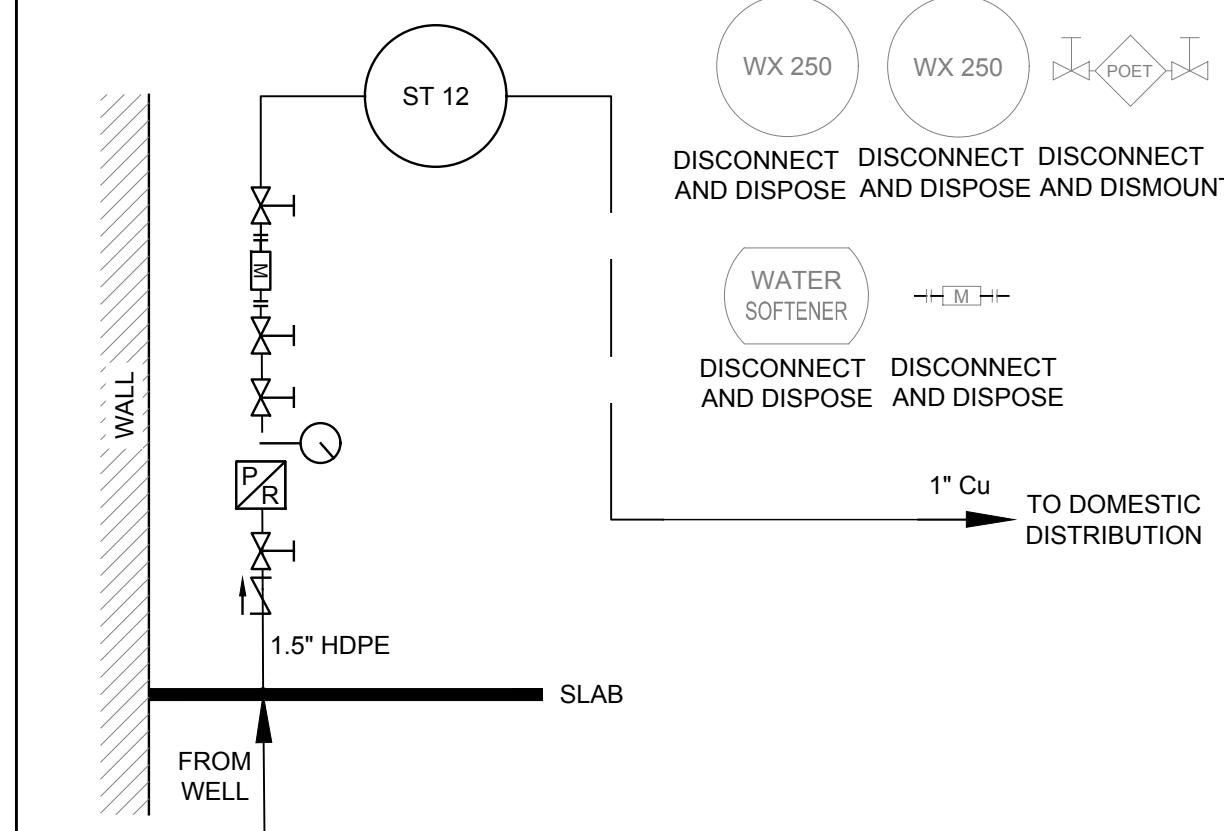
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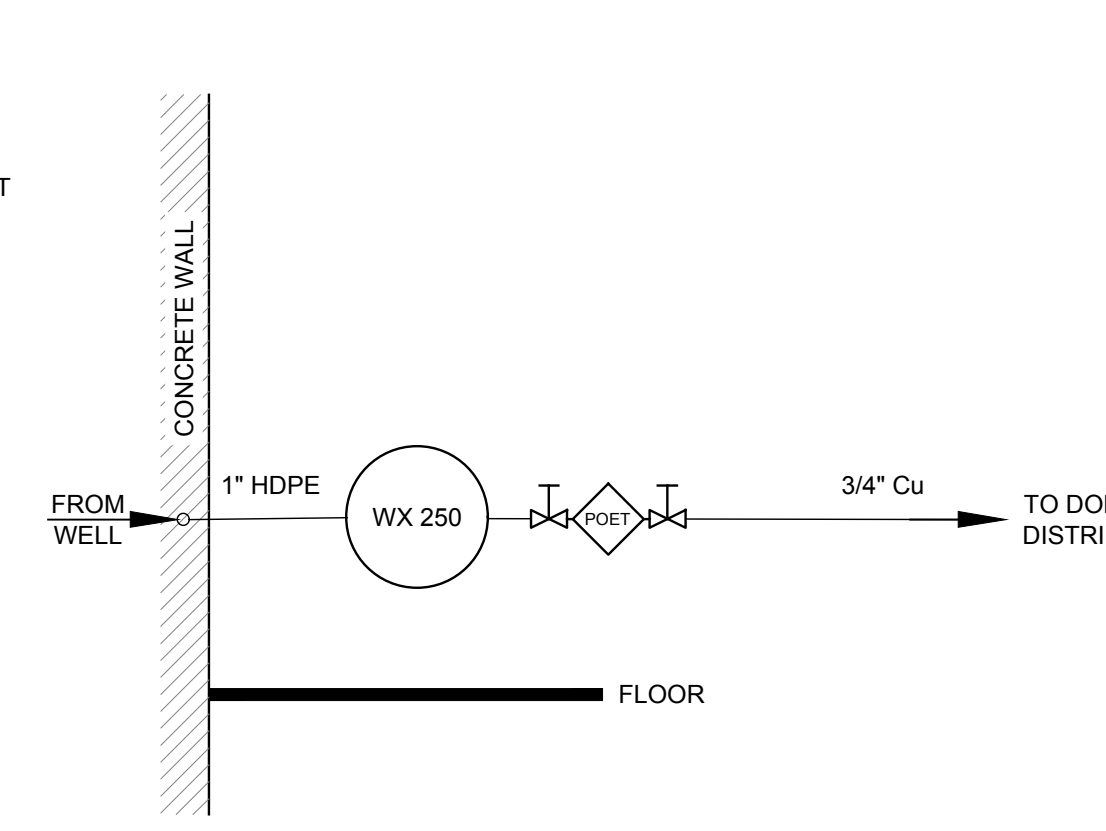
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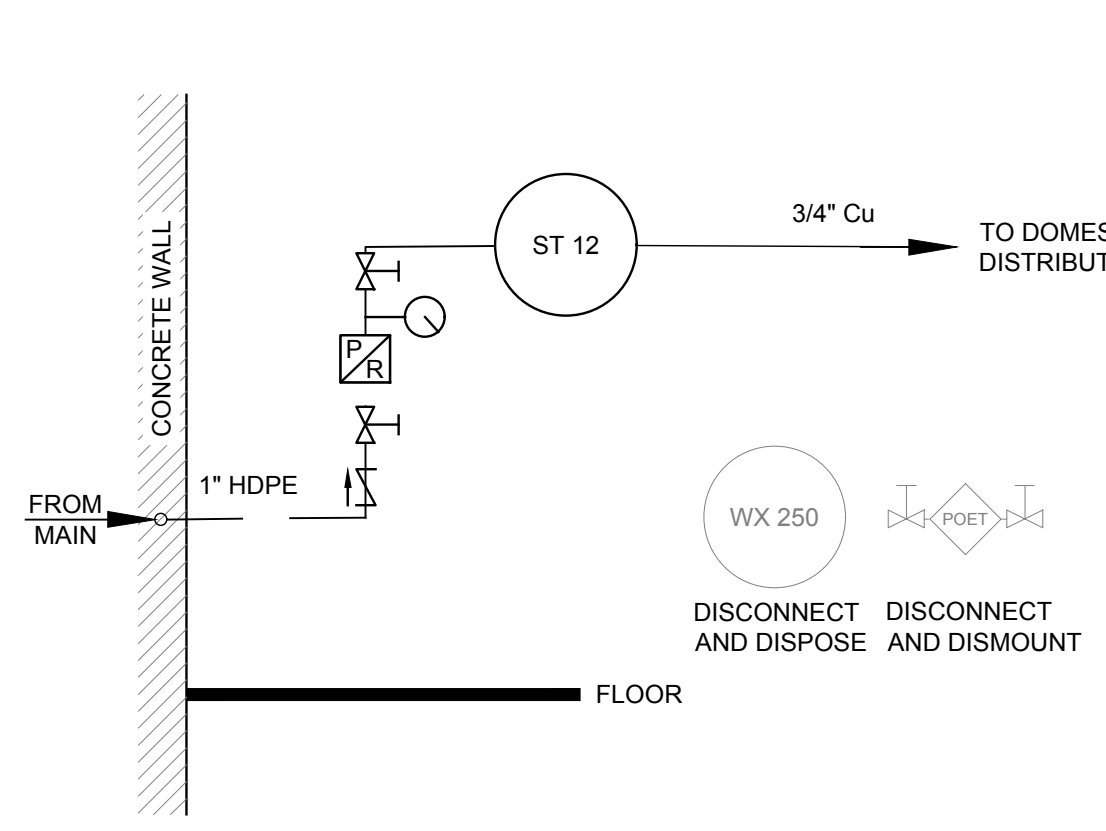
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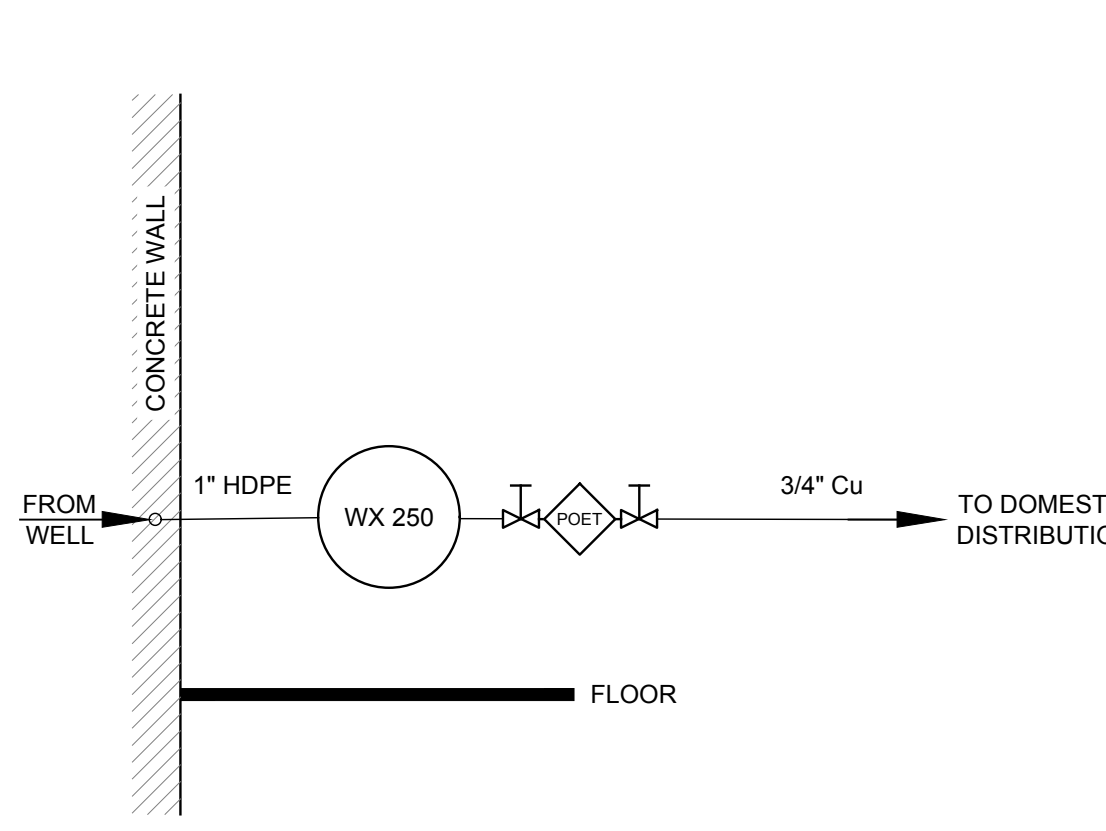
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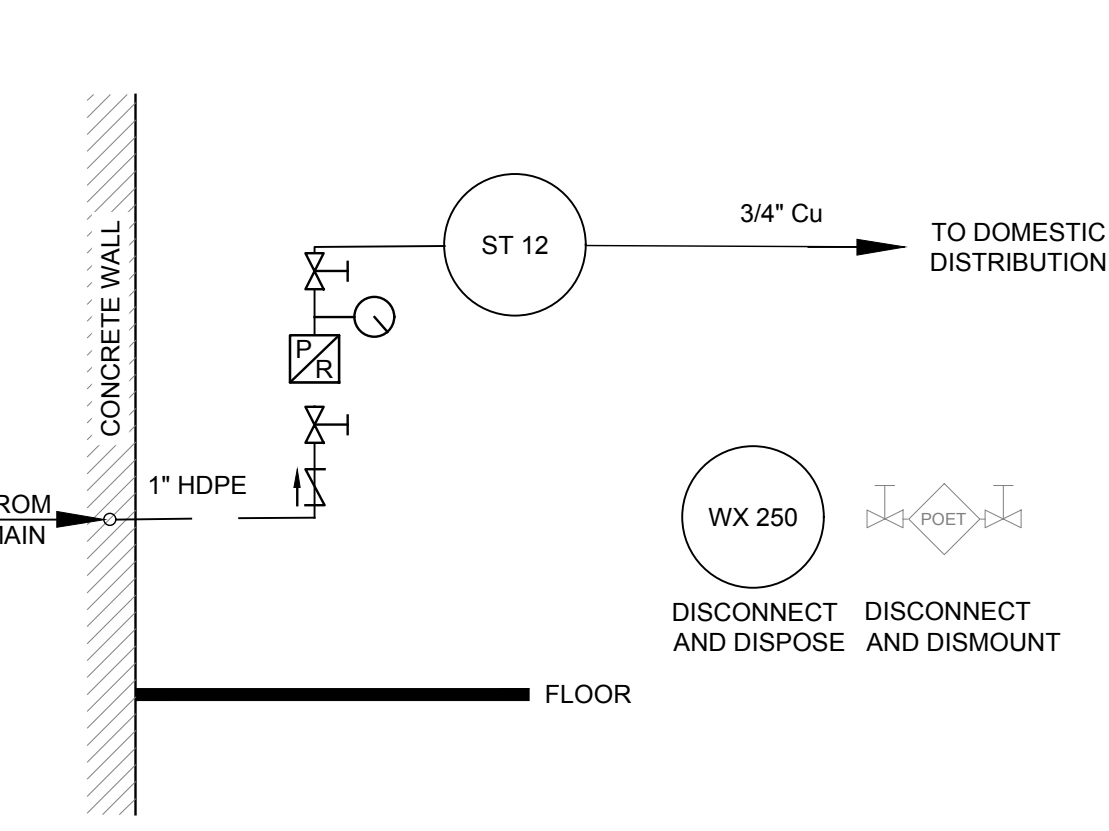
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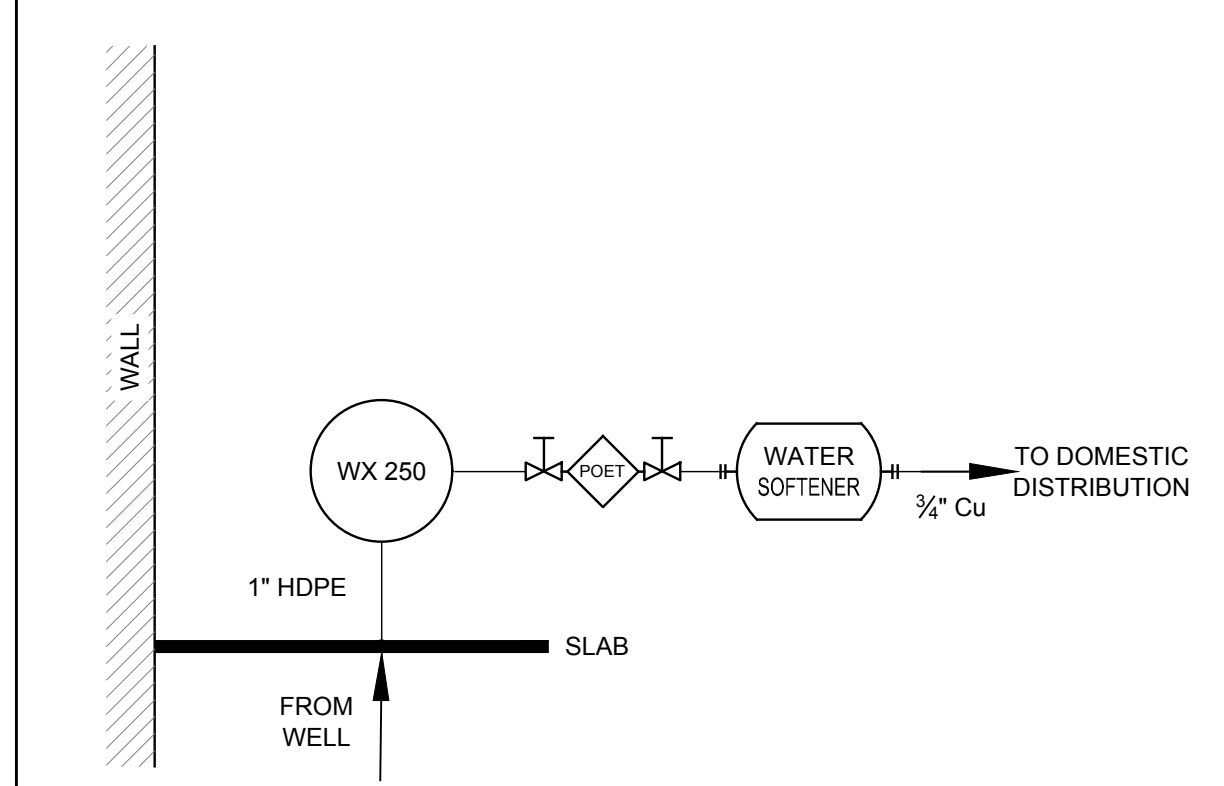
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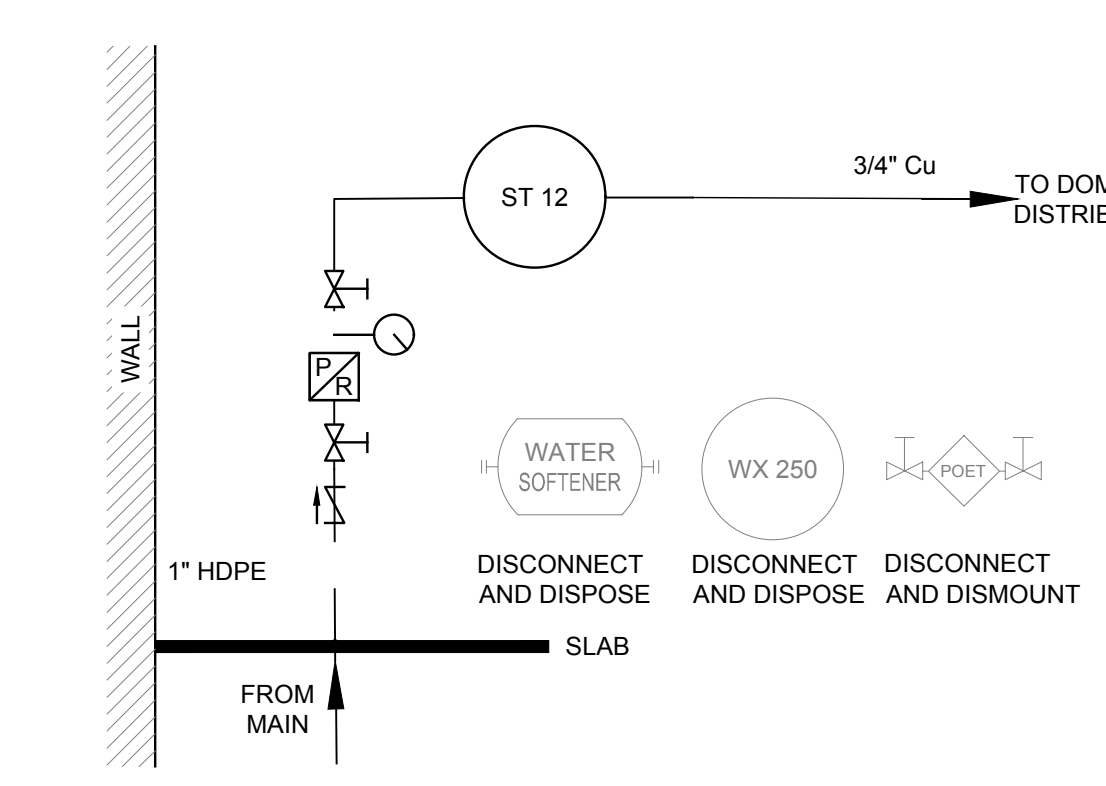
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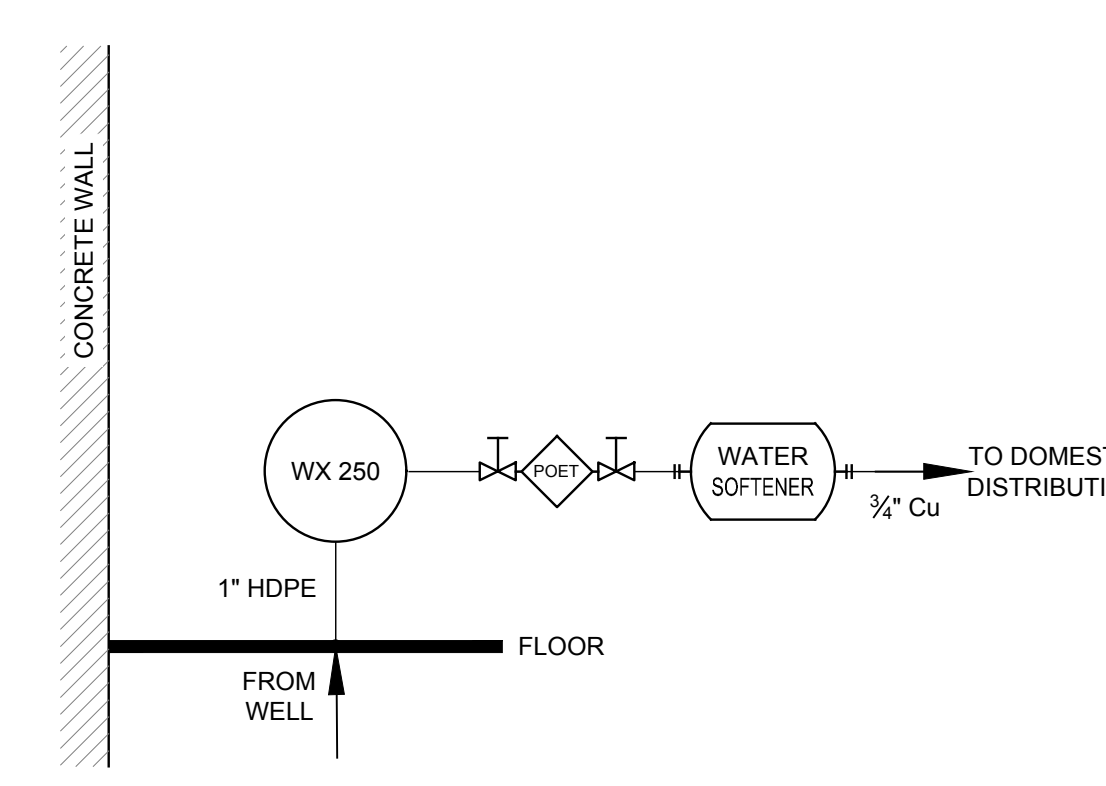
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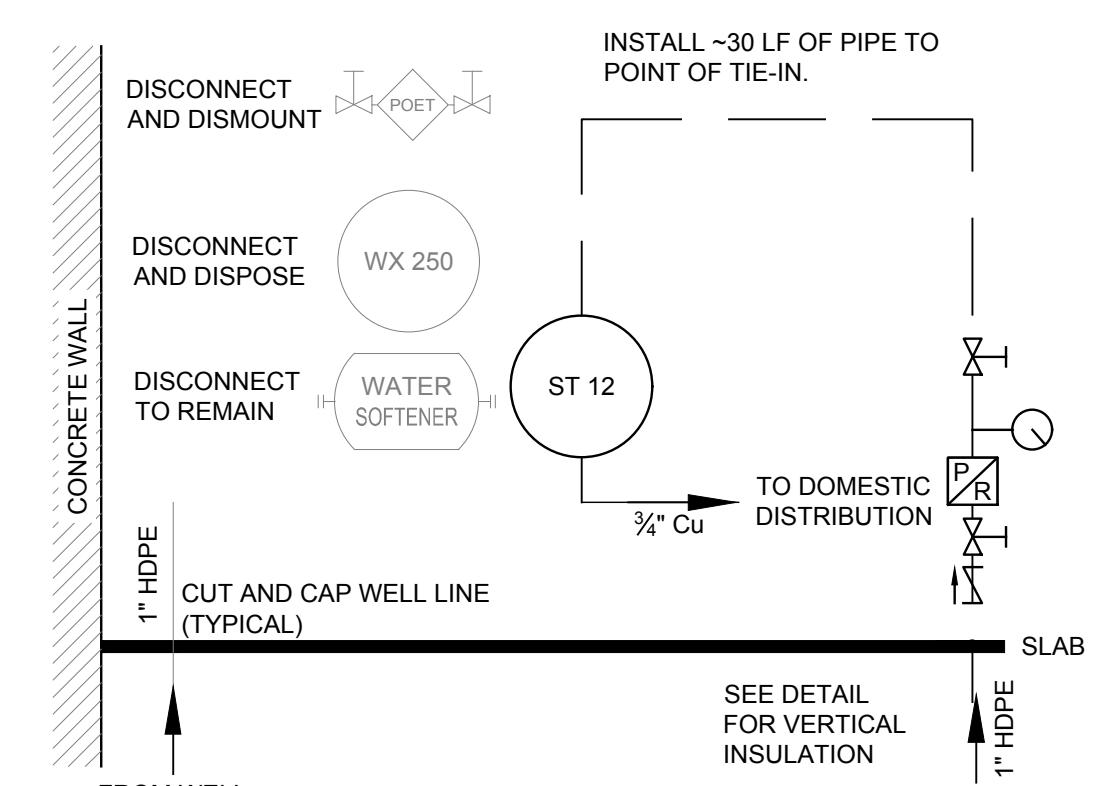
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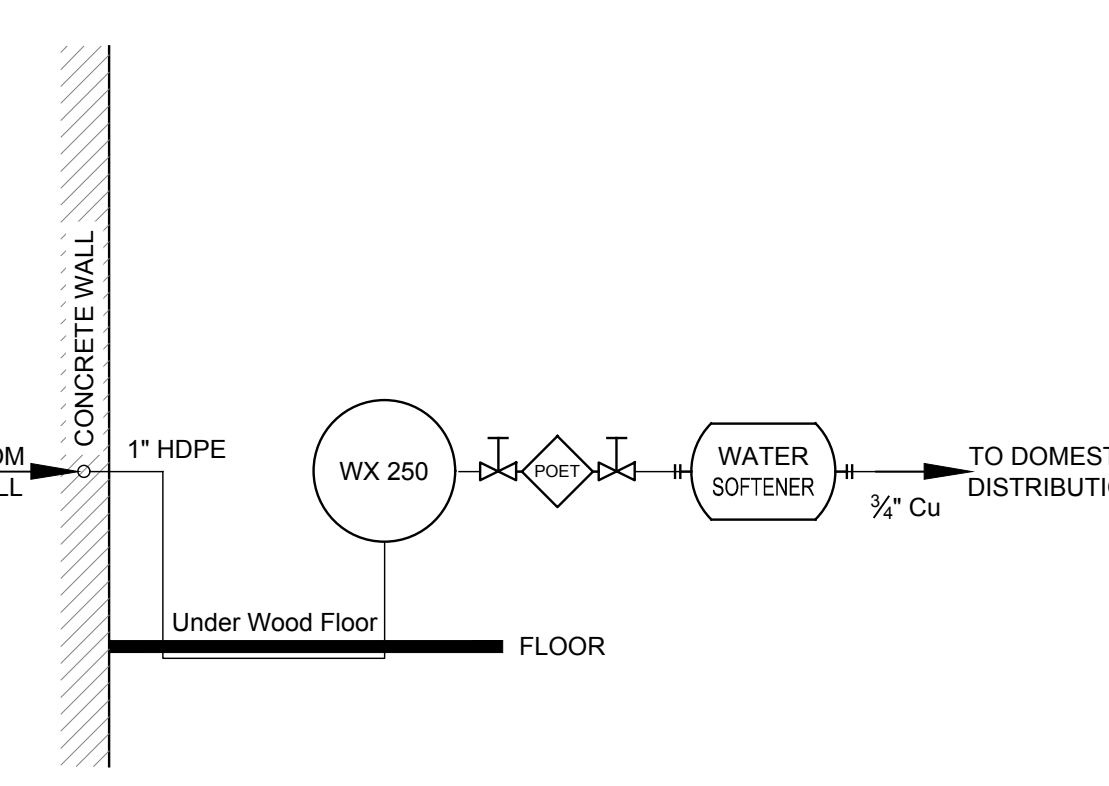
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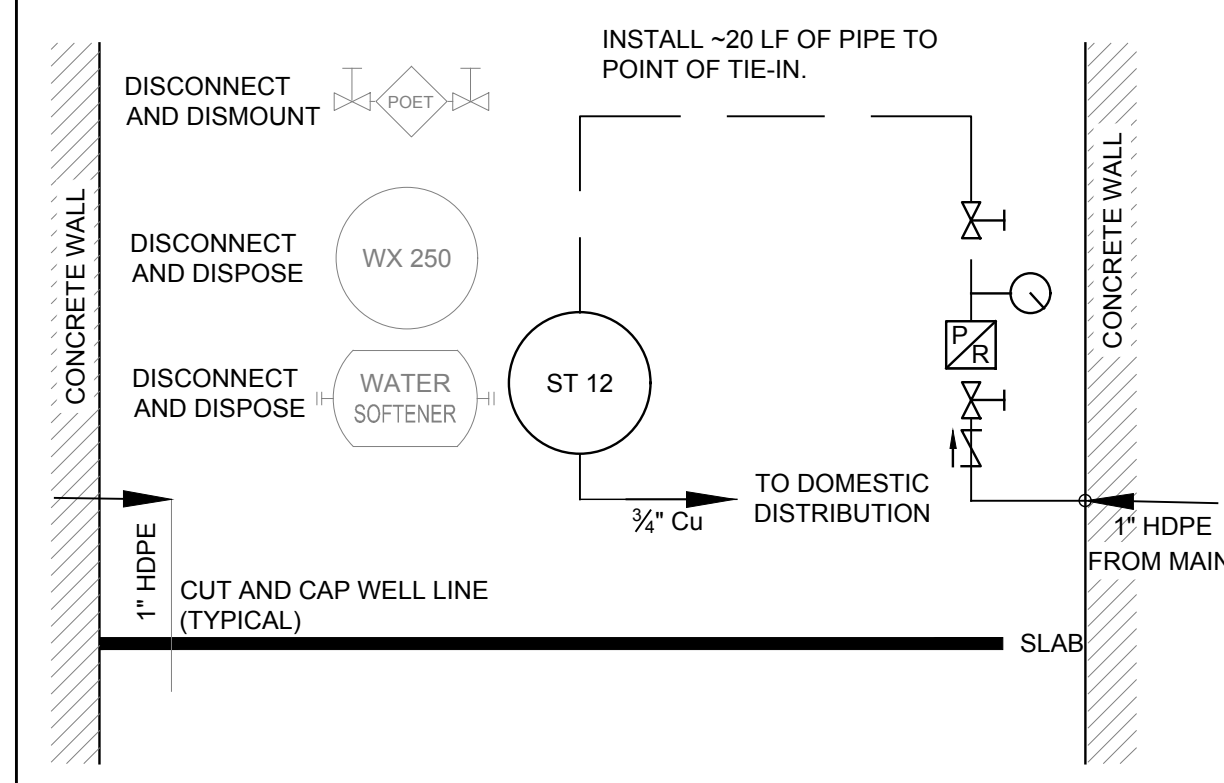
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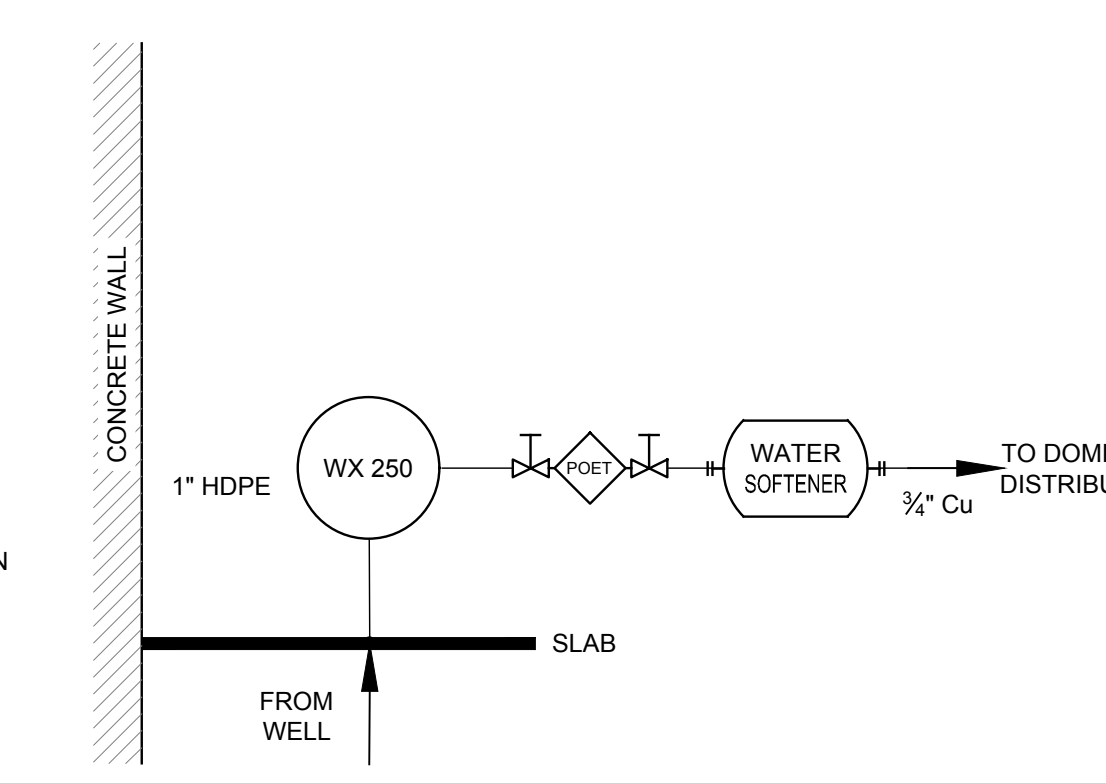
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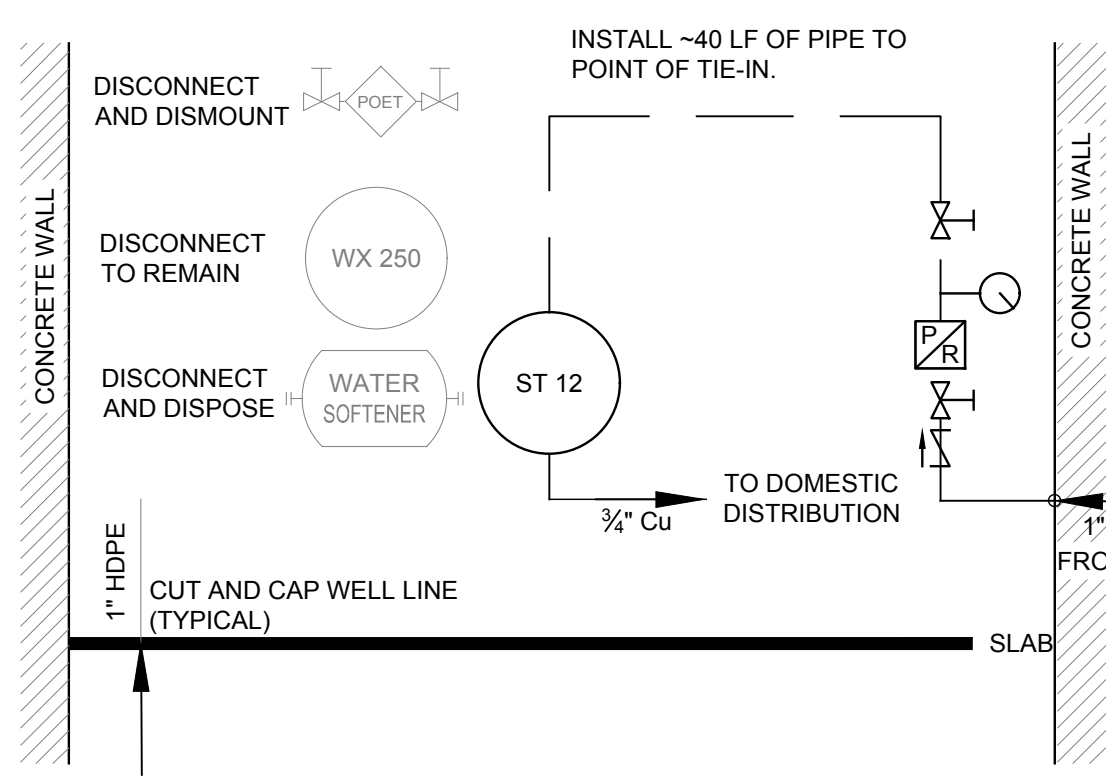
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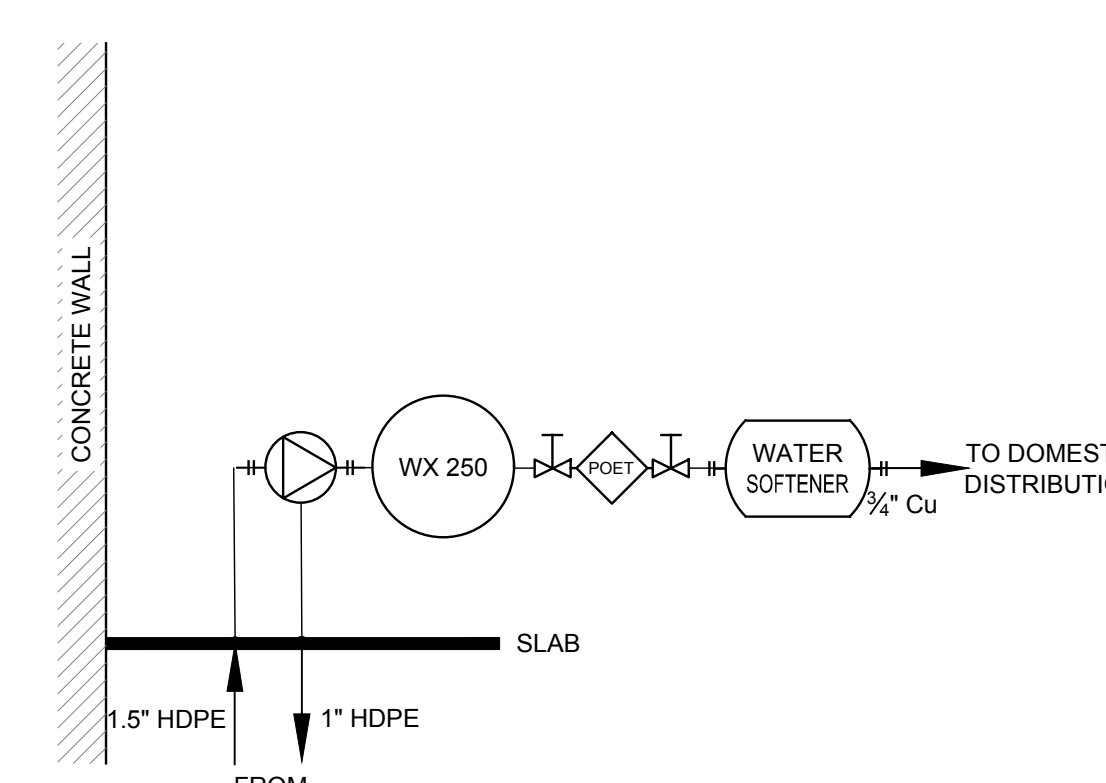
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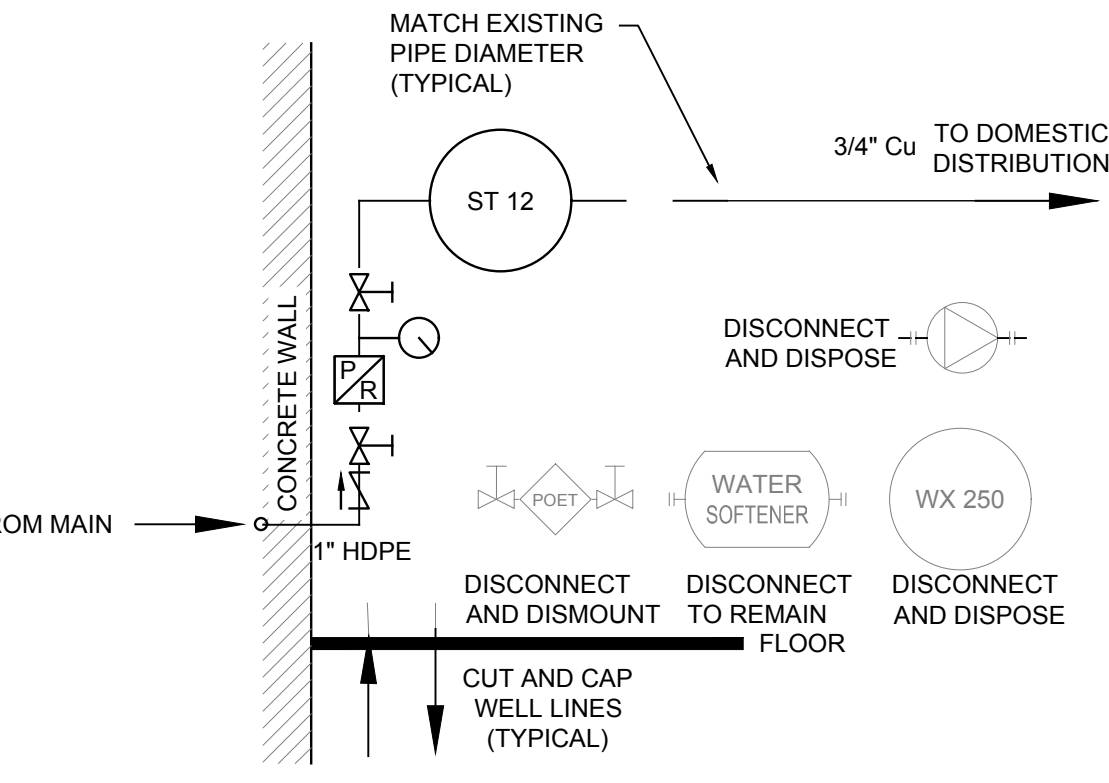
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18 WATER SERVICE ENTRANCE DETAIL  
346 APPLE HILL RD (PROPOSED) Scale: NTS



19 WATER SERVICE ENTRANCE DETAIL  
514 APPLE HILL RD (EXISTING) Scale: NTS



20 WATER SERVICE ENTRANCE DETAIL  
514 APPLE HILL RD (PROPOSED) Scale: NTS

1. DRAWING DATE: 05/14/2019 2. PLOTTED DATE: 05/14/2019 3. PLOTTER: HP DesignJet T1100e 4. PLOT SCALE: 1/8" = 1'-0" 5. PLOT ORIENTATION: LANDSCAPE 6. PLOT AREA: 11.0" x 17.0" 7. PLOT RESOLUTION: 600 DOTS PER INCH 8. PLOT FONT: 10 POINT 9. PLOT LINE WEIGHT: 0.25 POINTS 10. PLOT COLOR: BLACK AND WHITE 11. PLOT BACKGROUND: WHITE 12. PLOT OVERLAY: NONE 13. PLOT PRINT RANGE: ALL 14. PLOT PRINT RANGE: FROM 15. PLOT PRINT RANGE: TO 16. PLOT PRINT RANGE: BY 17. PLOT PRINT RANGE: PER PAGE 18. PLOT PRINT RANGE: PER SHEET 19. PLOT PRINT RANGE: PER DRAWING 20. PLOT PRINT RANGE: PER PROJECT 21. PLOT PRINT RANGE: PER FOLDER 22. PLOT PRINT RANGE: PER USER 23. PLOT PRINT RANGE: PER SYSTEM 24. PLOT PRINT RANGE: PER ADMIN 25. PLOT PRINT RANGE: PER SUPERVISOR 26. PLOT PRINT RANGE: PER MANAGER 27. PLOT PRINT RANGE: PER DIRECTOR 28. PLOT PRINT RANGE: PER VP 29. PLOT PRINT RANGE: PER SVP 30. PLOT PRINT RANGE: PER CTO 31. PLOT PRINT RANGE: PER CEO

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 441-1402 FAX: (802) 445-1291

NO.	DATE	DESCRIPTION

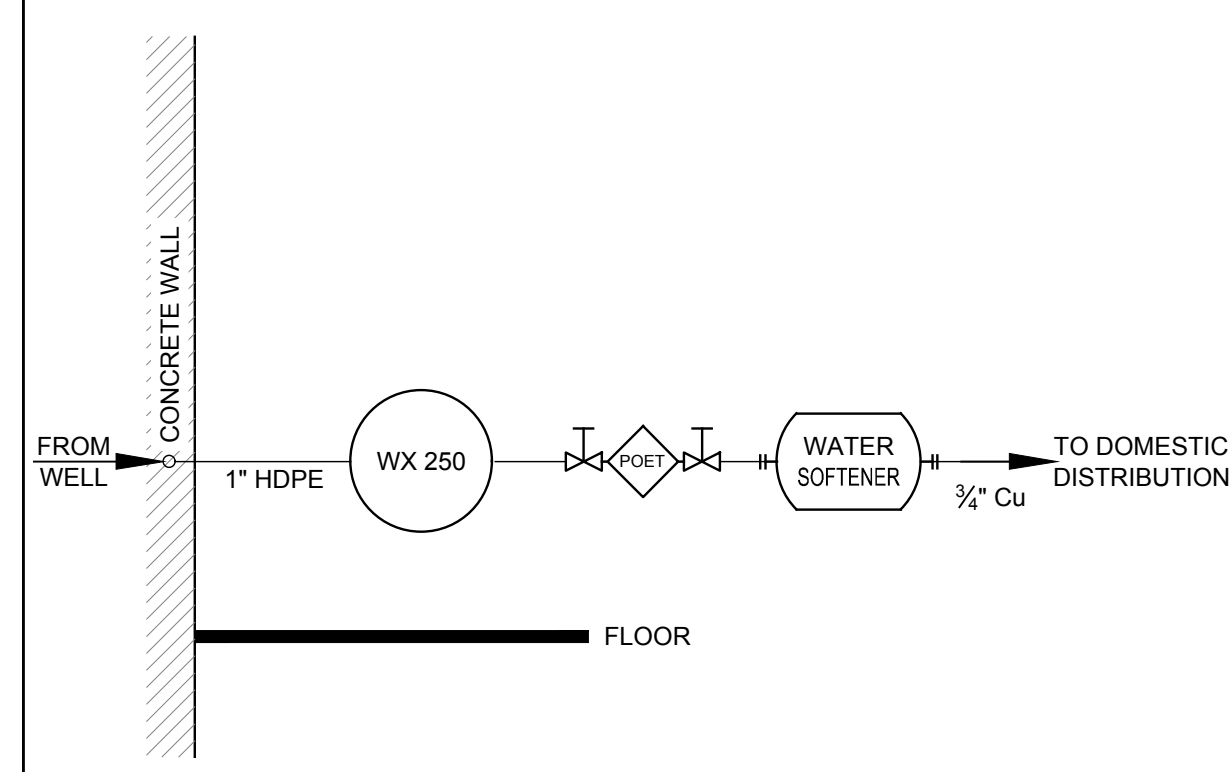
TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**CONTRACT 6**  
 SERVICE ENTRANCE  
 DIAGRAMS

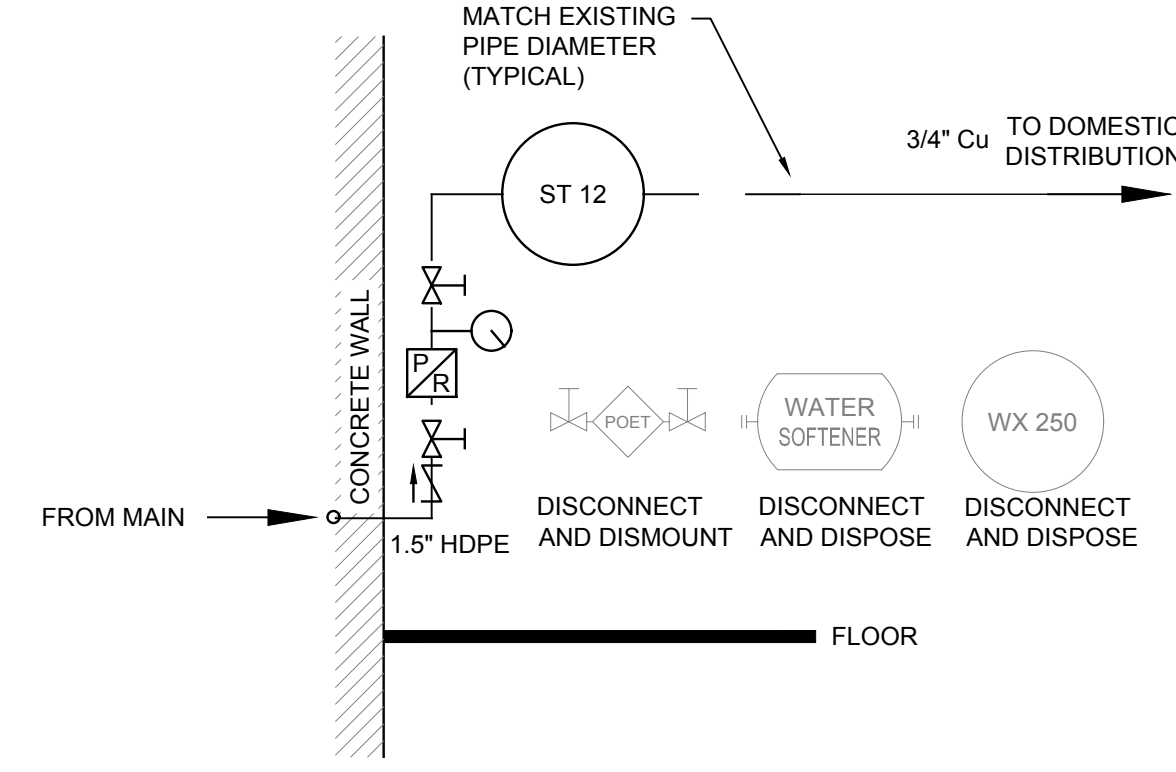
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C601**

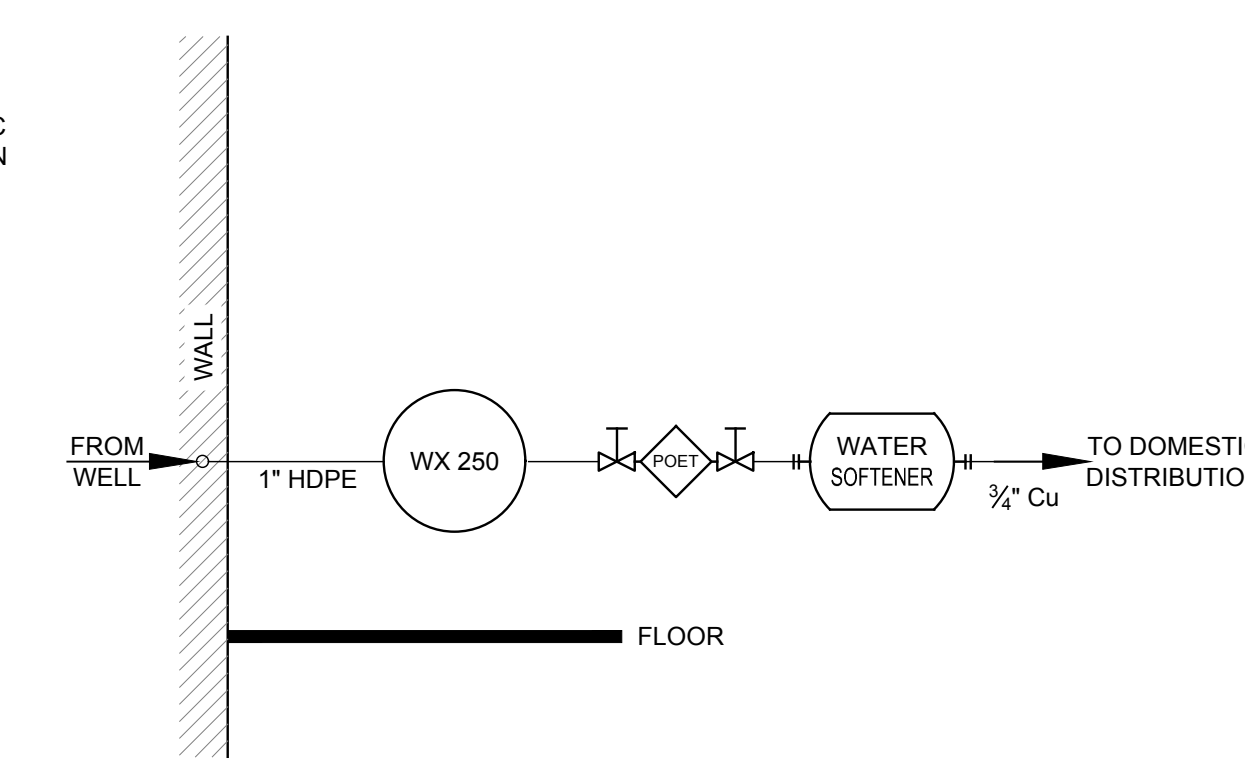




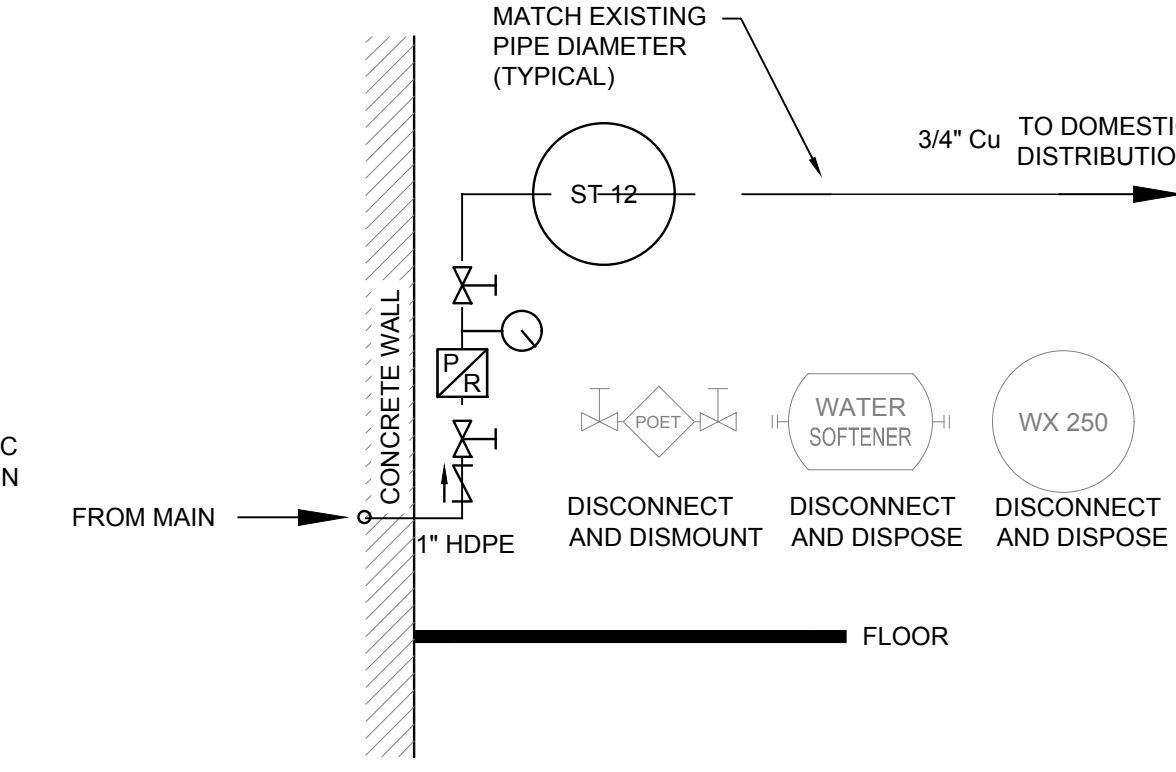
1 WATER SERVICE ENTRANCE DETAIL  
531 APPLE HILL RD (EXISTING)  
Scale: NTS



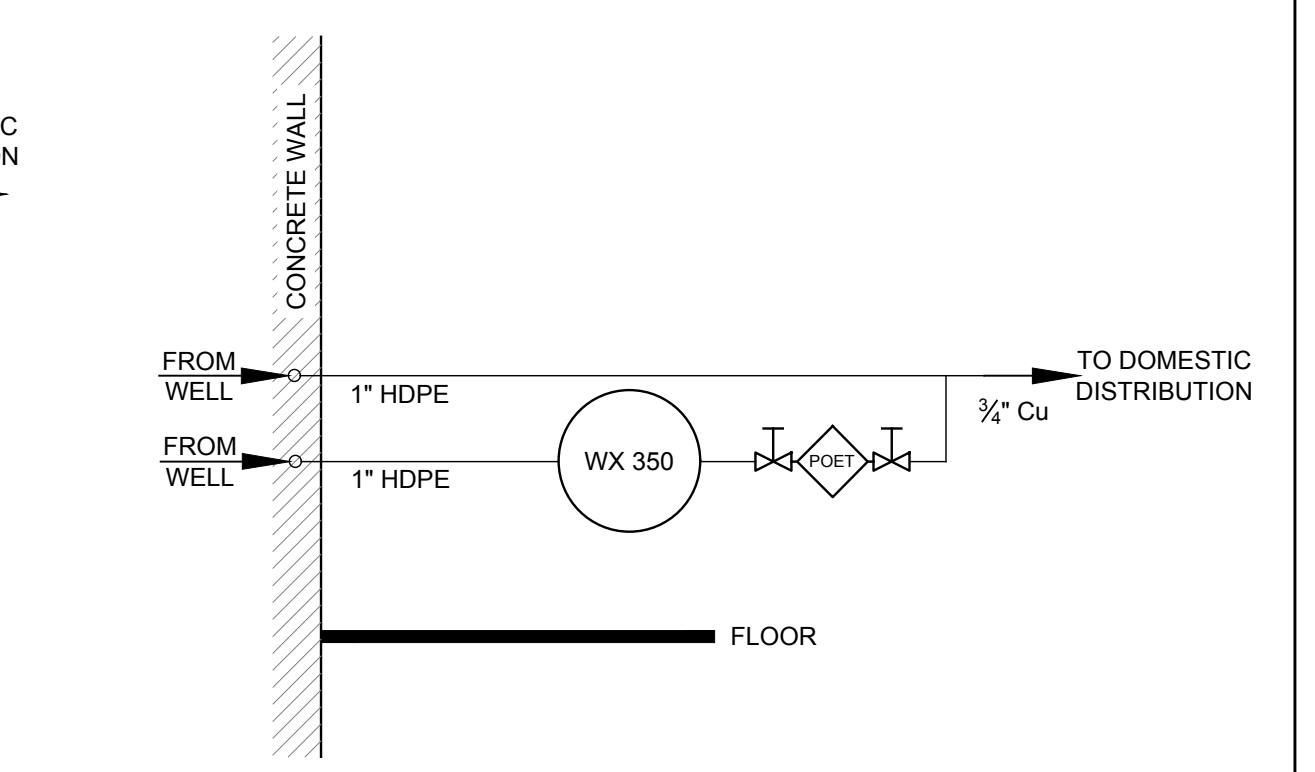
2 WATER SERVICE ENTRANCE DETAIL  
531 APPLE HILL RD (PROPOSED)  
Scale: NTS



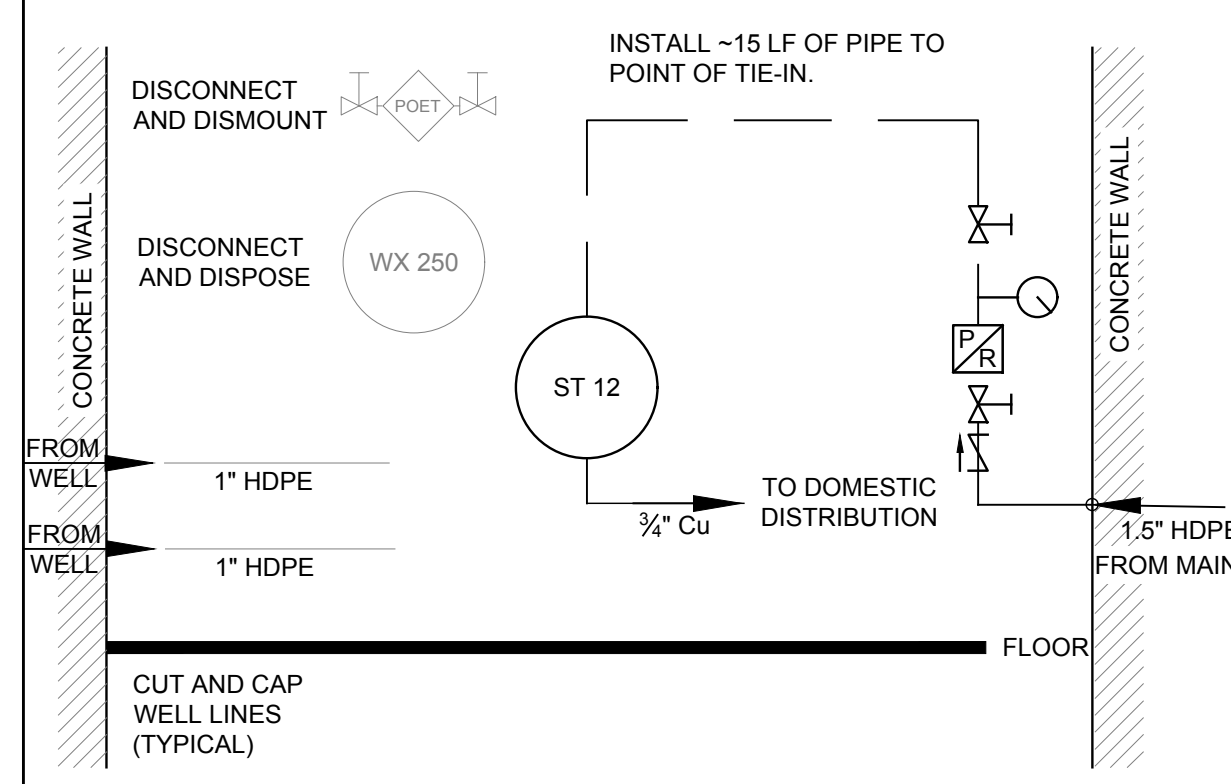
3 WATER SERVICE ENTRANCE DETAIL  
544 APPLE HILL RD (EXISTING)  
Scale: NTS



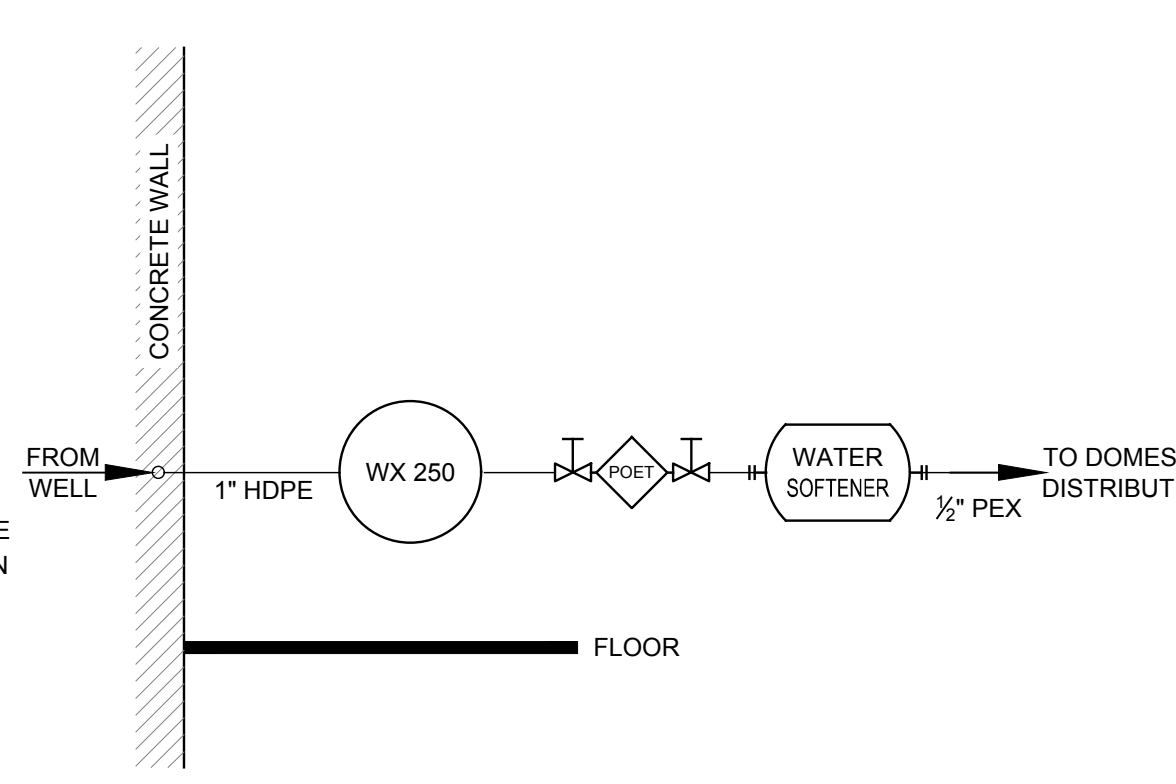
4 WATER SERVICE ENTRANCE DETAIL  
544 APPLE HILL RD (PROPOSED)  
Scale: NTS



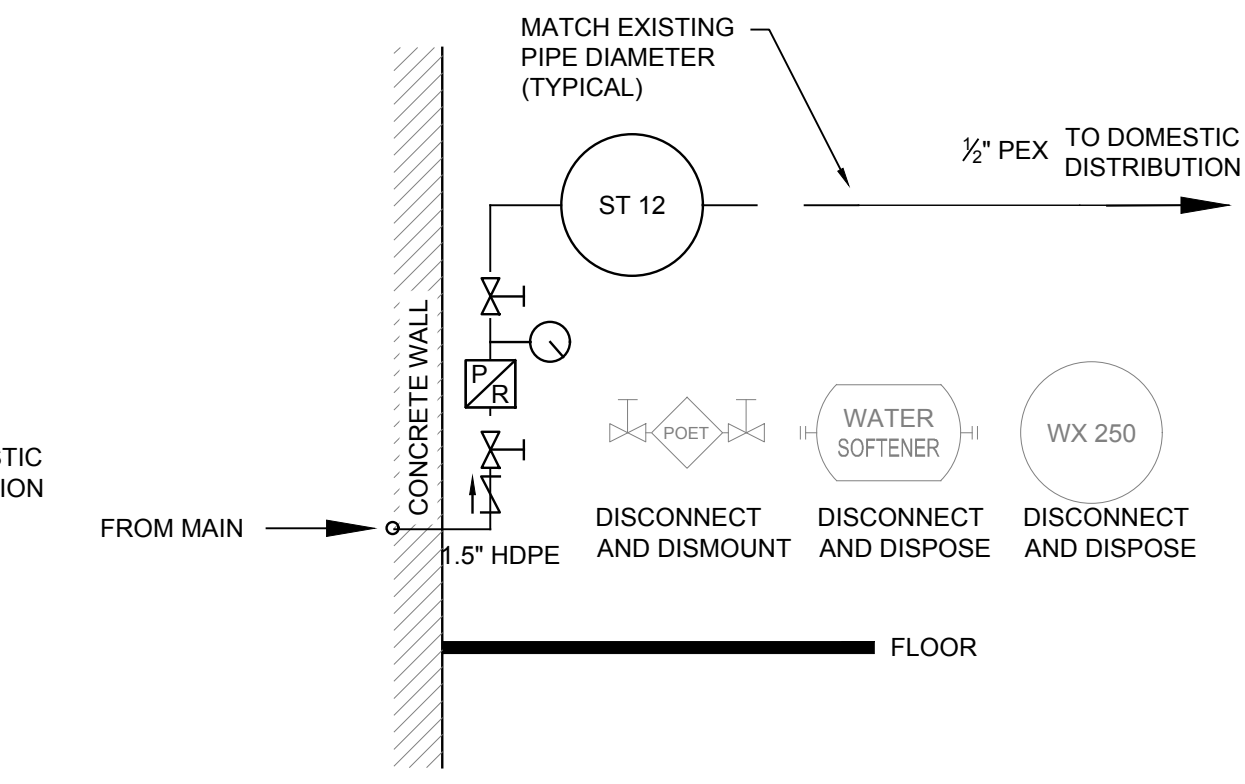
5 WATER SERVICE ENTRANCE DETAIL  
589 APPLE HILL RD (EXISTING)  
Scale: NTS



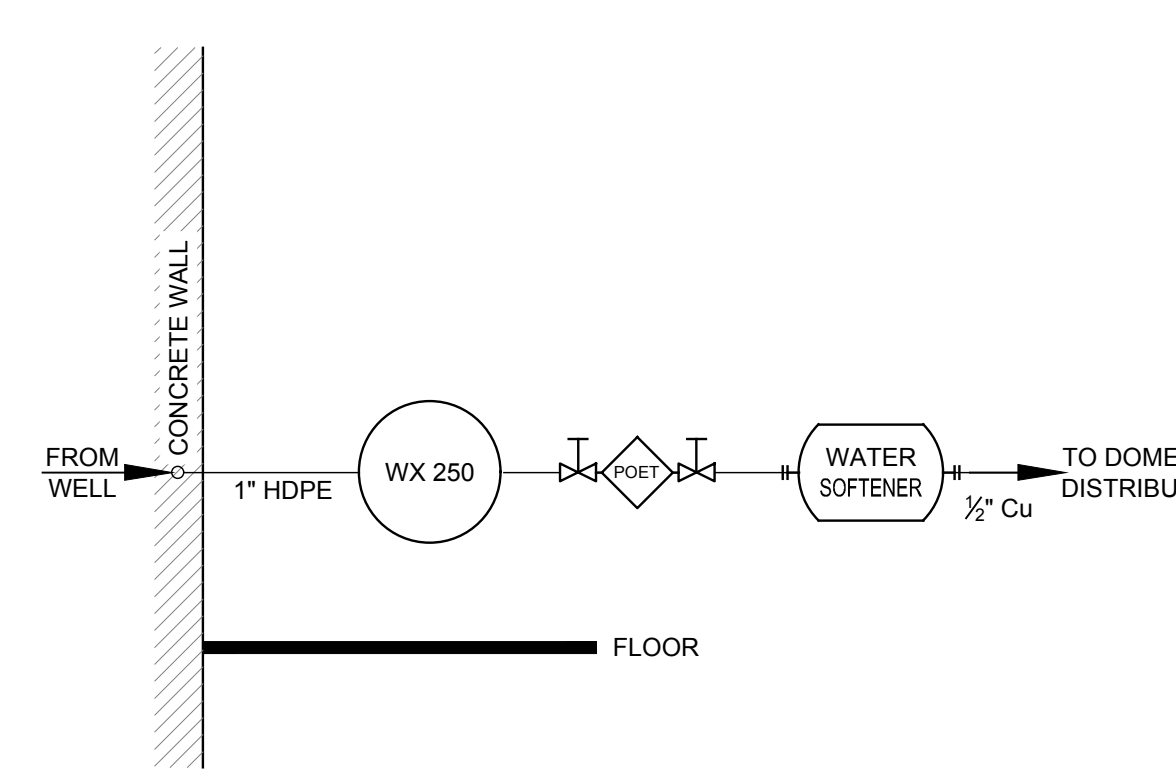
10 WATER SERVICE ENTRANCE DETAIL  
589 APPLE HILL RD (PROPOSED)  
Scale: NTS



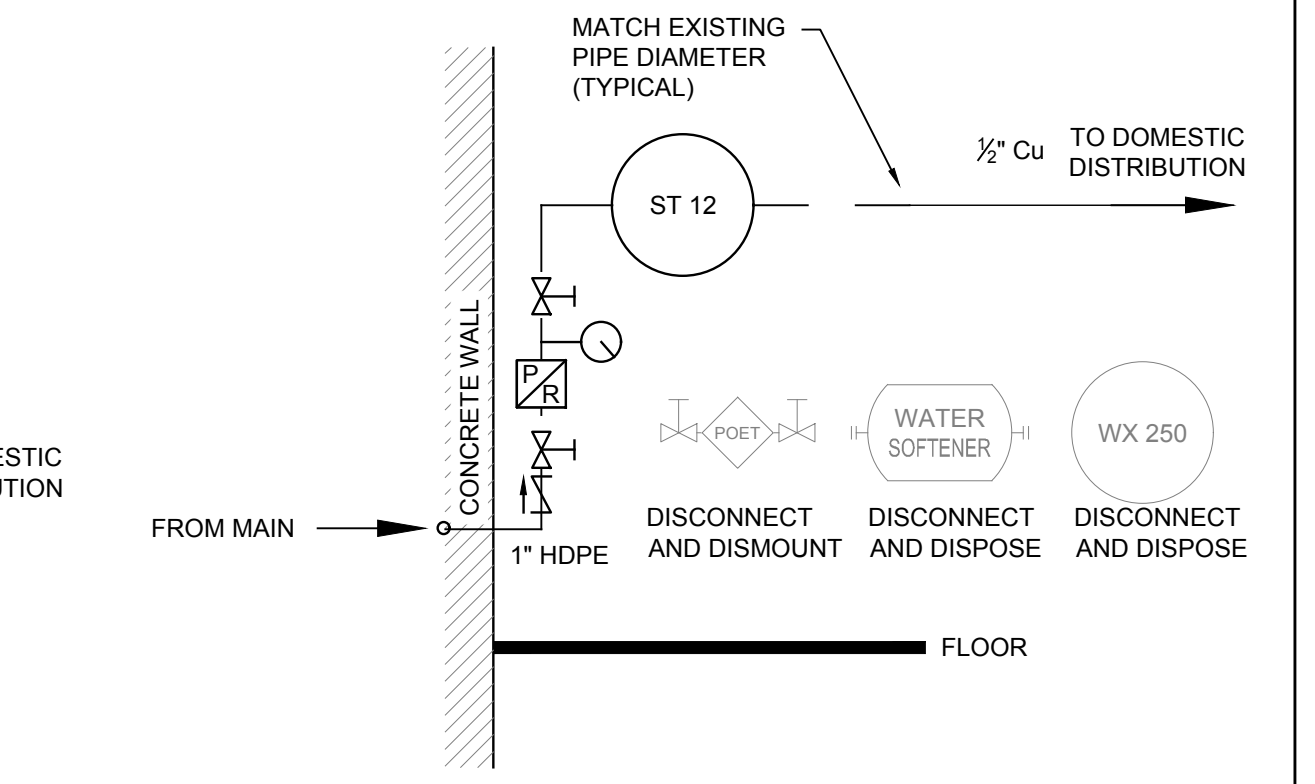
7 WATER SERVICE ENTRANCE DETAIL  
685 APPLE HILL RD (EXISTING)  
Scale: NTS



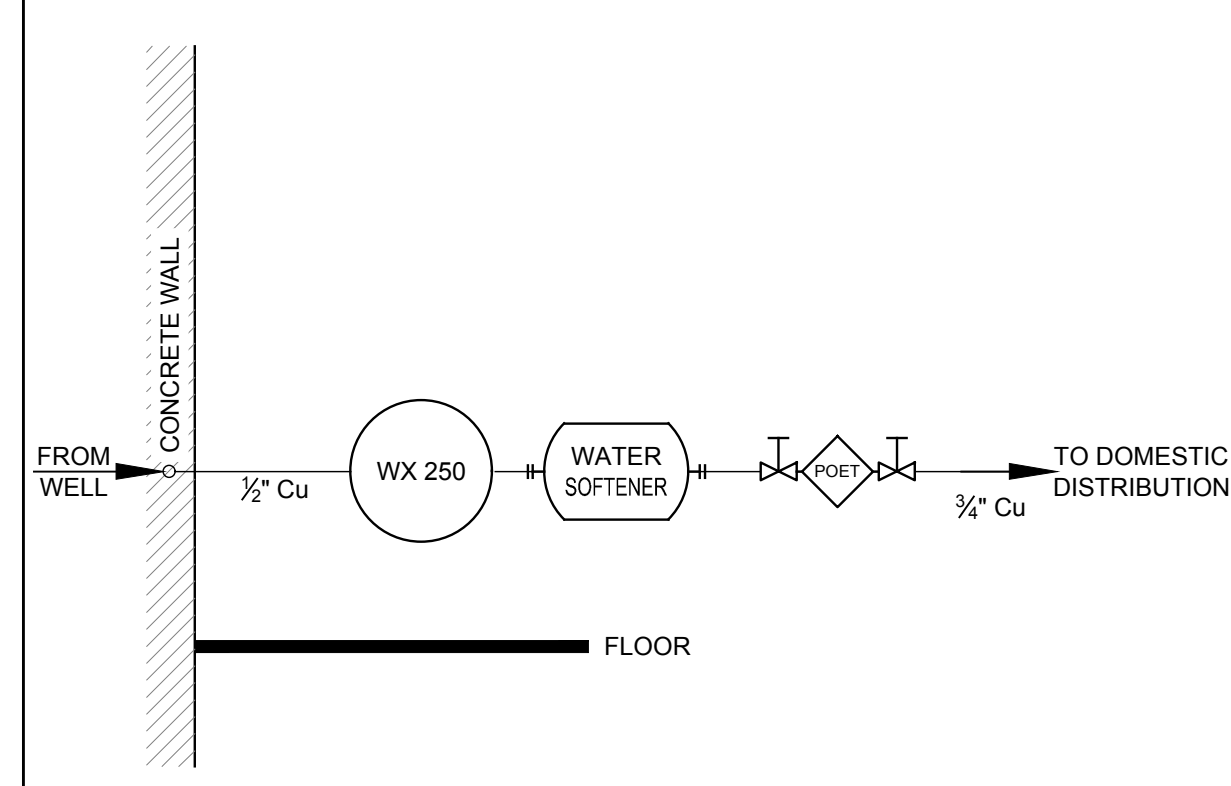
8 WATER SERVICE ENTRANCE DETAIL  
685 APPLE HILL RD (PROPOSED)  
Scale: NTS



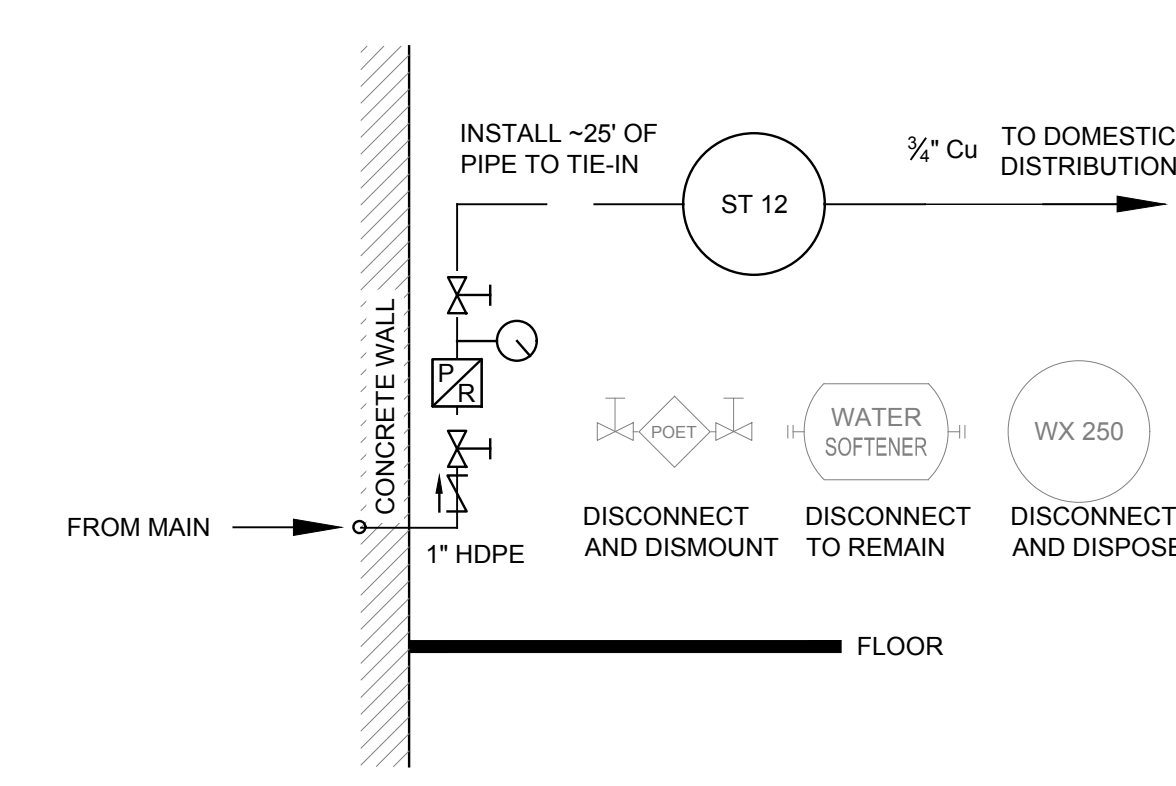
9 WATER SERVICE ENTRANCE DETAIL  
38 ASTRACHAN DR (EXISTING)  
Scale: NTS



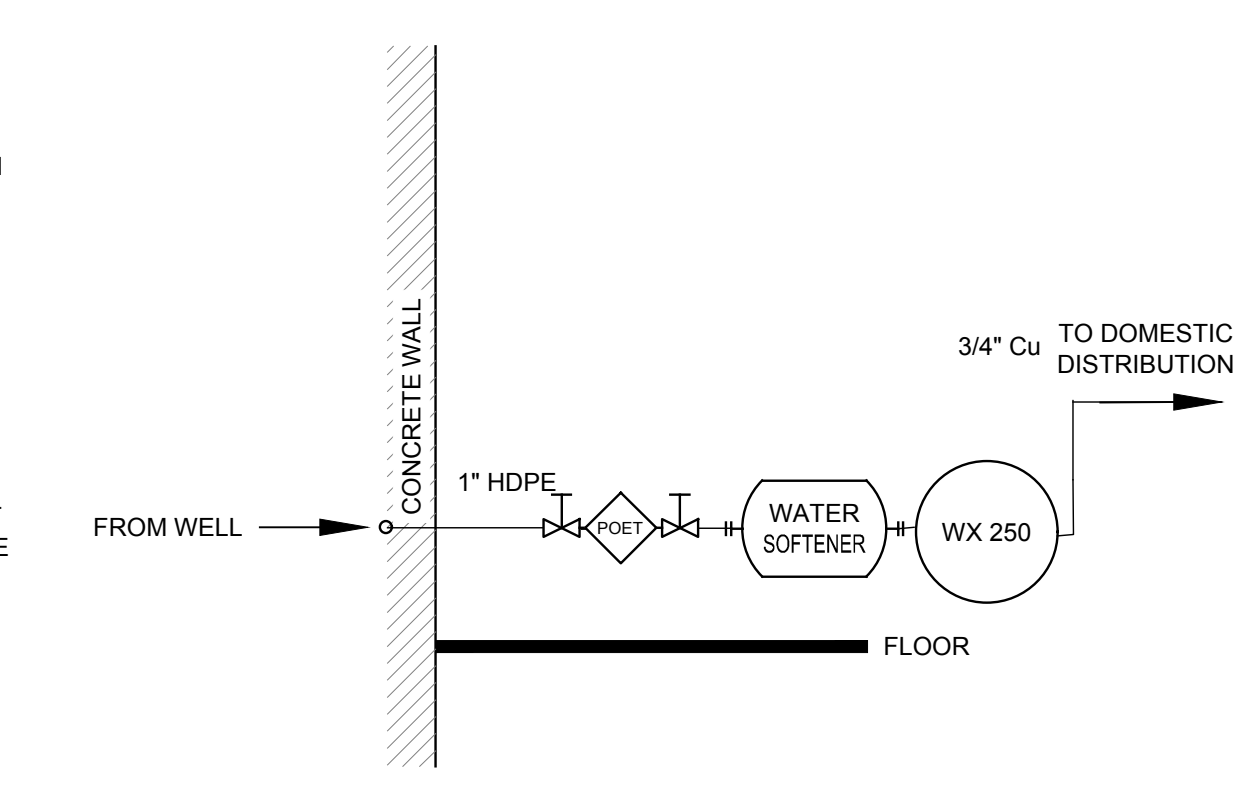
10 WATER SERVICE ENTRANCE DETAIL  
38 ASTRACHAN DR (PROPOSED)  
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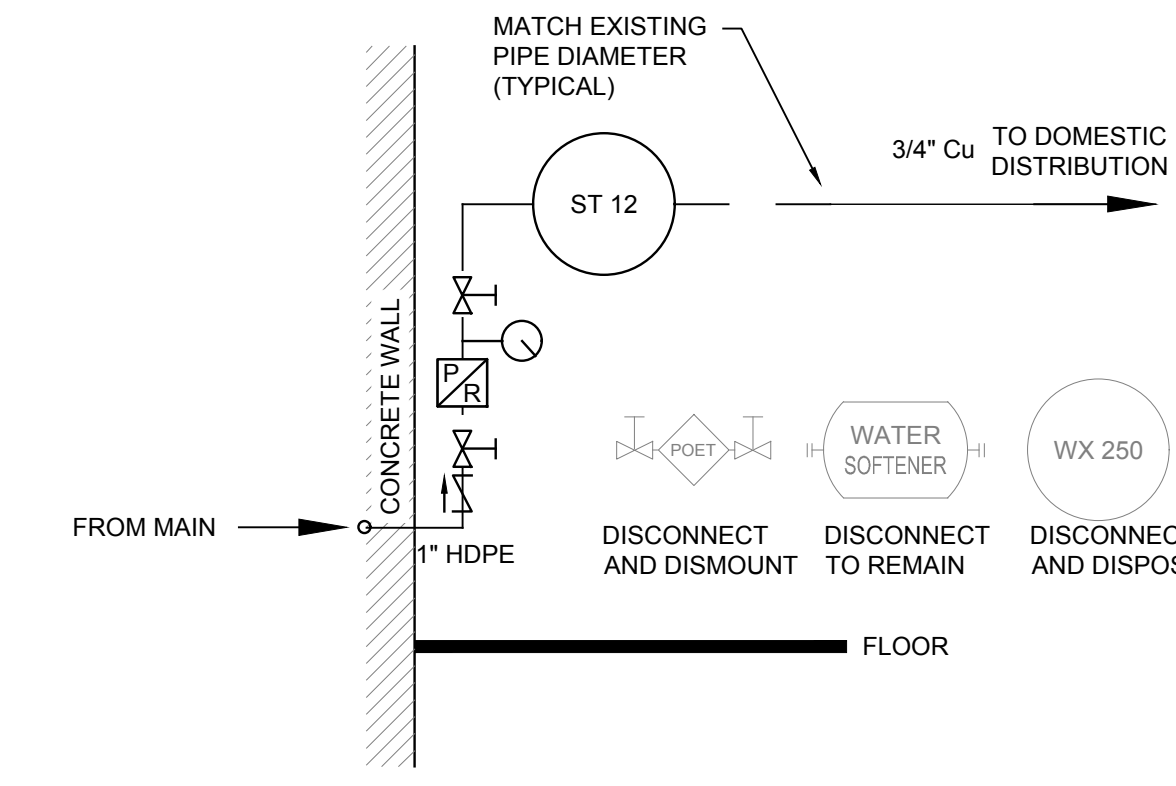
11 WATER SERVICE ENTRANCE DETAIL  
78 ASTRACHAN DR (EXISTING)  
Scale: NTS



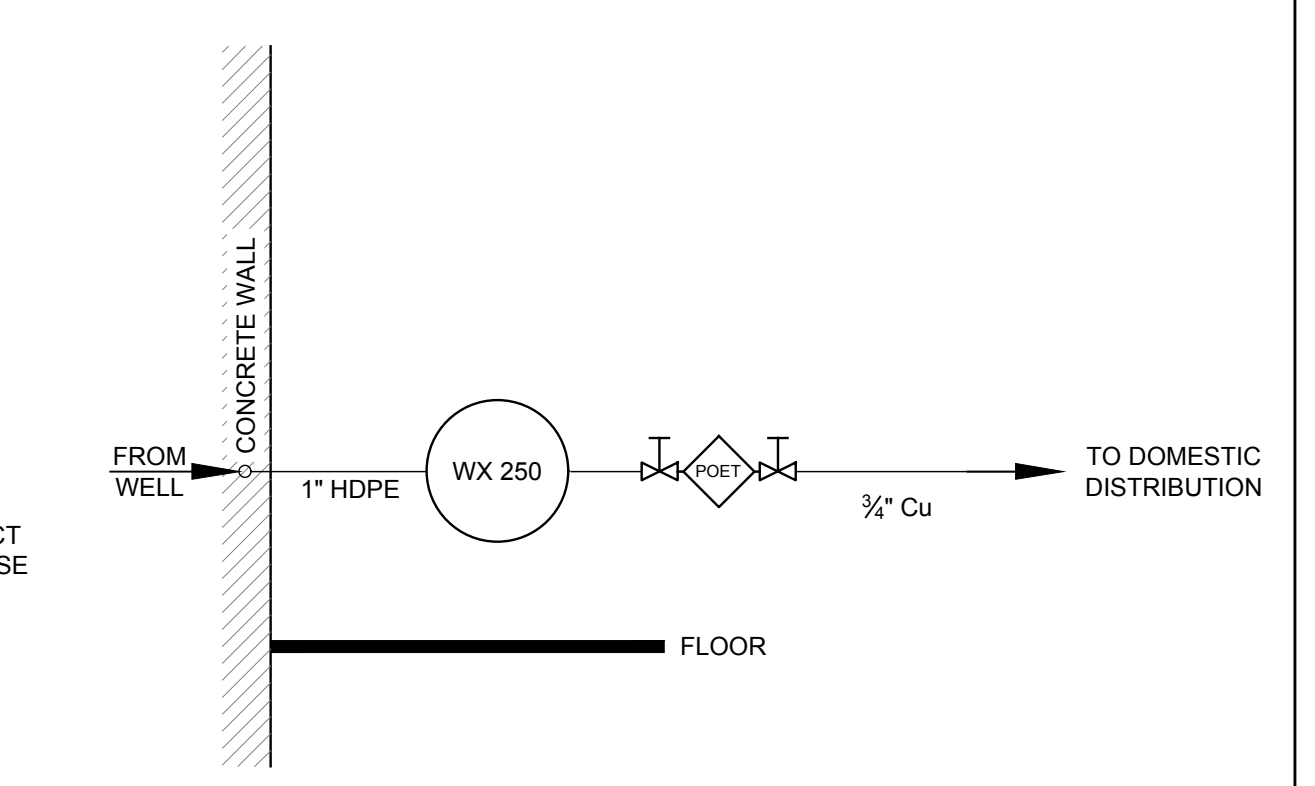
12 WATER SERVICE ENTRANCE DETAIL  
78 ASTRACHAN DR (PROPOSED)  
Scale: NTS



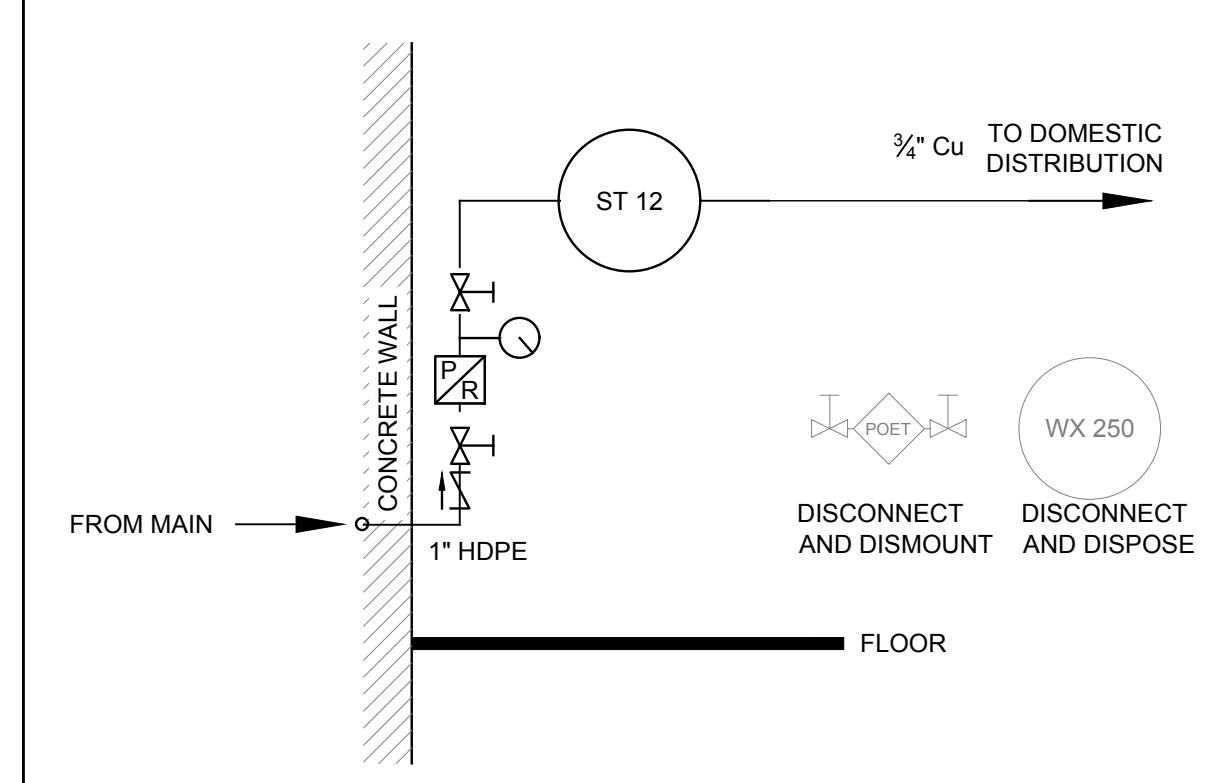
13 WATER SERVICE ENTRANCE DETAIL  
126 ASTRACHAN DR (EXISTING)  
Scale: NTS



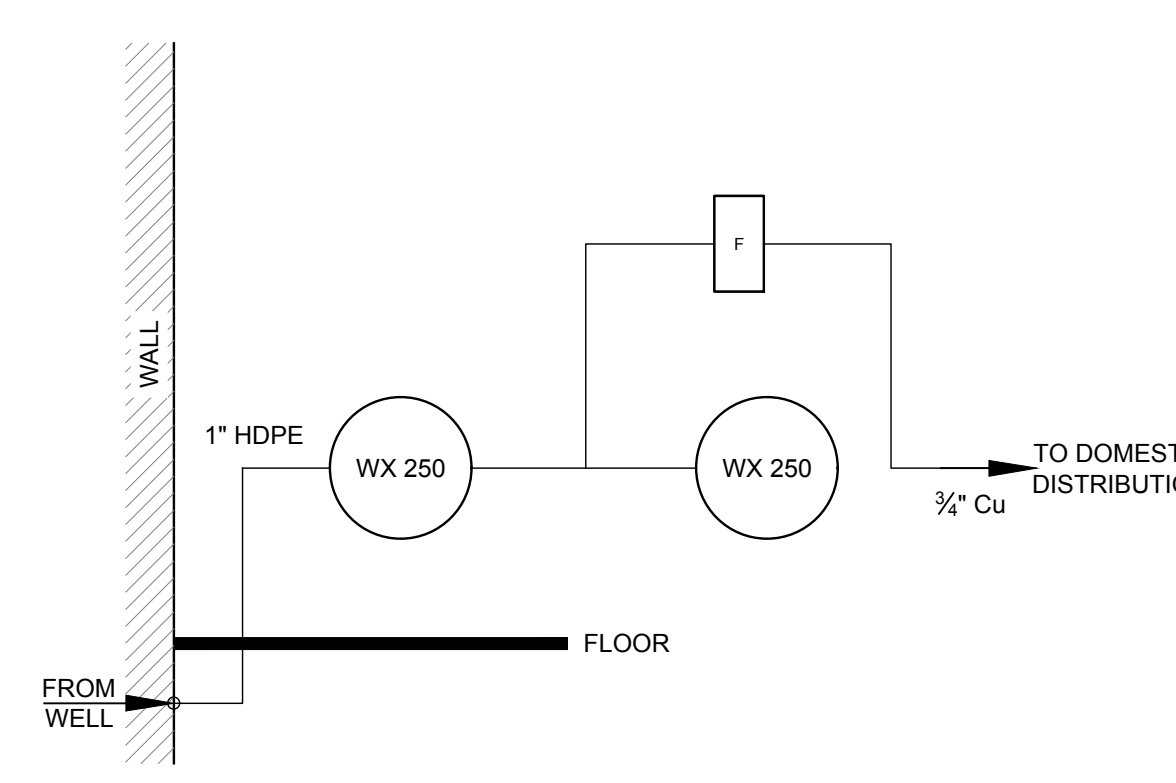
14 WATER SERVICE ENTRANCE DETAIL  
126 ASTRACHAN DR (PROPOSED)  
Scale: NTS



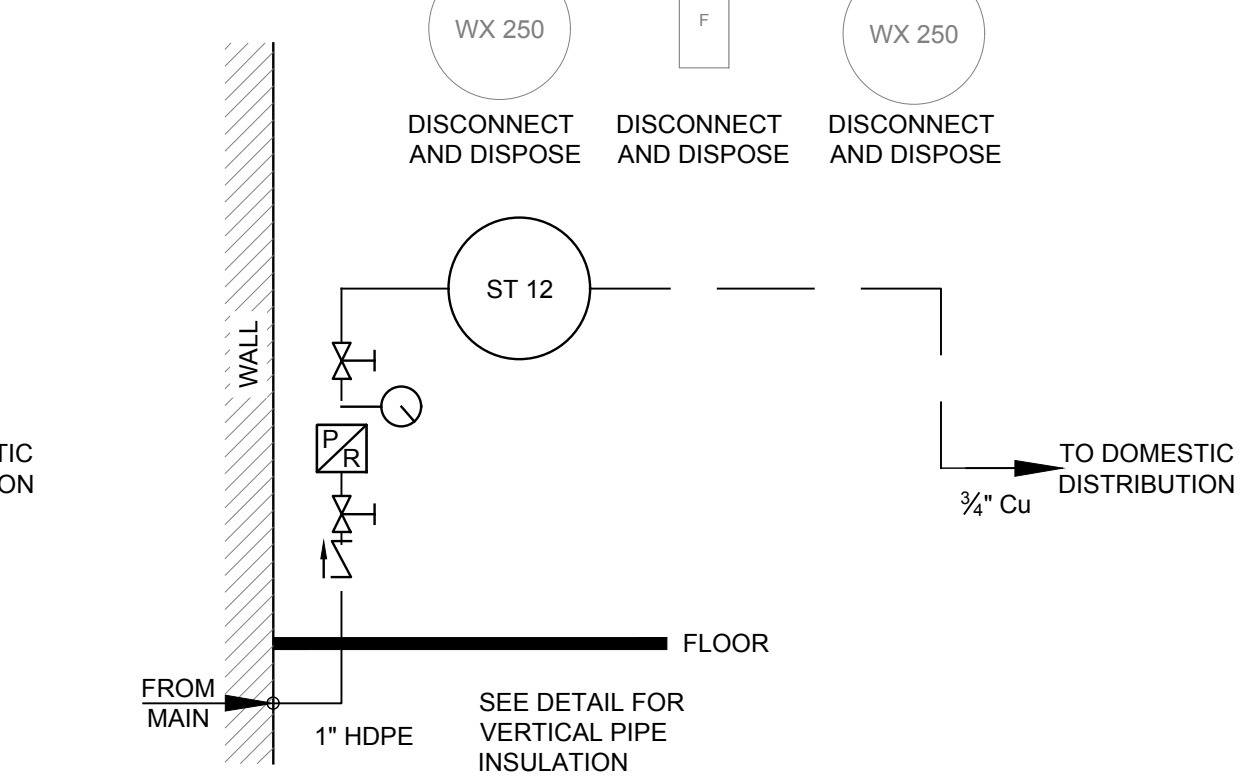
15 WATER SERVICE ENTRANCE DETAIL  
212 ASTRACHAN DR (EXISTING)  
Scale: NTS



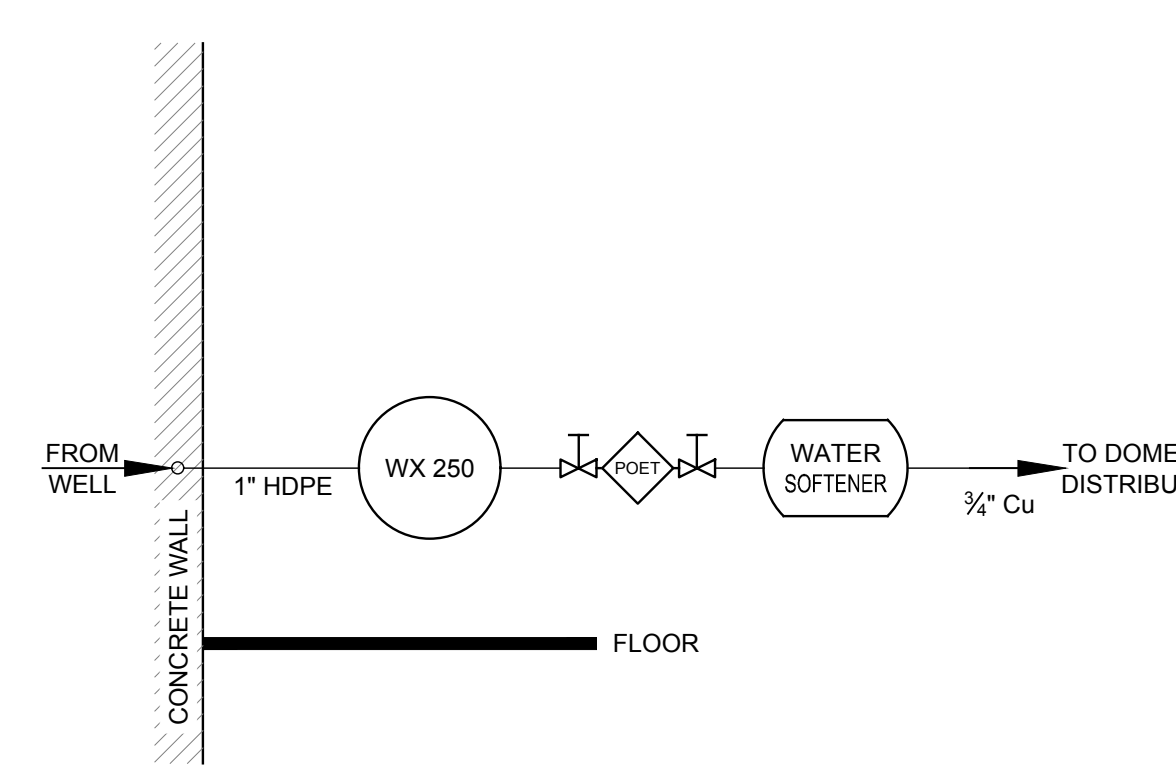
16 WATER SERVICE ENTRANCE DETAIL  
212 ASTRACHAN DR (PROPOSED)  
Scale: NTS



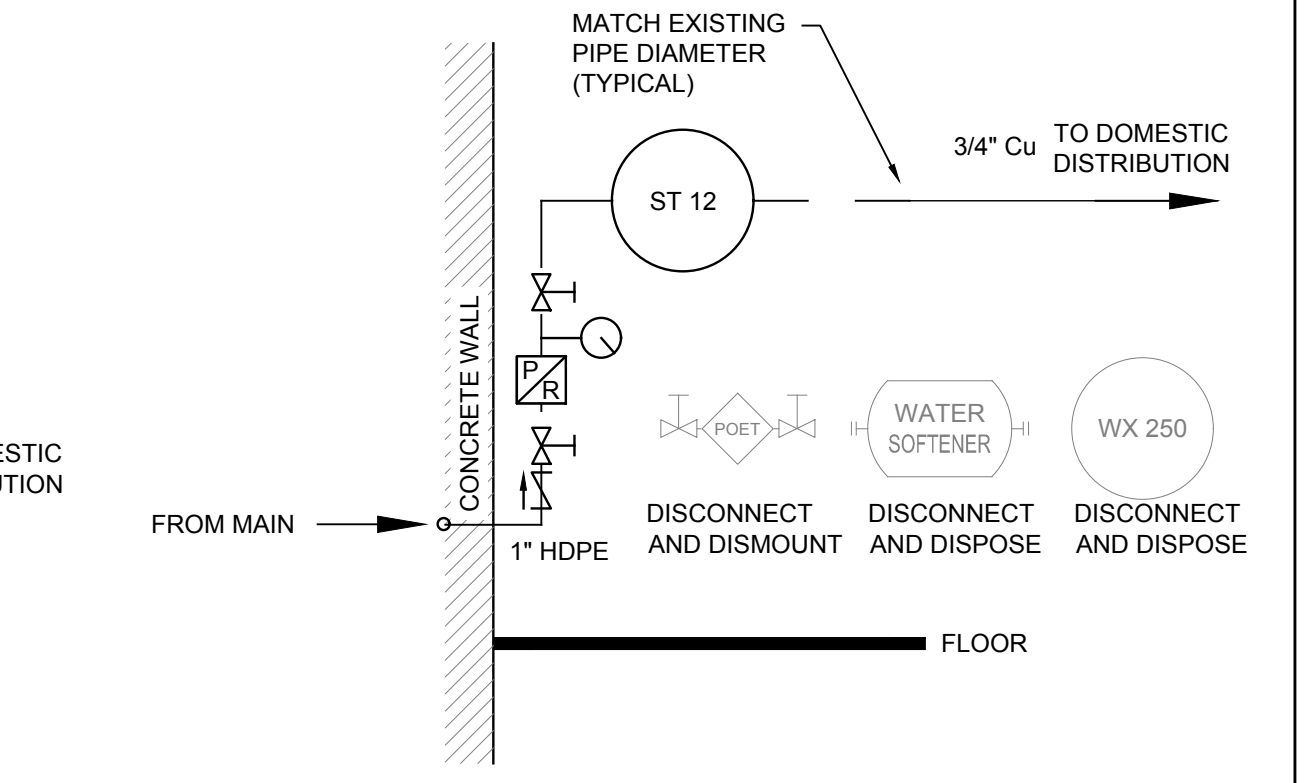
17 WATER SERVICE ENTRANCE DETAIL  
34 MCINTOSH LN (EXISTING)  
Scale: NTS



18 WATER SERVICE ENTRANCE DETAIL  
34 MCINTOSH LN (PROPOSED)  
Scale: NTS



19 WATER SERVICE ENTRANCE DETAIL  
55 MCINTOSH LN (EXISTING)  
Scale: NTS



20 WATER SERVICE ENTRANCE DETAIL  
55 MCINTOSH LN (PROPOSED)  
Scale: NTS

4. DRAWING DATE: 05/14/2019 7:59:43 AM REVISED DATE: 05/14/2019 7:59:43 AM CONTRACT & SERVICE AGREEMENT  
 3 May 2019 9:00:00

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 441-1402 FAX: (802) 445-1281

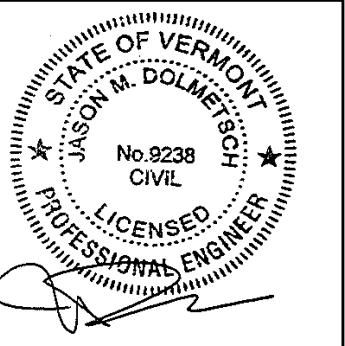
REVISIONS	
NO.	DESCRIPTION

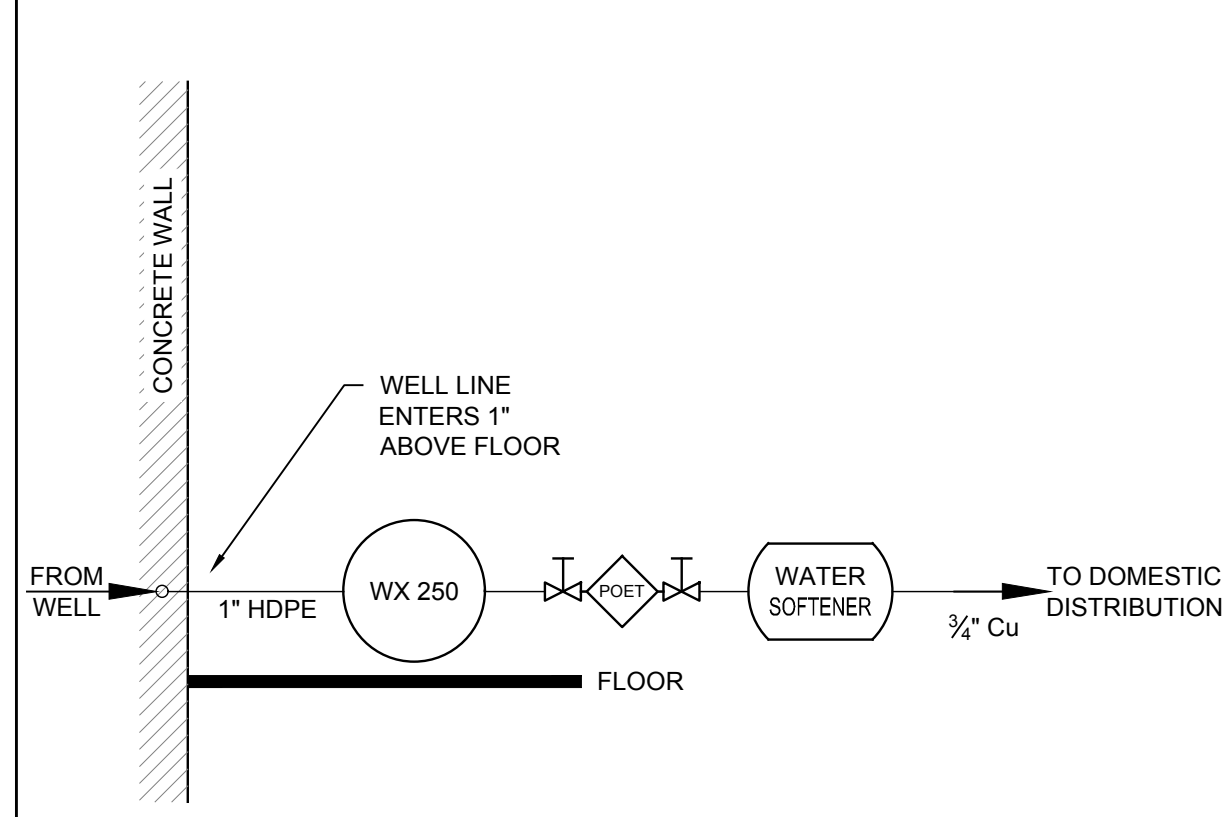
TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**CONTRACT 6**  
**SERVICE ENTRANCE**  
**DIAGRAMS**

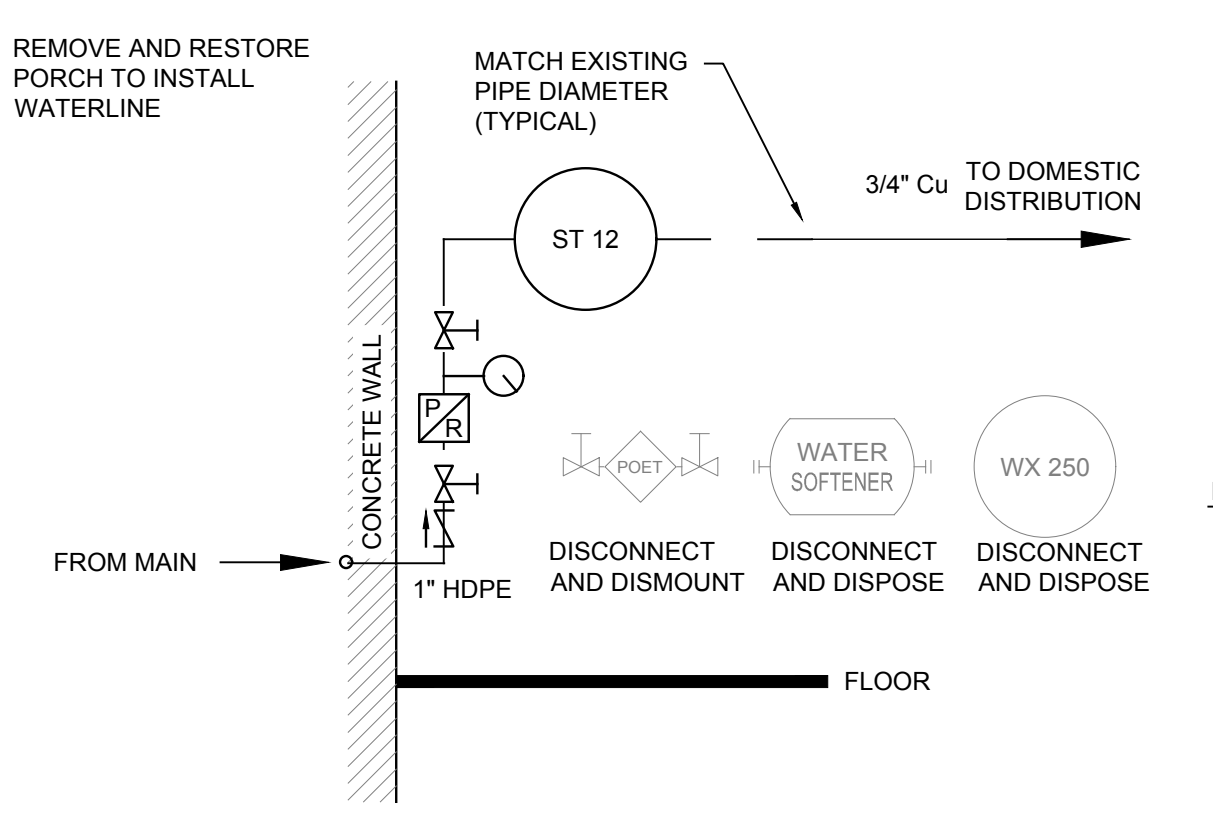
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C602**

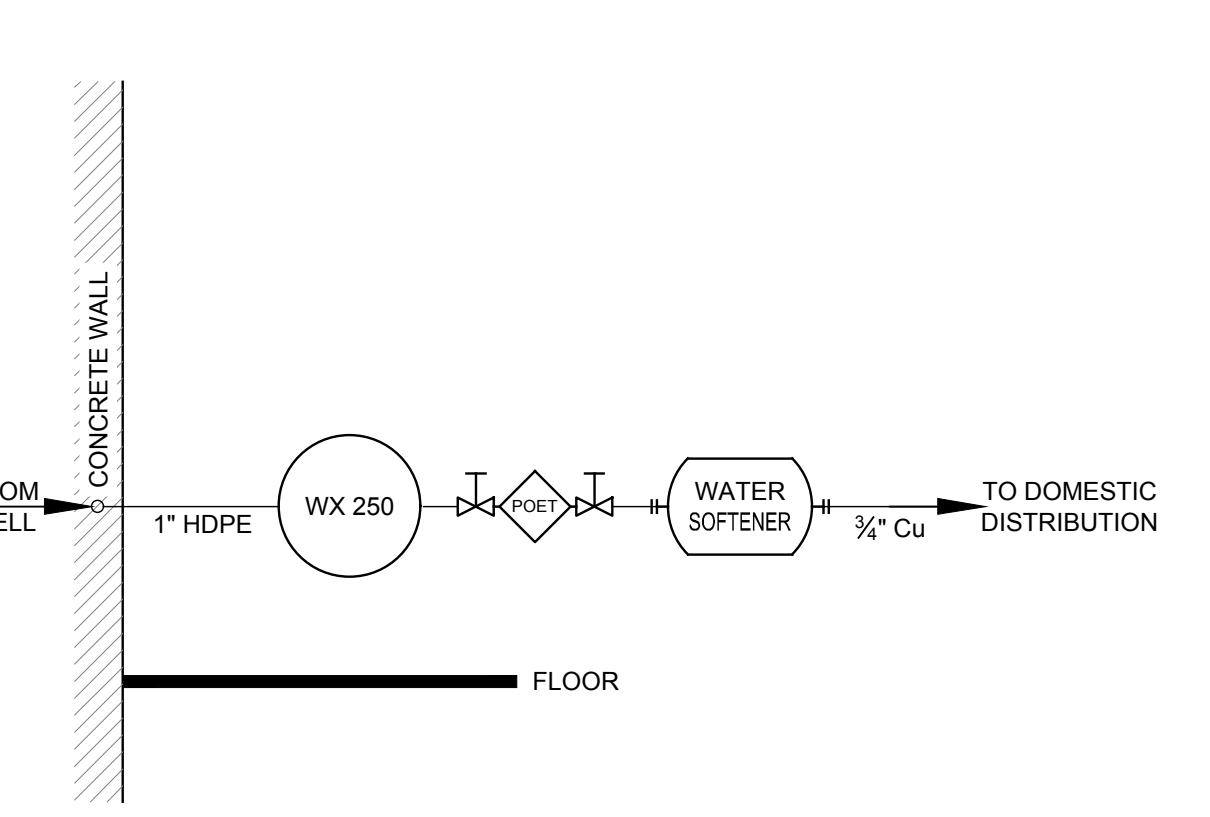




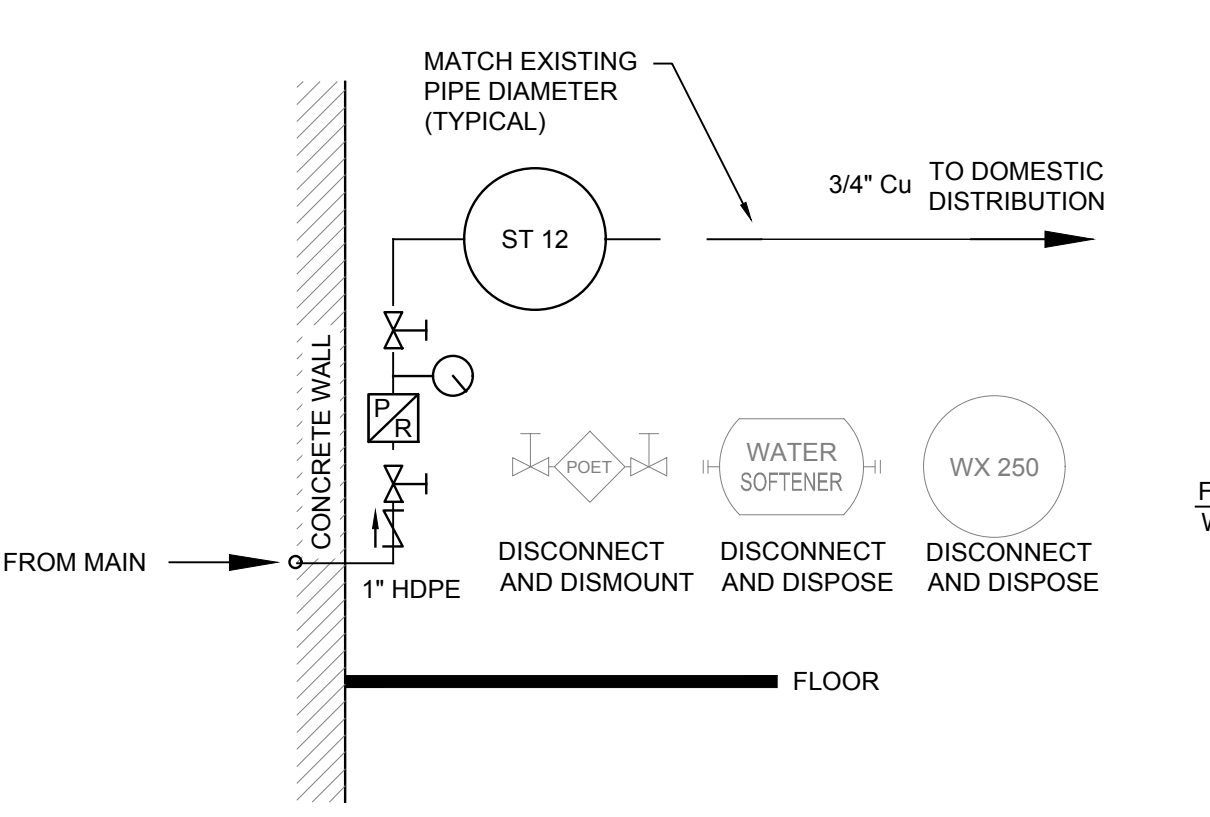
**1 WATER SERVICE ENTRANCE DETAIL**  
70 MCINTOSH LN (EXISTING) Scale: NTS



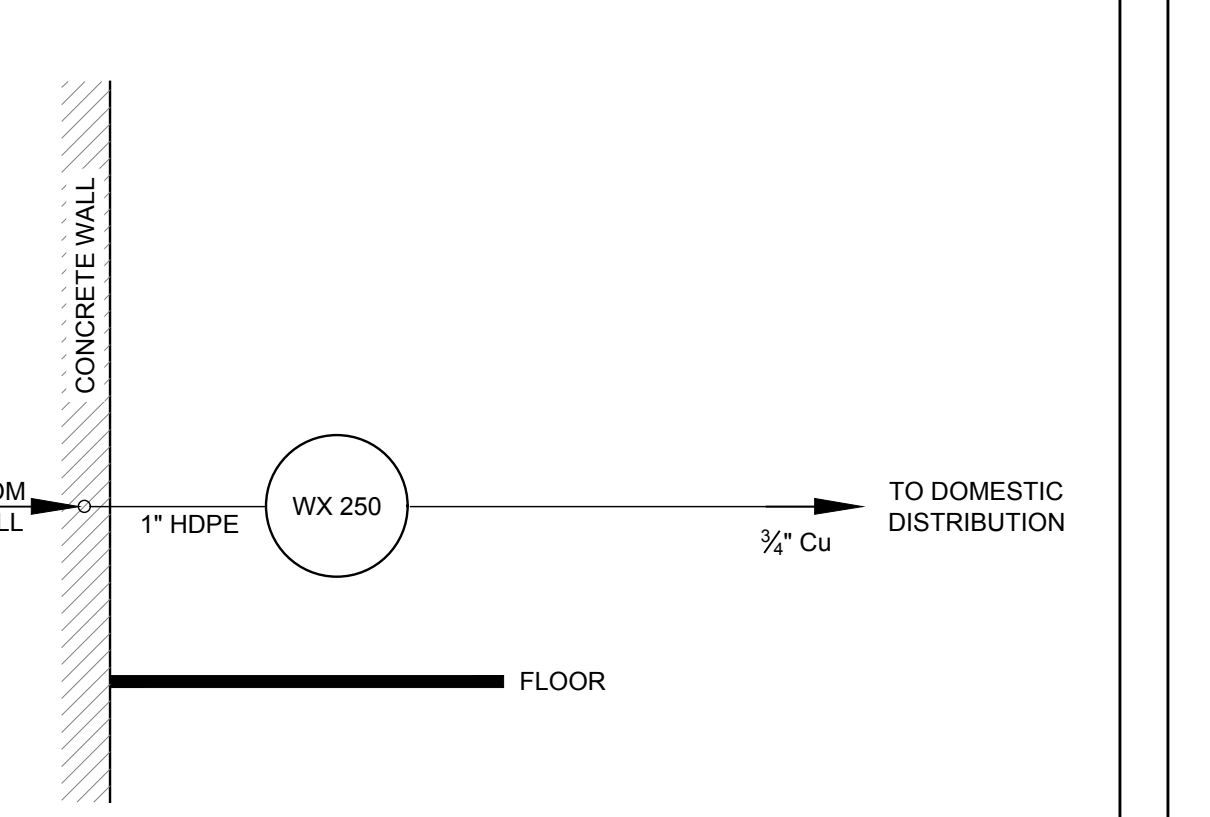
**2 WATER SERVICE ENTRANCE DETAIL**  
70 MCINTOSH LN (PROPOSED) Scale: NTS



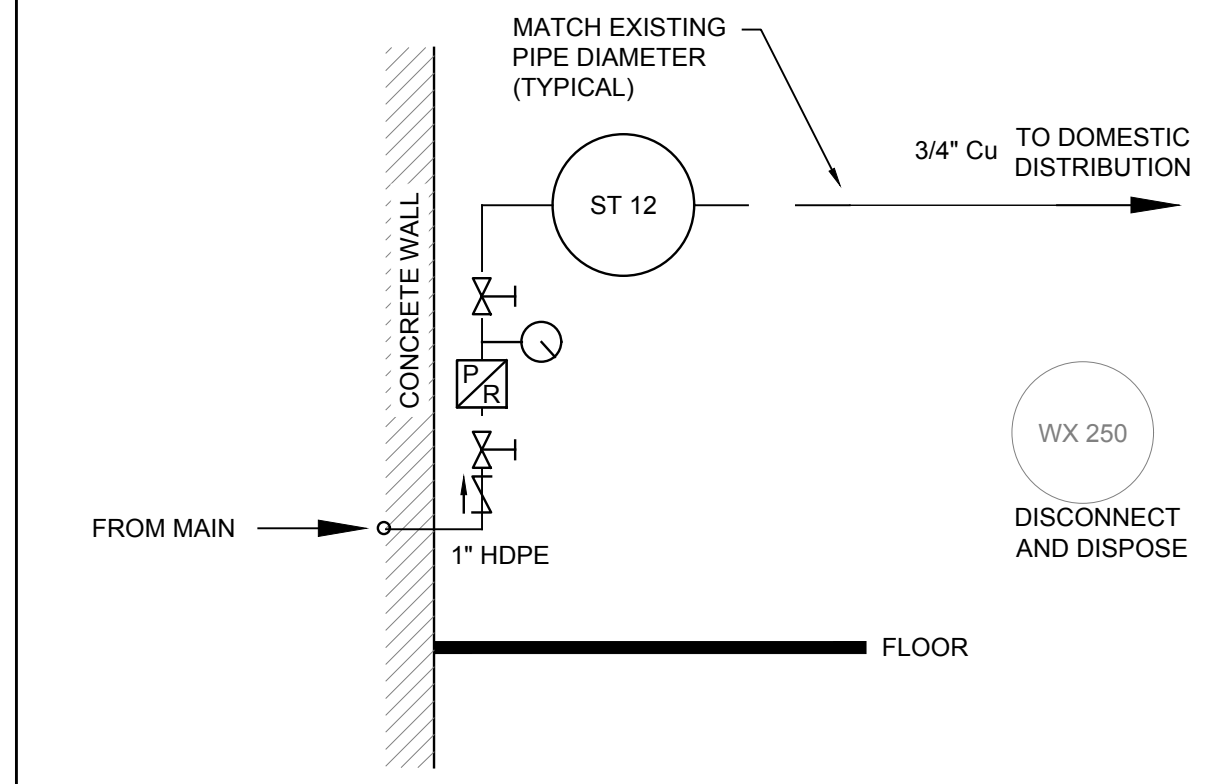
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105 MCINTOSH LN (EXISTING) Scale: NTS



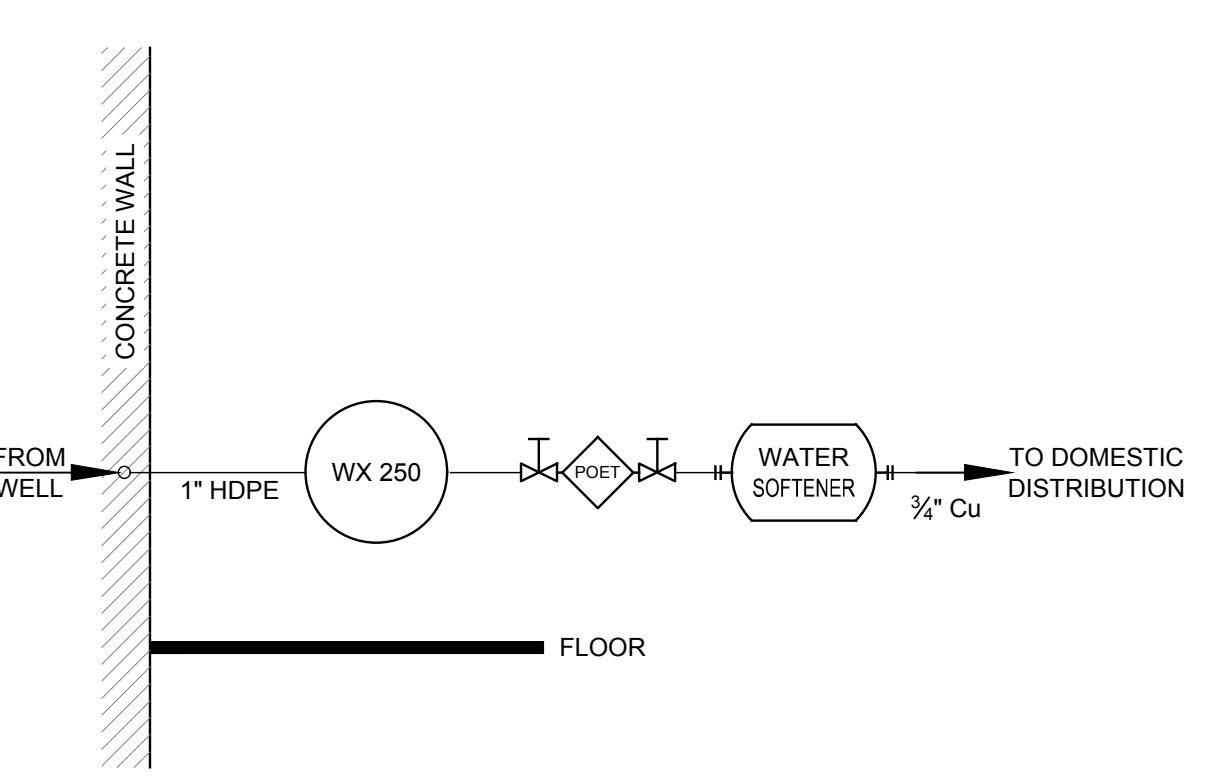
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105 MCINTOSH LN (PROPOSED) Scale: NTS



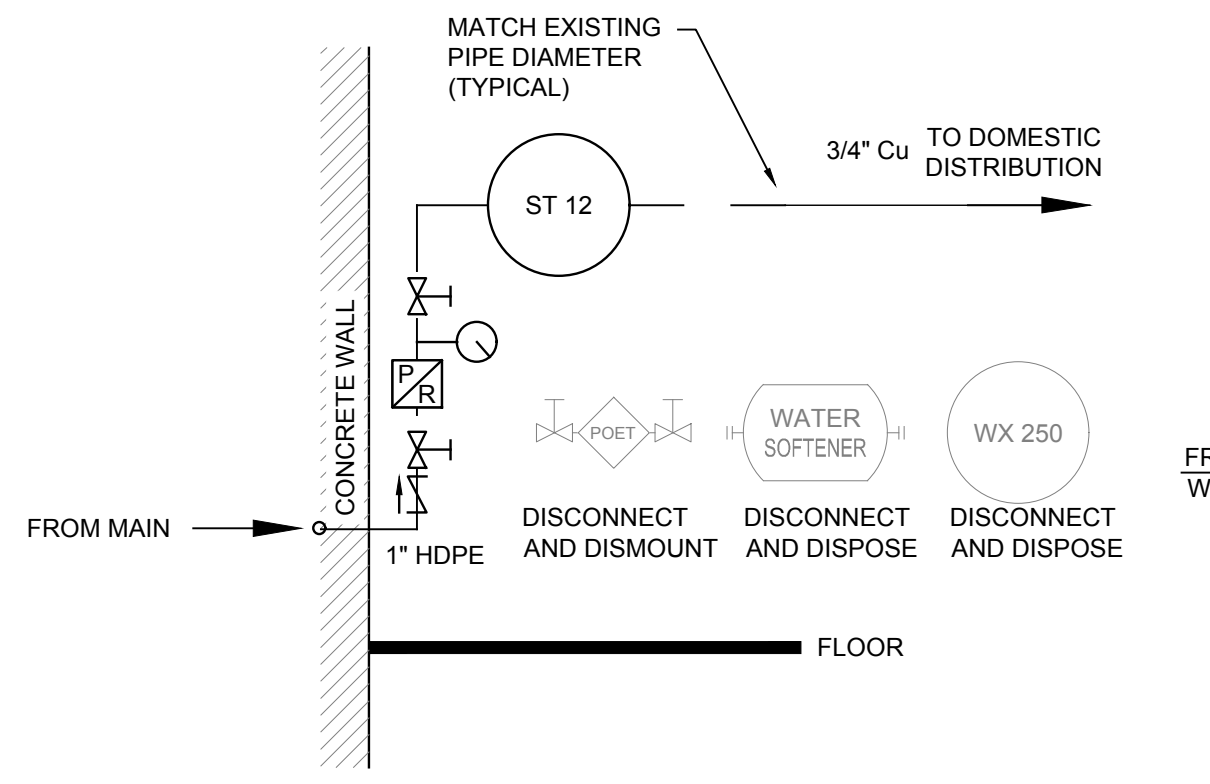
**5 WATER SERVICE ENTRANCE DETAIL**  
112 MCINTOSH LN (EXISTING) Scale: NTS



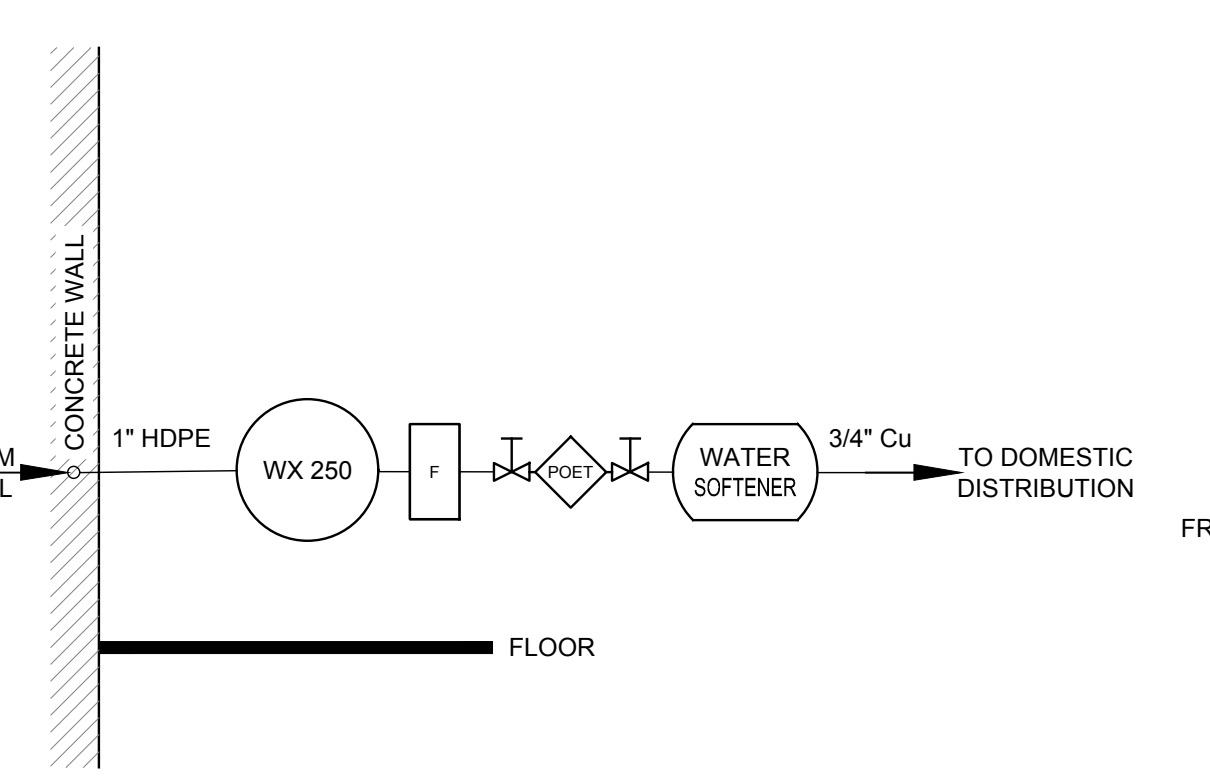
**6 WATER SERVICE ENTRANCE DETAIL**  
112 MCINTOSH LN (PROPOSED) Scale: NTS



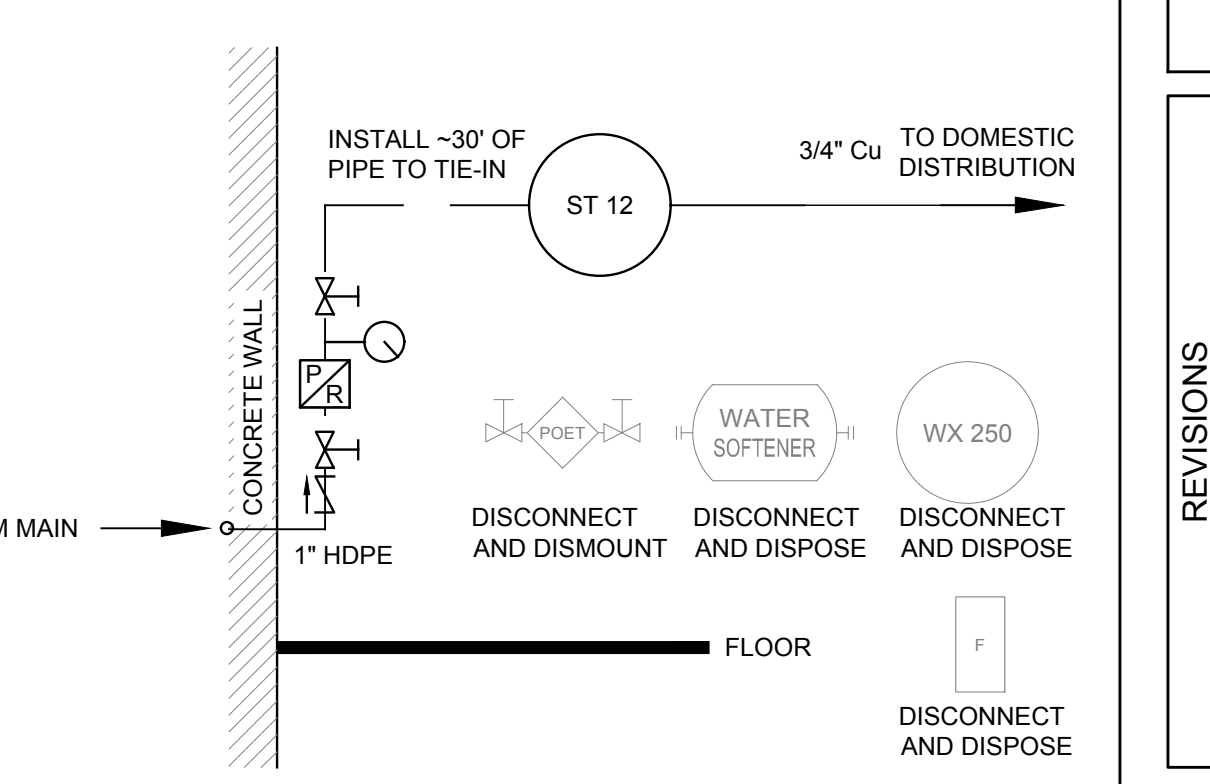
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118 MCINTOSH LN (EXISTING) Scale: NTS



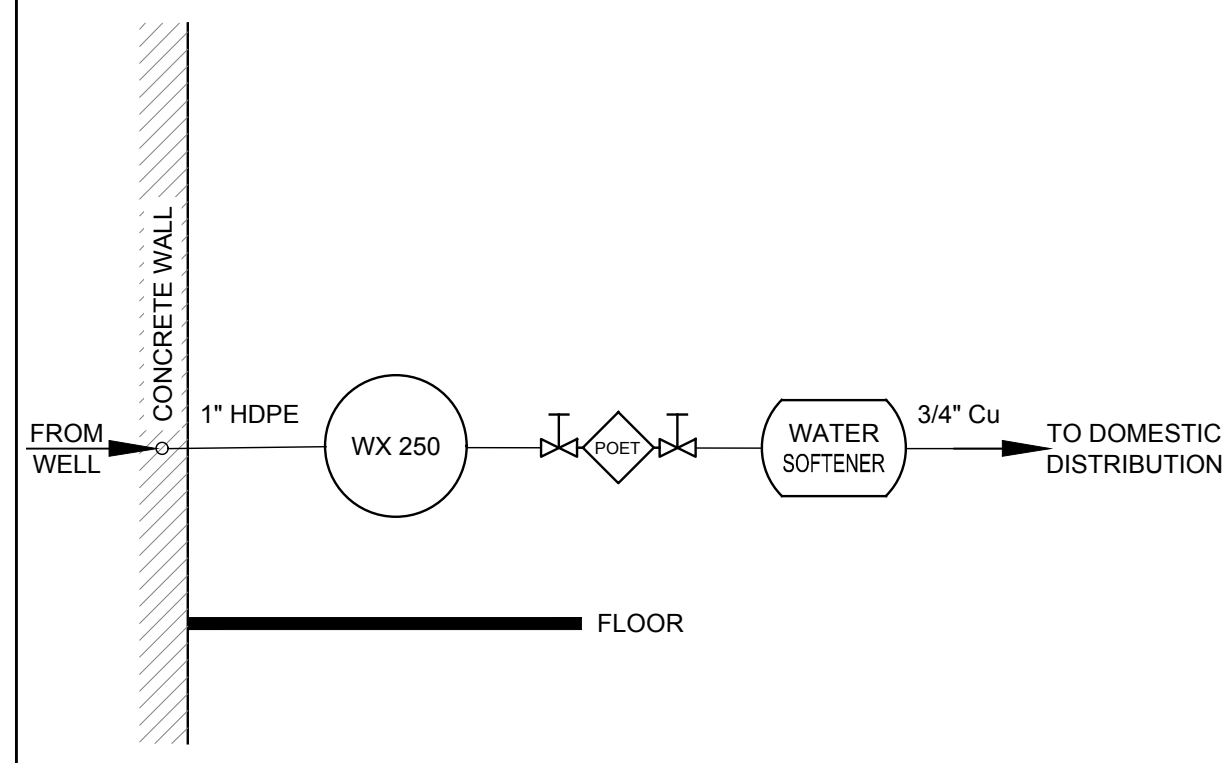
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118 MCINTOSH LN (PROPOSED) Scale: NTS



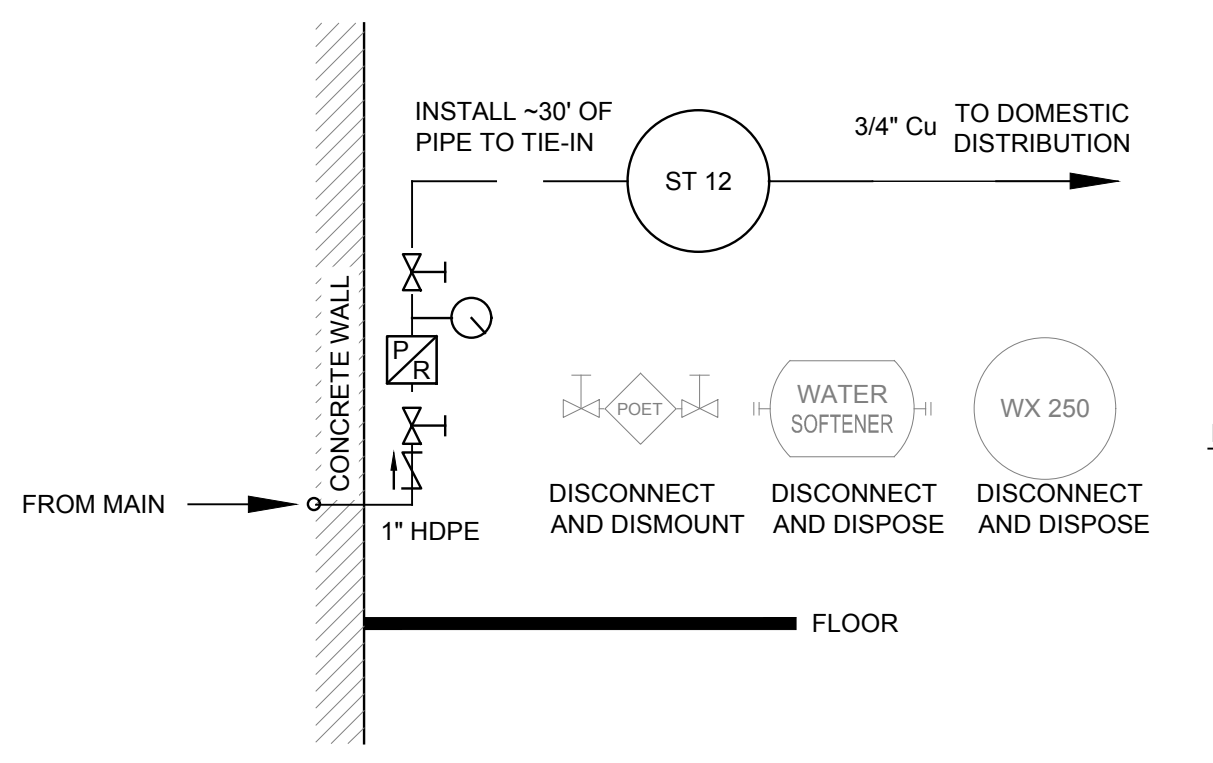
**9 WATER SERVICE ENTRANCE DETAIL**  
32 CORTLAND LN (EXISTING) Scale: NTS



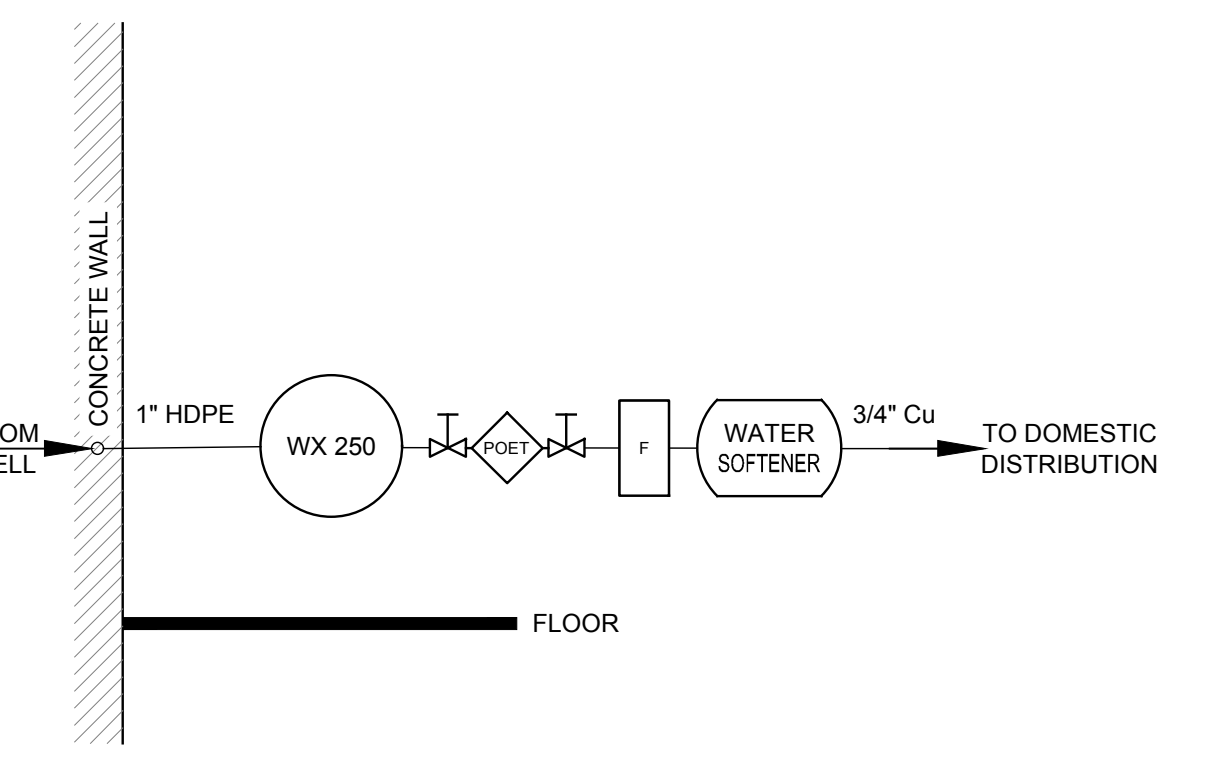
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32 CORTLAND LN (PROPOSED) Scale: NTS



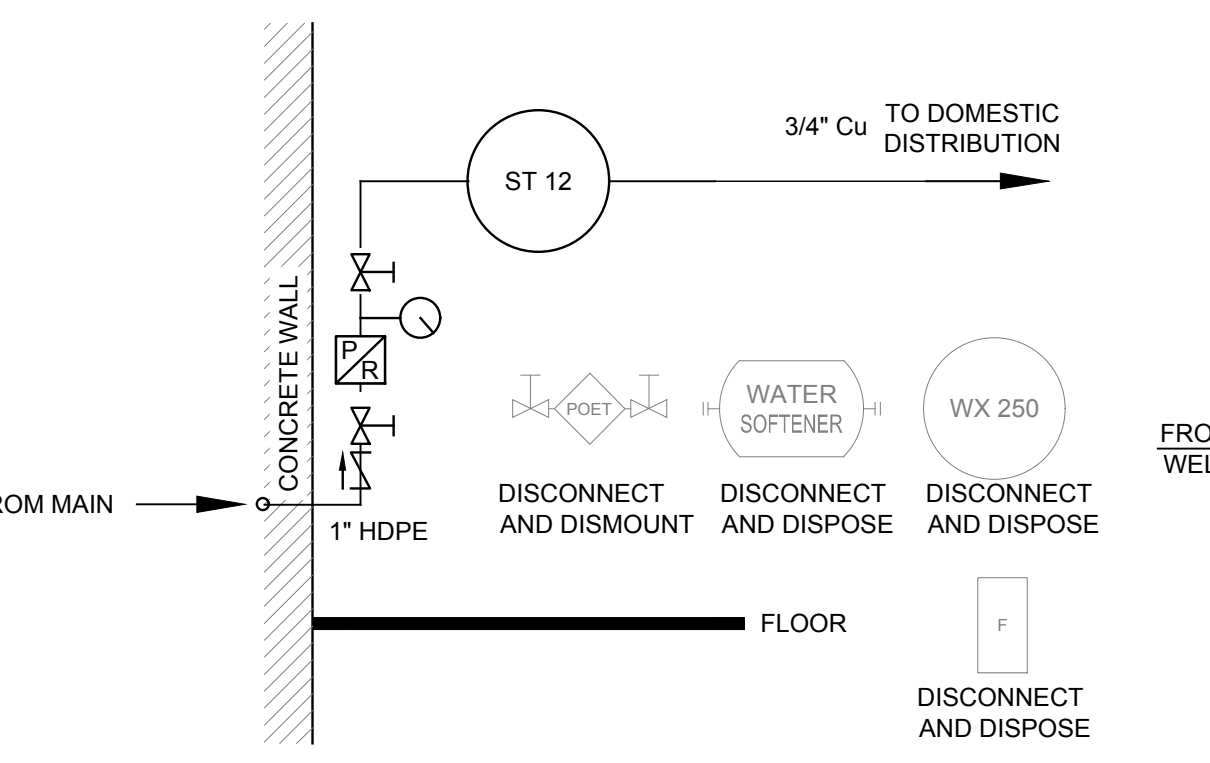
**11 WATER SERVICE ENTRANCE DETAIL**  
54 CORTLAND LN (EXISTING) Scale: NTS



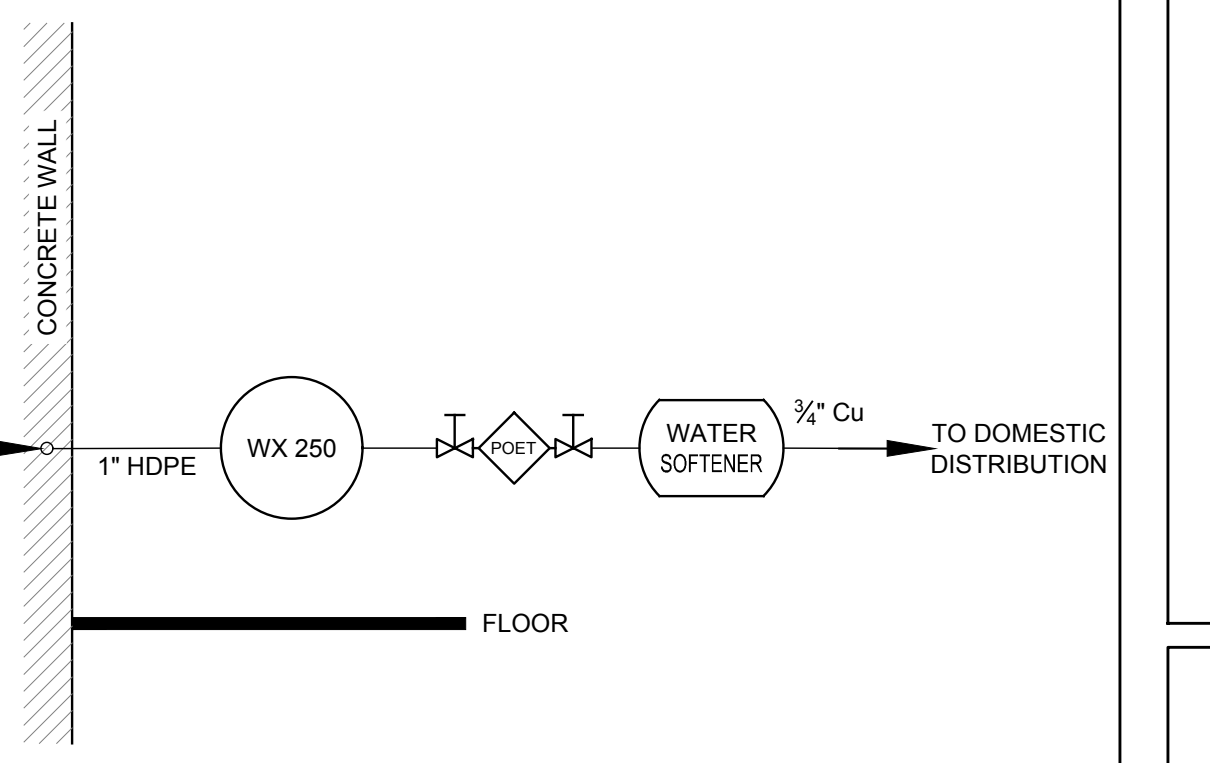
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54 CORTLAND LN (PROPOSED) Scale: NTS



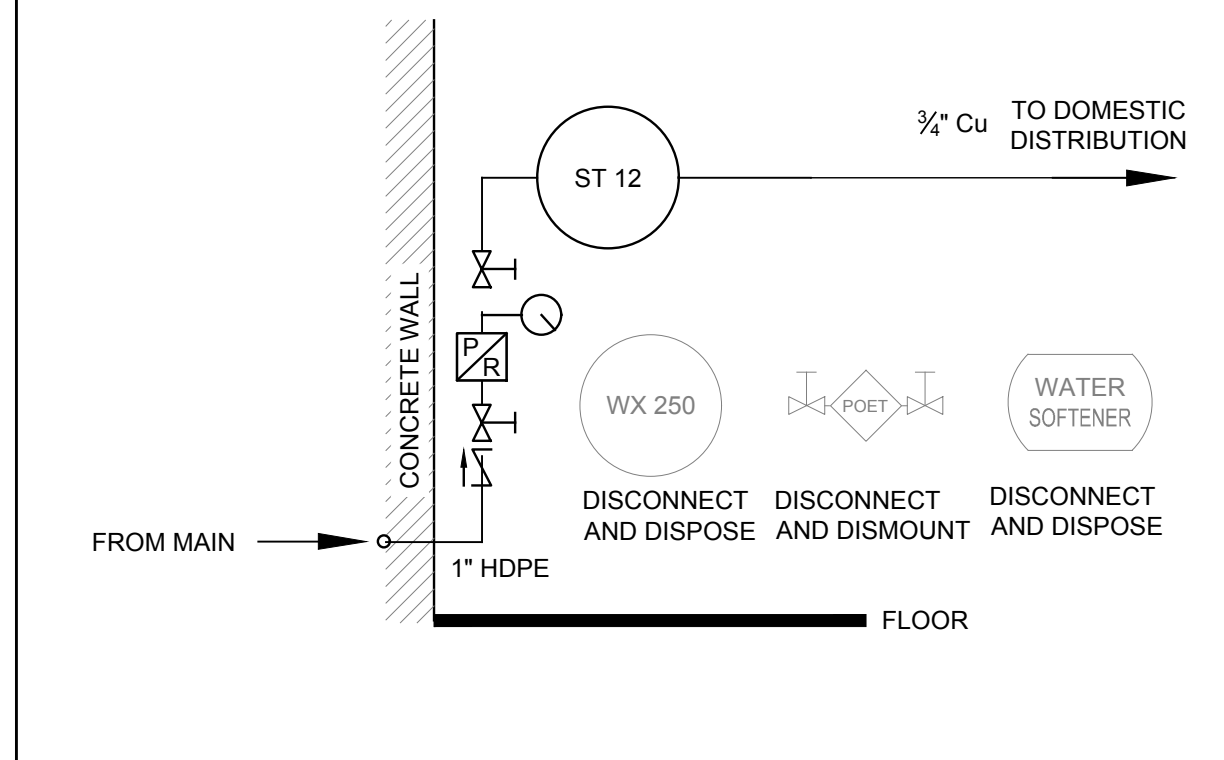
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150 CORTLAND LN (EXISTING) Scale: NTS



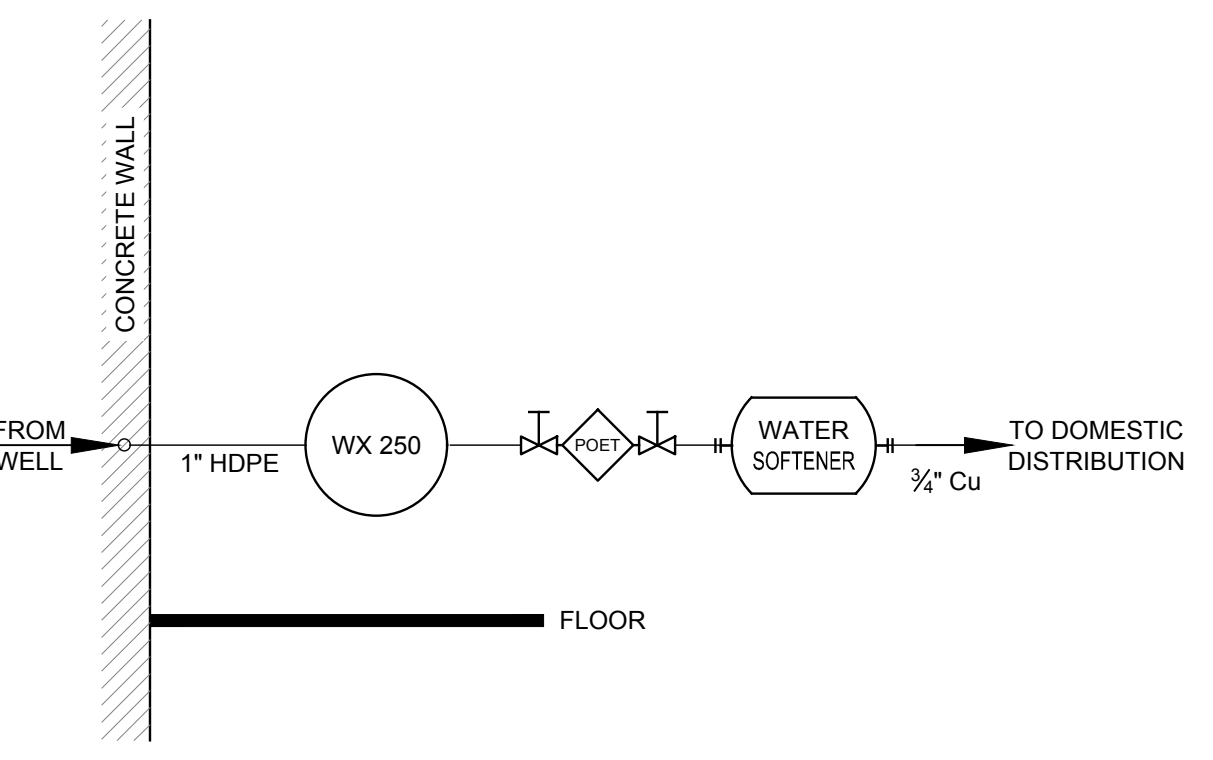
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150 CORTLAND LN (PROPOSED) Scale: NTS



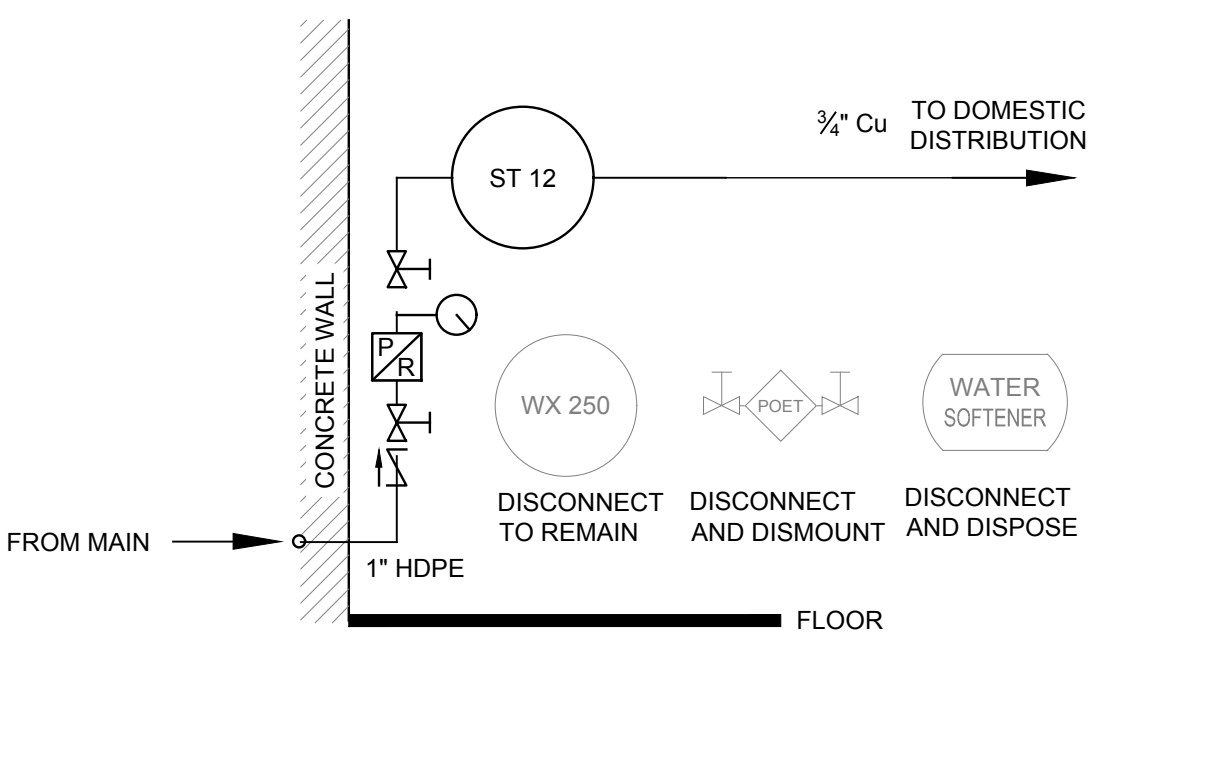
**15 WATER SERVICE ENTRANCE DETAIL**  
21 RUSSETT DR (EXISTING) Scale: NTS



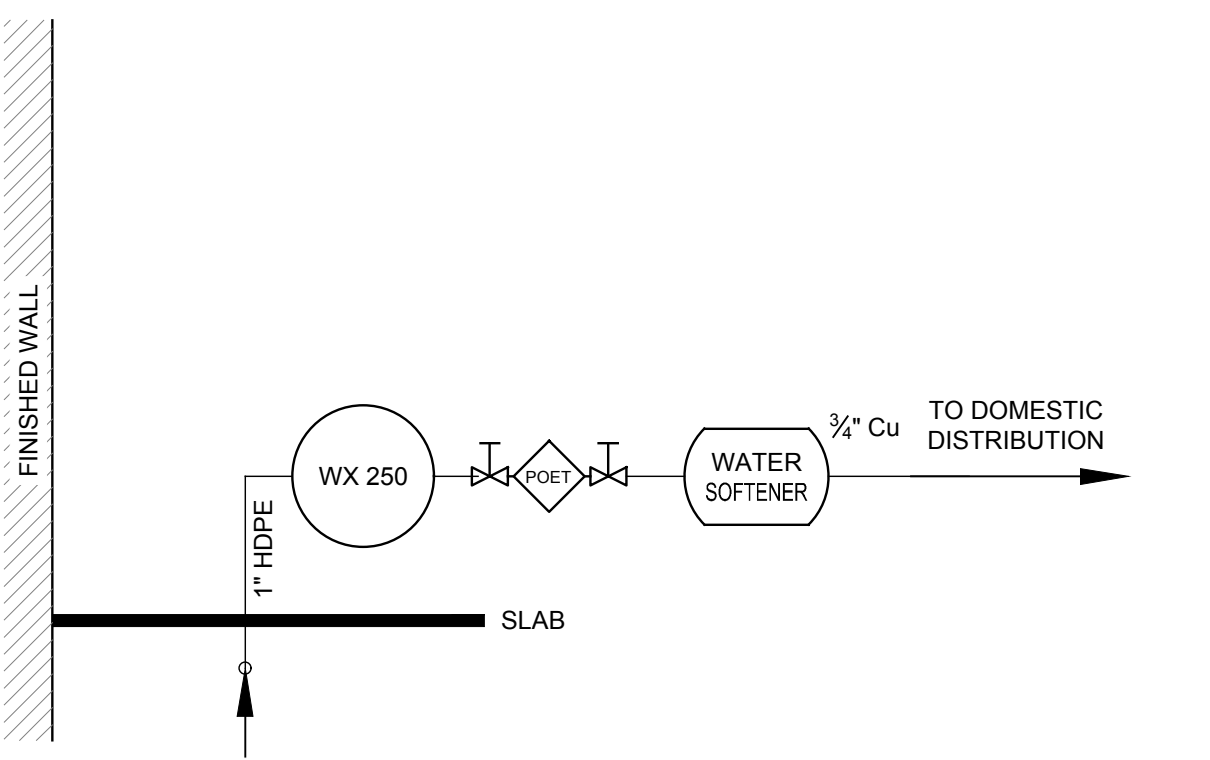
**16 WATER SERVICE ENTRANCE DETAIL**  
21 RUSSETT DR (PROPOSED) Scale: NTS



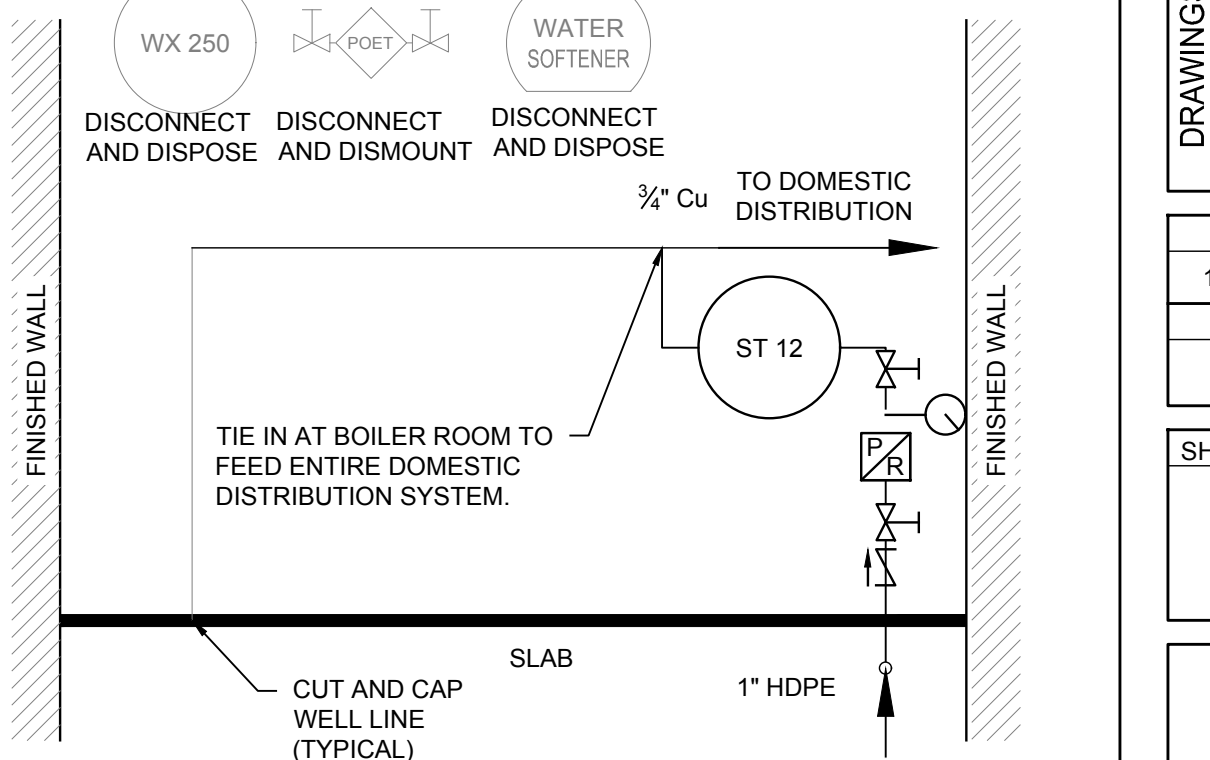
**17 WATER SERVICE ENTRANCE DETAIL**  
22 RUSSETT DR (EXISTING) Scale: NTS



**18 WATER SERVICE ENTRANCE DETAIL**  
22 RUSSETT DR (PROPOSED) Scale: NTS




**19 WATER SERVICE ENTRANCE DETAIL**  
85 RUSSETT DR (EXISTING) Scale: NTS



**20 WATER SERVICE ENTRANCE DETAIL**  
85 RUSSETT DR (PROPOSED) Scale: NTS

ALL DRAWING DIMENSIONS UNLESS OTHERWISE SPECIFIED SHALL BE IN FEET AND INCHES. DIMENSIONS IN PARENTHESES ARE FOR INFORMATION ONLY. SEE SHEET C508 FOR SYMBOL LEGEND. DATE: 05-14-2019

**MSK ENGINEERING AND DESIGN, INC.**  
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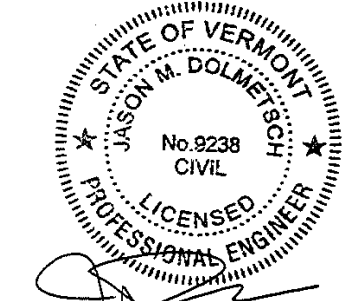
REVISIONS	
NO.	DESCRIPTION

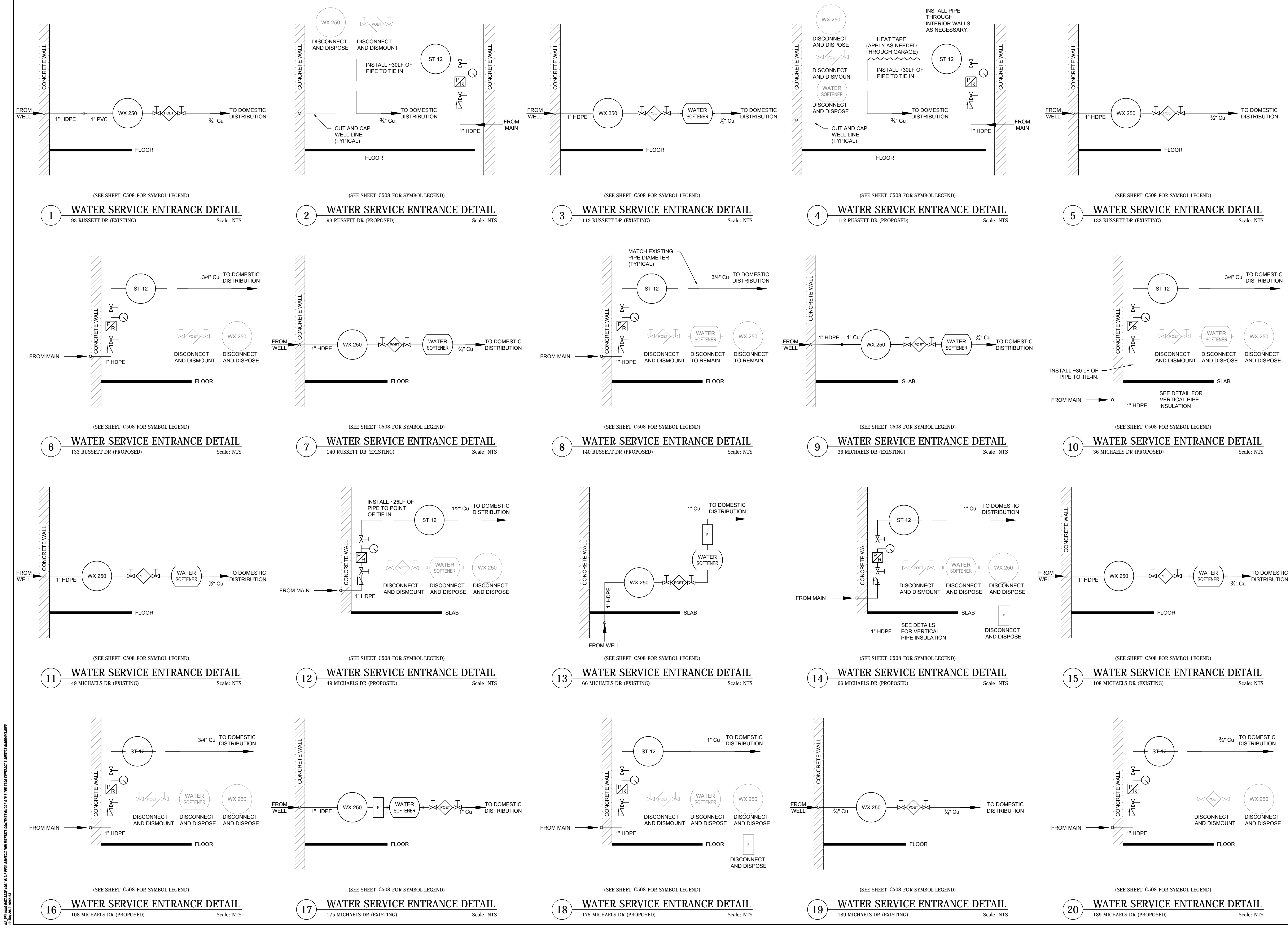
**TOWN OF BENNINGTON**  
**MUNICIPAL WATER SYSTEM**  
**REMEDIAL EXPANSION PHASE II**  
**BENNINGTON, VERMONT**

**CONTRACT 6**  
**SERVICE ENTRANCE**  
**DIAGRAMS**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C603**





**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 441-1402 FAX: (802) 445-1291

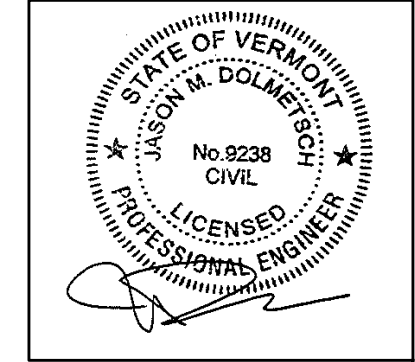
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

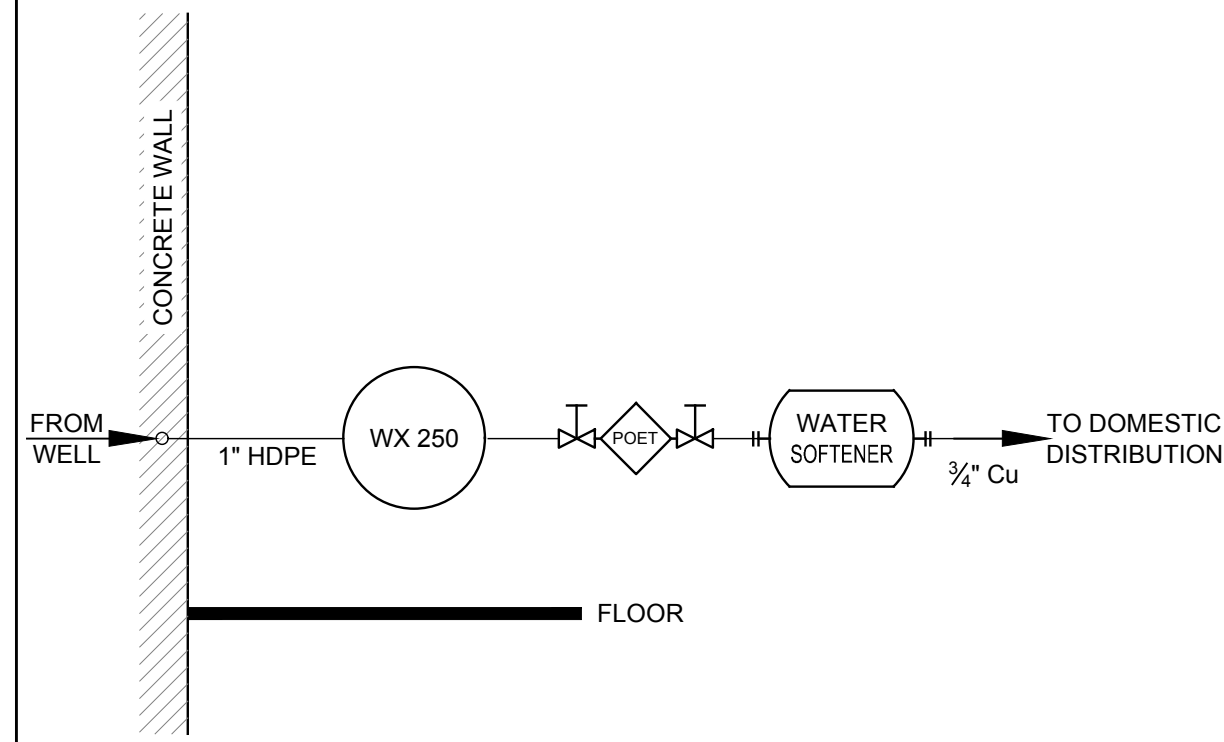
DRAWINGS THIS SHEET  
**CONTRACT 6**  
 SERVICE ENTRANCE  
 DIAGRAMS

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

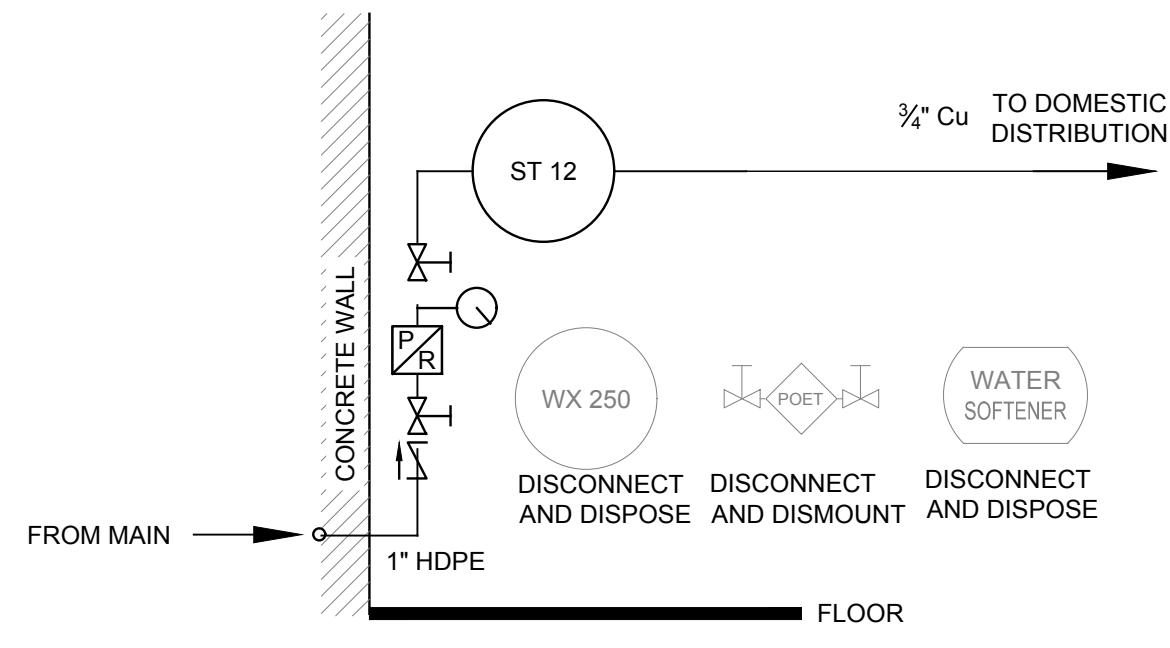
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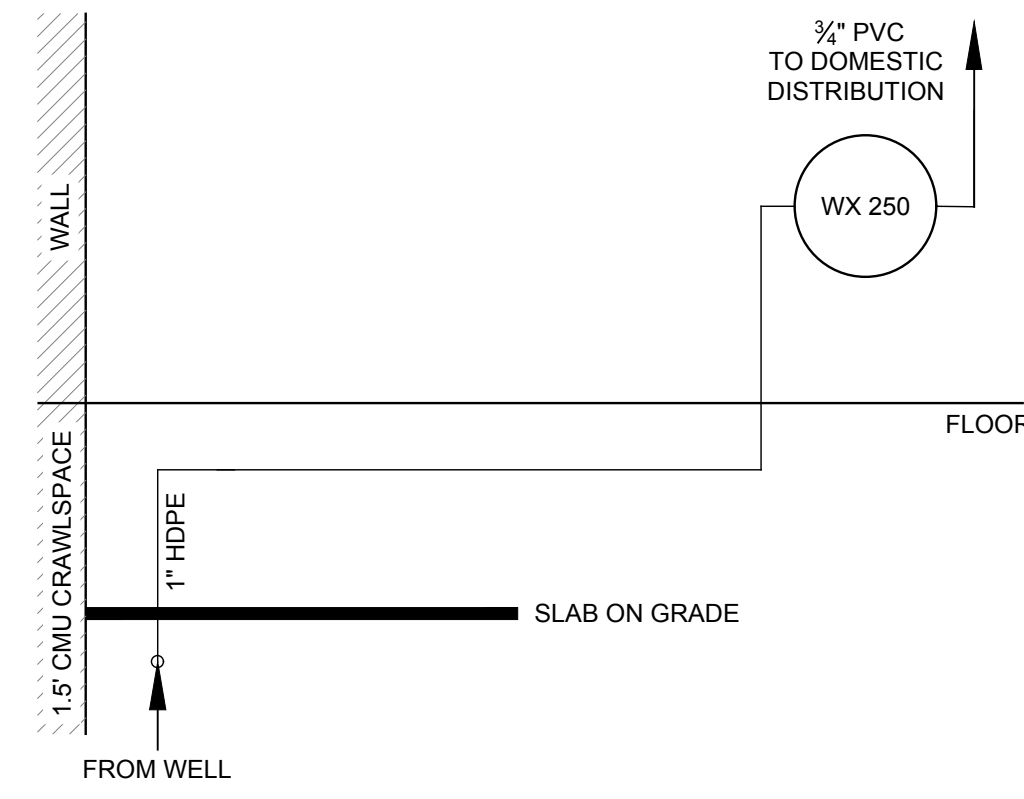
PLANNING AND DESIGN CONTRACT 1001-019.7 FOR REMEDIAL EXPANSION PHASE II OF THE MUNICIPAL WATER SYSTEM  
 150 DEPOT STREET, BENNINGTON, VERMONT 05201  
 802-441-1402 FAX 802-445-1291



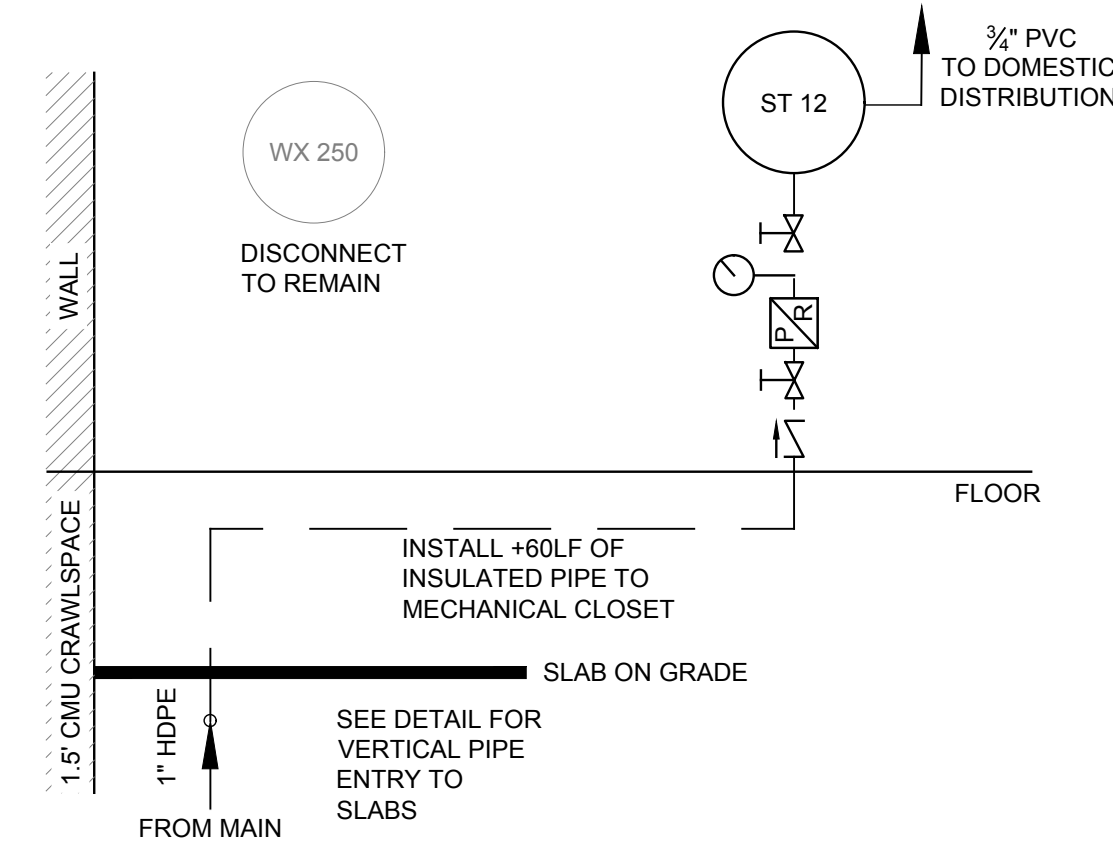
1 WATER SERVICE ENTRANCE DETAIL  
190 MICHAELS DR (EXISTING) Scale: NTS



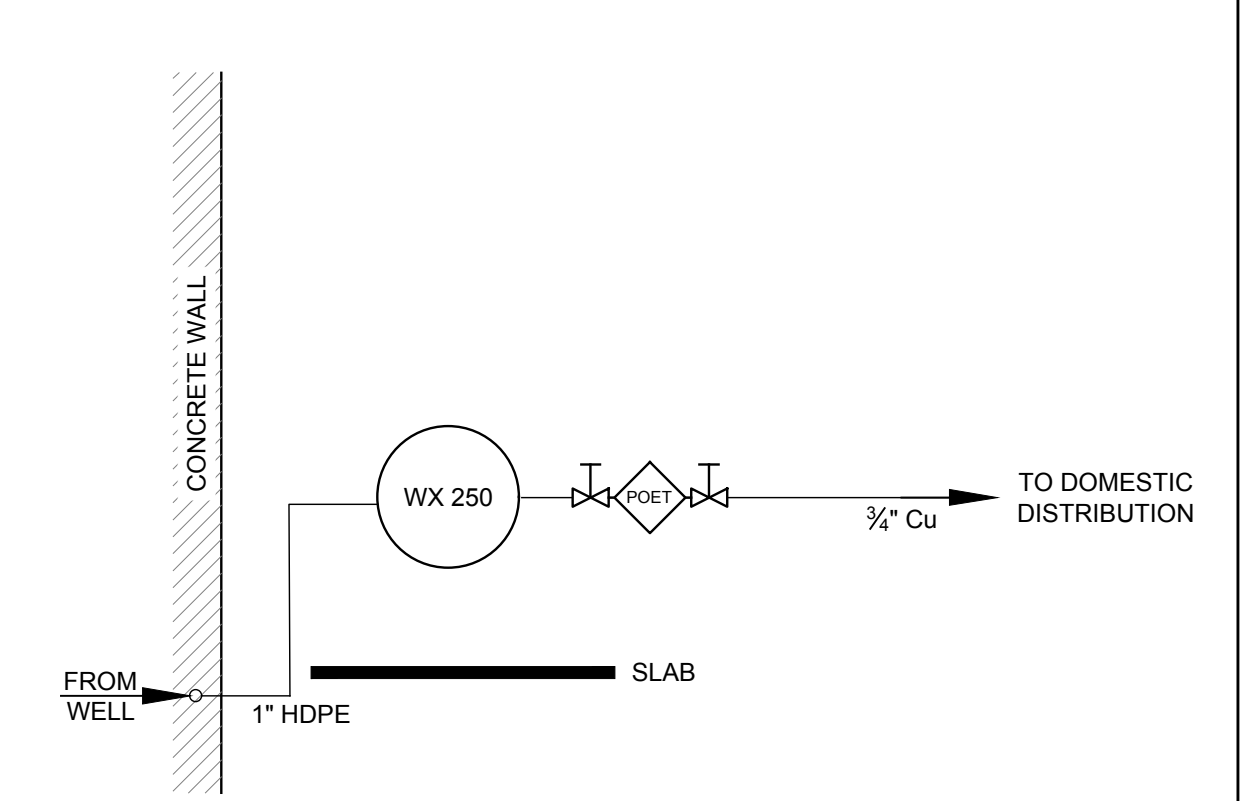
2 WATER SERVICE ENTRANCE DETAIL  
190 MICHAELS DR (PROPOSED) Scale: NTS



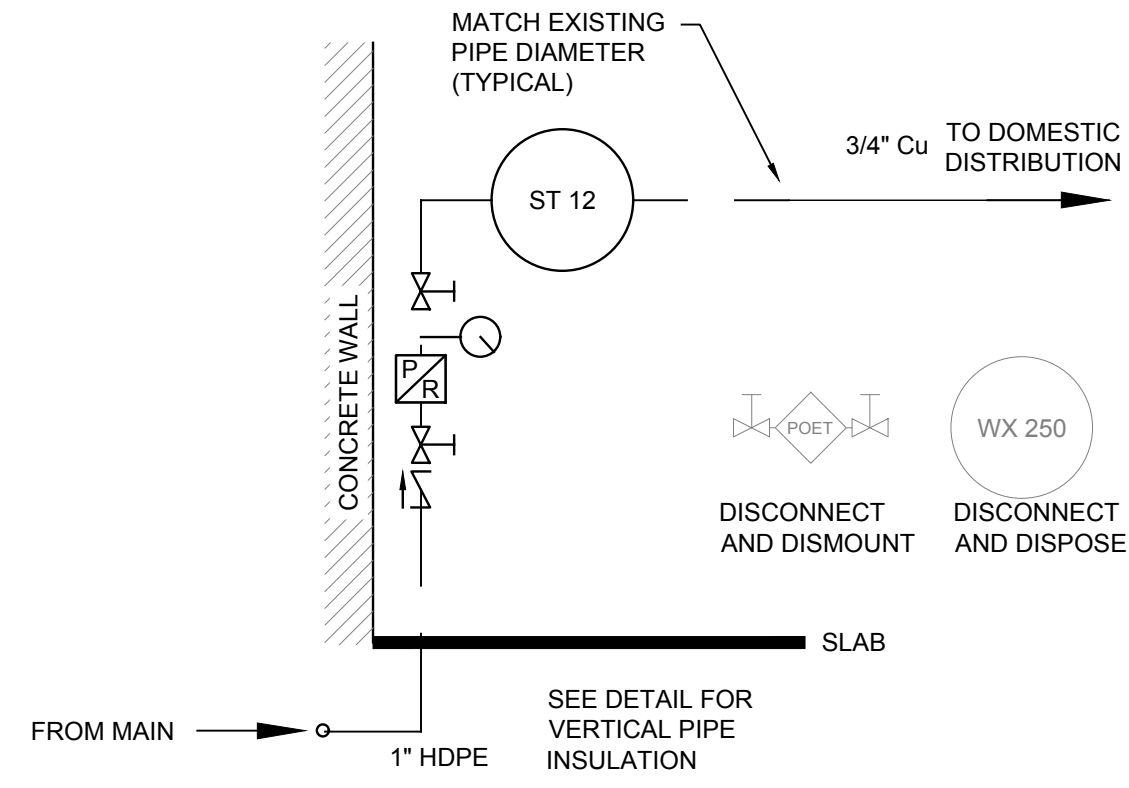
3 WATER SERVICE ENTRANCE DETAIL  
78 SQUAW HILL RD (EXISTING) Scale: NTS



4 WATER SERVICE ENTRANCE DETAIL  
78 SQUAW HILL RD (PROPOSED) Scale: NTS



5 WATER SERVICE ENTRANCE DETAIL  
251 SQUAW HILL RD (EXISTING) Scale: NTS



6 WATER SERVICE ENTRANCE DETAIL  
251 SQUAW HILL RD (PROPOSED) Scale: NTS

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1201



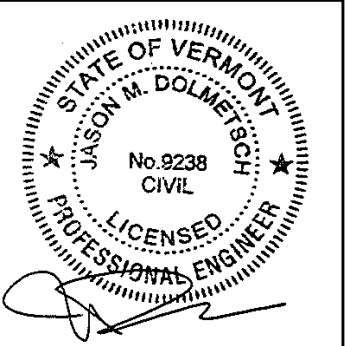
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
CONTRACT 6  
SERVICE ENTRANCE  
DIAGRAMS

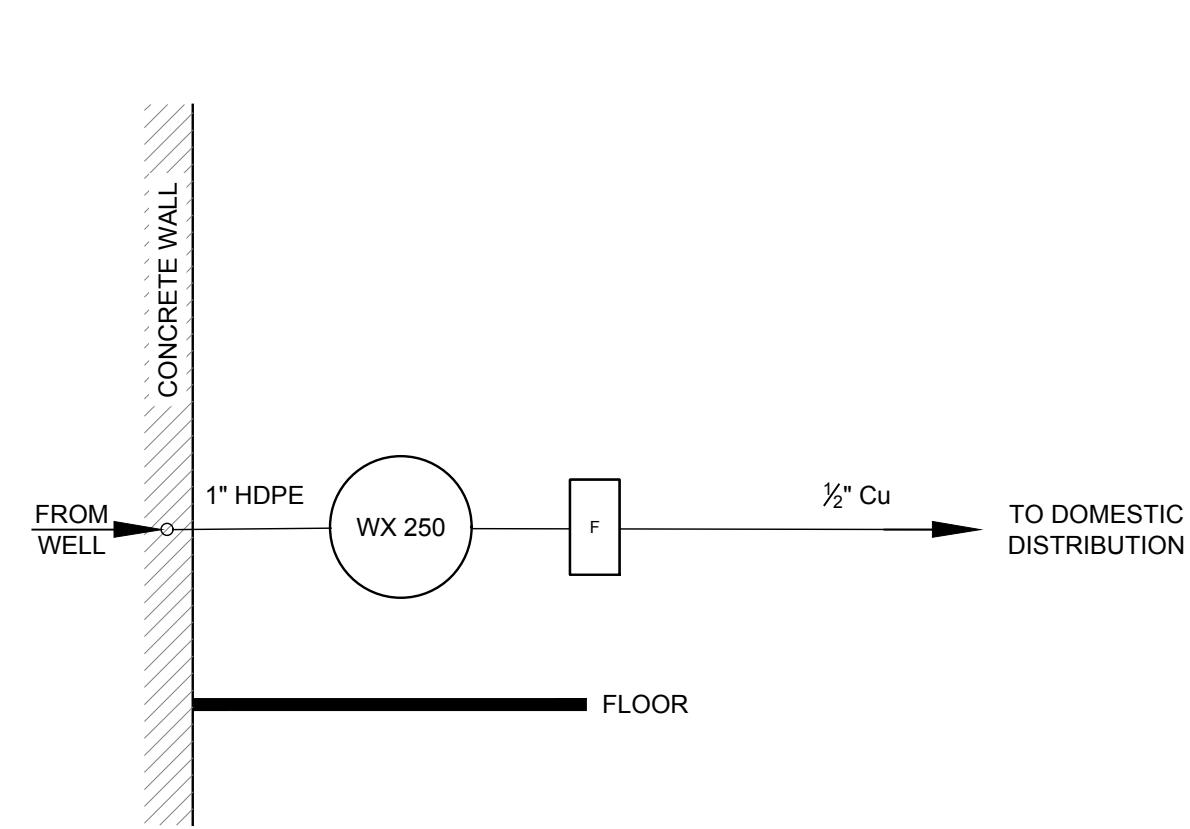
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C605**

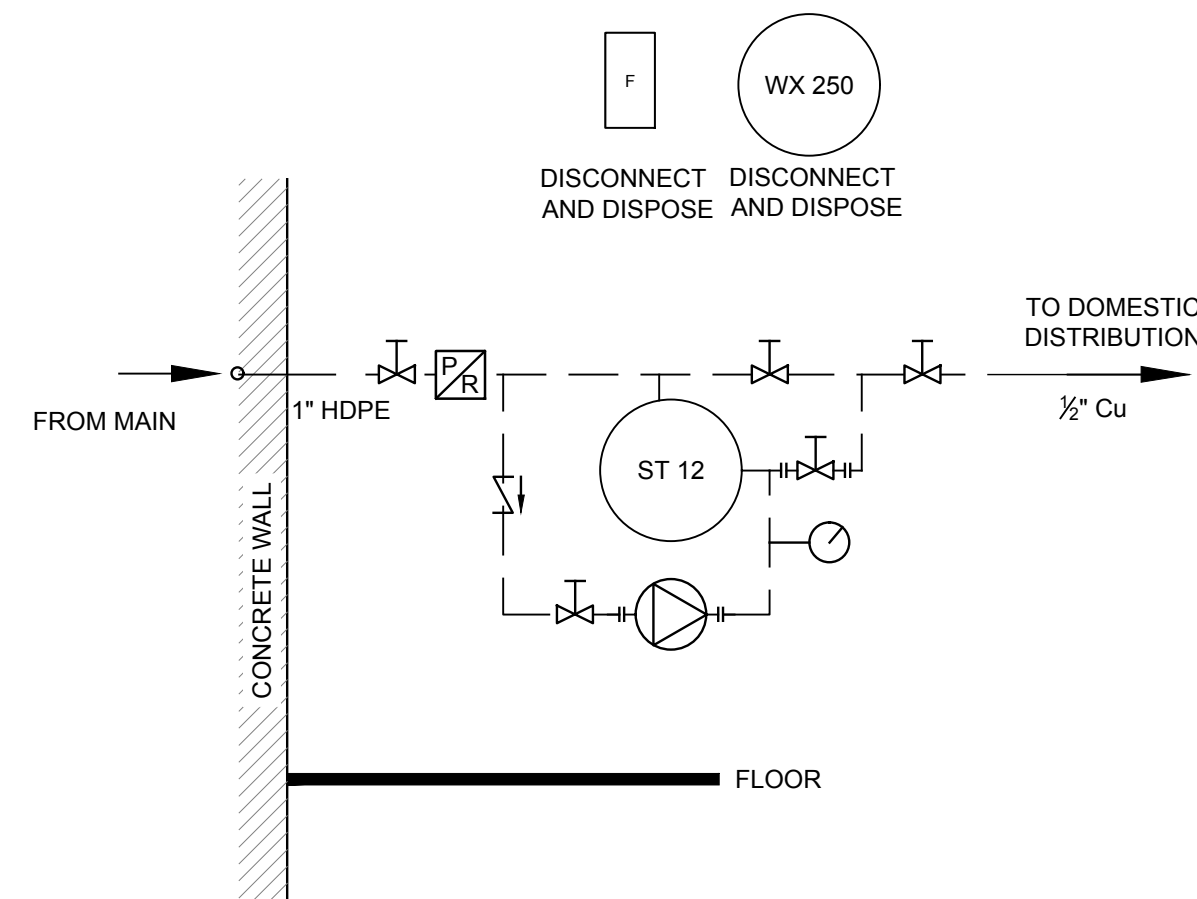


PLANNING DEPARTMENT (1001-019.7) FOR REMEDIATION PROJECTS CONTRACT #1001-019.7 FOR 2000 CONTRACT & SERVICE AGREEMENT  
2 May 2019 8:06:00 AM

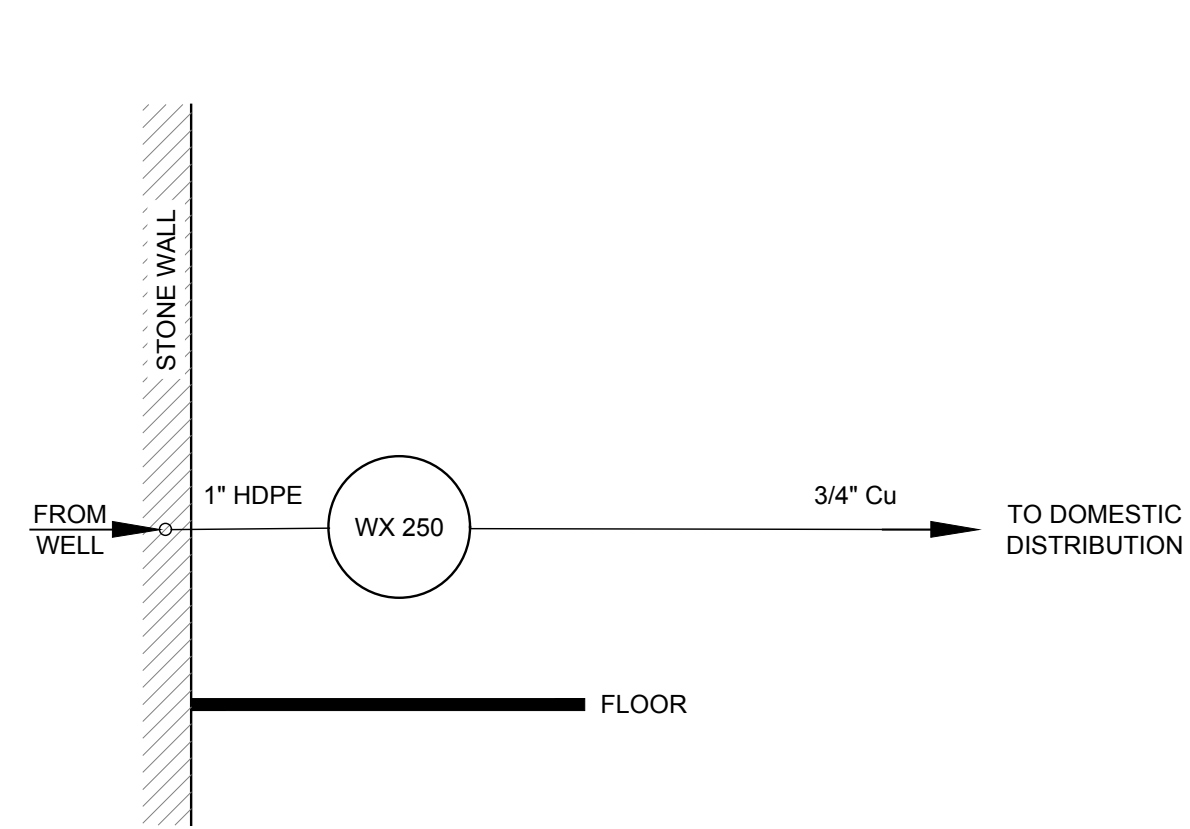




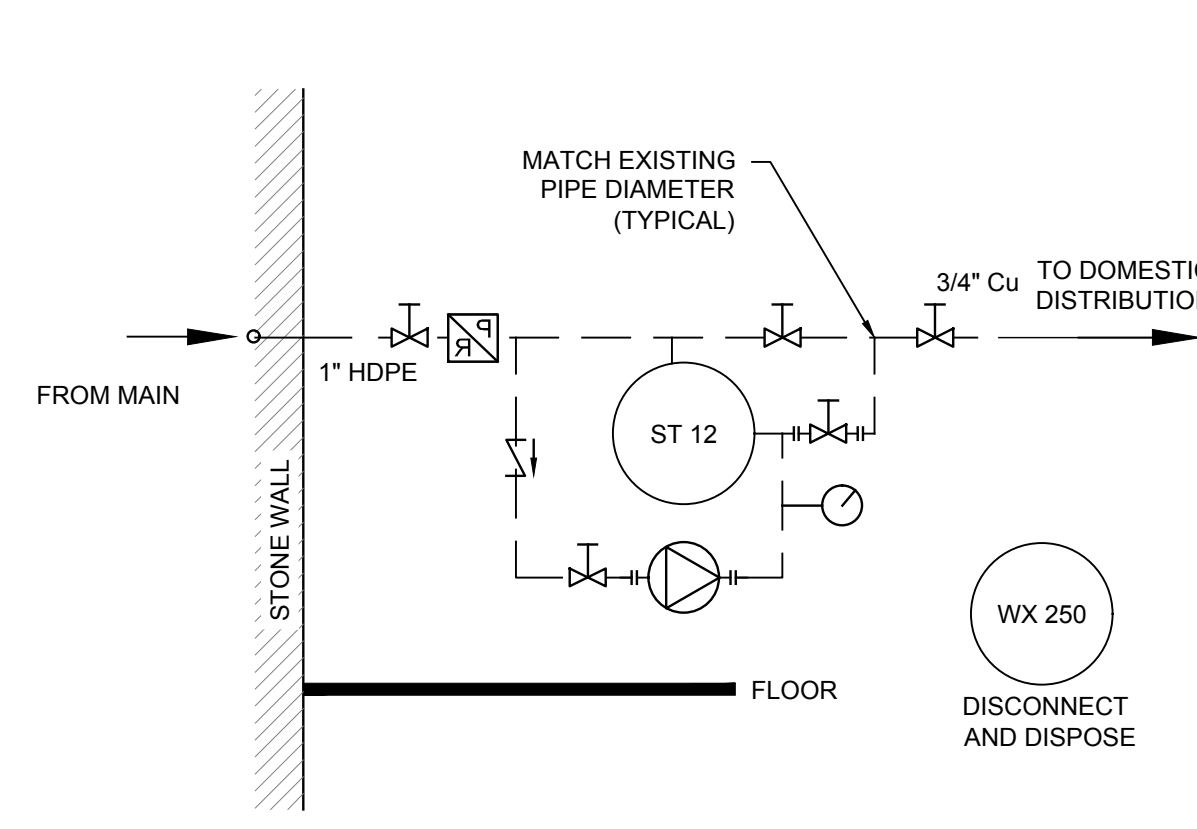
(SEE SHEET C508 FOR SYMBOL LEGEND)  
**1 WATER SERVICE ENTRANCE DETAIL**  
 609 HOUGHTON LN (EXISTING) Scale: NTS



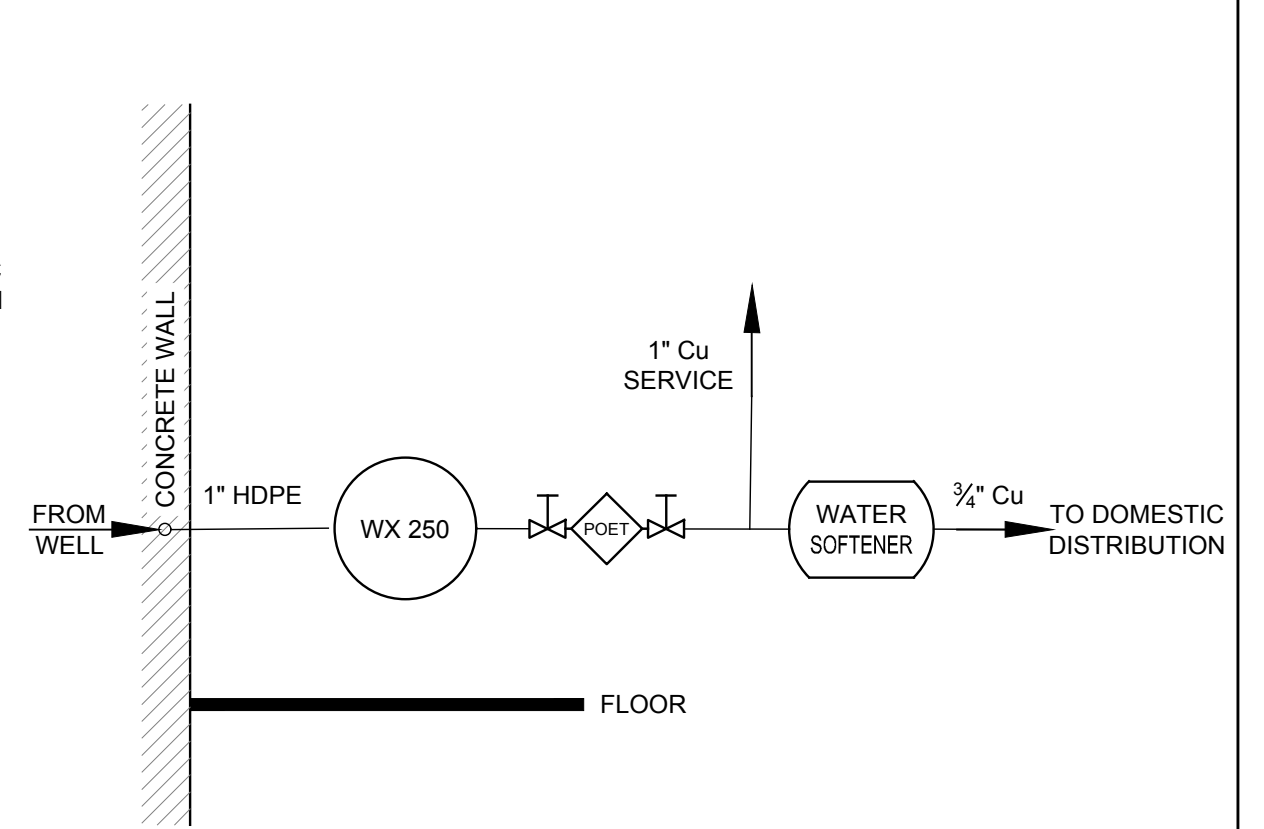
(SEE SHEET C508 FOR SYMBOL LEGEND)  
**2 WATER SERVICE ENTRANCE DETAIL**  
 609 HOUGHTON LN (PROPOSED) Scale: NTS



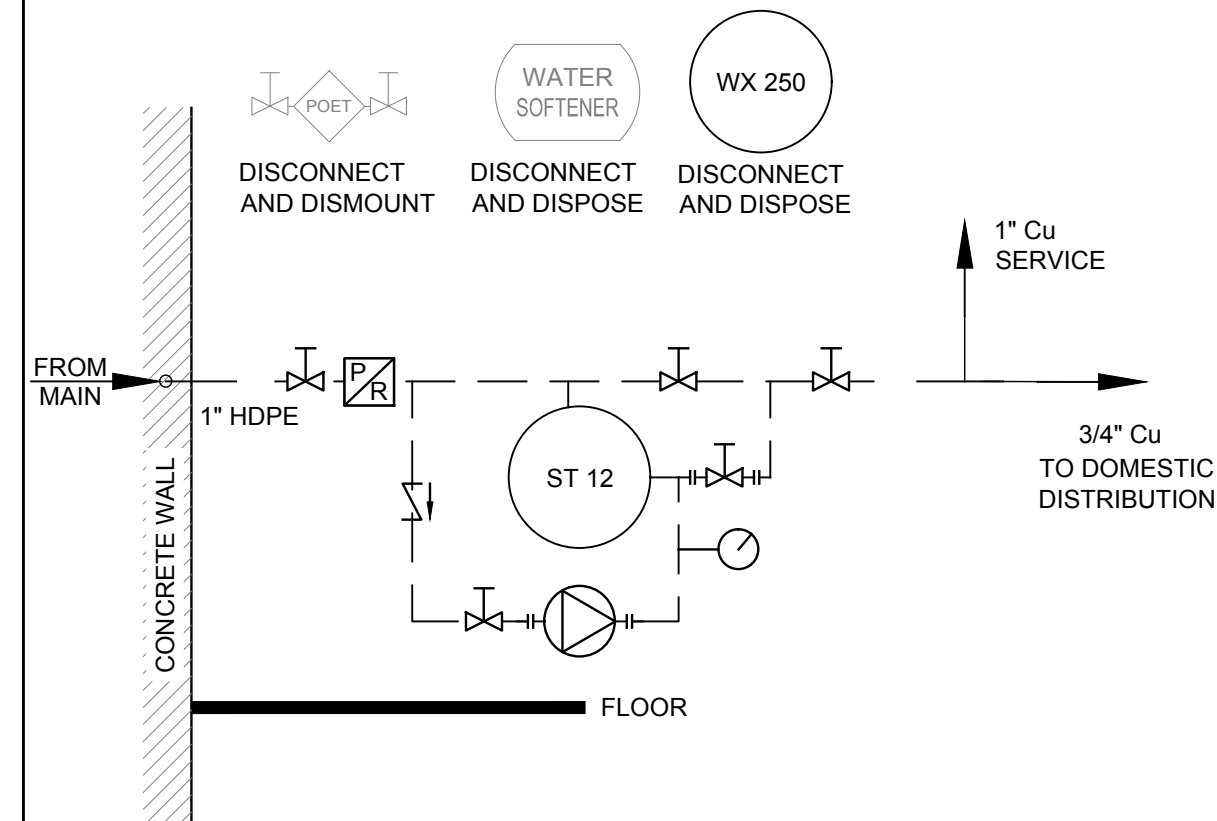
(SEE SHEET C508 FOR SYMBOL LEGEND)  
**3 WATER SERVICE ENTRANCE DETAIL**  
 628 HOUGHTON LN (EXISTING) Scale: NTS



(SEE SHEET C508 FOR SYMBOL LEGEND)  
**4 WATER SERVICE ENTRANCE DETAIL**  
 628 HOUGHTON LN (PROPOSED) Scale: NTS



(SEE SHEET C508 FOR SYMBOL LEGEND)  
**5 WATER SERVICE ENTRANCE DETAIL**  
 210 MICHAELS DR (EXISTING) Scale: NTS



(SEE SHEET C508 FOR SYMBOL LEGEND)  
**6 WATER SERVICE ENTRANCE DETAIL**  
 210 MICHAELS DR (PROPOSED) Scale: NTS

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

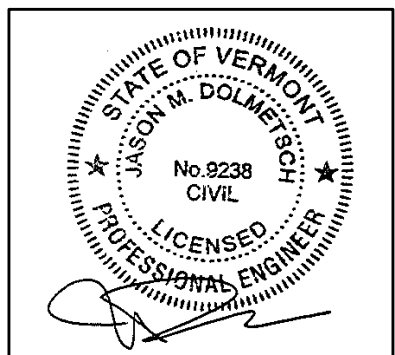
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**CONTRACT 6**  
 BOOSTED SERVICE  
 ENTRANCE DIAGRAMS

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C606**



**BOOSTER PUMP SYSTEMS ARE TO BE INSTALLED PURSUANT TO THE CRITERIA DESCRIBED IN THE TOWN OF BENNINGTON WATER DEPARTMENT PUBLIC COMMUNITY WATER SYSTEM (THE WATER SYSTEM), WSID #5016 - VARIANCE REQUEST GRANTED (12 JULY 2017)**

PLANNING DEPARTMENT (100-218) 1700 BARRINGTON AVENUE CONTRACT 6001-019.7 FOR 6000 CONTRACT & SERVICE AGREEMENT  
 2 May 2019 08:00:00



Civil – Environmental – Mechanical – Structural – Surveying  
Site & Facility Development – Construction- Compliance – Regulatory Permitting

Professional Engineering in Vermont – New Hampshire – New York

**Town of Bennington**  
**Water System Remedial Expansion Contract #6**  
**Bennington, Vermont**

Prepared by Project Engineer:

MSK Engineering & Design, Inc.  
Jason Dolmetsch, P.E.  
P.O. Box 139  
150 Depot Street  
Bennington, Vermont 05201  
Ph: 802-447-1402  
jdolmetsch@mskeng.com

For the Owners:

Town of Bennington  
205 South Street  
Bennington, VT 05201

Date of Issue: May 2019

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## **Contract Documents**

Town of Bennington  
Town of Bennington Water System Remedial Expansion  
Contract #6  
Bennington, Vermont  
May 2019

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## **ADVERTISEMENT FOR BIDS**

**Town of Bennington, Vermont**  
(OWNER)

**205 South Street Bennington, VT 05201**  
(Address)

Separate sealed BIDS for the construction of

**Town of Bennington Water System Remedial Expansion, Contract #6 – This project consists of the extension of water main line along Houghton Lane, Michaels Drive, Squaw Hill, Apple Hill Road, Russet Drive and McIntosh Lane in the Town of Bennington, Vermont. Specifically, the work will include trenching, removal of the existing asphalt and subbase, installation of water main, thrust blocks, hydrants, curb stops, service lines, trenchless installation of water main and sleeving under Vermont Route 7 (VT Route 7), and associated site work in accordance with the contract plans and specifications.**

will be received by **Town of Bennington, Vermont** at the office of **Town of Bennington, 205 South Street, Bennington, VT 05201**

until **3:00 pm**, (Prevailing Local Time) **June 6, 2019**, and then at said office publicly opened and read aloud.

Each BID must be accompanied by a certified check payable to the OWNER for five percent (5%) of the total amount of the BID. A BID bond may be used in lieu of a certified check.

The CONTRACT DOCUMENTS may be examined at the following locations:

**Town of Bennington – 205 South Street, Bennington, VT 05201**

**MSK Engineering & Design, Inc. – 150 Depot Street, Bennington, VT 05201**

Copies of the CONTRACT DOCUMENTS may be obtained by contacting Abby Chaloux at MSK Engineering & Design at (802) 447-1402, ext. 3 or [achaloux@mskeng.com](mailto:achaloux@mskeng.com). Copies may also be attained by contacting Nicholas Ratzer [nratzer@mskeng.com](mailto:nratzer@mskeng.com). CONTRACT DOCUMENTS will be sent electronically unless otherwise requested by the prospective bidder.

A Performance BOND and a Payment BOND each in an amount equal to one hundred percent (100%) of the contract price will be required.

A pre-bid conference for prospective bidders will be held at the **MSK Engineering and Design, Inc., 150 Depot Street, Bennington, VT 05201** on **May 28, 2019** at **11:00 am**.

Representatives of the **Town of Bennington** will be present to answer questions from bidders.

**10 May 2019**  
Date

  
Authorized Representative



## **INFORMATION FOR BIDDERS**

BIDS will be received by **Town of Bennington, Vermont** (herein called the "OWNER"), at **205 South Street, Bennington, VT 05201**

until **June 6, 2019 at 2:00 pm**, (local prevailing time) and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to **Town of Bennington at 205 South Street, Bennington, VT 05201**. Each sealed envelope containing a BID must be plainly marked on the outside as BID for **Town of Bennington Water System Remedial Expansion, Contract #6** and the envelope should bear on the outside the name of the BIDDER, BIDDER'S address, license number if applicable, and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at:

**Town of Bennington  
205 South Street  
Bennington, VT 05201**

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed (including Schedule A) and executed when submitted. Only one copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. A Bidder may withdraw any proposal submitted prior to the hour set for the closing of the Bids provided the request is signed in a manner identical with the proposal being withdrawn. Any BID received after the time and date specified, shall not be considered. No BIDDER may withdraw a BID within 30 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

All questions by prospective BIDDERS as to the interpretations of the INFORMATION FOR BIDDERS, Forms of PROPOSAL, Form of CONTRACT, Plans, Specifications or BONDS, must be submitted electronically in writing to the Consulting Engineer, at least seven (7) days before the date herein set for the opening of BIDS. An interpretation will be emailed with return receipt requested to prospective BIDDERS at the addresses given by them no later than five (5) days before the date of opening BIDS. Failure of any BIDDER to receive any such ADDENDUM or interpretation shall not relieve such BIDDER from any obligation under its BID as submitted. All ADDENDA so issued shall become part of the CONTRACT DOCUMENTS.

In the event there is any discrepancy in the PROPOSAL between any price in words, figures, or the extended totals, the price in words shall govern and the extended totals in each case shall be corrected accordingly. No BID will be accepted which does not contain a price for each item in this PROPOSAL.

Prospective BIDDERS and their agents will be permitted to make, at their own responsibility and expense, such borings, soundings, or other investigations over the site of the proposed work as they deem necessary. They must satisfy themselves by personal examination of the location of the proposed work, and by such other means as they deem necessary, as to the actual conditions and requirements of the WORK and as to the actual quantities required for the construction. Prices bid shall include every and all costs for the construction complete between the limits indicated on the plans and/or as set out in the specifications.

At the time of the opening of BIDS, each BIDDER will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Drawings and CONTRACT DOCUMENTS (including all ADDENDA).

The failure or omission of any BIDDER to receive or examine any form, instrument, or document shall in no way relieve any BIDDER from the obligation in respect to its BID.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a certified check payable to the OWNER for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the certified checks of all except the three lowest responsive, responsible BIDDERS. When the Agreement is executed, the certified checks of the two remaining unsuccessful BIDDERS will be returned. The certified check of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A BID BOND may be used in lieu of a certified check.

A performance BOND and a payment BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND, a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary Agreement and BOND forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may, at its option, consider the BIDDER in default, in which case the BID BOND or certified check accompanying the proposal shall become the property of the OWNER.

The OWNER, within ten (10) days of receipt of acceptable performance BOND, payment BOND and Agreement signed by the party to whom the Agreement was awarded, shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The OWNER shall issue the NOTICE TO PROCEED within ten (10) days of the execution of the Agreement. The "Date of Issuance" of the NOTICE TO PROCEED shall start the CONTRACT time. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended only by mutual written agreement between the OWNER and CONTRACTOR.

If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as it deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the BIDDER fails to submit the requested information and data, or the evidence submitted by or investigation of such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the WORK contemplated therein.

**A conditional or qualified BID will not be accepted.**

**Award will be made to the lowest responsive, responsible BIDDER.**

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.

Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the "Equal Employment Opportunity" clause set forth in the SUPPLEMENTAL GENERAL CONDITIONS.

Successful BIDDERS must be prepared to comply in all respects with the CONTRACT provisions regarding non-discrimination and sign the nondiscrimination statement which is part of the BID.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall, in no way, relieve any BIDDER from any obligation in respect to his BID.

If the low BIDDER intends to award the WORK to SUBCONTRACTOR(S) in excess of fifty (50) percent of the CONTRACT PRICE, the OWNER'S written approval is required prior to CONTRACT AWARD. The low BIDDER shall, within five (5) calendar days after the BID date, make written request to OWNER and will supply the names and addresses of major material SUPPLIER(S) and SUB-CONTRACTOR(S) in support of the request.

Wherever it may be written that an equipment manufacturer must have a specified period of experience with its product, equipment which does not meet the specified experience period can be considered if the equipment SUPPLIER or manufacturer is willing to provide BOND or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of a failure.

The BIDDER'S attention is directed to the "Supplemental General Conditions" of the CONTRACT SPECIFICATIONS, which contains requirements, provisions, policies and permits applicable to WORK under the CONTRACT.

The ENGINEER and contact is: **MSK Engineering and Design, Inc. – Jason M. Dolmetsch, P.E.**

Address and phone number is: **150 Depot Street, Bennington, VT 05201**

**Ph: 802 447-1402**

**Fx: 802 445-1291**

Inspection trips for prospective BIDDERS may be scheduled upon request.

**BID**

Proposal of \_\_\_\_\_ (hereinafter called "BIDDER"), organized and existing under the laws of the State of \_\_\_\_\_ doing business as: \_\_\_\_\_  
(a corporation, a partnership or an individual)

To the: **Town of Bennington, Vermont**  
(hereinafter called "OWNER".)

In compliance with your Advertisement for BIDS, BIDDER hereby proposes to perform all WORK for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #6**

---

in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID, each party thereto certifies as to his own organization, that his BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence MOBILIZATION AND CONSTRUCTION under this contract by JUNE 27, 2019 and to substantially complete the PROJECT by AUGUST 1, 2020. Final completion of the project shall take place on or before AUGUST 31, 2020. BIDDER further agrees to pay as liquidated damages, the sum of **\$750.00** for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDA:

- 1.
- 2.
- 3.
- 4.



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## BID SCHEDULE

BIDDER agrees to perform all the WORK described in the CONTRACT DOCUMENTS for the following unit prices:

ITEM NO.	ITEM DESCRIPTION	Unit	UNIT PRICE	ESTIMATED QUANTITY	EXTENDED AMOUNT
1	<b>Mobilization/Demobilization</b>	LS	\$	1	\$
	UNIT PRICE (written)				
2	<b>Erosion and Sediment Controls</b>	LS	\$	1	\$
	UNIT PRICE (written)				
3	<b>Traffic Control</b>	LS	\$	1	\$
	UNIT PRICE (written)				
4	<b>Trench Excavation of Rock</b>	CY	\$	1700	\$
	UNIT PRICE (written)				
5	<b>French Drain</b>	LF	\$	2000	\$
	UNIT PRICE (written)				
6	<b>Removal and Replacement of Unsuitable Trench Material</b>	CY	\$	6000	\$
	UNIT PRICE (written)				
7	<b>Gravel Road</b>	CY	\$	100	\$
	UNIT PRICE (written)				
8	<b>2.5" Caliper Tree Installation</b>	EA	\$	5	\$
	UNIT PRICE (written)				
9	<b>Bituminous Concrete Pavement - Patching</b>	TON	\$	2500	\$
	UNIT PRICE (written)				

10	<b>Bituminous Concrete Pavement – Overlay</b>	TON	\$	2800	\$
	UNIT PRICE (written)				
11.1	<b>¾" Corporation Stops</b>	EA	\$	39	\$
	UNIT PRICE (written)				
11.2	<b>1" Corporation Stops</b>	EA	\$	17	\$
	UNIT PRICE (written)				
11.3	<b>1.5" Corporation Stops</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
11.4	<b>2" Corporation Stops</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
12.1	<b>¾" Curb Stop</b>	EA	\$	39	\$
	UNIT PRICE (written)				
12.2	<b>1" Curb Stop</b>	EA	\$	17	\$
	UNIT PRICE (written)				
12.3	<b>1.5" Curb Stop</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
12.4	<b>2" Curb Stops</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
13.1	<b>3" Gate Valve</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
13.2	<b>4" Gate Valve</b>	EA	\$	2	\$
	UNIT PRICE (written)				

13.3	<b>6" Gate Valve</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
13.4	<b>8" Gate Valve</b>	EA	\$	22	\$
	UNIT PRICE (written)				
14	<b>Ductile Iron MJ Fittings</b>	LB	\$	1430	\$
	UNIT PRICE (written)				
15.1	<b>4" Ductile Iron Pipe</b>	LF	\$	1435	\$
	UNIT PRICE (written)				
15.2	<b>6" Ductile Iron Pipe</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
15.3	<b>8" Ductile Iron Pipe</b>	LF	\$	8190	\$
	UNIT PRICE (written)				
15.4	<b>1" HDPE Tubing Pipe</b>	LF	\$	5060	\$
	UNIT PRICE (written)				
15.5	<b>1.5" HDPE Tubing Pipe</b>	LF	\$	5805	\$
	UNIT PRICE (written)				
15.6	<b>2" HDPE Tubing Pipe</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
15.7	<b>3" HDPE Tubing Pipe</b>	LF	\$	1820	\$
	UNIT PRICE (written)				
15.8	<b>3/4" Copper Tube</b>	LF	\$	865	\$
	UNIT PRICE (written)				



15.9	<b>1" Copper Tube</b>	LF	\$	365	\$
	UNIT PRICE (written)				
15.10	<b>1.5" Copper Tube</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
15.11	<b>2" Copper Tube</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.1	<b>4" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.2	<b>6" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.3	<b>10" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.4	<b>18" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.5	<b>24" HDPE Sleeve</b>	LF	\$	200	\$
	UNIT PRICE (written)				
17	<b>Trenchless Water Main</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
18	<b>Pressure Reducing Valve Vault – Site Preparation</b>	LS	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
19	<b>Cast-in-Place Concrete Thrust Block</b>	EA	\$	20	\$
	UNIT PRICE (written)				

20	<b>Buried Rigid Insulation Board</b>	SF	\$	1500	\$
	UNIT PRICE (written)				
21	<b>Connection to Existing Mains</b>	EA	\$	1	\$
	UNIT PRICE (written)				
22	<b>Connection to Existing Gate Valves</b>	LS	\$	1	\$
	UNIT PRICE (written)				
23.1	<b>Building Service</b>	EA	\$	48	\$
	UNIT PRICE (written)				
23.2	<b>Slab on Grade Building Service</b>	EA	\$	7	\$
	UNIT PRICE (written)				
23.3	<b>Mobile Home Building Service</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
23.4	<b>Meter Installation</b>	EA	\$	2	\$
	UNIT PRICE (written)				
23.5	<b>Booster Pump Installation</b>	EA	\$	3	\$
	UNIT PRICE (written)				
24	<b>Fire Hydrant Assembly</b>	EA	\$	12	\$
	UNIT PRICE (written)				
25	<b>Flush Hydrant Assembly</b>	EA	\$	5	\$
	UNIT PRICE (written)				
26.1	<b>Lockable Well Caps</b>	EA	\$	2	\$
	UNIT PRICE (written)				

26.2	<b>Water Sampling Stations</b>	EA	\$	5	\$
	UNIT PRICE (written)				
27.1	<b>Closure of Abandoned Wells: Drilled</b>	LF	\$	12000	\$
	UNIT PRICE (written)				
27.2	<b>Closure of Abandoned Wells: Dug</b>	EA	\$	2	\$
	UNIT PRICE (written)				
28	<b>Utility Crossings</b>	EA	\$	71	\$
	UNIT PRICE (written)				
29	<b>Sewer Crossing – Water Below</b>	EA	\$	10	\$
	UNIT PRICE (written)				
30.1	<b>Culvert Installation – 18" CPEP Pipe</b>	LF	\$	615	\$
	UNIT PRICE (written)				
30.2	<b>Culvert Installation – 24" CPEP Pipe</b>	LF	\$	50	\$
	UNIT PRICE (written)				
30.3	<b>Culvert Installation – 36" CPEP Pipe</b>	LF	\$	40	\$
	UNIT PRICE (written)				
30.4	<b>Culvert Installation – 48" CPEP Pipe</b>	LF	\$	40	\$
	UNIT PRICE (written)				
31	<b>Riprap Stone Installation</b>	TON	\$	100	\$
	UNIT PRICE (written)				
32	<b>Leakage Clamps</b>	EA	\$	30	\$
	UNIT PRICE (written)				

33	Heat Tape installation	EA	\$	5	\$
	UNIT PRICE (written)				
34	Large Diameter Tree Removal (18 inches or larger)	EA	\$	10	\$
	UNIT PRICE (written)				
35	Yard Hydrant Installation	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
36	Bollard Installation	EA	\$	10	\$
	UNIT PRICE (written)				
37	Fluoroelastomer Gaskets	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
38	Meter Pit Installation	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
39	Concrete Curb	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
40	Off-Site Activity Area Spoils Management	LS	\$	1	\$
	UNIT PRICE (written)				

**TOTAL CONTRACT PRICE \$ \_\_\_\_\_**

**TOTAL CONTRACT PRICE (written) \_\_\_\_\_**

**BASIS FOR BID COMPARISON – TOTAL CONTRACT PRICE**





**NOTICE OF AWARD**

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT Description:

OWNER's P.O. Number: \_\_\_\_\_  
Owners Project Name: \_\_\_\_\_

**Town of Bennington Water System Remedial Expansion, Contract #6 – This project consists of the extension of water main line along Houghton Lane, Michaels Drive, Squaw Hill, Apple Hill Road, Russet Drive and McIntosh Lane in the Town of Bennington, Vermont. Specifically, the work will include trenching, removal of the existing asphalt and subbase, installation of water main, thrust blocks, hydrants, curb stops, service lines, trenchless installation of water main and sleeving under Vermont Route 7 (VT Route 7), and associated site work in accordance with the contract plans and specifications.**

The OWNER has considered the BID submitted by you for the above described WORK in response to its ADVERTISEMENT FOR BIDS dated **10 May 2019** and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$ \_\_\_\_\_

You are required by the Information for Bidders to execute the Agreement and furnish the required certificates of insurance and IRS W9 form within (10) calendar days from the date of this NOTICE to you.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this \_\_\_\_\_

\_\_\_\_\_  
**Town of Bennington**  
OWNER

\_\_\_\_\_  
(Print or Type Name)

Title: \_\_\_\_\_

\_\_\_\_\_  
Signature

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE OF AWARD is hereby acknowledged

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
CONTRACTOR

\_\_\_\_\_  
(Print or Type Name)

Title: \_\_\_\_\_

\_\_\_\_\_  
Signature

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## AGREEMENT

THIS AGREEMENT, made this \_\_\_\_ day of \_\_\_\_\_, 2019, by and

Between the **Town of Bennington**, hereinafter called "OWNER" and \_\_\_\_\_ doing business as (an individual, a partnership or a corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of **Town of Bennington Water System Remedial Expansion, Contract #6** (Project Name & OWNER's Project Number).
2. The CONTRACTOR will furnish all the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the WORK required by the CONTRACT DOCUMENTS on the date of issuance of the NOTICE TO PROCEED and will complete the same **no later than 90 days after the issuance of the NOTICE TO PROCEED** unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.
4. The CONTRACTOR agrees to perform all the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$\_\_\_\_\_ or as shown in the BID schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:
  - Advertisement for BIDS
  - Information for BIDDERS
  - BID
  - BID Bond
  - Notice of Award
  - Agreement
  - Payment BOND
  - Performance BOND
  - Notice to Proceed
  - Change Order Format
  - Partial Release and Waiver of Lien
  - Consent of Surety to Reduce Retainage at Substantial Completion
  - Certificate of Substantial Completion
  - Consent of Surety to Release Final Payment
  - Certificate of Final Completion and Acceptance of Work
  - General Conditions
  - Supplemental General Conditions
  - List of Permits
  - DRAWINGS prepared by **MSK Engineering and Design, Inc.** numbered **G006, C112 through C125A, C501 through C509, and C601 through C605**, and dated **May 14<sup>th</sup>, 2019**
  - SPECIFICATIONS prepared or issued **MSK Engineering and Design, Inc.** and Dated **May 2019**



- 6. OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.
- 7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in 3 copies, each of which shall be deemed an original on the date first above written.

OWNER: **Town of Bennington** \_\_\_\_\_

ATTEST: \_\_\_\_\_  
(Signature)

BY: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

Name: \_\_\_\_\_  
(Print or Type)

(Seal)

Title: \_\_\_\_\_

Title: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

BY: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

(CONTRACTOR Seal if available)

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ Phone #

ATTEST: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

Title: \_\_\_\_\_

**PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS THAT:

\_\_\_\_\_  
(Name of CONTRACTOR)

\_\_\_\_\_  
(Address of CONTRACTOR)

a \_\_\_\_\_, hereinafter called Principal,  
(Corporation, Partnership or Individual)

and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

**Town of Bennington, Vermont**  
(Name of OWNER)

**205 South Street, Bennington, Vermont 05201**  
(Address of OWNER)

hereinafter called OWNER, in the penal sum of \_\_\_\_\_ Dollars,  
\$(\_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2019, a copy of which is hereto attached and made a part hereof for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #6**

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK and all insurance premiums on said WORK, and for all labor performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2019.

ATTEST:

\_\_\_\_\_  
(Principal Secretary)

(Seal)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
Address

ATTEST:

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
Address

\_\_\_\_\_  
Principal's Printed Name

By: \_\_\_\_\_(s)

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Surety

By: \_\_\_\_\_  
Attorney-in-Fact

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570) as amended and be authorized to transact business in the State where the PROJECT is located.

**PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS THAT:

\_\_\_\_\_

(Name of CONTRACTOR)

\_\_\_\_\_

(Address of CONTRACTOR)

a \_\_\_\_\_, hereinafter called Principal, and  
(Corporation, Partnership or Individual)

\_\_\_\_\_

(Name of Surety)

\_\_\_\_\_

(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

**Town of Bennington, Vermont**

(Name of OWNER)

**205 South Street, Bennington, Vermont 05201**

(Address of OWNER)

hereinafter called OWNER, in the penal sum of \_\_\_\_\_ Dollars, \$(\_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #6**

NOW, THEREFORE, if the principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.



PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2019.

ATTEST:

\_\_\_\_\_  
Principal's Printed Name  
\_\_\_\_\_  
(Principal Secretary)

(Seal)

\_\_\_\_\_  
Witness as to Principal  
\_\_\_\_\_  
Address

\_\_\_\_\_  
By: \_\_\_\_\_(s)  
Address: \_\_\_\_\_  
\_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Witness as to Surety  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Address

\_\_\_\_\_  
Surety  
By: \_\_\_\_\_  
Attorney-in-Fact  
Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570) as amended and be authorized to transact business in the State where the PROJECT is located.

**NOTICE TO PROCEED**

To: \_\_\_\_\_  
(CONTRACTOR)

Date of Issuance: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Project: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

You are hereby notified to commence all WORK on this date in accordance with the Agreement dated \_\_\_\_\_, 2019. The date of completion of all WORK is **August 1, 2020**.

\_\_\_\_\_  
Town of Bennington, Vermont  
(OWNER)

By: \_\_\_\_\_  
(Printed or Typed Name)

By: \_\_\_\_\_  
(Signature)

Title: \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE TO PROCEED

is hereby acknowledged by \_\_\_\_\_,  
(Name of CONTRACTOR)

this the \_\_\_\_ day of \_\_\_\_\_, 20\_\_

By: \_\_\_\_\_  
(Printed or Typed Name)

By: \_\_\_\_\_  
(Signature)

Title: \_\_\_\_\_

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**INSTRUCTIONS FOR CONTRACTORS OR SUBCONTRACTORS**  
**RELEASE AND WAIVER OF LIEN FORM**

1. At the preconstruction meeting, the OWNER will receive from the CONTRACTOR a list of all major items (s)he intends to subcontract.
2. Prior to the first requisition for payment, the OWNER will inform the CONTRACTOR as to which of these SUBCONTRACTORS or vendors may be required to complete a Release of Lien Form. Note that 40 CFR §33.302 requires CONTRACTOR to pay their SUBCONTRACTORS for satisfactory performance within 30 days of payment to CONTRACTOR by OWNER.
3. The CONTRACTOR shall include in the payment package a Release of Lien Form for the overall CONTRACT and those of any SUBCONTRACTORS or vendors so identified by the OWNER.
4. For all interim payments prior to 90% completion of the CONTRACT, the CONTRACTOR may delete, "...the undersigned does hereby waive, release and relinquish any and all claims, demands and rights of lien for all work, labor, materials, machinery or other goods, equipment or services done, performed or furnished..." from the first statement.
5. Final payment requires complete wording in the first statement and a fully executed form.

**GENERAL CONTRACTOR'S OR SUBCONTRACTOR'S**  
**RELEASE AND WAIVER OF LIEN**

For and in consideration of the receipt of \$ \_\_\_\_\_, in payment for labor and/or materials furnished, the undersigned does hereby waive, release and relinquish any and all claims, demands and rights of lien for all work, labor, materials, machinery or other goods, equipment or services done, performed or furnished for the construction located at the site hereinafter described, to wit:

**Town of Bennington Water System Remedial Expansion, Contract #6**  
(Project Name and OWNER)

\_\_\_\_\_

\_\_\_\_\_, Vermont as of \_\_\_\_\_  
(Date)

The undersigned further warrants and represents that any and all valid labor and/or materials and equipment bills, now due and payable on the property herein above described in behalf of the undersigned, have been paid in full to date of this waiver, or will be paid from these funds.

\$ \_\_\_\_\_  
Total Paid to Date This Contract

\$ \_\_\_\_\_  
Current Payment Due

\$ \_\_\_\_\_  
Total Billed to Date This Contract

\_\_\_\_\_  
CONTRACTOR/SUB-CONTRACTOR

\_\_\_\_\_  
Witness Signature

By: \_\_\_\_\_

\_\_\_\_\_  
Witness Printed Name

Title: \_\_\_\_\_



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**CHANGE ORDER # \_\_\_\_\_**

Owner's Project Number RF/VT/STAG # _____	Date: _____
Contract #: _____	Agreement Date: _____
Contract Title: _____	ORIGINAL PRICE: \$ _____
Owner: _____	Notice to Proceed Date: _____
Contractor: _____	Calendar Days: _____
Engineer: _____	Original Completion Date: _____

**The following changes are hereby made to the CONTRACT DOCUMENTS:**

**DESCRIPTION:**

**JUSTIFICATION:**

PRICE: This C.O.<sup>(1)</sup> will (not change/increase/decrease) the Contract Price By: \$ \_\_\_\_\_  
Current Contract Price per most recent C.O.: \$ \_\_\_\_\_  
The new Contract Price including this C.O. is: \$ \_\_\_\_\_

TIME: Current Contract Calendar Days as per most recent C.O.: Calendar Days \_\_\_\_\_  
This C.O. will (not change/increase/decrease) the Contract Calendar Days by: Calendar Days \_\_\_\_\_  
The new Contract Calendar Days including this C.O. is: Calendar Days \_\_\_\_\_  
The new Contract Completion Date is, therefore: \_\_\_\_\_

**NOTE: The CONTRACTOR must provide a Revised Project Schedule to reflect increases or decreases in Contract Time as authorized by this C.O.**

REQUESTED BY: \_\_\_\_\_  
Print or Type Name Signature

**SIGNATURES/APPROVALS:**

Stipulated price and time adjustment includes all costs and time associated with the above described change. CONTRACTOR waives all rights for additional compensation or time extension for said change. CONTRACTOR and OWNER agree that the price(s) and time adjustment(s) stated above are equitable and acceptable to both parties.

Recommended By (Engineer): \_\_\_\_\_  
Print or Type Name Signature

Accepted By (CONTRACTOR): \_\_\_\_\_  
Print or Type Name Signature

Ordered By (OWNER): \_\_\_\_\_  
Print or Type Name Signature

(1) C.O. means Change Order

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**Supply (with an original signature) the Consent of Surety to Reduction in Retainage, using AIA Document G707A or a similarly formed document, along with the original of the CONTRACTOR's request for the reduction of retainage. A sample of the CONTRACTOR's request form for reduction in retainage on page 3 of 3. This document will be submitted to the Engineer for review and recommended approval to the OWNER prior to the payment requisition which shows a reduction in retainage at successful completion of at least 50% of the work (not including materials stored on site) or at Substantial Completion for further reduction below 5% (but not less than the remaining value of work to be completed). Retainage will not be reduced until the Surety provides a document in the form (as noted above) to the CONTRACTOR for submission by the CONTRACTOR to the OWNER which indicates that the Surety agrees with the reduction.**

Note: if additional copies are needed, a copy of the Consent of Surety form and a copy of the CONTRACTOR's Request for Reduction of Retainage are acceptable.



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**CONTRACTOR'S REQUEST FOR REDUCTION OF RETAINAGE**

TO:

OWNER:

Date

FROM: CONTRACTOR Name, Address

OWNER'S PROJECT #:

**CONTRACT NO.:**

**CONTRACT WORK:**

Adjusted Total Contract (Including Change Orders)		\$
Work Completed (Not Including Material Stored)	%	\$
Current Retainage	%	\$
Requested Retainage	%	

Consent of Surety Letter attached

CONTRACTOR Signature:

CONTRACTOR's Typed Name:

Title \_\_\_\_\_ Date \_\_\_\_\_

**PROFESSIONAL ENGINEER'S RECOMMENDATION FOR REDUCTION OF RETENTION**

Pursuant to the conditions of the Construction Documents and my evaluation of the satisfactory performance by the CONTRACTOR in the execution of the work, I do  do not  recommend release of retention and future percentage as set forth below.

Typed Name	Recommend Release/Sign	Do Not Recommend Release/Sign	Date
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

**OWNER'S AUTHORIZATION FOR REDUCTION OF RETENTION**

Authorization is hereby granted for retention on the subject contract to be maintained at \_\_\_\_\_ % until further notice.

OWNER's Authorized Representative Signature: \_\_\_\_\_

Date: \_\_\_\_\_

OWNER's Authorized Representative Typed Name: \_\_\_\_\_

**E-MAIL THIS FORM:** This form may be submitted to OWNER/ENGINEER electronically for review by e-mail addressed to the OWNER'S Authorized Representative at: \_\_\_\_\_ and the ENGINEER at: \_\_\_\_\_

**NOTE:** Form may be submitted electronically only for review purposes. To meet contractual requirements, form submitted to OWNER must have original signatures and be accompanied by Consent of Surety. Reduction of Retainage does not release the CONTRACTOR or Surety of the requirements to satisfactorily complete the Contract. General Conditions Section 19.1 applies to this request.

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**CERTIFICATE OF SUBSTANTIAL COMPLETION**

OWNER \_\_\_\_\_

OWNER's Project Number \_\_\_\_\_

Project Name \_\_\_\_\_

=====

CONTRACTOR \_\_\_\_\_ Contract Date \_\_\_\_\_

Contract for \_\_\_\_\_

=====

Project or Specified Part Shall Include \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

=====

**DEFINITION OF SUBSTANTIAL COMPLETION**

**The date of Substantial Completion of a Project or specified part of a Project is the date when the construction is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part of the Project can be utilized for the purpose for which it was intended.**

=====

To: \_\_\_\_\_

(OWNER)

And To: \_\_\_\_\_

(CONTRACTOR)

The WORK performed under this CONTRACT has been inspected by authorized representatives of the OWNER, CONTRACTOR, and ENGINEER, and the Project or Specified Part of the Project is hereby declared to be Substantially Completed as of the following date:

Date of Substantial Completion: \_\_\_\_\_

If a tentative list of items to be completed or corrected is appended hereto, the failure to include an item on it does not alter the responsibility of the CONTRACTOR to complete all the WORK in accordance with the CONTRACT DOCUMENTS and CONTRACT TIME.

Recommended By:

ENGINEER	(Signature)	Date
	(Print or Type Name)	

Approved By:

OWNER	(Signature)	Date
	(Print or Type Name)	

=====

The CONTRACTOR accepts the above Certificate of Substantial Completion.

CONTRACTOR	(Signature)	Date
	(Print or Type Name)	

=====

EXCEPTIONS AS TO GUARANTEES AND WARRANTIES:

=====

ATTACHMENTS:

1) Punch List Dated: \_\_\_\_\_

2) List the CONTRACTOR's Warranty Start and End Dates along with any Extended Warranty information here. Some items (such as roofing) may have a manufacturer's warranty longer than one year. Any documentation to support warranty requests (bill of sale, etc.) need to be supplied as part of the OWNER's O&M Manual under the warranty section.



**Consent of Surety Company to release the Final Payment, using AIA Document G707 or a similarly formed letter (sample next page), with the original of the Consent attached to the original of the application, and a copy of the consent attached to each copy of the application.**

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**CONSENT OF SURETY COMPANY TO FINAL PAYMENT**

Project: \_\_\_\_\_  
Location: \_\_\_\_\_  
Contract #: \_\_\_\_\_

TO: \_\_\_\_\_, **OWNER**  
\_\_\_\_\_  
\_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

Contract Date: \_\_\_\_\_

---

In accordance with the provisions of the Contract between the OWNER and the CONTRACTOR as indicated above, the

\_\_\_\_\_ (here insert name and address of Surety Company and delete this reminder) \_\_\_\_\_, Surety Company,  
\_\_\_\_\_  
\_\_\_\_\_

on bond of

\_\_\_\_\_ (here insert name and address of CONTRACTOR and delete this reminder) \_\_\_\_\_, CONTRACTOR,  
\_\_\_\_\_  
\_\_\_\_\_

hereby approves of the final payment to the CONTRACTOR, and agrees that final payment to the CONTRACTOR shall not relieve the Surety Company of any of its obligations to the OWNER as set forth in the said Surety Company's bond. The Surety agrees to be bound to the warranty period under the same conditions as the CONTRACTOR. The warranty is defined as commencing with Substantial Completion (or with each Substantial Completion if there is more than one) of the Project, or any portion thereof, and continuing for one (1) calendar year from the date of Final Acceptance of the entire project unless otherwise modified in writing as part of the Substantial Completion or Final Acceptance.

IN WITNESS WHEREOF, \_\_\_\_\_  
the Surety Company has hereunto set its hand this \_\_\_\_\_ Day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
Surety Company

\_\_\_\_\_  
Signature of Authorized Representative

Attest:  
(Seal)

\_\_\_\_\_  
Title

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**CERTIFICATE OF FINAL COMPLETION AND ACCEPTANCE OF WORK**

CONTRACT NO. \_\_\_\_\_ AGREEMENT DATE: \_\_\_\_\_

CONTRACT DESCRIPTION: \_\_\_\_\_

Notice to Proceed Date of Issuance: \_\_\_\_\_

Completion Date per Agreement and Change Orders # \_\_\_\_\_ thru # \_\_\_\_\_; \_\_\_\_\_  
(Date)

**FINAL CERTIFICATION OF CONTRACTOR**

I hereby certify that the WORK as identified in the Final Estimate of Payment for construction CONTRACT WORK dated \_\_\_\_\_, represents full compensation for the actual value of WORK completed. All WORK completed conforms to the terms of the AGREEMENT and authorized changes.

\_\_\_\_\_  
CONTRACTOR Signature  
\_\_\_\_\_  
Date Print or Type Name  
\_\_\_\_\_  
Title

**FINAL CERTIFICATION OF ENGINEER**

I have reviewed the CONTRACTOR'S Final Payment Request dated \_\_\_\_\_ and hereby certify that to the best of my knowledge, the cost of the WORK identified on the Final Estimate represents full compensation for the actual value of WORK completed and that the WORK has been completed in accordance with the terms of the AGREEMENT and authorized changes. This certification is provided in accord with the terms of GENERAL CONDITION number 20.1.

\_\_\_\_\_  
ENGINEER Signature  
\_\_\_\_\_  
Date Print or Type Name

**FINAL ACCEPTANCE OF OWNER**

I, as representative of the OWNER, accept the above Final Certifications and authorize Final Payment in the amount of \$ \_\_\_\_\_ and direct the CONTRACTOR'S attention to the GENERAL CONDITION #5. The guaranty for all WORK completed subsequent to the date of SUBSTANTIAL COMPLETION, expires one (1) year from the date of this Final Acceptance.

\_\_\_\_\_  
OWNER Signature  
\_\_\_\_\_  
Date Print or Type Name  
\_\_\_\_\_  
Title



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## GENERAL CONDITIONS

- |  |   |
|--|---|
| 1. Definitions                               | 16. Correction of Work                      |
| 2. Additional Instructions & Detail Drawings | 17. Subsurface Conditions                   |
| 3. Schedules, Reports and Records            | 18. Suspension of Work, Termination & Delay |
| 4. Drawings and Specifications               | 19. Payments to CONTRACTOR                  |
| 5. Shop Drawings                             | 20. Acceptance of Final Payment as Release  |
| 6. Materials, Services and Facilities        | 21. Insurance                               |
| 7. Inspection and Testing                    | 22. Contract Security                       |
| 8. Substitutions                             | 23. Assignments                             |
| 9. Patents and Copyrights                    | 24. Indemnification                         |
| 10. Surveys, Permits, Regulations            | 25. Separate Contracts                      |
| 11. Protection of Work, Property, Persons    | 26. Subcontracting                          |
| 12. Supervision by CONTRACTOR                | 27. Engineer's Authority                    |
| 13. Changes in the Work                      | 28. Land and Rights-of-Way                  |
| 14. Contract Change Orders                   | 29. Guaranty                                |
| 15. Time for Completion & Liquidated Damages | 30. Taxes                                   |

### 1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

1.2 ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications or corrections.

1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER - Any person, firm or corporation submitting a BID for the WORK.

1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER - A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS - The contract, including Advertisement For Bids, Information For Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR - The person, firm or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS - The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12 ENGINEER - The person, firm or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER - A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.

1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.

1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR - An individual, firm or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION - That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.

1.24 SUPPLIER - Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

## 2. ADDITIONAL INSTRUCTION AND DETAIL DRAWINGS

2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.

2.2 The additional drawings and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

## 3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that he anticipates he will earn during the course of the WORK.

#### 4. DRAWINGS AND SPECIFICATIONS

4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2 Any conflicts between the Contract Documents and Specifications, between Contract Drawings, and/or site conditions shall be brought to the attention of the ENGINEER in writing immediately upon discovery. The ENGINEER shall respond per General Conditions 27.4. If the CONTRACTOR requests additional compensation refer to General Condition 13. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR's risk.

#### 5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING, which substantially deviates from the requirement of the CONTRACT DOCUMENTS, shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

#### 6. MATERIALS, SERVICES AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, supplies and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

## 7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at his expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests or approvals by the engineer or others shall not relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection, or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR'S expense.

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in questions, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

## 8. SUBSTITUTIONS

8.1 Whenever a material, article or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalog number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalog number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and



use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

## 9. PATENTS and COPYRIGHTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and copyrights, and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, however, if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent or copyright, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

## 10. SURVEYS, PERMITS, REGULATIONS

10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

## 11. PROTECTION OF WORK, PROPERTY AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify OWNERS of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.

11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. He will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

## 12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. **The supervisor shall be present on the site during any construction activity to perform adequate supervision and coordination of the WORK.**

## 13. CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 The ENGINEER may also at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

## 14. CONTRACT CHANGE ORDERS

14.1 All changes affecting the Project's construction cost, length of time, or modifications of the terms or conditions of the CONTRACT, must be authorized by means of a written CONTRACT Change Order which is mutually agreed to by the OWNER and CONTRACTOR. The CONTRACT Change Order will include extra WORK, WORK for which quantities have been altered from those shown in the BID Schedule, as well as decreases or increases in the quantities of installed units which are different from those shown in the BID Schedule because of final measurements. All changes must be recorded on a CONTRACT Change Order (which form is part of these CONTRACT Documents) and fully executed before they can be included in a partial payment estimate. Changes for WORK, quantities, and/or conditions will include any respective time adjustment, if justified. Time adjustments will require an updated Project Schedule with the Change Order.

14.2 When the Contract sum is, in whole or in part, based on unit prices, the OWNER reserves the right to increase or decrease a unit price quantity as may be deemed reasonable or necessary in order to complete the WORK contemplated by this CONTRACTOR. Overhead and Profit (OHP) will not be included in a unit quantity Change Order.

14.3 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

- (a) Unit prices previously approved, or
- (b) An agreed lump sum, or
- (c) Time and Materials (T&M) for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the WORK.

14.4 In addition, there may be added an amount to be agreed upon to cover the cost of general overhead and profit (OHP). The markup for OHP by the General CONTRACTOR may not exceed 15% if the General CONTRACTOR executes the WORK. If a SUBCONTRACTOR executes the WORK, the Sub-CONTRACTOR's OHP may not exceed 15% of the cost of the actual WORK, and the General CONTRACTOR may not apply for more than a 5% markup for OHP on the actual WORK (not including the SUBCONTRACTOR's OHP).

## 15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure final completion within the CONTRACT TIME. IT is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following, and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order duly issued by the OWNER;

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a CONTRACT with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1. and 15.4.2 of this article.

## 16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR's expense. If the CONTRACTOR does not take action to remove such rejected work within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

## 17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the OWNER may, if he determines the facts so justify, consider and adjust any such claims. If the OWNER finds that payment is not warranted he shall issue a written justification to the CONTRACTOR. The CONTRACTOR will have 14 calendars days to respond with additional written information or justification after which the claim for additional compensation may no longer be asserted.

## 18. SUSPENSION OF WORK, TERMINATION AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume the WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged as bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT price exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR's services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of this approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days WRITTEN NOTICE to the OWNER and the ENGINEER

stop the WORK until he has been paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.

18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

## 19. PAYMENTS TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER's title to the material and equipment and protect his interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The ENGINEER will, within five (5) working days after receipt of each corrected partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. The OWNER will, within fifteen (15) working days of the presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain ten (10) percent of the amount of each payment until final completion and acceptance of all WORK covered by the CONTRACT DOCUMENTS. However, after fifty (50) percent of the WORK has been completed, if the OWNER finds that satisfactory quality and progress is being made, the OWNER shall reduce Retainage to five (5) percent on the current and remaining estimates. When the WORK is substantially complete (operational or beneficial occupancy), the retained amount shall be further reduced below five (5) percent to only that amount related to the punchlist and necessary to assure completion. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

19.2 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.3 The OWNER shall have the right to enter the premises for the purpose of doing WORK not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.4 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

19.5 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, material-men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills



or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

19.6 If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there may be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

## 20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1 Upon final completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

20.2 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the CONTRACT DOCUMENTS or the Performance BOND or Payment BONDS.

## 21. INSURANCE

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

21.1.1 Claims under workmen's compensation, disability benefit and other similar employee benefit acts

21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death or his employees

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees

21.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting there from.

21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverage afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 INSURANCE REQUIREMENTS. Insurance obtained by the CONTRACTOR to cover the below-listed requirements shall be procured from an insurance company registered and licensed to do business in the State of

Vermont. All insurance coverage for property damage shall provide coverage for "Replacement" cost. Before the CONTRACT is signed and becomes effective, the CONTRACTOR shall file with the OWNER a certificate of insurance, in duplicate, executed by an insurance company or its licensed agent(s), on a form satisfactory to the OWNER, stating that with respect to the CONTRACT awarded, the CONTRACTOR carries insurance in accordance with the following requirements. Renewal certificates for keeping the required insurance in force for the duration of the CONTRACT shall also be filed as specified above. No warranty is made that the coverages and limits listed herein are adequate to cover and protect the interests of the CONTRACTOR and any SUBCONTRACTOR for the CONTRACTOR'S and any SUBCONTRACTOR'S operations. These are solely minimums that have been established to protect the interests of the OWNER. The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, insurances as hereinafter specified:

21.3.1 Workers Compensation Insurance. With respect to all operations performed the CONTRACTOR shall carry Workers Compensation Insurance in accordance with the laws of the State of Vermont, 21 V.S.A. Chapter 9. The CONTRACTOR shall also ensure that all SUBCONTRACTORS carry Workers Compensation Insurance in accordance with 21 V.S.A. Chapter 9 for all work performed by them.

CONTRACTOR shall carry Employer's Liability Insurance with Limits of Coverage not less than:

- \$1,000,000 Each employee for disease
- \$1,000,000 Each accident
- \$1,000,000 Disease policy limit

CONTRACTOR shall amend their policy to include a waiver of subrogation endorsement in favor of Saint-Gobain Parties, which shall be defined as: Saint-Gobain, its parent(s), and each of their respective direct or indirect, partners, members, affiliates, principals, directors, officers, stockholders, and employees ("Saint-Gobain Parties"). CONTRACTOR shall also include a waiver of subrogation endorsement in favor of the State of Vermont, Officers and Employees ("State of Vermont").

21.3.2 Commercial General Liability Insurance. With respect to all operations performed by the CONTRACTOR and SUBCONTRACTORS, the CONTRACTOR shall carry Commercial General Liability Insurance on an occurrence form providing all major divisions of coverage, including but not limited to:

- Premises - Operations
- Independent CONTRACTOR's Protective
- Products and Completed Operations
- Personal Injury Liability

Policy shall include endorsements ISO form CG20 10, CG 20 37 and CG 20 01, including Saint-Gobain Parties and State of Vermont as additional insureds. Saint-Gobain Parties and State of Vermont are to be afforded the same types of coverage as listed in declarations page of the named insured's policy. Policy shall include a waiver of subrogation endorsement in favor of Saint-Gobain Parties and State of Vermont. Policy shall include a cross-liability and severability of interest clauses. Policy shall contain an endorsement noting that CONTRACTOR'S insurance is primary and any other insurance carried by Saint-Gobain or the State of Vermont shall be noncontributory.

CONTRACTOR's General Liability and Property Damage Insurance will be obtained by the CONTRACTOR protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by himself or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. Contractual Liability applying to the CONTRACTOR'S obligations, unless this requirement is waived in writing by the OWNER, shall have Limits of Coverage not less than:

- \$1,000,000 Each Occurrence
- \$2,000,000 General Aggregate applying, in total to this project only
- \$1,000,000 Products/Completed Operations Aggregate
- \$ 250,000 Fire Damage Legal Liability

21.3.3 Automobile Liability Insurance. The CONTRACTOR shall carry Automobile Liability Insurance covering all motor vehicles, including owned, hired, borrowed, and non-owned vehicles, used in connection with the project. Limits of Coverage shall be not less than:

Bodily Injury: \$1,000,000 Each Person, \$1,000,000 Each Occurrence  
Property Damage: \$ 1,000,000 Each Occurrence, OR  
Combined Single Limit: \$2,000,000 Each Occurrence

Policy shall include an endorsement, including Saint-Gobain Parties and the State of Vermont as additional insureds. Saint-Gobain Parties and the State of Vermont are to be afforded the same types of coverage as listed in declarations page of the named insured's policy. Policy shall include a waiver of subrogation endorsement in favor of Saint-Gobain Parties and the State of Vermont. Policy shall include a cross-liability and severability of interest clauses. Policy shall contain an endorsement noting that CONTRACTOR'S insurance is primary and any other insurance carried by Saint-Gobain or the State of Vermont shall be noncontributory.

21.3.4 Excess/Umbrella Liability. CONTRACTOR shall carry Excess/Umbrella Liability insurance with a limit of not less than \$5,000,000 per occurrence, at least with respect to policies required in 21.3.1, 23.3.2 and 23.3.3; coverage shall provide excess limits and be at least follow form or broader.

21.3.5 Pollution Liability. CONTRACTOR shall carry a Pollution Liability policy for losses caused by pollution conditions that arise from the operations of the CONTRACTOR described under the terms of the CONTRACT. CONTRACTOR shall carry Pollution Liability Insurance with Limits of Coverage not less than:

\$3,000,000 Per pollution condition  
\$3,000,000 Aggregate written on occurrence form with no sunset clause

The pollution conditions include:

- (a) Bodily injury, sickness, and disease to include mental anguish or shock, sustained by any one person; including death
- (b) Property damage including physical damage to or destruction of tangible property including the resulting loss of use thereof, clean-up costs, and the loss of use of tangible property that has not been physically destroyed.
- (c) Defense including costs, charges, and expenses incurred in the investigation, adjustment of defense claims for such compensatory damages;
- (d) Transportation coverage including the loading and unloading of products, goods, and/or waste

21.3.6 General Insurance Conditions. The insurance specified under paragraphs 21.3.1, 21.3.2, 21.3.3, 21.3.4 and 21.3.5 above shall be maintained in force until acceptance of the project by the OWNER. Under paragraph 21.3.2 above, Products and Completed Operations Coverage shall be maintained in force for at least one year from the date of acceptance of the project. The contractual liability insurance requirements detailed in the Contract Documents are to indemnify, defend, and hold harmless the OWNER, and additional insureds, as applicable, and their officers, agents, representatives, and employees, with respect to any and all claims, causes of actions, losses, expenses, or damages that arise out of, relate to, or are in any manner connected with the CONTRACTOR'S work or the supervision of the CONTRACTOR'S work on this project. Each policy, except the Workers Compensation Policy, shall name the OWNER, St. Gobain Parties, and the State of Vermont, as additional insured for actions, losses, expenses or damages that arise out of, relate to, or are in any manner connected with the CONTRACTOR'S work or the supervision of the CONTRACTOR'S work on this project. Umbrella Excess Liability Policies may be used in conjunction with primary policies to comply with any of the limit requirements specified above. "Claims-made" coverage forms are expressly prohibited. The CONTRACTOR shall investigate and the CONTRACTOR and/or insurance company shall either adjust or defend all claims against the insured for damages covered, even if groundless. Each policy furnished shall contain a rider or non-cancellation clause reading in substance as follows:

Anything herein to the contrary notwithstanding, no cancellation, termination, or alteration of this policy by the company or the assured shall become effective unless and until notice of cancellation, termination, or alteration has been given by registered mail to the OWNER, at least 30 calendar days

before the effective cancellation, termination, or alteration date unless all work required to be performed under the terms of the CONTRACT is satisfactorily completed as evidenced by the formal, final acceptance of the project by the OWNER. There shall be no directed compensation allowed the CONTRACTOR on account of any premium or other charge necessary to take out and keep in effect such insurance or bond; the cost thereof shall be considered included in the general cost of the work.

21.3.7 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, in accordance with the provision of the laws of the state in which the WORK is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any WORK is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous WORK under this CONTRACT at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause, each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

21.5 The CONTRACTOR shall secure "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, water and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, the ENGINEER, and the OWNER.

## 22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance BOND and a Payment BOND in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. The form of such BONDS are subject to review and approval by St. Gobain. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal BONDS, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

## 23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign or otherwise dispose of the CONTRACT or any portion thereof, or of his right, title or interest therein, or his obligations hereunder, without written consent of the other party.

## 24. INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out

of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, design or SPECIFICATIONS.

## 25. SEPARATE CONTRACTS

25.1 The OWNER reserves the right to let other CONTRACTS in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT by himself or he may let other CONTRACTS containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS, who are parties to such CONTRACTS (for the OWNER, if he is performing the additional WORK himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his WORK with theirs.

25.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, WRITTEN NOTICE thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefore as provided in Section 14 and 15.

## 26. SUBCONTRACTING

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 If the CONTRACTOR was not required to obtain OWNER approval of the SUBCONTRACTOR(s) prior to Award of the CONTRACT, the CONTRACTOR shall provide written notification to the OWNER within 10 working days of the CONTRACTOR's intent to employ SUBCONTRACTOR(s) on site. The notification shall list the name, address and telephone number of the SUBCONTRACTOR(s); estimated dollar amounts of SUBCONTRACT(s); estimated start and completion dates of the SUBCONTRACTOR(s) work.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS and of persons whether directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.



26.5 Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

## 27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions in writing relative to interpretation of the CONTRACT DOCUMENTS.

## 28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

## 29. GUARANTY

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one, (1) year from the date of SUBSTANTIAL COMPLETION or FINAL COMPLETION OF THE PROJECT or specified part, as appropriate. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION (or FINAL COMPLETION OF THE PROJECT for items not completed at time of SUBSTANTIAL COMPLETION) or specified part, as appropriate, that the completed project is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the project resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

## 30. TAXES

30.1 The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

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**TOWN OF BENNINGTON**  
**WATER SYSTEM REMEDIAL EXPANSION PROJECT**  
**10 May 2019**

State Permits  
Attachment 1

- State of Vermont Stream Alteration Permit (will be issued in separate Addendum)
- State of Vermont Water Supply Permit (will be issued in separate Addendum)
- State of Vermont Construction General Permit (will be issued in separate Addendum)
- Erosion Prevention and Sediment Control Plan (EPSC) (will be issued in separate Addendum)
- Army Corps of Engineer's Category 2 General Permit (will be issued in separate Addendum)
- State of Vermont Agency of Transportation State Highway Access Permit Letter of Intent (will be issued in separate Addendum)

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**SECTION 012600  
MEASUREMENT AND PAYMENT**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. This section specifies administrative and procedural requirements for Unit and Lump Sum Prices stated in the Bid Schedule.
- B. A "Measurement and Payment Schedule" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods described under each Price.

**1.03 GENERAL PROVISIONS**

- A. Each unit price or lump sum stated in the Bid Schedule shall constitute full compensation for all materials, labor, tools, equipment and incidentals thereto, to perform the work in accordance with the Contract Documents.
- B. Consider all work required by the Contract Documents and/or normally required during the construction of the work herein specified, and not listed as a separate Item, as included and incidental to all items stated in the Bid Schedule. Such work will not be paid for as a separate Item.

**1.04 ITEMS INVOLVING EARTHWORK**

- A. Items involving earthwork shall include full compensation for the following as required:
  - 1. Excavation of earth, sawcutting and removal of pavement, stripping, grubbing, clearing, tree removal, disposal of surplus, demolition of waste material
  - 2. Supply, placement, and compaction of bedding material, backfill, any other borrow material;
  - 3. Dewatering of surface and groundwater where encountered;
  - 4. Sheeting, bracing, and trench protection;
  - 5. Final cleanup and surface restoration unless specifically described in another Item.

**1.05 ITEMS INVOLVING ROCK REMOVAL**

- A. Items involving rock removal shall include, but are not limited to, the following:
  - 1. The cost of the pre-blast survey (if applicable);
  - 2. Rock removal within the specified pay limits;
  - 3. Transportation and disposal of rock;
  - 4. Refilling with appropriate backfill material.
- B. The Contractor and Engineer shall agree on the method of measurement prior to blasting or removal of material. The Engineer shall be present during rock removal operations and all quantities shall be agreed upon with the Contractor at that time.
- C. The Contractor shall only be reimbursed for removal of rock within the specified pay limits. The Contractor will be responsible for removing and replacing any material blasted beyond the specified pay limits with appropriate backfill material at no additional cost to the Owner.

**1.06 INCREASE, DECREASE OR ELIMINATION OF ITEMS**

- A. The quantity of units identified in the Contract Documents are not guaranteed. No additional compensation for anticipated profits shall be granted nor shall the Contract be deemed



invalid due to an increase, decrease or elimination of an item in the Bid Schedule by the Engineer.

#### **1.07 CONTRACTOR COORDINATION WITH WORK BY OTHERS**

- A. The watermain extension project includes multiple concurrent contracts that may be performed by separate contractors, and that will require contractor coordination. Water Main tie-ins between multiple contracts will occur at the following locations:
  - 1. Contract 5 - Contract 6:
    - a. Houghton Lane
- B. Contractor means & methods will determine which Contractor arrives first. Whichever Contractor arrives first shall provide the gate valves, pipe stub and a temporary cap and thrust block for connection by subsequent Contractor. Subsequent Contractor shall be responsible for all labor and materials required to make connection and for restoration immediately adjacent to the connection. Each Contractor shall be paid for the actual units of work installed. No additional payment will be made for any required coordination.

#### **1.08 EXCESS SPOILS AND UNSUITABLE EXCAVATED MATERIAL**

- A. All excavated native soil that is not re-used within the project limits shall be delivered to a collection site designated by the Engineer and secured by the Contractor with approval from the State of Vermont. The designated site shall be located at the Town of Benningtons former landfill on Houghton Lane, within the specified corrective action area. All costs associated with loading, hauling and discharge of excess spoils and unsuitable excavated material shall be incidental to other items of work.
- B. All costs associated with coordinating spoils loads from Contracts 5-7 shall be incidental to other items of work. Management, security, and restoring collection area shall be the responsibility of the Contract #6 Contractor.
- C. The Contract #6 Contractor shall construct, maintain, and restore the spoils site and all access roads to the designated spoils site to accommodate all construction spoils loads from Contracts 5-7 until the date of Final Completion listed in the Contract Documents. All coordination with other contracts and contractors including, but not limited to, designated dump areas, scheduling, access, and frequency of loads shall be the responsibility of the Contract #6 Contractor.
- D. The Contractor shall conduct operations at the spoils management site so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.
- E. The Contractors responsible for Contracts #5 and #7 shall coordinate with the Contract #6 Contractor all activities including, but not limited to, scheduling, access, and frequency of loads.
- F. The opening and managing of the designated off site activity area for spoils shall be operable and ready to receive excavated materials within 15 work days of the Notice to Proceed. Any claims from other Contracts associated with the delay of an operable spoils site shall be the responsibility of the Contract #6 Contractor.
- G. The Contractor shall conduct operations at the spoils management site so as to prevent unauthorized access from the public. The access gate to the site shall be secure at all times.

- H. The opening and managing of an off site activity area for spoils other than the designated spoils site shall require compliance with Section 015713 of the Contract Documents and will be the responsibility of the individual Contractors.

#### **1.09 MEASUREMENT OF QUANTITIES**

- A. All work completed under the Contract will be measured by the Engineer according to U.S. Customary units, as required by the Contract Documents. The measurement and determination of the number of units will be made as specifically described in Part 3 of this Section.
- B. Area: Unless otherwise specified in the Contract, area computations will be made horizontally. Measurements for area computations will be the neat dimension shown on the Plans or authorized in writing by the Engineer.
- C. Volumes: Unless otherwise specified in the Contract, volume computations will be made using arithmetical formulae of in-place quantities after compaction to the specified density and in accordance with the limits shown in the Contract Documents or as authorized in writing by the Engineer.
- D. Length Measurement: All items measured by the linear foot will be measured parallel to the base or foundation upon which the item is placed, unless otherwise indicated in the Contract Documents.
- E. Lump Sum: The term "lump sum", when used as a unit of measurement for an item of payment, means complete payment for the work described in the Item Description.
- F. Each: The term "Each", when used as a unit of measurement for an item of payment, means the complete payment per item for the work described in the Item Description.

#### **1.10 SCOPE OF PAYMENT**

- A. In general, the Contractor shall receive and accept the compensation provided in accordance with the General Conditions of the Contract Documents as full payment for:
  - 1. Furnishing all materials, labor, tools, equipment and performing all work contemplated and required under the Contract Documents;
  - 2. All loss or damage arising out of the work from actions of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered during the prosecution of the work until its acceptance by the Owner;
  - 3. All risks of every description connected with the prosecution of the work;
  - 4. All expenses incurred by or in consequence of the temporary suspension or discontinuance of the work for any infringement of patent, trademark, or copyright, and for the completing the work in an acceptable manner according to the Contract Documents.

### **PART 2 - PRODUCTS (NOT APPLICABLE).**

### **PART 3 - EXECUTION**

#### **3.01 UNIT PRICED ITEM DESCRIPTIONS**

- A. Item No. 1 - Mobilization/Demobilization
  - 1. Mobilization and demobilization of all necessary equipment and materials; set up of the necessary storage areas, field offices, Engineering field offices, sanitary and other facilities required by Federal, State and local law or regulation; obtaining all required permits, insurance and bonds; and any costs associated with initiation of the Contract work.
  - 2. Unit of Measure: Lump Sum (The maximum amount of Mobilization/Demobilization shall not be greater than 6% of the Total Contract Price).

- B. Item No. 2 - Erosion and Sediment Controls
  - 1. Planning, furnishing, installing, maintaining, removing, and disposing of erosion prevention and sediment control measures in accordance with the Contract Documents.
  - 2. Unit of Measure: Lump Sum.
- C. Item No. 3 – Traffic Control
  - 1. Development and submittal of traffic control plan for approval by agencies having jurisdiction, purchase and installation of traffic control signs, traffic control management in compliance with applicable standards and permits.
  - 2. Unit of Measure: Lump Sum
- D. Item No. 4 - Trench Excavation of Rock
  - 1. Removal of all solid rock in formation, or boulders measuring 1 cubic yard or more, excavated within 6 inches beneath invert elevation of pipe in trenches, and 24 inches wider than pipe diameter, or 42 inches wide, whichever is greater. This item includes the backfill of all voids where solid rock was removed with suitable material.
  - 2. Unit of Measure: Cubic Yard
- E. Item No. 5 - French Drain
  - 1. Installation of French Drain as shown in the Contract Plans to daylight and as directed by the Engineer if excessive groundwater is encountered during the installation of water distribution lines.
  - 2. Unit of Measure: Linear Foot
- F. Item No. 6 - Removal and Replacement of Unsuitable Trench Material
  - 1. Furnishing and installing of replacement trench backfill meeting the requirements of Specification 312323, only where excavated on-site materials are unsuitable for trench backfill and only as directed by the Engineer.
  - 2. Unit of Measure: Cubic Yard
- G. Item No. 7 - Gravel Road
  - 1. Furnishing and installing gravel road material meeting the requirements of Specification 312323 as shown in the Contract Plans and as directed by the Engineer. General restoration of gravel driveways shall be incidental to waterline installation unless explicitly noted on the plans. Quantities will be based on neat line measurements in place.
  - 2. Unit of Measure: Cubic Yard
- H. Item No. 8 – 2.5" Caliper Tree Installation
  - 1. Furnishing, installing in a prepared bed and watering of 2.5" caliper deciduous trees in accordance with the details shown in the Contract Documents.
  - 2. Unit of Measure: Each
- I. Item No. 9 - Bituminous Concrete Pavement - Patching
  - 1. Costs shall include all labor, materials and equipment necessary to repair the asphalt pavement within the removal limits of the watermain installation trenches including, but not limited to, preparation of a mix design and material submittals for Engineer's review, saw-cutting, removal and disposal of existing pavement, replacement of existing detectable warning panels and posts where removed for construction, preparation of subbase and installation of base course, tack coating, pavement installation and field quality control, protection of the installed pavement until the

surface temperature has cooled sufficiently to prevent mechanical injury, and clean-up. Costs shall also include re-establishment of pavement markings disturbed by construction. All work shall conform to the Contract Documents.

2. Unit of Measure: Ton
- J. Item No. 10 – Bituminous Concrete Pavement – Overlay
1. Costs shall include all labor, materials and equipment necessary to install 2,  $\frac{3}{4}$ "-inch compacted lifts of Type IV asphalt overlay including, but not limited to, cold-planing at terminations, sweeping, tack coating, pavement installation and field quality control, protection of the installed pavement until the surface temperature has cooled sufficiently to prevent mechanical injury, and clean-up. Costs shall also include re-establishment of pavement markings disturbed by construction. All work shall conform to the Contract Documents. Cold planing shall be assumed to be a  $\frac{3}{4}$ " average depth when joining to existing asphalt pavement at a 2-foot length including paved driveways. A rubber-tired roller must be used on the shim coat to knead the pavement in the existing road profile. Costs shall also include re-establishment of pavement markings disturbed by construction. Copies of all load slips must be handed to inspectors at the delivery of each load.
  2. Unit of Measure: Ton
- K. Item No. 11 – Corporation Stops
1. Furnishing and installing corporation stops in accordance with the Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 11.1 –  $\frac{3}{4}$ " Corporation Stops
    - b. Item No. 11.2 – 1" Corporation Stops
    - c. Item No. 11.3 – 1.5" Corporation Stops
    - d. Item No. 11.4 - 2" Corporation Stops
- L. Item No. 12 – Curb Stops
1. Furnishing and installing Curb Stops in accordance with Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 12.1 –  $\frac{3}{4}$ " Curb Stop
    - b. Item No. 12.2 – 1" Curb Stop
    - c. Item No. 12.3 - 1.5" Curb Stop
    - d. Item No. 12.4 - 2" Curb Stops
- M. Item No. 13 – Gate Valves
1. Furnishing and installing Gate Valves including, but not limited to, furnishing and installing anchorages and valve boxes in accordance with the Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 13.1 – 3" Gate Valve
    - b. Item No. 13.2 – 4" Gate Valve
    - c. Item No. 13.3 – 6" Gate Valve
    - d. Item No. 13.4 – 8" Gate Valve
- N. Item No. 14 – Ductile Iron MJ Fittings

1. Furnishing and installing ductile iron fittings including, but not limited to, mechanical joint thrust restraints, and manufacturer "blue" bolts in accordance with the Contract Documents.
  2. Unit of Measure: Pound (lb). Weight of fitting shall be determined as published by the Ductile Iron Pipe Research Association. Mechanical joints, bolts, fasteners and gaskets shall be incidental.
- O. Item No. 15 – Pipe and Tube
1. Earthwork, sawcutting and removing existing pavement, furnishing and installing pipe or tube, pipe bedding, installation of Trace Wire for non-conductive water mains and service lines, cleaning, disinfection, pressure and bacteria testing in accordance with the Contract Documents. Coordination with other contractors for connection to new water mains installed under separate contracts shall be incidental to the unit price bid for the associated water main pipe. Copper tees, reducers and miscellaneous fittings for service line connections shall be incidental. 90% payment upon complete installation of pipe and service corporation and curb stops. 10% payment upon completion of required pressure and bacteria testing. All service lines shall be paid 90% upon complete installation of pipe through foundation and final 10% upon completion of yard restoration.
  2. Unit of Measure: Linear Foot
    - a. Item No. 15.1 - 4" Ductile Iron Pipe
    - b. Item No. 15.2 - 6" Ductile Iron Pipe
    - c. Item No. 15.3 - 8" Ductile Iron Pipe
    - d. Item No. 15.4 – 1" HDPE Tubing Pipe
    - e. Item No. 15.5 – 1.5" HDPE Tubing Pipe
    - f. Item No. 15.6 – 2" HDPE Tubing Pipe
    - g. Item No. 15.7 – 3" HDPE Tubing Pipe
    - h. Item No. 15.8 – 3/4" Copper Tube
    - i. Item No. 15.9 – 1" Copper Tube
    - j. Item No. 15.10 – 1.5" Copper Tube
    - k. Item No. 15.11 – 2" Copper Tube
- P. Item No. 16 – Sleeves
1. Trenchless installation of casing sleeves in accordance with the Contract Documents, including boring pits, carrier pipe, casing spacers, end seals and thrust blocks. If Agency approval is granted for open cut in lieu of trenchless installation, all excavation, bedding, backfill, carrier pipe, casing spacers and end seals shall be incidental.
  2. Unit of Measure: Linear Foot
    - a. Item No. 16.1 – 4" HDPE Sleeve
    - b. Item No. 16.2 – 6" HDPE Sleeve
    - c. Item No. 16.3 – 10" HDPE Sleeve
    - d. Item No. 16.4 – 18" HDPE Sleeve
    - e. Item No. 16.5 – 24" HDPE Sleeve
- Q. Item No. 17 – Trenchless Water Main



1. Trenchless installation of 10" HDPE water main carrier pipe installed within a specified HDPE casing pipe and all associated accessories and appurtenances, casing spacers and end seals, cleaning, disinfecting, pressure and bacteria testing and trenchless installation of casing sleeves in accordance with the Contract Documents. Unit price shall include all labor, equipment and materials, boring pit construction, protection and clean-up.
  2. Unit of Measure: Linear Foot (Horizontal Distance)
- R. Item No. 18 – Pressure Reducing Valve Vault – Site Preparation
1. Work required to prepare the site for installation of Pressure Reducing Valve Vaults (PRV's) including, but not limited to, site preparation, excavation, installation of 8-inch compacted gravel base for PRV vault, connection of exterior lines, coordination with PRV supplier on delivery and construction progress, electrical trenching and energizing of the PRV, incidental site work, installation of 1-1/2" pvc sump drain pipe to daylight, and backfill and restoration. PRV shall be supplied and offloaded by others. This item includes all coordination and associated lead times associated with the PRV and its supplier.
  2. Unit of Measure: Lump Sum
- S. Item No. 19 - Cast-in-Place Concrete Thrust Block
1. Furnishing and Installing cast-in-place concrete thrust blocks in accordance with the Contract Documents.
  2. Unit of Measure: Each
- T. Item No. 20 - Buried Rigid Insulation Board
1. Furnishing and installing minimum 2" thick buried rigid insulation board in accordance with the Contract Documents.
  2. Unit of Measure: Square Foot
- U. Item No. 21 – Connection to Existing Mains
1. All labor, equipment and materials required to make connections to existing water mains including test digs and field verification of existing mains.
  2. Unit of Measure: Lump Sum
- V. Item No. 22 – Connection to Existing Gate Valves
1. All labor, equipment and materials required to make connections to existing gate valves.
  2. Unit of Measure: Lump Sum
- W. Item No. 23 – Service Connections
1. All work required within the building envelope for the installation and connection of new water service lines including, but not limited to, demolition, disposal, construction, modification of existing water systems, installation of equipment and appurtenances, electrical and plumbing permits, record documents, O&M Manuals and owner training as outlined in the Contract Documents and within the specified pay limits. Existing line sizes indicated on individual service connection details are approximate. Contractor shall provide all required materials and fittings necessary for a complete system. Where required, meters shall be purchased from the Town of Bennington Water Department.
  2. Unit of Measure: Each
    - a. Item 23.1 – Building service
    - b. Item 23.2 – Slab on Grade Building Service

- c. Item 23.3 – Mobile Home Building Service
  - d. Item 23.4 – Meter Installation
  - e. Item 23.5 – Booster Pump Installation
- X. Item No. 24 – Fire Hydrant Assembly
- 1. Furnishing, assembling and installing fire hydrant assemblies in accordance with Contract Documents including, but not limited to, hydrants and appurtenances, mechanical joint thrust restraint at the hydrant assembly joints, hydrant isolation gate valves, hydrant tee, hydrant branch pipe, hydrant markers, and concrete thrust blocking at the hydrant and hydrant tee.
  - 2. Unit of Measure: Each
- Y. Item No. 25 – Flush Hydrant Assembly
- 1. Furnishing, assembling and installing flush hydrant assemblies in accordance with Contract Documents including, but not limited to, hydrants and appurtenances, hydrant isolation gate valve, mechanical joint thrust restraint at the hydrant assembly joints and concrete thrust blocking at the hydrant and isolation gate valve.
  - 2. Unit of Measure: Each
- Z. Item No. 26 – Lockable Well Caps and Water Sampling Stations
- 1. Furnishing, assembling and installing lockable well caps and water sampling station assemblies where indicated on the plans or as directed by the Engineer in accordance with the Contract Documents. This item shall include, but is not limited to, the removal of the well pump and well line, and capping of abandoned service line at well casing and foundation.
  - 2. Unit of Measure: Each
    - a. Item 26.1 – Lockable well caps
    - b. Item 26.2 – Water Sampling Station
- AA. Item No. 27 – Closure of Abandoned Wells
- 1. All work associated with decommissioning wells including State of Vermont well closure reports in accordance with the Contract Documents. This item shall include, but is not limited to, the removal of the well pump and well line, and capping of abandoned service line at well casing and foundation.
  - 2. Unit of Measure:
    - a. 27.1 – Drilled Well: Linear Foot
    - b. 27.2 – Dug Well: Each
- BB. Item No. 28- Utility Crossings
- 1. Temporary disconnection, temporary service (if required) and reconnection of underground electrical or telecommunications utilities for the purpose of completing trench excavation as noted on the Drawings.
  - 2. Unit of Measure: Each
- CC. Item No. 29 - Sewer Crossing – Water Below
- 1. Removal and replacing of an existing sewer line crossing above a water line in accordance with the Contract Documents.
  - 2. Unit of Measure: Each
- DD. Item No. 30 Culvert Installation

1. All work associated with the removal and replacement of existing culverts as noted in the contract plans or directed by the Engineer including, but not limited to; earthwork, sawcutting and removing existing pavement, removal and disposal of existing storm pipe, furnishing and installing new pipe, pipe bedding, removal and replacement of unsuitable trench material, and trench backfill.
  2. Unit of Measure: Linear Foot
    - a. Item 30.1 - 18" CPEP Pipe
    - b. Item 30.2 - 24" CPEP Pipe
    - c. Item 30.3 - 36" CPEP Pipe
    - d. Item 30.4 - 48" CPEP Pipe
- EE. Item No. 31 Riprap Stone Installation
1. All work associated with installing riprap stone at culvert ends and specified swales as noted in the contract plans or directed by the Engineer including, but not limited to: earthwork, grading, removal of existing material, and furnishing and installing new stone. Load tickets shall be provided at time of delivery.
  2. Unit of Measure: Ton
- FF. Item No. 32. Leakage Clamps
1. Furnishing and Installing ductile iron leakage clamps in accordance with the Contract Documents.
  2. Unit of Measure: Each
- GG. Item No. 33. Heat Tape installation
1. Furnishing and installation of heat tape on service lines in accordance with the Contract Documents.
  2. Unit of Measure: Each
- HH. Item No. 34 – Large Diameter Tree Removal (18 inches or larger)
1. All work associated with removing large diameter trees including, but not limited to, cutting and chipping, stump removal, earthwork and cleanup in accordance with the Contract Documents.
  2. Unit of Measure: Each
- II. Item No. 35 - Yard Hydrant Installation
1. Furnishing, assembling and installing yard hydrant assembly in accordance with Contract Documents including, but not limited to, hydrant and appurtenances.
  2. Unit of Measure: Each
- JJ. Item No. 36 - Bollard Installation
1. Furnishing, assembling and installing bollard assembly in accordance with Contract Documents.
  2. Unit of Measure: Each
- KK. Item No. 37 - Fluoroelastomer Gaskets
1. Furnishing and installing fluoroelastomer gaskets in accordance with Contract Documents and as directed by the Engineer.
  2. Unit of Measure: Each
- LL. Item No. 38 - Meter Pit Installation

1. Furnishing, assembling and installing meter pit assembly in accordance with Contract Documents including, but not limited to, site preparation, excavation, installation of 8-inch compacted gravel base for meter pit, connection of exterior lines, meter, valves and appurtenances.

2. Unit of Measure: Each

MM. Item No. 39 - Concrete Curb

1. All excavation, subbase installation and preparation, installation, and surrounding surface restoration for concrete curbing in accordance with the Contract Documents

2. Unit of Measure: Linear Foot

NN. Item No. 40 - Off-Site Activity Area Spoils Management

1. All work associated with coordinating and managing a preapproved spoils disposal location for Contracts 5, 6 and 7. Costs shall include all security, labor, materials, and equipment necessary to maintain spoils site and access for the duration of the Contract. Work shall include, but is not limited to, preparation of a Spoils Management plan for Engineer's review, acquisition of necessary permits, preparation of site for construction vehicle access, installation and maintenance of erosion control fencing, field quality control, site grading, and clean-up in accordance with the Contract Documents.

2. Unit of Measure: Lump Sum

OO. Item No. 41 - Excavating and Handling for Offsite Disposal of Contaminated Soil

1. All work associated with initial identification of potential petroleum-contaminated soil through visual (soil staining, slicks, or sheens) or olfactory (odor) methods, notifying the Site Health & Safety Officer regarding the potential soil contamination as soon as possible so that the existence of any contamination can be confirmed; Excavation, segregation, and handling of contaminated soils, placement, wrapping and maintenance of contaminated soils on 6 mil plastic sheeting, removal of contaminated soils from project site to a temporary stockpile to the satisfaction of State of Vermont Department of Environmental Conservation, Sites Management Section, loading of contaminated soils. The truck bed will be wrapped in 6 mil plastic sheeting to prevent contamination of the truck bed and seepage.

2. Unit of Measure: Cubic Yard

**END OF SECTION**

**SECTION 013000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittal procedures, schedules, lists and instructions for proper and prompt submittal and review of construction related documents.
- B. Coordination, field engineering, preconstruction meeting, progress meetings, and examination.
- C. Progress meetings.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRECONSTRUCTION MEETING**

- A. A pre-construction meeting will be held prior to the start of construction.
- B. Engineer shall schedule the Pre-Construction Meeting after Notice of Award and shall be responsible for preparing an agenda, recording discussions and distributing meeting minutes.
  - 1. Minimum Agenda - Pre-construction Meeting:
    - a. Individual sign-in.
    - b. Owner's, Prime Contractor's, Major Sub-Contractor's, and Engineer's contact persons for project.
    - c. Procedures to be followed when working on site.
    - d. Submittals:
      - 1) Shop Drawings
      - 2) Samples
      - 3) Products
      - 4) Traffic Control Plan
      - 5) Erosion Control Plan
    - e. Material Deliveries:
      - 1) Owner-supplied equipment
      - 2) Contractor-supplied equipment
      - 3) Site laydown area
    - f. General Discussion and Critical Areas.
    - g. Sequence of Work and Procedures:
      - 1) Contractor's Schedule
      - 2) Start of on-site work
      - 3) Construction Staking
      - 4) Completion date specified
      - 5) Coordination with on-site Owner's representatives
      - 6) Owner's Work in conjunction with Contract
    - h. Specific Procedures:
      - 1) Temporary Facilities



- 2) Noise, General Safety & Site Security
- 3) Traffic in site area
- 4) Site access - (key procedures)
- 5) Utility notifications & coordination
- 6) Other special procedures

### 3.02 **PROGRESS MEETINGS**

- A. The Engineer shall schedule and conduct Construction Progress Meetings and shall be responsible for preparing an agenda, recording discussions and distributing the meeting minutes. These meetings will be held every week, or more frequently as needed.
1. Minimum Agenda - Construction Progress Meeting:
    - a. Review, revise as necessary, and approve minutes of previous meeting(s).
    - b. Review progress of the work since last meeting, including status of submittals for approval.
    - c. Identify problems which will impede planned progress.
    - d. Develop corrective measures and procedures to regain planned schedule.
    - e. Complete other current business.
    - f. Three week Look-Ahead Schedule.
    - g. Schedule of the next meeting.
  - B. Minimum Attendance Required:
    1. Contractor.
    2. Owner.
    3. Contractor's Superintendent.
    4. Major Subcontractors as requested.
    5. Engineer.
  - C. The Engineer shall schedule and conduct special Construction Administration meetings including Pre-Installation meetings on critical systems and assemblies and other meetings as deemed necessary.

### 3.03 **CONSTRUCTION PROGRESS SCHEDULE**

- A. Submit preliminary schedule in duplicate within 15 days after effective date of the Agreement.
- B. Revise and resubmit as required within 5 days.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities.
- E. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- F. Submit updated schedule with each Application for Payment.
- G. Indicate estimated percentage of completion for each item of work at each submission.
- H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by allowances.

### 3.04 **MANUFACTURER INSTALLATION INSTRUCTIONS**

- A. When required, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing to Engineer.
- B. Indicate special procedures, conditions requiring special attention, and special environmental criteria required for application or installation.

### 3.05 **MANUFACTURER CERTIFICATES**

- A. When specified in individual specification sections, submit certification by manufacturer to Engineer, in duplicate.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

### 3.06 **SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
  - 5. Traffic Control Plan.
  - 6. Erosion Control Plan.
  - 7. Lighting Plan.
- B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
  - 1. Shop Drawings and proposed products intended for incorporation in the Work, including fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
    - a. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
    - b. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
    - c. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
    - d. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - e. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - f. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
    - g. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.
    - h. Provide space for Contractor and Engineer review stamps.
    - i. If directed to revise and resubmit, identify all changes made since previous submission.

- j. Submittals not requested will not be recognized or processed.
  - k. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 24" x 36".
  - l. Submittal: Submit one electric copy and two hard copies for the Engineer's concurrent review.
  - m. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
  - n. Engineer shall not proceed with Shop Drawing review without prior review and approval by Contractor.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- 1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical to the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
    - a. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
      - 1) Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
    - b. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
      - 1) Preliminary submittals will be reviewed and returned with the Engineer's mark indicating selection and other action.
  - 2. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

### 3.07 REQUESTS FOR INFORMATION (RFI)

- A. Definition: A request seeking one of the following:
  - 1. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  - 1. Prepare a separate RFI for each specific item.
  - 2. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Review Time: Engineer will respond and return RFIs to Contractor within ten calendar days of receipt.
- D. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

### 3.08 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be

rejected.

### 3.09 SUBMITTAL REVIEW

- A. Submittals for Review: Engineer will review each submittal, and acknowledge, or take other appropriate action.
- B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.
- C. Engineer's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
  - 1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Engineer's and consultants' actions on items submitted for review:
  - 1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Acknowledged", or language with same legal meaning.
    - b. "Acknowledged as noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
  - 2. Not Authorizing fabrication, delivery, and installation:
    - a. "Revise and Resubmit".
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.
    - b. "Rejected".
      - 1) Submit item complying with requirements of Contract Documents.
- E. Engineer's and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  - 2. Items for which action was taken:
    - a. "Reviewed" - no further action is required from Contractor.

### MEASUREMENT AND PAYMENT

- 4.01 **ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

**SECTION 014000**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Instructions and requirements for quality assurance and quality control of installation.
- B. Control of installation.

**1.02 REFERENCES**

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date for receiving bids, except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. The contractual relationship, duties, and responsibilities of the parties in the contract nor those of the Engineer will not be altered from the Contract Documents by mention or inference otherwise in any reference document.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Submit a certified written report of each inspection, test or similar service to the Engineer, in duplicate, within 48 hours after completion of results.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Conformance with Contract Documents.
    - k. When requested by Engineer, provide interpretation of results.
  - 2. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

**1.04 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Contractor shall engage and pay for services of an independent testing agency to perform compliance testing for submitted products and materials.
- B. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work and the Contractor is also required to engage an entity for the same or related element, Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
- C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.



D. Contractor Employed Agency:

1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

**PART 2 PRODUCTS - NOT USED**

1. Laboratory: Authorized to operate in the State in which the Project is located.
2. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

**PART 3 EXECUTION**

**3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, sub-contractors, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

**3.02 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

**3.03 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
  2. Perform inspections, sampling and testing of materials and construction specified with qualified personnel.
  3. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
  4. Perform additional tests and inspections required by Engineer .
  5. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the Work.

3. Agency may not assume any duties of Contractor .
  4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.

#### 3.04 ASSOCIATED SERVICES

- A. Cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
  2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

#### 3.05 DEFECT ASSESSMENT

1. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
2. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
3. Security and protection of samples and test equipment at the project site.

#### 3.06 COORDINATION AND SCHEDULING

- A. Coordinate the sequence of activities to accommodate required services with a minimum of delay and avoid the necessity of removing and replacing construction to accommodate inspections and tests.
- B. Responsible for scheduling times for inspections, tests, taking samples and similar activities.

#### 3.07 RETESTING

- A. The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
- B. Cost of retesting construction for Work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
- C. Replace Work or portions of the Work not complying with specified requirements.

- D. In the event that additional testing is specifically requested by the Engineer in excess of the number of tests required by the individual specification sections:
  - 1. If the additional requested test fails, the Contractor shall be responsible for the cost of the test and any subsequent testing required until a passing test is recorded.
  - 2. If the additional requested test passes, the Owner shall be responsible for the cost of the test.

**3.08 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer in advance of required observations. Observer subject to approval of Engineer and Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to Manufacturer's written instructions.
- D. Submit report within 15 days of observation to Engineer for information.
- E. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- F. If, in the opinion of Owner, it is not practical to remove and replace the work, Owner may, at their discretion, direct an appropriate remedy or adjust payment.

**PART 4 MEASUREMENT AND PAYMENT**

- 4.01 **ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

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**SECTION 015000**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Guidelines, directions, and descriptions for temporary utilities, including electricity, lighting, heat, ventilation, telephone service, water and sanitary facilities.
- B. Temporary controls for barriers and protection of the work during construction.
- C. Construction Facilities: Progress cleaning.
- D. Temporary Controls: Barriers, enclosures and fencing.
- E. Security requirements.
- F. Waste removal facilities and services.
- G. Field offices.

**1.02 RELATED REQUIREMENTS**

- A. Section 015500 - Vehicular Access and Parking.

**1.03 REFERENCE STANDARDS**

- A. OSHA Publications:
  - 1. 3007 Ground Fault Protection on Construction Sites
  - 2. No. 3115 Underground Construction
  - 3. No. 3124 Stairs and Ladders
  - 4. No. 2226 Excavation and Trenching Operations
- B. International Fire Code (IFC), latest edition.
  - 1. Chapter 14 for construction with flammable materials present.

**1.04 TEMPORARY UTILITIES - SEE SECTION 015100**

- A. Electricity: If available and adequate, Owner's existing power service may be utilized during construction. Do not disrupt Owner's need for continual service.
  - 1. Owner's permanent convenience receptacles may be utilized during construction.
  - 2. Owner's permanent building lighting may be utilized during construction.
- B. Heat: Existing heating system, if available, may be utilized during construction. If not available provide temporary heat for construction and protection of facilities. Maintain space at 68 degrees F.
- C. Ventilation: Ventilate enclosed areas to assist cure of materials, dissipate humidity and prevent accumulation of dust, fumes, vapors or gases.
  - 1. Extend and supplement existing equipment with temporary fan units as required to maintain clean air for construction operations.
  - 2. Provide additional fans as needed.
  - 3. During winter heating season use conservation measures to reduce heat loss.
- D. Telephone Service: Provide and maintain telephone service, if required.
- E. Water Service: Existing water system (if available) may be utilized during construction. Utilize measures to conserve water. If not available, provide temporary supply for potable use, sanitation and construction.
- F. Sanitary Facilities: Existing restroom facility (if available) may be utilized during construction. If not available, provide temporary sanitary facilities for workers and



representatives.

- G. Safety Barriers: Provide safety barriers to prevent unauthorized entry into construction areas and allow for Owner's use of site if required.
- H. Field Office: If required, provide a clean, weather tight structure with necessary electrical and mechanical equipment and a drawing table and chair. Locate as directed by Owner or Engineer in the field.
- I. Internet: Provide and maintain high speed internet service to all work stations with wireless capabilities. 25 megabits per second minimum.
- J. Printer: One(1) - All in one color inkjet printer capable of printing, scanning and coping Ledger, Legal and Letter sizes. Standard interfaces shall include Hi-Speed USB 2.0, Wireless (802.11b/g/n), Ethernet. Minimum requirements include: 35 page automatic document feeder, printing 20 color copies per minute at 6000 x 1200 dpi resolution, scan resolution 2400 x 2400 dpi, flat bed document glass size Ledger (11" x 17") with standalone copy features, minimum of 250 sheet input capacity cassettes and 2 additional complete set of ink cartridges. All warranties, maintenance, servicing and sufficient appropriate ink/toner cartridges and paper for the duration of the Work.
  - 1. Supplies for the printer/scanner/copier shall include 8.5x11 inch paper, 11x17 inch paper, ink and toner throughout the duration of the project.
- K. Office Furnishings: Furniture will be delivered and placed as directed by the Engineer. Provide and maintain work stations to include the following:
  - 1. Desks: Flat top, double pedestal, with one box and one file drawer in each pedestal, 60-inches by 30-inches.
  - 2. Chairs: Ergonomic, adjustable heights, on rollers, with armrests.
  - 3. File Cabinet: Two drawer file cabinet.
  - 4. Conference Table and Chairs: One (1) table (3-feet by 10-feet minimum), scratch and stain resistant and 15 meeting-type chairs.
  - 5. One (1) each refrigerator, microwave, and coffee machine.
- L. Waste Disposal: One waste receptacle and recycling bin for each desk with weekly janitorial services.
- M. Miscellaneous Field Supplies:
  - 1. One (1) minimum/maximum digital thermometer, with batteries for the duration of the Work.
  - 2. One (1) rain gauge
  - 3. One (1) first aid kit conforming to the latest revision of ANSI/ISEA Z 308.1
  - 4. Toiletries as needed.
- N. Provide and pay for all electrical power, lighting, water, heating and cooling, ventilation and temporary utilities required for construction purposes.

#### 1.05 FIELD OFFICE AND STORAGE AREA

- A. If unused space is available on site, Contractor may use it for office and storage space. Space must be coordinated with and approved by Owner.
- B. Areas designated for storage must be secured by Contractor. Sensitive or hazardous materials shall not be brought on site without the written consent of Owner.

#### 1.06 SITE DRAINAGE

- A. Grade site to drain around temporary facilities.

- B. Provide erosion control and protection as needed.

#### 1.07 **BARRIERS**

- A. Sensitive and hazardous materials must be stored away from drainage areas and water ways.
- B. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- C. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- D. Provide protection for plants designated to remain. Replace damaged plants.
- E. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

#### 1.08 **FENCING**

- A. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

#### 1.09 **SECURITY**

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

#### 1.10 **VEHICULAR ACCESS AND PARKING - SEE SECTION 01 5500**

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.

#### 1.11 **WASTE REMOVAL**

- A. Provide means of removing mud from vehicle wheels before entering streets.
- B. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- C. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- D. Provide containers with lids. Remove trash from site weekly.
- E. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

#### 1.12 **REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities and materials prior to final application for payment.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.
- D. Restore new permanent facilities used during construction to specified condition.

#### **PART 2 PRODUCTS - NOT USED**

#### **PART 3 EXECUTION - NOT USED**

**END OF SECTION**

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**SECTION 015500  
VEHICULAR ACCESS AND PARKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Construction Traffic Control
- B. Access roads.
- C. Parking.
- D. Flag persons.
- E. Haul routes.
- F. Maintenance.
- G. Removal, repair.

**1.02 REFERENCES**

- A. Manual of Uniform Traffic Control Devices, (MUTCD), latest edition.
- B. Vermont Agency of Transportation (VTrans) - Standard Specifications for Construction, Division 100 and 600.

**1.03 SUBMITTALS**

- A. Submit a Traffic Control Plan for Engineer, State, and Local Agency review and approval at the Pre-Construction Conference. If no Pre-Construction Conference is held, Traffic Control Plan shall be submitted prior to site mobilization.

**1.04 QUALIFICATIONS**

- A. Procure all required permits and certifications for commercial vehicles hauling equipment and materials onto and off of the project site.
- B. Provide a qualified traffic maintenance person with the following minimum qualifications:
  - 1. Be familiar with the requirements and importance of maintaining safe and smooth traffic flows.
  - 2. Have previous experience working with maintenance and protection of traffic.
  - 3. Be competent to supervise personnel in traffic maintenance operations.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Use only traffic control devices manufactured from materials that are durable, lightweight, rigid and visible, but do not create a hazard when struck.
- B. All traffic control devices used shall comply with applicable provisions of the MUTCD, latest edition.

**2.02 ACCESSORIES**

- A. Barricades: Type III, clear, well maintained and properly marked or lighted for nighttime use.
- B. Signs: Utilize signs with messages appropriate to provide adequate construction control. Signs and sign mountings shall conform to the Vtrans Standard Specifications for Construction, current edition.
- C. Traffic Cones: The cones shall be orange in color, shall be a minimum of 28 inches in height with a broadened base, and fabricated from materials that withstand impact. For nighttime use, cones shall have a minimum 6 inch wide white flexible reflectorized band placed a minimum of 3 inches, but not more than 4 inches, from the top. An additional 4 inch white reflectorized band shall be placed a minimum of 2 inches below the 6 inch band.

The cones shall be weighted at the base to prevent overturning by wind. The reflectorized band shall be fabricated from Type III C, Type IV or Wide Angle Prismatic flexible reflective sheeting.

- D. Lights, delineators and reflectors: Red, yellow or white in color with no less than 12 square inches of reflective area per unit.
- E. Delineator Drums: Drums shall be approximately 36 inches in height and minimum of 18 inches in diameter at the top. They shall be constructed of durable plastic with horizontal, circumferential, orange and white reflectorized stripes. The reflectorized striped shall be fabricated from Type III C, Type IV, or Wide Angle Prismatic flexible reflective sheeting. Delineator drums shall be weighted with sand placed at the bottom of the drum or constructed so that they cannot be blown over or displaced by wind or passing traffic, and do not create a hazard if accidentally struck.

### **PART 3 EXECUTION**

#### **3.01 SCHEDULING AND COORDINATION**

- A. Prior to commencing work, develop and agree to a detailed schedule between the Engineer, Utility Companies, the Contractor and Subcontractor(s).
- B. Before any detour or temporary route is opened to traffic, all necessary Temporary Traffic Control (TTC) devices shall be in place.
- C. Schedule work to reopen a closed intersection in the most expedient manner. Any public road closures shall be approved by the governmental authority having jurisdiction.
- D. Provide access to all residential dwellings and businesses adjacent to this project.
- E. All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, TTC devices that are no longer appropriate shall be removed or covered.

#### **3.02 PREPARATION**

- A. Provide, erect and place all required traffic control devices in the appropriate locations prior to beginning any construction activity.

#### **3.03 ACCESS ROADS**

- A. Tracked vehicles not allowed on paved areas.
- B. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.
- C. Provide unimpeded access for emergency vehicles. Maintain 20 foot (6 m) width driveways with turning space between and around combustible materials.
- D. Contractor shall utilize only those roads designated as access roads by the governing authority having jurisdiction for access to the project site.

#### **3.04 PARKING**

- A. Contractor shall install vehicle tracking pads to prevent material tracking onto adjacent roadways.
- B. Provide and maintain access to fire hydrants free of obstructions.
- C. Arrange for temporary parking areas to accommodate use of construction personnel.
- D. Construction may utilize those portions of the existing facilities designated by the Owner for access and parking.

#### **3.05 FLAG PERSONS**

- A. Provide trained and equipped flag persons to regulate traffic when construction operations or traffic encroach on public traffic lanes.



### 3.06 HAUL ROUTES

- A. Confine construction traffic to haul routes.
- B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
- C. Provide traffic control and access to all commercial vehicles including, but not limited to: Emergency vehicles, mail trucks, school buses and dairy trucks.

### 3.07 MAINTENANCE

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

### 3.08 REMOVAL, REPAIR

- A. Repair existing facilities damaged by use, to original condition.
- B. Repair damage caused by installation.

## PART 4 MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

- A. Items as required within the plans and traffic control details.

### END OF SECTION

- A. If traffic control is bid as a Lump Sum on the bid form, the amount bid must include the appropriate number of units as defined in "A" above within the plans and traffic control details to properly complete the project.

### 5.02 PAYMENT

- A. Include all costs associated with the requirements listed herein in the lump sum price bid for traffic control.
- B. If no bid item is provided, payment will be incidental to other related items of work.

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**SECTION 015713  
EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Permanent erosion control.
- E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor .

**1.02 RELATED REQUIREMENTS**

- A. Section 311000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.
- B. Section 312200 - Grading: Temporary and permanent grade changes for erosion control.
- C. Section 321123 - Aggregate Base Courses: Temporary and permanent roadways.
- D. Section 329219 - Seeding: Permanent turf for erosion control.
- E. Section 329300 - Plants: Permanent plantings for erosion control.

**1.03 REFERENCE STANDARDS**

- A. State of Vermont Agency of Natural Resources, Department of Environmental Conservation: Chapter 22 - Stormwater Permitting Rule.
- B. State of Vermont :Vermont Standards and Specifications for Erosion Prevention and Sediment Control", current edition.
- C. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus 2014.
- D. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity. 1999a (Reapproved 2014).
- E. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles 2011.
- F. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.
- G. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile 2016.
- H. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples 2002 (Reapproved 2009).

**1.04 PERFORMANCE REQUIREMENTS**

- A. Comply with all State of Vermont Erosion and Sedimentation control standards.
- B. Review, revise, and follow the Erosion and Sedimentation Prevention Plan and submit periodic inspection reports in accordance with the SWPPP requirements and state stormwater permits and regulations.
- C. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained.
  - 1. Obtain permits and pay for securities required by authority having jurisdiction.
  - 2. Contractor shall sign on as Co-Permittee and Permit Operator where required.

3. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
  - E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
    1. Prevent runoff of sediment-laden water into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less..
  - F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
    1. Control movement of sediment and soil from temporary stockpiles of soil.
    2. Prevent development of ruts due to equipment and vehicular traffic.
    3. If erosion occurs due to non-compliance with these requirements, restore eroded areas immediately at no cost to Owner, including removal and disposal of accumulated sediment in storm and sanitary sewer systems, open channels and stormwater treatment practices.
  - G. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
    1. Prevent windblown soil from leaving the project site.
    2. Prevent tracking of mud onto public roads outside site.
    3. Prevent mud and sediment from flowing onto sidewalks and pavements.
    4. If erosion occurs due to non-compliance with these requirements, restore eroded areas immediately at no cost to Owner .
  - H. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
    1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner ; remove deposited sediments; comply with requirements of authorities having jurisdiction.
    2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
  - I. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
    1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner ; remove deposited sediments; comply with requirements of authorities having jurisdiction.
  - J. Open Water: Prevent standing water that could become stagnant.
  - K. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

#### 1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
  1. Submit within 2 weeks after Notice to Proceed.

2. Include:
    - a. Site plan identifying proposed erosion and sedimentation controls compliant with Contract Documents and applicable permits.
    - b. Schedule of temporary preventive measures, in relation to ground disturbing activities.
  3. Obtain the approval of the Plan by authorities having jurisdiction.
  - 4.
  5. Obtain the approval of the Plan by Owner .
- C. Inspection Reports: Contractor shall perform inspections and maintain records in accordance with the General Permit 3-9020 conditions and requirements.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Mulch: Use one of the following:
1. Straw or hay.
  2. Wood waste, chips, or bark.
  3. Erosion control matting or netting.
- B. Grass Seed For Temporary Cover: Use seed mix identified on plans or select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- C. Fiber Rolls (Straw Wattles):
1. Wood, 2 by 2 inches (50 by 50 mm) in cross section.
  2. 9 inch, East Coast Erosion Control Sediment Retention Fiber Rolls, or approved equal.
- D. Silt Fence:
1. Where required by the local municipality having jurisdiction, where indicated on the plans, or where required at critical areas.
  2. Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible. Silt fence shall be backed with wire fence, minimum 14 gauge with 6" openings.
  3. Posts: hardwood, 2" by 2" in cross section.
- E. Erosion Control Blanket: Erosion Control Blanket and Turf Reinforcement Mat shall conform to VTrans Standard Specifications for Construction, current edition. Install on slopes 3:1 or steeper, in swales and stormwater conveyance channels, and where indicated on plans.
- F. Permanent Turf Reinforcement Mat
1. As per pan.
- G. Clean Stone: See Section 321123 for aggregate.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

### **3.02 PREPARATION**

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.



- B. Maximum area of disturbance at any one time shall be as established in issued General Permit 3-9020.

### 3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed, temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
  - 1. Width: As required; 20 feet (7 m), minimum.
  - 2. Length: 50 feet (16 m), minimum.
  - 3. Provide at each construction entrance from public right-of-way.
  - 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences, bales or approved alternative.
  - 1. Provide linear sediment barriers:
    - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
    - b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
    - c. Along the toe of cut slopes and fill slopes.
    - d. Across the entrances to culverts that receive runoff from disturbed areas.
- D. Storm Drain Drop Inlet Sediment Traps: Manufactured drop-in style filter bags or site-construction sediment filters shall be installed at each existing and newly installed storm sewer inlet to prevent sediment laden water from entering. Contractor shall maintain as needed and in accordance with Manufacturer's instructions.
- E. Soil Stockpiles: Protect using one of the following measures:
  - 1. Cover with polyethylene film, secured by placing soil on outer edges.
  - 2. Cover with mulch at least 4 inches (100 mm) thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches (150 mm) of straw or hay.
  - 3. Install perimeter silt fence at tow of stockpile.
- F. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
  - 1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- G. Temporary Seeding: Use where temporary vegetated cover is required.
- H. Permanent turf reinforcement mats or temporary erosion control: Install where required or where indicated on plans.

### 3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface at Construction Entrances:
  - 1. Excavate minimum of 6 inches (150 mm).
- B. Permanent turf reinforcement mats or temporary erosion control: Install where required or where indicated on plans.
  - 1. Place geotextile fabric full width and length, with minimum 12 inch (300 mm) overlap at joints.
  - 2. Place and compact at least 6 inches (150 mm) of [2" - 3"] inch ([ ] mm) diameter stone.
- C. Silt Fences:

1. Store and handle fabric in accordance with ASTM D4873.
  2. Silt fence shall either be installed in a 4 inch deep by 6 inch wide trench on the upslope side of the fence, or be machine sliced in with a 4 inch fabric embedment. If utilizing trench method, trench shall be backfilled and compacted. Top of fabric shall be at a minimum 32 inch nominal height.
  3. Posts shall be installed at a maximum 4 foot spacing, with a minimum embedment of 24 inches.
  4. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches (460 mm), with J hooks.
  5. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches (300 mm) high with post spacing not more than 4 feet (1220 mm).
- D. Fiber Rolls:
1. Install in fiber roll sections with roll ends overlapping 4 feet or greater, with each end of row turned uphill.
- E. Erosion Control Blankets:
1. Install where indicated in plans or as needed per manufacturers recommendations.
- F. When hydraulic seeder is used, seedbed preparation is not required.
1. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.
- G. Permanent Turf reinforcement mats:
1. Install where indicated in plans per manufacturers recommendations.
- H. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
  2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
  3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at manufacturers specified rate.
  4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft (6 to 8 kg per 100 sq m).
  5. Incorporate fertilizer into soil before seeding.
  6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.
  7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
  8. Repeat irrigation as required until grass is established.

### 3.05 MAINTENANCE

- A. Comply with General Permit 3-9020 inspection and reporting requirements.
- B. Repair deficiencies immediately.
- C. Silt Fences:
  1. Promptly replace fabric that deteriorates unless need for fence has passed.

2. Remove silt deposits that exceed one-third of the height of the fence.
  3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Fiber Rolls:
1. Promptly replace rolls that fall apart or otherwise deteriorate unless need has passed.
- E. Clean out temporary sediment control structures as required and relocate soil on site.
- F. Place sediment in appropriate locations on site; do not remove from site.
- G. Sweep debris and soil from work area daily in a manner that prevents dust from becoming airborne.

### 3.06 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer .
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.
- D. Comply with all SWPPP requirements relative to protection removal.

### 3.07 OFF-SITE ACTIVITY AREAS

- A. Off-Site Activity (OSA) areas are those areas located outside of the Project's defined construction limits but within the projects Corrective Action Area II (CAII) and associated Operational Unit A (OUA) that are necessary adjuncts used for supporting the construction activities, including access roads, waste, borrow, and staging areas. Compliance with Environmental and Pollution Control Regulations described in construction permits and the spoils management plan shall apply to all OSA areas.
- B. The projects corrective action area can be found at the State of Vermont Agency of Natural Resources Department of Environmental Conservation Website, found at the following link: <https://anrweb.vt.gov/PubDocs/DEC/PFOA/Maps/PFASOpenHouseMap.pdf>
- C. Opening Off Site Activity Areas:
  1. General: The Contractor shall demonstrate that the proposed OSA area is in accordance with all Project permits and that the following are met:
    - a. The final shape, slope, and contour of the land in and about the area will not be undesirable aesthetically or as it relates to drainage.
    - b. Is consistent with any duly adopted development plan, land use plan or land capability plan, whether site specific, local, or regional.
    - c. The entrance is at the most desirable angle or perspective from any nearby Town and State roads, residences, and other facilities.
    - d. The Contractor shall remove, stockpile, and preserve topsoil, sod, and other suitable material from the surface of the area prior to proceeding with other operations.
    - e. The Contractor has all erosion prevention and sediment control measures, as indicated in the Conforming Erosion Prevention and Sediment Control Plan, in place prior to use of the area. At a minimum, erosion prevention and sediment control measures published by ANR shall be used as best management practices for OSA areas.

2. The Contractor shall meet all Vermont Agency of Natural Resources (VT ANR) siting criteria listed below for each spoils management site.
    - a. Areas where water lines are being expanded within Corrective Action Area II (CAAIL) as identified in the Consent Order
    - b. On public land/in public right of way area, if possible
    - c. Areas with limited erosion potential
    - d. Greater than 100 feet from wetlands, river corridor, and Federal Emergency Management Agency (FEMA) floodplains
    - e. Outside of public water supply source protection areas; and
    - f. Distal from homes with private wells that will not be replaced with municipal water.
- D. Clearances:
1. Permits. The Contractor and/or the property owner shall be required to obtain or amend all necessary State, Federal, and local permits and clearances, prior to using an area for the Project. Any fees related to applications for such permits shall be the responsibility of the Contractor
- E. Maintaining Off-Site Activity Areas:
1. General: The Contractor shall conduct operations at OSA areas so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.
  2. Area Erosion Prevention and Sediment Control Measures. Installation and maintenance of erosion prevention and sediment control measures at OSA areas shall be consistent with the Conforming Erosion Prevention and Sediment Control Plan for the specific area. The On-Site Plan Coordinator (OSPC) shall review these areas as required in the Contract.
  3. Seasonal Shutdown. For areas that will be utilized for more than one Construction Season the Contractor shall grade to no more than 1:3 (V:H), seed and mulch disturbed fill areas prior to shutting down for the season.
- F. Closing Off-Site Activity Areas:
1. With the exception of those areas which will remain open for commercial use, the Contractor shall complete the following prior to the Completion and Acceptance of the Project:
    - a. Shape the entire area to leave banks in a neat and presentable condition, properly and thoroughly graded and drained.
    - b. Establish vegetation on all disturbed areas.
    - c. All stones, boulders, stumps, and debris shall be removed or satisfactorily disposed of.
- G. The Contractor shall conduct operations at the spoils management site so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.

1. Slopes shall not be left steeper than 1:3 (V:H) for earthen fills. Slopes shall not be left steeper than 1:2 (V:H) for fill made up of stone or concrete. The tops of slopes and toes of slopes shall be neatly rounded.
2. Stockpiled sod, topsoil, and other stripped material shall be evenly spread over the surface of the area. The complete area shall be seeded and mulched in accordance with the Contract Documents.

**END OF SECTION**



**SECTION 016000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations and procedures.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 RELATED SECTIONS**

- A. Instructions to Bidders: Product options and substitution procedures.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures.
- C. Section 014000 - Quality Requirements: Product quality monitoring.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal requirements and procedures.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

**PART 2 PRODUCTS**

**2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner , or otherwise indicated as to remain the property of the Owner , become the property of the Contractor ; remove from site.

**2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by the Contract Documents.

**2.03 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

**PART 3 EXECUTION**

**3.01 SUBSTITUTION PROCEDURES**

- A. Instructions to Bidders specifies time restrictions for submitting requests for Substitutions during the bidding period and the documents required. Any products approved during the bidding period will be identified by Addendum.
- B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request for substitution constitutes a representation that the Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
  - 1. Submit three copies and one electronic copy of request for substitution for consideration. Limit each request to one proposed substitution.
  - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  - 3. The Engineer will notify Contractor in an addendum of decision to accept or reject request.

### 3.02 **TRANSPORTATION AND HANDLING**

- A. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- B. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- C. Transport and handle products in accordance with manufacturer's instructions.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

### 3.03 **STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.

- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**PART 4 MEASUREMENT AND PAYMENT**

**4.01 ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

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**SECTION 017000  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Starting systems, demonstration, instructions, testing, adjusting, and balancing.
- B. Examination, preparation, and general installation procedures.
- C. Surveying for laying out the work.
- D. Cleaning and protection.
- E. Closeout procedures, final cleaning, punch list, adjusting, project record documents, warranties, spare parts, and maintenance materials.

**1.02 REFERENCES**

- A. Applicable and appropriate operations and maintenance manuals provided by manufacturer.
- B. Contract Documents

**1.03 PERFORMANCE REQUIREMENTS**

- A. Equipment and system must perform as stated in the applicable sections herein prior to final acceptance and payment.

**1.04 SUBMITTALS**

- A. Provide written guidance on schedules and time frame for coordination of various components.
- B. See Section 013000 - Administrative Requirements, for submittal procedures.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

**1.05 OPERATIONS AND MAINTENANCE DATA**

- A. Every individual component supplied for the project shall be identified in the operations and maintenance manual which shall be assembled as follows:
  - 1. Each O&M manual shall be divided into a minimum of two volumes.

**1.06 QUALITY ASSURANCE**

- A. All equipment must be properly labeled as directed by the Manufacturer or in the technical specifications.
- B. All components must be properly labeled and all operations and maintenance manuals must be present on site prior to startup.

**1.07 QUALIFICATIONS**

- A. When specified in individual technical sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to startup, and to supervise placing equipment or system in operation.
- B. Perform testing, adjusting, and balancing.
  - 1. Volume One shall contain at least the following:
    - a. Final tag list.
    - b. Detailed floor plan showing location of each tagged piece of equipment.
    - c. An overview of the plant, the process equipment, and the control system and how the plant's systems and subsystems interact and are controlled.



- d. Complete description prepared by the Process Equipment Supplier of each system and subsystem and component with cross reference to tag number.
  - e. Complete operating and maintenance instructions for each and every item of equipment (referencing tag number), setting forth in detail and step-by-step the procedure for starting, stopping, operating and maintaining the entire system as installed. A schedule of recommended maintenance intervals shall also be included.
  - f. Any special emergency operating instructions and a list of service organizations, including addresses and telephone numbers, capable of rendering emergency service to the various parts of the system.
  - g. Procedures for normal operation, trouble shooting, routine data analysis, water analysis, interpretation of data, etc.
  - h. A section on plant safety in general and for each system.
  - i. Appendices to Volume One shall include the following:
    - 1) P & I.D.'s and mechanical, electrical and instrumentation installation drawings on 11" x 17" size paper.
    - 2) Copy of final control system ladder logic.
    - 3) A complete valve tag list, including the name and function of the pipe in which the valve is mounted.
    - 4) All manufacturer's equipment guarantees and warranties.
2. Volume Two shall contain, at lease, the following:
- a. Manufacturer's manuals for each piece of equipment including individual components and subsystems of complete assemblies. The section of the manual on operation shall describe the function of each component and its relationship to the system of which it is a part. Where several models, options or styles are described, the manual shall identify the items actually provided.
  - b. Blue line prints or reviewed shop drawings or reviewed shop drawing and diagrams of all systems.
  - c. Certified equipment drawings or reviewed shop drawing data clearly marked for equipment furnished.
- C. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Engineer. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
- a. Complete parts list of all replaceable parts, their part numbers and the name and address of the nearest vendor.
2. Binding
- a. Manuals shall be bound in durable plastic or fiberboard covers. Each sheet shall be reinforced to prevent tearing from continued use and each manual shall have the following information clearly printed on its inside cover:
    - 1) Project name, name of owner and address (inside and outside cover).
    - 2) Name and address of Engineers.
    - 3) Name and addresses of Contractor and Subcontractors.
    - 4) Telephone numbers of Contractors, including night and emergency numbers.
    - 5) Major equipment vendor's names and telephone numbers.

3. Number of complete sets shall be 3, as outlined herein.

#### **1.08 PROJECT CONDITIONS**

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas as required by Contract Documents and permits. Prevent erosion and sedimentation.
- C. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

#### **1.09 WARRANTY**

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, Suppliers, and Manufacturers.
- C. Provide Table of Contents and assemble in binder with durable cover.
- D. Submit prior to final Application for Payment.

### **PART 2 PRODUCTS NOT APPLICABLE**

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.
- B. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- C. Verify wiring and support components for equipment are complete and tested.
- D. Execute start up under direct supervision of Contractor and in full accordance with manufacturer's instructions.

#### **3.02 PREPARATION**

- A. Execute final facility cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate for the surface and material being cleaned.
- D. Clean operating equipment components and accessories such as filters.
- E. Clean debris from drainage systems.
- F. Clean site, sweep paved areas, rake clean landscaped surfaces, remove applicable erosion control measures.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- H. Adjust operating products and equipment to ensure smooth and unhindered operation.

#### **3.03 SCHEDULING AND COORDINATION**

- A. Coordinate schedule for startup of various equipment and systems.
- B. Coordinate with Owner on how project is taken over and operated during transition.

#### **3.04 LAYING OUT THE WORK**

- A. Notify Engineer 48 hours prior to startup of each item.

### 3.05 FIELD QUALITY CONTROL

- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of final inspection.
- B. Demonstrate equipment and instruct in a classroom environment on site by qualified representatives who are knowledgeable about the equipment and its performance.
- C. Verify locations of survey control points prior to starting work.
- D. Demonstrate start up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- E. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

### 3.06 TOLERANCES

- A. Verify that all specified tolerances are being met.
- B. Promptly notify Engineer of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer .
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

### 3.07 PROTECTION OF INSTALLED WORK

- A. Protect all finished work until Owner accepts responsibility.

### 3.08 PROJECT RECORD DOCUMENTS

- A. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during construction.
- B. Submit a written report stating that equipment or system has been properly installed and is functioning correctly.

### 3.09 SPARE PARTS AND MAINTENANCE MATERIALS

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual technical specification sections.
- B. Deliver to location as directed by Engineer.
- C. Reports will be submitted to the Engineer indicating observations and results of tests and indicating compliance or noncompliance with the requirements of the Contract Documents.

- D. Provide to Engineer one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instructions for assembly, installation, and adjusting.
- E. Ensure entries are complete and accurate, enabling future reference by Owner.
- F. Store record documents separate from documents used for construction.
- G. Record information concurrent with construction progress.
- H. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- I. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finished first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract Drawings.
  - 6. Change orders where applicable.
- J. Submit Operations and Maintenance Manual bound in 8½ x 11 inch text pages, capacity expansion binders with durable covers.
  - 1. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project and subject matter of binder when multiple binders are required.
  - 2. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
  - 3. Prepare a Table of Contents for each volume, with each product or system description identified.
  - 4. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned, with Engineer comments. Revise content of all document sets as required by Engineer prior to final submission.
  - 5. Submit 3 sets of revised final volumes, within 10 days after final inspection.
- K. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

**PART 4 MEASUREMENT AND PAYMENT**

**4.01 ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK.  
NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**



**SECTION 023000  
SUBSURFACE INVESTIGATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Geotechnical Evaluation of Sub-Surface Conditions.

**1.02 REFERENCES**

- A. Contract Documents

**1.03 SOIL INVESTIGATION**

- A. A Geotechnical Evaluation Report has been prepared by QC/QA Laboratories, Inc., hereinafter referred to as the Geotechnical Engineer. Electronic copies of the report are available and may be obtained by contacting the Engineer. The actual report, including boring logs, soils analysis and recommendations, is on file and may be inspected at the Engineer's office.
- B. This report was obtained only for the Owner's use in design and is not a part of the Contract Documents. The report and log of borings is available for the Contractor's information, but is not a warrant of subsurface conditions.
- C. The Contractor should visit the site and become acquainted with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but such subsurface investigation shall be performed only under time schedules and arrangements approved in advance by the Construction Manager and Engineer.
- D. The Geotechnical Engineer shall be retained by the Contractor to observe performance of work in connection with excavation, filling and grading. Re-adjust all work that does not meet technical or design requirements, but make no deviations from the Contract Documents without specific and written approval of the Geotechnical Engineer.
- E. The Geotechnical Engineer may be retained by the Owner to observe performance of work in connection with excavation, filling and grading. Re-adjust all work that does not meet technical or design requirements, but make no deviations from the Contract Documents without specific and written approval of the Project Engineer.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

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**SECTION 024100  
DEMOLITION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Building demolition.
- B. Abandonment and removal of existing utilities and utility structures.

**1.02 RELATED REQUIREMENTS**

- A. Section 312323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

**1.03 REFERENCE STANDARDS**

- A. State of Vermont Wastewater System and Potable Supply Rules, 2007.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
  - 1. Areas for temporary construction and field offices.
  - 2. Areas for temporary and permanent placement of removed materials.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
  - 2. Identify demolition firm and submit qualifications.
- D. Construction Waste Management Plan: Submit plan in accordance with Section 017419.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION**

**3.01 SCOPE**

- A. Remove all buildings, appurtenant structures, waste and debris from the area designated on the Contract Plans.
- B. Remove underground tanks that contain or once contained petroleum products; fill and bury other types of tanks.
- C. Remove or abandon existing septic system and all associated appurtenances. Any waste stone or soil removed from the systems shall be disposed or in compliance with section 1-930 of the 2019 Wastewater System and Potable Water Supply Rules.
- D. Remove fences and gates.
- E. Remove other items indicated, for salvage, relocation, recycling and disposal.
- F. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 312200.

**3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.

2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  3. Provide, erect, and maintain temporary barriers and security devices.
  4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  5. Do not close or obstruct roadways or sidewalks without permit.
  6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
  7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner .
- C. Protect existing structures and other elements that are not to be removed.
1. Provide bracing and shoring.
  2. Prevent movement or settlement of adjacent structures.
  3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner ; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Comply with requirements of Section 017419 - Waste Management.
  2. Dismantle existing construction and separate materials.
  3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

### 3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner .
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner .
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

### 3.04 **DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**



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**SECTION 311000  
SITE CLEARING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Clearing and protection of vegetation.
- B. Removal of existing debris.

**1.02 RELATED REQUIREMENTS**

- A. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- C. Section 312200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Fill Material: As specified in Section 312200 - Grading

**PART 3 EXECUTION**

**3.01 SITE CLEARING**

- A. Comply with other requirements specified in Section 017000.
- B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

**3.02 EXISTING UTILITIES AND BUILT ELEMENTS**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Protect existing structures and other elements that are not to be removed.

**3.03 VEGETATION**

- A. Do not remove or damage vegetation beyond the limits indicated on drawings.
- B. Install substantial, highly visible fences at least 3 feet high (at least 1 m high) to prevent inadvertent damage to vegetation to remain:
  - 1. At vegetation removal limits.
  - 2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
  - 3. Around other vegetation to remain within vegetation removal limits.
  - 4. Where required for permit compliance.
- C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.
- D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
  - 1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.

2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
  3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
  4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
- E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner .

#### 3.04 **DEBRIS**

- A. Remove debris and trash from work limits as necessary to complete work.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

**SECTION 311143  
HORIZONTAL DIRECTIONAL DRILLING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes provisions for the materials and installation of sleeve and carrier pipe via the method of horizontal directional drilling.

**1.03 SYSTEM PERFORMANCE REQUIREMENTS**

- A. Assembly to meet applicable AOT and AWWA standards.

**1.04 SUBMITTALS**

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Provide product data, including thickness and size for the following:
  - 1. Steel, PVC or HDPE casing pipe.
  - 2. Carrier pipe.
  - 3. Casing spacers.
  - 4. End seals.
  - 5. HDPE headwall thrust restraint.
  - 6. High strength trace wire.
- C. Provide the name and qualification of proposed directional drilling subcontractor. The information shall include, at a minimum:
  - 1. The qualifications of the subcontractor and key personnel showing that all directional drilling operations will be performed by a competent drill contractor and crew with a minimum of (5) years of relevant experience, at least as complex and of similar size as this project.
  - 2. Identification of key person(s) and contact information proposed for this project.
  - 3. A list of completed projects with details of the types of pipe installations including Owner and Engineer contact names and telephone numbers.
- D. Provide a work plan and schedule of activities proposed to perform the work under this specification, including any proposed variation from the Drawings and Specifications. Information in this work plan shall include, but not be limited to, the following:
  - 1. Method for directional drilling indicating the following:
    - a. Plan showing the work zone equipment configuration at the end of the bore(s), staging areas, storage areas, and the location of slurry, cuttings and pit spoil handling areas.
    - b. Boring procedure, tooling for drilling, method for control slurry, design of entrance and exit pits and method to verify that installed utilities are acceptable.
    - c. Materials list including bentonite and bentonite additives proposed for use on the project along with product data sheets for all materials used on the site.
    - d. Steering and tracking equipment procedures and proposed locations of ground based coils or other equipment requiring surface or subsurface access.

2. Contingency Plans that address each of the following:
  - a. Inadvertent return, and/or spill of drilling fluids, hydraulic fluids, etc., including measures to contain and clean the affected area.
  - b. Clean up of surface seepage of drilling fluids and spoils.
  - c. Collapse of borehole.
  - d. Sealing of abandoned boreholes.
3. Drilling Fluids Management Plan should address the following:
  - a. Identify all proposed drilling muds and additives to be used and provide the Engineer with the appropriate MSDA sheets.
  - b. Calculated hole volumes and drilling fluids volumes.
  - c. Source and amount of water required for drilling mud and all necessary approvals and permits.
  - d. Method of slurry containment and cleanup of all drilling fluid overflows or spills.
  - e. Method of recycling drilling fluid and spoils.
  - f. Method of transporting and disposing of drilling fluids and spoils including proof of approvals for same.
  - g. Allowable pull-back forces and stresses for pipes.
4. Time required for complete pipe installation.

#### 1.05 **QUALITY ASSURANCE**

- A. Directional drilling subcontractor shall comply with requirements of the Town of Bennington Water Department, State of Vermont Agency of Natural Resources and State Agency of Transportation, and all associated permit requirements.
- B. The directional drilling subcontractor shall provide a full-time on-site representative thoroughly knowledgeable of the equipment, boring procedures, and available to address immediate concerns and emergency operations.
- C. The Contractor shall protect piping materials before, during and after installation. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.
- D. Upon the direction of the Engineer, the Contractor shall remove, replace and/or rework all piping that does not meet the requirements of this section. The Contractor shall perform all remedial measures at no additional cost to the Owner.
- E. All work shall be subject to applicable testing requirements of other Specifications Sections.

#### 1.06 **PROJECT CONDITIONS**

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Verify that piping may be installed in compliance with original design and referenced standards.
- C. Site Information: Reports on subsurface condition investigations made during the design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions (between soil borings). Owner assumes no responsibility for interpretations or conclusions drawn from this information. Contractor has the responsibility to make themselves aware of site conditions and perform any testing they deem necessary prior to bid.

### **PART 2 - PRODUCTS**



## 2.01 DRILLING FLUIDS

- A. Provide drilling fluids specifically suited for horizontal directional drilling and the site-specific soil/project conditions. Do not use any chemicals or polymer surfactants in the drilling fluid without written consent from the Engineer.
- B. Drilling fluids intended to provide support for pipe in a conduit or sleeve shall be selected to cure in such a manner to provide permanent protection and support of the pipe.
- C. All drilling fluids shall be approved by agencies having jurisdiction prior to use.

## 2.02 WATER

- A. The Owner will allow the Contractor to take water from the Owner's water system at Owner stipulated locations, if necessary. The Contractor shall provide all required tools, equipment and trucking necessary to transport water to the work site.

## 2.03 CASING SPACERS AND END SEALS

- A. Casing Spacers shall be SSI Stainless Steel Casing Spacer as manufactured by Advance Products and Systems, Inc., (APS) or approved equal.
- B. End seals shall be one piece pull-on rubber end seal, Model AC or IL-S316 "Innerlynx" with stainless steel hardware, as manufactured by Advance Products and Systems, Inc., (APS) or approved equal.

## 2.04 PIPING

- A. Casing pipe shall be DR 17 HDPE - 4710, Carbon Steel ASTM A139 Gr. B, AWWA C900/C905 fusible PVC, or approved equal.
- B. Carrier pipe shall be as noted on plans.
- C. HDPE headwall thrust restraint shall be axial thrust restraint as manufactured by Plasson or approved equal.
- D. Trace wire shall be Copperhead SoloShot extra high strength #12 AWG high carbon 1055 grade steel with blue colored insulation or approved equal.

# PART 3 - EXECUTION

## 3.01 GENERAL

- A. All pipes shall be cut, fabricated, and installed in strict conformance with the pipe manufacturer's recommendations.
- B. All pipes shall be installed to lines and grades as shown on the subcontractors drilling plan. Provide horizontal and vertical record locations at 20 ft intervals or less as directed by the Engineer.

## 3.02 DRILLING OPERATIONS

- A. The Contractor shall notify the Engineer (2) business days in advance of starting directional drilling work.
- B. The exact method and techniques for completing the directionally drilled installation shall be determined by the directional drilling subcontractor. The Contractor shall prepare a plan to be submitted for the Engineer review which describes the noise reduction program, solids control plan, and drilling procedure. All drilling operations shall be performed by supervisors and personnel experienced in direction drilling. All required labor, equipment, materials and support services shall be provided by the Contractor. Installation shall at all times comply with the subcontractors directional drilling plan.
- C. The position of the drill string shall be monitored by the directional drilling subcontractor with the downhole survey instruments. The directional drilling subcontractor shall compute the position in the X,Y, and Z axis relative to ground surface from downhole survey data, a

minimum of once per length of each drilling pipe approximately 20 foot interval. Deviations from the acceptable tolerances described in the Specifications shall be documented and immediately brought to the attention of the Engineer for review and/or approval/rejection. The profile and alignment defined on the drawings for the bores define the required grade. The Contractor shall maintain and provide to the Engineer, upon request, the data generated by the downhole survey tools in a form suitable for independent calculation of the pilot hole profile.

- D. Between the entry and exit point, the directional drilling subcontractor shall provide and use a separate steering system employing a ground survey grit system such as "TRU-TRACKER", or equal, wherever possible.
- E. During the entire operation, waste and leftover drilling fluids from the pits and cuttings shall be dewatered and disposed of in accordance with all permits and regulatory agencies requirements. Remaining water shall be cleaned by Contractor to meet permit requirements.
- F. The Owner retains the right to sample or monitor waste drilling mud, cuttings and water.

### 3.03 HANDLING DRILLING FLUIDS AND CUTTINGS

- A. During the drilling, reaming, or pullback operations the directional drilling subcontractor shall make adequate provisions for handling the drilling fluids, and cuttings at the entry and exit pits. These fluids must not be discharged into any waterway or stormwater system. When provisions for storage of the fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal disposal site. The directional drilling operation shall be conducted in such a manner that drilling fluids are not forced through the sub-bottom into any waterway. After completion of the directional drilling work, the entry and exit pit locations shall be restored to original conditions. The Contractor shall comply with all permit provisions.
- B. Pits constructed at the entry or exit point area shall be constructed to completely contain the drill fluid and prevent escape to any waterway. The directional drilling subcontractor shall utilize drilling tools and procedures which will minimize the discharge of any drill fluids. The Contractor shall comply with all mitigation measures indicated in the required permits and elsewhere in the Specifications.
- C. To the extent practical, a closed loop drilling fluid system shall be maintained.
- D. Drilling fluid disposal quantities shall be minimized by utilizing a drilling fluid cleaning system which allows returned fluids to be used.
- E. As a part of the installation plan specified herein before, the Contractor shall submit a drilling fluid plan which details types of drilling fluids, cleaning and recycling equipment, estimated flow rates, and procedures for minimizing drilling fluid escape.

### 3.04 TOLERANCES

- A. Pipe installed by the directional drilling method must be located as shown on the Drawings, both horizontally and in profile unless otherwise approved.
- B. When requested, the Contractor shall provide explanations of this position monitoring and steering equipment and data. The directional drilling subcontractor shall employ experienced personnel to operate the directional drilling equipment and, in particular, the position monitoring steering equipment. No information pertaining to the position or inclination of the pilot bores shall be withheld from the Engineer.
- C. The exit point shall fall within a rectangle 5 feet wide and 10 feet long centered on the planned exit point.

### 3.05 ENVIRONMENTAL PROVISIONS

- A. The directional drilling operation is to be completed in a manner to prevent the discharge of water, drilling mud and cuttings to the adjacent stream, groundwater, or land areas involved during the construction process. Equipment and procedures shall maximize the reuse of drilling mud to minimize waste. All excavated pits used in the drilling operation shall be lined by the Contractor with heavy duty plastic sheeting with sealed joints to prevent the migration of drilling fluids.
- B. The Contractor and directional drilling subcontractor shall visit the site and must be aware of all structures and site limitations at the directional drilling crossing and provide the Engineer with a drilling plan outlining procedures to prevent drilling fluid from adversely affecting the surrounding area.
- C. The general work areas on the entry and exit ends of the drilling shall be enclosed by a berm to contain planned spills or discharge.
- D. Waste cuttings and drilling mud shall be processed through a solid control plant comprised at sumps, pumps, tanks, desalter/desander, centrifuges, material handlers, and/or handlers all in a quantity sufficient to perform the cleaning/separating operation without interference with the drilling program. The cutting and excess drilling fluids shall be dewatered and dried to the extent necessary for disposal in off site landfills. Water from the dewatering process shall be treated by the Contractor to meet permit requirements and disposed of per the authority requirements. The cuttings and water for disposal are subject to being sampled and tested. The construction site and adjacent areas will be checked frequently for signs of unplanned leaks or seeps, as required by the authority.
- E. Equipment and materials for cleanup and contingencies shall be provided in sufficient quantities by the Contractor and maintained by all sites for use in the event of inadvertent leaks, seeps or spills.

### 3.06 **SITE RESTORATION**

- A. At the conclusion of all drilling operations, remove any excavation support systems that may have been installed for the entrance and exit pits. If withdrawal would damage or disturb the roadway subgrade or ground surface, leave supports in place and cut off three feet below finished grade.
- B. All abandoned pilot and boreholes shall be grouted closed with grout or bentonite within 48 hours of abandonment. No additional compensation will be provided for grouting abandoned boreholes.

### 3.07 **BORE PATH REPORT**

- A. The Contractor shall furnish a Bore Path Report to the Engineer within seven days of the completion of each bore path. Include in the following report:
  - 1. Location of the project.
  - 2. Name of the person collecting data, including title, position and company name.
  - 3. Identification of the detection method used.
  - 4. Elevations and offset locations of critical changes in bore path.
  - 5. Copy of drilling fluids testing logs.

### 3.08 **RECORD PLANS**

- A. The Contractor shall provide the Engineer with a complete set of Record Plans showing all bores (successful and failed) within 30 calendar days of completing the work. Ensure that the plans are dimensionally correct copies of the Contract Plans and include plan and profile, boring location and subsurface conditions as directed by the Engineer. The plans must show appropriate elevations at 20 foot intervals and be referenced to the design plan datum. Specific plan content requirements include, but are not limited to the following:

1. The horizontal center of the pipe.
2. Bore path profile.
3. Bore notes on each plan stating the final bore path diameter, pipe diameter, drilling fluid composition, and composition of any other material used to fill the annular void between the bore path and the pipe.

**END OF SECTION**

**SECTION 312200  
GRADING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Removal of topsoil.
- B. Rough grading the site for site structures.
- C. Finish grading.

**1.02 RELATED REQUIREMENTS**

- A. Section 311000 - Site Clearing.
- B. Section 312316 - Excavation.
- C. Section 312316.13 - Trenching: Trenching and backfilling for utilities.
- D. Section 312316.26 - Rock Removal.
- E. Section 312323 - Fill: Filling and compaction.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Topsoil: See Section 312323.
- B. Other Fill Materials: See Section 312323.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Verify the absence of standing or ponding water.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Notify utility company to remove and relocate utilities.
- E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
- F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs, from damage by grading equipment and vehicular traffic.

**3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

- G. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

#### 3.04 SOIL REMOVAL

- A. Stockpile topsoil to be re-used on site; remove remainder from site.
- B. Stockpile subsoil to be re-used on site; remove remainder from site.
- C. Stockpiles: Use areas designated on site; protect from erosion.
- D. All removed material shall be transported to a Contractor secured site within the corrective action area. No material shall leave the corrective action area.

#### 3.05 FINISH GRADING

- A. Before Finish Grading:
  - 1. Verify building and trench backfilling have been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch (13 mm) in size. Remove soil contaminated with petroleum products.
- C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches (75 mm).
- D. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- E. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

#### 3.06 REPAIR AND RESTORATION

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

#### 3.07 FIELD QUALITY CONTROL

- A. See Section 312323 for compaction density testing.

**END OF SECTION**



**SECTION 312316  
EXCAVATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures and utilities within the building.
- B. Trenching for utilities outside the building to utility main connections.
- C. Temporary excavation support and protection systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.
- C. Section 311000 - Site Clearing: Vegetation and existing debris removal.
- D. Section 312200 - Grading: Soil removal from surface of site.
- E. Section 312200 - Grading: Grading.
- F. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.
- G. Section 312316.26 - Rock Removal: Removal of rock during excavating.
- H. Section 312323 - Fill: Fill materials, backfilling, and compacting.
- I. Section 313700 - Riprap.
- J. Section 334100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

**1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards current edition.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Bedding and Fill to Correct Over-Excavation:
  - 1. See Section 312323 for bedding and corrective fill materials at general excavations.
  - 2. See Section 312316.13 for bedding and corrective fill materials at utility trenches.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the work are as indicated.
- B. Survey existing adjacent structures and improvements and establish exact elevations at fixed points to act as benchmarks.
  - 1. Resurvey benchmarks during installation of excavation support and protection systems and notify Owner if any changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 311000 for clearing, grubbing, and removal of existing debris.

- C. See Section 312200 for topsoil removal.
- D. Locate, identify, and protect utilities that remain and protect from damage.
- E. Notify utility company to remove and relocate utilities.
- F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.
- G. Protect plants, lawns, rock outcroppings and other features to remain.
- H. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Engineer.
- I. Contractor shall schedule meeting with Homeowner and Engineer to coordinate service line route prior to commencing any work on private property.

### 3.03 **TEMPORARY EXCAVATION SUPPORT AND PROTECTION**

- A. Excavation Safety: Comply with OSHA's Excavation Standard, 29 CFR 1926, Subpart P.
  - 1. Depending upon excavation depth, time that excavation is open, soil classification, configuration and slope of excavation sidewalls, design and provide an excavation support and protection system that meets the requirements of 29 CFR 1926, Subpart P:

### 3.04 **EXCAVATING**

- A. Excavate to accommodate new structures and construction operations.
  - 1. Excavate to the specified elevations.
  - 2. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
- B. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Provide temporary means and methods, as required, to remove all water from excavations until directed by Engineer. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

**END OF SECTION**

## **SECTION 312316.13 TRENCHING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Backfilling and compacting for utilities outside the building to utility main connections.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Site grading.
- B. Section 312316 - Excavation: Building and foundation excavating.
- C. Section 312316.26 - Rock Removal: Removal of rock during excavating.

#### **1.03 REFERENCE STANDARDS**

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2018.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method 2007.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2011.
- G. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017.

### **PART 2 PRODUCTS**

#### **2.01 FILL MATERIALS**

#### **2.02 SOURCE QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

#### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic. If disturbed or lost, the Contractor shall immediately have them replaced by a Licensed Surveyor, at no additional

cost to the Owner.

- E. Protect plants, lawns, rock outcroppings and other features to remain.
- F. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Engineer.
- G. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. The Contractor shall be responsible for any repairs or remedial work necessary, at no additional cost to the Owner.
- H. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- I. Provide erosion control measures to meet State Permit and as out lined in the Erosion Control Specification Section.

### **3.03 TRENCHING**

- A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- G. Remove lumped subsoil, boulders, and rock.
- H. Remove excavated material that is unsuitable for re-use from site.
- I. Stockpile excavated material to be re-used in area designated on site.
- J. Remove excess excavated material from site.
- K. Provide temporary means and methods, as required, to remove all water from trenching. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

### **3.04 PREPARATION FOR UTILITY PLACEMENT**

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.
- D. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, and 12 inches each side, unless otherwise indicated.
- E. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading

- F. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches below invert elevation to receive bedding course.

### 3.05 BACKFILLING

- A. Notify Engineer when excavations have reached required Subgrade.
- B. When Engineer determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Backfill to contours and elevations indicated using unfrozen materials.
- D. Employ a placement method that does not disturb or damage other work.
- E. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Slope grade away from building minimum 2 inches in 10 feet (50 mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
  - 1. Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade and similar construction: 95 percent of maximum dry density.
  - 2. At other locations: 85 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Install warning tape directly above utilities, 18 inches above utility.
- L. Backfill excavations promptly, but not before completing the following:
  - 1. Acceptance of construction below finish grade.
  - 2. Removal of temporary shoring and bracing, and sheeting.
  - 3. Removal of all trash and debris from excavation.
  - 4. Any existing underground utilities encountered during trenching shall be inspected and surveyed for as built before backfilling.
- M. Backfill excavations at the end of each working day.

### 3.06 TOLERANCES

- A. Top Surface of General Backfilling: Plus or minus 1 inch (h) from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus [0.5] inch ([ ] mm) from required elevations.

### 3.07 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167 or ASTM D6938.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor") or ASTM D698 ("standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests:

1. Trench Backfill: At minimum 200 LF intervals, density tests shall be performed at top of pipe bedding and each successive lift.

**END OF SECTION**



**SECTION 312316.26  
ROCK REMOVAL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Removal of identified rock during excavation.

**1.02 DEFINITIONS**

- A. Site Rock: Solid mineral material with a volume in excess of 1 cubic yard ([ ] cubic meter) or solid material that cannot be removed with a 3/4 cubic yard (0.57 cubic meter) capacity power shovel without drilling.

**1.03 REFERENCE STANDARDS**

- A. NFPA 495 - Explosive Materials Code 2018.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate the proposed method of blasting, delay pattern, explosive types, type of blasting mat or cover, and intended rock removal method.
- C. Pre and Post Blast Surveys.

**1.05 QUALITY ASSURANCE**

- A. Seismic Survey Firm: Company specializing in seismic surveys with five years documented experience.
- B. Explosives Firm: Company specializing in explosives for disintegration of rock, with five years documented experience.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Explosives: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.
- B. Delay Device: Type recommended by explosives firm.
- C. Blast Mat Materials: Type recommended by explosives firm.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify site conditions and note subsurface irregularities affecting work of this section.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.

**3.03 ROCK REMOVAL**

- A. Excavate and remove rock by either mechanical or explosive methods.
- B. Mechanical Methods: Drill holes and utilize expansive tools to fracture rock.
- C. If rock is uncovered requiring the explosives method for rock disintegration, execute as follows:
  - 1. Maintain at least two continuous recording seismographs on site during explosive detonation which shall be reviewed by an Engineer qualified to assess accelerations produced by explosive shockwaves.
  - 2. Disintegrate rock and remove from excavation.

- D. Use of Explosives: Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.
  - 1. Comply with NFPA 495 and applicable state and local codes.
  - 2. Prior to blasting, obtain a seismographic survey to determine maximum charges that can be used at each location in area of excavation without damaging adjacent properties or other work.
  - 3. Prior to executing seismographic survey, advise owners of adjacent buildings and structures in writing; explain planned survey and blasting operations.
  - 4. Prior to blasting, document conditions of buildings near locations of intended blasting and photograph existing conditions identifying existing irregularities.
  - 5. Schedule work to avoid working hours of occupied buildings nearby.
  - 6. Unless otherwise noted, conduct drilling operations Monday through Friday; 7:00 am to 5:00 pm. Explosive detonations shall be limited to 9:00 am to 4:00 pm Monday through Friday.
  - 7. After blasting, document conditions of buildings near locations of blasting and photograph conditions identifying any changes to the pre-existing conditions.
- E. Form level bearing at bottom of excavations.
- F. Remove shaled layers to provide sound and unshattered base for footings.
- G. In utility trenches, excavate to 6 inches (150 mm) below invert elevation of pipe and 24 inches (600 mm) wider than pipe diameter. Or 42 inches wide, whichever is greater.
- H. Remove excavated materials from site.
- I. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 312323. No payment will be made to correct unauthorized rock removal.
- J. Maintain and provide to Engineer daily records of hole location, total depth, depth to rock, explosive load, weight per delay per hole, and the type of subsurface materials and any unusual event during an explosive detonation.

#### 3.04 FIELD QUALITY CONTROL

- A. Independent agency field inspection will be provided under provisions of Section 014000 - Quality Requirements.

**END OF SECTION**

**SECTION 312323**  
**FILL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Filling, backfilling, and compacting for building volume below grade.
- B. Backfilling and compacting for utilities outside the building to utility main connections.

**1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 033000 - Cast-in-Place Concrete.
- C. Section 312200 - Grading: Removal and handling of soil to be re-used.
- D. Section 312200 - Grading: Site grading.
- E. Section 312316 - Excavation: Removal and handling of soil to be re-used.
- F. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.
- G. Section 312316.26 - Rock Removal: Removal of rock during excavating.
- H. Section 313700 - Riprap.

**1.03 REFERENCE STANDARDS**

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses 2017.
- B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2014.
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2011.
- G. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Soil Samples: 10 pounds (4.5 kg) sample of each type of fill; submit in air-tight containers to testing laboratory.
- C. Materials Sources: Submit name of imported materials source.
- D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- E. Compaction Density Test Reports.
- F. Testing Agency Qualification Statement.

**1.05 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.

**PART 2 PRODUCTS**

**2.01 FILL MATERIALS**

- A. General Fill: Subsoil excavated on-site.
  - 1. Graded.
  - 2. Free of lumps larger than 3 inches (75 mm), rocks larger than 6 inches ([ ] mm), and debris.
- B. Structural Fill: Subsoil excavated on-site.
  - 1. Structural Fill shall consist of on-site sand and/or gravel soils, or an imported, well graded crusher run stone or bank-run sand and gravel, which is free of clay, organics and friable or deleterious particles. Imported Structural Fill should also conform to the following gradation requirements.
    - 2 inch sieve: 100 percent passing
    - 1/4 inch sieve: 25 to 85 percent passing
    - #40 sieve: 5 to 50 percent passing
    - #200 sieve: 0 to 8 percent passing
- C. Crushed Gravel for Subbase: Coarse aggregate, conforming to State of Vermont Highway Department standard.
  - 1. Coarse - 704.05A:
    - 4 inch sieve: 95 to 100 percent passing
    - #4 sieve: 25 to 50 percent passing
    - #100 sieve: 0 to 12 percent passing
    - #200 sieve: 0 to 6 percent passing
  - Fine - 704.05B:
    - 2-inch sieve: 100 percent passing
    - 1-1/2 inch sieve: 90 to 100 percent passing
    - #4 sieve: 30 to 60 percent passing
    - #100 sieve: 0 to 12 percent passing
    - #200 sieve: 0 to 6 percent passing
- D. Drainage Aggregate: Shall consist of clean, hard, crushed washed stone or washed crushed gravel meeting the material and gradation requirements of the VTrans Standard Specifications Section 704.16A, or approved equivalent:
  - 1. 3/4" Crushed Stone

- 1 inch sieve: 100 percent passing
  - 3/4 sieve: 90 to 100 percent passing
  - 3/8 sieve: 20 to 55 percent passing
  - #4 sieve: 0 to 10 percent passing
  - #8 sieve: 0 to 5 percent passing
- E. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
1. Graded in accordance with ASTM C136/C136M; within the following limits:
    - #4 sieve: 100 percent passing
    - #100 sieve: 0-20 percent passing
    - #200 sieve: 0-8 percent passing
- F. Bedding Material: Sand or granular materials with 100 percent passing a 1/2 inch sieve, 20 percent passing the #4 and not more than 8 percent passing a No. 200 sieve.
- G. Topsoil: Obtain from project site or from areas having similar soil characteristics found at the project site.
1. Whenever possible, stockpile and reapply topsoil to disturbed areas.
  2. When insufficient topsoil on site exists, provide new topsoil with the following characteristics:
    - a. 4 to 6 percent by weight of fine-textured, stable organic material.
    - b. Contains not less than 20 percent fine textured material (passing the No 200 sieve) and not more than 15% clay.
    - c. Be relatively free of stones over 1-1/2 inch diameter, trash, noxious weeds such as nutsedge and quackgrass.
    - d. Compost and other amendment materials shall have a C:N ratio below 25:1. Compost shall meet the Vermont Solid Waste Management definition.
    - e. Does not contain soluble salts greater than 500 ppm.
  3. Free of roots, rocks larger than 1/2 inch (12 mm), subsoil, debris, large weeds and foreign matter.
- H. Stone for Stone Fill: Stone for stone fill shall be approved, hard, blasted, angular rock other than serpentine rock containing the fibrous variety chrysotile (asbestos). The least dimension of the stone shall be greater than 33 percent of the longest dimension. The stone fill shall be reasonably well graded from smallest to the maximum size stone specified so as to form a compact mass when in place
1. Type I. The longest dimension of the stone shall vary from 1-12 inches, and at least 50% of the volume of the stone in place shall have a minimum dimension of 4 inches.
  2. Type II . The longest dimension of the stone shall vary from 2 to 36 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 12 inches.
  3. Type III. The longest dimension of the stone shall vary from 3 to 48 inches, and at least 50% of the volume of the stone in-place shall have a minimum dimension of 16 inches.
  4. Type IV. The longest dimension of the stone shall vary from 3 to 60 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 20 inches.

5. Type X. The longest dimension of the stone shall be at least 120 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 24 inches. The least dimension of the stone shall be greater than 33 percent of the longest dimension.

## 2.02 ACCESSORIES

- A. Turf Reinforcement: Biodegradable, East Coast Erosion Control Blanket ECC-2B, or Engineer approved equal.
- B. Geotextile fabrics shall conform to VTrans Standard Specifications Section 720, or approved equivalent, or as indicated on the plans.

## 2.03 SOURCE QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the Work are as indicated.
- B. Identify required lines, levels, contours, and datum locations.
- C. Verify areas to be filled are not compromised with surface or ground water.

### 3.02 PREPARATION

- A. Proofroll subgrade to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

### 3.03 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Place and compact material in equal continuous layers not exceeding 6 inches compacted depth.
- G. Slope grade away from building minimum 6 inches in 10 feet ([ ] mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
  1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 95 percent of maximum dry density.
  2. Other areas: Use general fill, flush to required elevation, compacted to minimum 85 percent of maximum dry density.



- I. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade and similar construction: 95 percent of maximum dry density.
  - 2. At other locations: 85 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

### 3.04 FILL AT SPECIFIC LOCATIONS

- A. Use general fill unless otherwise specified or indicated.
- B. Over Subdrainage Piping at Foundation Perimeter and Under Slabs:
  - 1. Drainage aggregate and geotextile fabric.
  - 2. Cover drainage fill with general fill.
  - 3. Compact to 95 percent of maximum dry density.
- C. Buried Utility Piping, Conduits and Duct Bank in Trenches:
  - 1. Bedding: Use Fill Type Bedding.
  - 2. Cover with general fill.
  - 3. Fill up to subgrade elevation.
  - 4. Compact in maximum 6 inch ([ ] mm) lifts to 95 percent of maximum dry density.
- D. At Lawn Areas:
  - 1. Use general fill.
  - 2. Fill up to 4 inches ([ ] mm) below finish grade elevations.
  - 3. Fill up to subgrade elevations.
  - 4. Compact to 85 percent of maximum dry density.
  - 5. See Section 312200 for topsoil placement.
- E. At Planting Areas Other Than Lawns:
  - 1. Use general fill.
  - 2. Fill up to 12 inches (300 mm) below finish grade elevations.
  - 3. Fill up to subgrade elevations.
  - 4. Compact to 85 percent of maximum dry density.
  - 5. See Section 312200 for topsoil placement.
- F. At French Drains:
  - 1. Use Fill Type Drainage Aggregate.
  - 2. Compact to 95 percent of maximum dry density.

### 3.05 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch (25 mm) from required elevations.
- B. Top Surface of Subgrade Under Paved Areas: Plus or minus 1 inch (25 mm) from required elevations.
- C. Top Surface Under Paved Areas: Plus or minus 1/2 inch from required elevations.

### 3.06 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Soil Fill Materials:
  - 1. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor").
  - 2. If tests indicate work does not meet specified requirements, remove work, replace and retest.
  - 3. Frequency of Tests:
    - a. Trench Backfill: At 200 LF intervals, density tests shall be performed at top of pipe bedding, mid-depth of general backfill, and top of general backfill.
    - b. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 5,000 sq. ft. (186 sq. m) or less of paved area but in no case less than three tests.
    - c. As directed by Engineer.

### 3.07 CLEANING

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**

**SECTION 321216  
ASPHALT PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aggregate base course.
- B. Bituminous concrete paving.

**1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Preparation of site for paving and base.
- B. Section 312323 - Fill: Compacted subgrade for paving.
- C. Section 321723.13 - Painted Pavement Markings

**1.03 REFERENCE STANDARDS**

- A. Vermont Agency of Transportation (VTrans) - Standard Specifications for Construction; 2018.
- B. AI MS-2 - Asphalt Mix Design Methods 2015.
- C. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction 2009a.

**1.04 QUALITY ASSURANCE**

- A. Perform Work in accordance with VTrans Standard Specifications.
- B. Provide Engineer with Manufacturers written certification that each load of asphalt cement (A.C.) meets the requirements of the specification.
- C. Provide asphalt mix design no less than 15 days prior to beginning construction.
- D. Mixing Plant: Conform to VTrans Standard Specifications.
- E. Obtain materials from same source throughout.

**1.05 FIELD CONDITIONS**

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F ([ ] degrees C), or surface is wet or frozen.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Performance-Graded Asphalt Binder: Conform to Section 406 of the VTrans Standard Specifications for Bituminous Concrete Pavement (Marshall).
- B. Aggregate for mix: Conform to Section 406.03A of the VTrans Standard Specifications.
- C. Tack Coat: Homogeneous, medium curing, liquid asphalt.
  - 1. Emulsified asphalt meeting requirements of either ASTM D977, Grade SS-1H, or ASTM D2397, Grade CSS-1H.
- D. Geotextile Fabric: Geotextile for Roadbed Separator shall conform to Section 720 of the VTrans Standard Specifications.

**2.02 ASPHALT PAVING MIXES AND MIX DESIGN**

- A. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
- B. Submit proposed mix design of each class of mix for review prior to beginning of work. Unless otherwise noted, mix designs shall be Marshall Type 2, Type 3 or Type 4.

**2.03 SOURCE QUALITY CONTROL**

- A. Test mix design and samples in accordance with State of Vermont Highway standards.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that compacted subgrade and/or aggregate base is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct prior to beginning paving operations.
- C. Verify utility castings are properly adjusted to grade prior to beginning paving operations.

#### **3.02 PREPARATION - TACK COAT**

- A. Provide clean saw cut edges prior to paving.
- B. All surfaces shall be cleaned and sprayed with an RS-1, CRS-1, RS-1h or CRS-1h emulsified asphalt prior to placing any bituminous mixture.
- C. Apply tack coat in accordance with manufacturer's instructions.
- D. Apply tack coat in accordance with Section 406.12 and at the application rates stated Table 406.12A of the VTrans Standard Specifications.
- E. Apply tack coat to contact surfaces of curbs, gutters, adjacent pavement joints, and between subsequent asphalt lifts.
- F. Maintain proper distributor spray bar height and spray nozzle angle. Maintain proper distributor speed during application.
- G. Coat surfaces of manhole frames with environmentally safe product to prevent bond with asphalt pavement. Do not tack coat these surfaces.

#### **3.03 PLACING ASPHALT PAVEMENT**

- A. Place asphalt base course within 8 hours of applying primer or tack coat.
- B. Place base and wearing courses to compacted thickness specified in plans.
- C. Maintain a mix laydown temperature of no less than 230 degrees F when ambient temperature is 60 degrees F or higher. When ambient temperature is below 60 degrees F, Engineer will determine laydown temperature.
- D. Spread and finish all mixtures with a self-propelled, bituminous paver, to the required section, leaving the mixture uniformly dense, smooth, and free from irregularities. In locations where it is impractical to use self-propelled bituminous pavers, or other types of lay-down equipment, a road grader or maintainer may be used if approved by the Engineer.
- E. Control the speed of paver to place the mixture uniformly and continuously without tearing or gouging. Do not exceed the Manufacturer's recommendation, and coordinate the paver speed with the output of the plant to provide for a smooth, continuous operation, minimizing starting and stopping.
- F. Level, fill or rake all transverse and longitudinal joints, high or low areas, and surface irregularities, prior to compaction. Immediately remove material dropped on previously compacted lanes.
- G. Sweep and tack previously placed layer or surface before spreading the next layer.
- H. Tack all joints and coordinate vertical construction joints in successive courses so the joints do not fall on the same vertical plane.
- I. Place pavement uniformly against the surface or edge of curb, gutters, manholes or similar structures, and at such an elevation so that the pavement is 1/4-inch higher than the edge of the structure after the pavement has been compacted.

- J. Correct any low or high defective areas immediately. Correction can be accomplished by patching or cutting out the surface and replacing with fresh, hot, bituminous mixture, or by milling the surface.
- K. The sequence of rolling operations as well as the type and number of rollers must be commensurate with production, and adequate to obtain the specified density before the mat temperature falls below 185 degrees F.
- L. Thoroughly compact with hand or other mechanical tampers approved by the Engineer any areas not accessible to standard asphalt rollers.
- M. Remove and replace any mixture that becomes loose, broken, or becomes mixed with dirt, shows any excess deficiency of bitumen, or is defective in any manner.
- N. Do not place hot mix on a frozen subgrade, or when weather conditions prevent the proper handling or finishing of the asphalt pavement. Presence of frost particles in or on the subgrade or base course is considered a frozen subgrade.
- O. Compact asphalt pavement sloughs with rollers capable of providing a smooth, finished, compacted slough that is free of tire marks and unevenness or drop-off.
- P. Failing tests from field samples will be considered sufficient evidence to reject a full day's work.
- Q. Adjust any casting that is not 1/4-inch below the top of the finished surface. Adjust casting upward if greater than 1/4-inch below the top of the finished surface.
- R. Asphalt pavement shall be compacted to 95 percent of the Theoretical Maximum Density (Rice Method). Density of field samples shall be tested with a nuclear density gage at specified frequency.
- S. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

#### 3.04 **PLACING ASPHALT PAVEMENT - OVERLAY**

- A. Cold-plane at terminations.
- B. Prepare surface for pavement installation by sweeping and tack coating pavement.
- C. Installed specified overlay as noted in the Contract Plans.
- D. A rubber-tired roller must be used on the shim coat to knead the pavement in the existing road profile.

#### 3.05 **TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch (6 mm) measured with 10 foot (3 m) straight edge.
- B. Compacted Thickness: Within 1/4 inch (6 mm) of specified or indicated thickness.
- C. Variation from True Elevation: Within [1/4] inch ([ ] mm).
- D. Adjacent surface match: New finished surface must be 1/4-inch above any adjacent surface.

#### 3.06 **FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for quality control.
- B. The density of the compacted asphalt pavement shall be tested with a nuclear density gauge at a frequency of one (1) test per 1,500 square yards per lift of asphalt pavement, or a minimum of one (1) test per lift of pavement per day.
- C. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.
- D. Asphalt paving mixture shall be field sampled and tested for conformance with the mix design at intervals of one (1) test per 1,000 tons of asphalt pavement produced, or a

minimum of one (1) test per lift of pavement per day.

- E. The density of the compacted asphalt pavement shall be tested with a nuclear density gauge at a frequency of one (1) test per 1,500 square yards per lift of asphalt pavement, or a minimum of one (1) test per lift of pavement per day.
- F. Contractor shall pay for all additional tests and inspection required due to failing work and/or tests, and for any repairs and/or replacement necessitated by failing work.
- G. Copies of all load slips must be handed to inspectors at the delivery of each load.

### 3.07 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury until surface temperature is less than 140 degrees F (60 degrees C).
- B. Do not allow traffic on the completed surfacing until the mat has been compacted and has cooled sufficiently to prevent damage.
- C. Damage to the asphalt pavement due to inadequate protection shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the Owner.

**END OF SECTION**



**SECTION 321313  
CONCRETE PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete sidewalks, stair steps, integral curbs, gutters, median barriers, parking areas and roads.
- B. Detectable Warning Panels for ADA curb ramps.
- C. Concrete Formwork.

**1.02 RELATED REQUIREMENTS**

- A. Concrete Reinforcement.
- B. Joint sealing for concrete expansion joints.
- C. Section 312200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- D. Section 312323 - Fill: Compacted subbase for paving.

**1.03 REFERENCE STANDARDS**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete 2016.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- D. ACI 305R - Guide to Hot Weather Concreting 2010.
- E. ACI 306R - Guide to Cold Weather Concreting 2016.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2018.
- G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- H. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2016, with Editorial Revision (2016).
- I. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2018.
- J. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2018.
- K. ASTM C150/C150M - Standard Specification for Portland Cement 2018.
- L. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.
- M. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- N. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2011.
- O. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2017.
- P. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2015.
- Q. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2014.

- R. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- S. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction 2018.
- T. ASTM D8139 - Standard Specification for Semi-Rigid, Closed-Cell Polypropylene Foam, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction 2017.

#### 1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, curing compound and detectable warning panels.
- C. Provide a concrete mix design prepared by an independent testing laboratory. Design mixes in accordance with ACI 301.
- D. Prior to pouring concrete in hot weather, submit a written hot weather concreting plan to the Engineer for approval.
- E. Prior to pouring concrete in cold weather, submit a written cold weather concreting plan to the Engineer for approval.

### PART 2 PRODUCTS

#### 2.01 PAVING ASSEMBLIES

- A. All site concrete shall be, at a minimum, 4,000 psi at 28 days, unless specified elsewhere. Thickness, section and reinforcement as indicated on plans.

#### 2.02 FORM MATERIALS

- A. Form Materials: Conform to ACI 301 and ACI 347.
  - 1. Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
  - 1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
  - 2. Thickness: 1/2 inch (12 mm).

#### 2.03 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa) yield strength; deformed billet steel bars; unfinished.
- B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- C. Dowels: ASTM A615/A615M, Grade 60 - 60,000 psi (420 MPa) yield strength; smooth steel bars; unfinished.

#### 2.04 CONCRETE MATERIALS

- A. Obtain cementitious materials from same source throughout.
- B. Cement: ASTM C150/C150M, Type II/IIA Portland cement, gray color.
- C. Fine and Coarse Mix Aggregates: ASTM C33/C33M.
- D. Fly Ash: ASTM C618, Class C or F.
- E. Water: Clean and potable, and not detrimental to concrete.
- F. Air-Entraining Admixtures: ASTM C260/C260M.

- G. Chemical Admixtures: ASTM C494/C494M, Type A - Water Reducing, Type C - Accelerating and Type G - Water Reducing, High Range and Retarding.
  - 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

#### 2.05 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1, Class A.
- B. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.
- C. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
- D. Detectable Warning Panels
  - 1. Detectable Warning Panels shall consist of square or rectangular panels with a surface of truncated domes, aligned in a square or radial grid pattern. Panels shall extend the full width of all curb ramp landings, and a minimum of 24 inches in the predominant direction of travel. Panels shall be wet-set; surface applied panels will not be allowed.

#### 2.06 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- D. Concrete Properties:
  - 1. Compressive strength, when tested in accordance with ASTM C39/C39M at {CH#15030} days; {CH#15031}.
  - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 3. Total Air Content: 4 to 7 percent, determined in accordance with ASTM C173/C173M.
  - 4. Maximum Slump: 4 inches (100 mm).

#### 2.07 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Concrete Supplier shall provide a load ticket for each delivery of concrete

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

#### 3.02 SUBBASE

- A. See Section 321123 for construction of base course for work of this Section.

#### 3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole and casting frames to prevent bond with concrete pavement.

- C. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

#### 3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

#### 3.05 REINFORCEMENT

- A. Place reinforcement as indicated.

#### 3.06 COLD AND HOT WEATHER CONCRETING

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

#### 3.07 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. In accordance with ACI specifications, concrete that has not been discharged within 90 minutes from when cementitious materials were first added to water, and/or after drum revolutions have exceeded 300 from when cementitious materials were first added to water, shall be rejected and shall not be incorporated into the work. No payment shall be made for concrete that has been rejected for non-conformance with aforementioned requirements.
- C. Do not place concrete when base surface is saturated or ponding water.
- D. In dry conditions, moisten base course prior to concrete placement. Use appropriate procedures to accomplish moistened base without creating areas of ponding water.
- E. Ensure reinforcement, inserts, embedded parts, formed joints and formed joints are not disturbed during concrete placement.
- F. Install Detectable Warning Panels at curb ramps or where indicated on plans in accordance with Manufacturers recommendations. Ensure full bearing on substrate.
- G. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

#### 3.08 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Place [1/2] inch ([ ] mm) wide expansion joints at 25 foot ([ ] m) intervals and to separate paving from vertical surfaces, footings, foundation and building walls, existing concrete and other components.
  1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch (13 mm) of finished surface.
  2. Secure to resist movement by wet concrete.
  3. All locations requiring expansion joints may not be indicated on plans. Contractor shall ensure that adequate expansion joints are provided at appropriate locations to ensure damage to site improvements does not occur due to expansion and contraction of concrete members.
  4. All expansion joints shall be sealed.
- C. Provide control joints.

1. Joint spacing shall be per plans. Where not explicitly indicated, a minimum spacing of 5 feet shall be used.
2. Between sidewalks and curbs.
3. Between curbs and pavement.
4. Control joints may be tooled or saw cut. Tooled joints shall provide 1/4 inch radius and be cut 1/3 into depth of slab during finishing.

### 3.09 FINISHING

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius ( 6 mm radius).
- C. Curbs and Gutters: Light broom, texture parallel to pavement direction.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### 3.10 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).
- B. Maximum Variation From True Position: 1/4 inch (6 mm).

### 3.11 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
  1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  2. Contractor shall pay for and provide proposed mix design, to be submitted to Engineer for review prior to commencement of concrete operations.
  3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
  4. Contractor shall pay for all additional tests and inspection required due to failing work and/or tests.
- B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples from the first load of each days pour and for every 50 cu yd ( [ ] cu m) or less of each class of concrete placed thereafter.
  1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  2. The cylinders comprising one set will be made from the same sample of concrete and shall be tested at the following schedule: one (1) cylinder tested at seven (7) days and one (1) at twenty-eight (28) days. The third cylinder shall be held by the testing agency until the Owner or Engineer orders it tested or disposed of. If an additional cylinder is cast for cold weather concreting, it shall be tested at twenty-eight (28) days.
  3. Additional cylinders cast at the Contractor's request to facilitate early opening to traffic shall be paid for by the Contractor.
- C. Slump Testing: Slump tests shall be performed in accordance with ASTM C143 for each sample taken. The maximum allowable slump of the concrete mix shall be 4 inches.
- D. Air Entrainment: Air content in accordance with ASTM C231 shall also be tested and recorded for each sample of concrete used in making test cylinders. The air content shall fall within the range of 4 percent to 7 percent.

- E. Test Results: The testing agency shall report test results in writing to the Engineer within 24 hours of test.
- F. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

**3.12 DEFECTIVE CONCRETE**

**3.13 PROTECTION**

- A. Defective concrete is defined as follows:
  - 1. Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
  - 2. Concrete failing to meet specifications for compressive strength, air entrainment, consistency (slump) and/or composition.
  - 3. Concrete that is excessively honey-combed or contains embedded debris.
  - 4. Concrete that is spalling, experiencing surface delamination, and/or any other form of premature degradation.
- B. Any concrete meeting at least one of the above criteria or that does not comply with the requirements of this Section 32 1313 or any other requirements of the contract documents shall be replaced by the Contractor to the satisfaction of the Engineer at no cost to the Owner. Replaced concrete shall be tested at the same schedule as other concrete and such testing shall be incidental.
- C. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- D. Do not permit vehicular traffic over pavement for 7 days minimum or until concrete has reached 75 percent of 28-day compressive strength, as established by cylinder testing data, and until all joints have been sealed.

**END OF SECTION**



**SECTION 321723.13  
PAINTED PAVEMENT MARKINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Parking lot markings, including parking bays, crosswalks, arrows, handicapped symbols and curb markings.
- B. Roadway lane markings.

**1.02 RELATED REQUIREMENTS**

- A. Section 321216 - Asphalt Paving.

**1.03 REFERENCE STANDARDS**

- A. FS TT-P-1952 - Paint, Traffic Black, and Airfield Marking, Waterborne 2015f.
- B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- C. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration Current Edition.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver paint in containers of at least 5 gallons (18 L) accompanied by batch certificate.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

**1.06 FIELD CONDITIONS**

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Materials as required by VTrans Specifications for Construction, latest edition.
- B. Line and Zone Marking Paint: color(s) as indicated.
  - 1. Roadway Markings: As required by authorities having jurisdiction.
  - 2. Parking Lots: Yellow.
  - 3. Handicapped Symbols: Blue.
  - 4. Crosswalks and Turn Arrows: White.
- C. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as

to perform satisfactorily during period for which its use is required.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.

#### **3.02 PREPARATION**

- A. Allow new pavement surfaces to cure.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. If obliteration of existing markings using paint is acceptable in lieu of removal as determined by authorities having jurisdiction; apply the black paint in as many coats as necessary to completely obliterate the existing markings.
- D. Clean surfaces thoroughly prior to installation.
  - 1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
  - 2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.
- E. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.
- F. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.
- G. Temporary Pavement Markings: When required or directed by Engineer , apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
  - 1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
  - 2. At Contractor 's option, temporary marking tape may used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to Owner .

#### **3.03 INSTALLATION**

- A. As required by MUTCD and VTrans Specifications for Construction, latest edition.

#### **3.04 DRYING, PROTECTION, AND REPLACEMENT**

- A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.
- B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.
- C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.
- D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.
- E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Owner .

**END OF SECTION**

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**SECTION 329219  
SEEDING**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Topsoil material.
- B. Section 312200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- C. Section 312323 - Fill: Topsoil material.

**1.02 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Topsoil samples.
- C. Certificate: Certify seed mixture approval by authority having jurisdiction.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

**2.02 SEED MIXTURE**

- A. Seed Mixture Meadow or areas requiring little mowing:
  - 1. Kentucky Blue Grass: 10 percent.
  - 2. Creeping Red Fescue Grass: 35 percent.
  - 3. VNS Turf-Type Tall Fescue: 25 percent.
  - 4. Annual Ryegrass: 15 percent.
  - 5. Perennial Ryegrass: 12 percent.
  - 6. Clover: 0 to 3 percent.
- B. Seed Mixture Lawn and other maintained areas:
  - 1. Creeping Red Fescue Grass: 50 percent.
  - 2. Kentucky Blue Grass: 30 percent.
  - 3. Perennial Ryegrass: 20 percent.

**PART 3 EXECUTION**

**3.01 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches (50 mm) of topsoil.

- E. Lightly water to aid the dissipation of fertilizer.

### 3.02 SEEDING

- A. Meadow or areas requiring little mowing: Apply seed at a rate of 80 lbs per acre evenly in two intersecting directions. Rake in lightly.
- B. Lawn and other maintained areas: Apply seed at a rate of 100 lbs per acre evenly in two intersecting directions. Rake in lightly.
- C. Do not seed areas in excess of that which can be mulched on same day.
- D. Lightly compact seeded areas.
- E. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- F. Immediately following seeding and compacting, apply mulch. Maintain clear of shrubs and trees.
- G. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches (100 mm) of soil.
- H. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches (100 by 100 mm).

**END OF SECTION**



**SECTION 329300  
PLANTS**

**PART 2 PRODUCTS**

**1.01 PLANTS**

- A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

**END OF SECTION**

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**SECTION 330110.58**  
**DISINFECTION OF WATER UTILITY PIPING SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Disinfection of site domestic water lines and site fire water lines specified in Section 331416.

**1.02 RELATED REQUIREMENTS**

- A. Section 331416 - Water Utility Distribution Piping.

**1.03 REFERENCE STANDARDS**

- A. AWWA B300 - Hypochlorites 2010, Addendum 2011.
- B. AWWA B301 - Liquid Chlorine 2010.
- C. AWWA B302 - Ammonium Sulfate 2016.
- D. AWWA B303 - Sodium Chlorite 2010.
- E. AWWA C651 - Disinfecting Water Mains 2014.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Bacteriological report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Initial and 24 hour Coliform bacteria test results for each outlet tested.
  - 7. Certification that water conforms, or fails to conform, to bacterial standards of the Vermont Water Supply Rule.

**1.05 QUALITY ASSURANCE**

- A. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State in which the Project is located.
- B. Submit bacteriologist's signature and authority associated with testing.

**PART 2 PRODUCTS**

**2.01 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate and AWWA B303 Sodium Chlorite.

**PART 3 EXECUTION**

**3.01 DISINFECTION**

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Inject treatment disinfectant into piping system.
- D. Maintain disinfectant in system for 24 hours.

- E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- F. If any of the noted testing must be re-certified by Project Engineer due to system failures, all extra Engineering fees will be paid by the Contractor at no additional cost to the Owner.
- G. Replace permanent system devices removed for disinfection.

**3.02 FIELD QUALITY CONTROL**

- A. Test samples in accordance with AWWA C651.

**END OF SECTION**

**SECTION 330513  
MANHOLES AND STRUCTURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete.

**1.03 REFERENCE STANDARDS**

- A. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections 2015a.
- B. ASTM C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections (Metric) 2015a.
- C. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals 2018.
- D. ASTM C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals (Metric) 2018.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 (ASTM C478M), with resilient connectors complying with ASTM C923 (ASTM C923M).
- B. Mortar and Grout: Type S.

**2.02 CONFIGURATION**

- A. As per Contract Documents.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify items provided by other sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location, and ready for roughing into Work.
- C. Verify excavation for manholes is correct.

**3.02 MANHOLES**

- A. Place stone base pad, level.
- B. Place manhole sections plumb and level, trim to correct elevations.
- C. Position and fit for pipe.
- D. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
- E. Coordinate with other sections of work to provide correct size, shape, and location.

**3.03 MASONRY WORK**

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 inches (200 mm).
- C. Form concave mortar joints.

- D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

**END OF SECTION**



**SECTION 331113  
POTABLE WATER SUPPLY WELL ABANDONMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Well Abandonment

**1.02 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include data indicating material type and installation method complying with State of Vermont Water Supply Division Regulations.
- C. Well abandonment forms as required by the State of Vermont for each well abandoned.

**1.03 DEFINITIONS**

- A. Well: Any hole drilled, driven, bored, excavated, or created by similar method into the earth to locate, monitor, extract, or recharge groundwater where the water table or potentiometric surface is artificially lowered through pumping.
- B. Shallow Water Source: A developed structure to collect groundwater, generally less than 20 feet deep. This includes springs, dug wells, jetted wells, drilled wells, and well points, and other water intake structures which may or may not be under the jurisdiction of the Vermont Well Driller's Rules and Construction Standards.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. As approved by the State of Vermont Water Supply Rule.

**PART 3 EXECUTION**

**3.01 FILLING**

- A. Groundwater sources which are no longer in use or planned for use shall be sealed by such methods as necessary to restore the controlling geologic conditions which existed prior to construction and shall conform to the requirements of the Vermont Water Supply Rule and reiterated below.
- B. Drilled Wells to be abandoned shall:
  - 1. Be sealed to prevent undesirable exchange of water from one aquifer to another.
  - 2. Have fill materials other than cement grout or concrete approved in advance by the Water Supply Division.
  - 3. When filled with cement grout or concrete, these materials shall be applied to the well hole through a pipe, tremie, or bailer, and filled to surface grade. Wells shall be re-filled to surface grade if consolidation of grout occurs.
  - 4. Be disinfected and free from foreign materials.
  - 5. Be disconnected and plugged from the home to prevent any backflow of grout into the home.
  - 6. Topsoil and seed disturbed areas.
- C. Shallow Wells to be abandoned shall:
  - 1. Be disinfected and free from foreign materials.
  - 2. Be disconnected and plugged from the home to prevent any backflow of grout into the home.

3. Remove top lid and casing section 2 feet below grade.
  4. Fill and compact with clean, drainable fill.
  5. Topsoil and seed disturbed areas.
- D. Well abandonment shall be performed only by a Vermont licensed water well driller or monitoring well driller for her or his respective class and in conformance with all Water Supply Division regulations.

**END OF SECTION**

**SECTION 331416**  
**WATER UTILITY DISTRIBUTION PIPING AND APPURTENANCES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water pipe for site conveyance lines.
- B. Pipe valves and Fire Hydrants.
- C. Hydrostatic pressure testing.
- D. Trace Wire

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Concrete for thrust restraints.
- B. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
- C. Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.
- D. Section 330513 - Manholes and Structures.
- E. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

**1.03 REFERENCE STANDARDS**

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2012.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2018.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2014 (Editorial 2017).
- D. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2015.
- E. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2016.
- F. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).
- G. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40 2017.
- H. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter 2015.
- I. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals 1998 (Reapproved 2011).
- J. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Polyethylene of Raised Temperature (PE-RT) Tubing 2018a.
- K. ASTM F2080 - Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe 2018.
- L. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2011 (Amended 2012).
- M. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2010.
- N. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.

- O. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges 2011.
- P. AWWA C502 - Dry-Barrel Fire Hydrants 2014.
- Q. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service 2015.
- R. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances 2017.
- S. AWWA C800 - Underground Service Line Valves and Fittings 2014.
- T. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service 2017.
- U. AWWA C904 - Cross-Linked Polyethylene (PEX) Pressure Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service 2016.
- V. UL 246 - Hydrants for Fire-Protection Service Current Edition, Including All Revisions.

#### 1.04 **SYSTEM PERFORMANCE REQUIREMENTS**

- A. Minimum Working Pressure Ratings: Except where otherwise indicated, the following are minimum pressure requirements for water system piping:
  1. Underground Piping: 200 psig
  2. Underground Piping: Downstream of Fire Department Connections: 200 psig

#### 1.05 **SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, concrete thrust block mix design, and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- E. Operation and Maintenance Data: Upon approval of submittals, furnish Engineer with 3 copies of Manufacturer's drawings and instructions for use in Operation and Maintenance Manual.
- F. Test Reports specified in this specification section.
- G. Name and relevant experience of firm completing water main tapplings.

#### 1.06 **QUALITY ASSURANCE**

- A. Perform Work in accordance with municipality requirements and State of Vermont Natural Resources.
- B. Comply with standards of authorities having jurisdiction for potable water piping and plumbing systems. Include materials, installation, testing, and disinfection.
- C. Product Options: Water systems specialties and accessories are based on specific types, manufacturers, and models indicated. Components by other manufacturers but having equal performance characteristics may be considered, provided deviations in dimensions, operation, and other characteristics do not change design concept or intended performance as judged by Project Engineer and Town Water Department. The burden of proof of equality of products is on Contractor.

#### 1.07 **DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store valves in shipping containers with labeling in place.

- B. Deliver free of damage and store in protected area with labeling in place.
- C. Report any damage, including light surface scratches, to Engineer prior to installation. Repair or replace any coating or component damage as required by Manufacturer and as directed by Engineer.
- D. Protect valves from weather. Store valves indoors and maintain temperature higher than ambient dew point temperature. Support valves off ground or pavement in watertight enclosures when outdoor storage is necessary.
- E. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.
- F. Deliver pipes and tubes with factory applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- G. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

## **PART 2 PRODUCTS**

- A. Protect flanges, fittings, and piping specialties from moisture and dirt.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.
- C. All handling and storage procedures to meet or exceed the requirements of AWWA, M41.

### **2.02 PROJECT CONDITIONS**

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility locating service for area where Project is located.
- B. Verify that water system piping may be installed in compliance with original design and referenced standards.
- C. Site Information: Reports on subsurface condition investigations made during the design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions (between soil borings). Owner assumes no responsibility for interpretations or conclusions drawn from this information. Contractor has the responsibility to make themselves aware of site conditions and perform any testing they deem necessary prior to bid.

### **2.03 SEQUENCING AND SCHEDULING**

- A. Coordinate connection to water main with the Town Water Department and Project Engineer at least 48 hours prior to work.
- B. The Contractor shall notify and obtain permission from the Fire Department having jurisdiction at least 24 hours prior to the shutting down service to any hydrant, and shall notify the Fire Department when service is restored.
- C. Coordinate with pipe materials, sizes, entry locations, and pressure requirements of building fire protection systems piping.
- D. Coordinate with pipe materials, sizes, entry locations, and pressure requirements of building water distribution systems piping.
- E. Coordinate with other utility work and utility companies which may be effected.

### **2.04 GENERAL**

- A. All products or materials that may come into contact with water intended for use in a public water system shall meet the National Sanitary Foundation International (NSF)/American National Standards Institute (ANSI) Standard 61.

## 2.05 WATER PIPE

- A. Ductile Iron Pipe: AWWA C151/A21.51: Ductile iron pipe shall meet the requirements of ANSI/AWWA C151/A51.51, or the latest revision thereof. The thickness class of Ductile Iron pipe shall be C52. All Ductile Iron Pipe shall be cement mortar lined and contain an exterior bituminous seal conforming with AWWA/ANSI C104/A21.4. All water main fittings shall be ductile iron.
  - 1. Fittings: Ductile iron, standard thickness. Ductile Iron fittings shall be manufactured by Sigma, Tyler Union, or approved equal, and shall have a working pressure of 350 pounds per square inch meeting AWWA C153. All Ductile Iron fittings shall be cement mortar lined and contain an exterior bituminous seal conforming with AWWA/ANSI C104/A21.4. All fittings shall be mechanically restrained and have thrust blocking. Thrust blocking shall be of adequate size to prevent movement of pipe and appurtenances when under pressure.
  - 2. Joints: AWWA C111/A21.11, Styrene butadiene rubber (SBR) or vulcanized SBR gasket with rods.
    - a. Fluorocarbon elastomer gaskets if petroleum hydrocarbon and/or chlorinated solvent contaminated soils are encountered.
      - 1) Champion Fluoroelastomer (FKM) or approved equal.
  - 3. Jackets: AWWA C105/A21.5 polyethylene jacket For use when corrosive soils are encountered.
  - 4. Pipe Joints shall be Restrained Mechanical Joint (MJ) type with "Mega-Lug Series 1100" mechanical joint restraint glands as manufactured by EBAA Ton Sales, Inc., "Uni-Flange Series 1400 Wedge Action" mechanical joint restraint glands as manufactured by Ford Meter Box Co. or approved equal, with T-bolt and rubber gaskets.
  - 5. Pipe joints shall be "Field Lock" Gasket System restrained push-on bell and spigot joint type, as manufactured by U.S. Pipe & Foundry Co. or approved equal where indicated in the specifications or project drawings.
  - 6. Pipe shall be 18' or 20' lengths.
  - 7. Mechanical Joint Bolt Requirements: Bolts for mechanical joint fittings, valves, and hydrants shall be Fluorocarbon Bolts and Nuts meeting AWWA C111 and ANSI/ASME B1.1.
  - 8. Pipe Couplers: HYMAX Long Body Coupling, or approved equal.
  - 9. Leakage Clamps: Ford FBC-E Style or Engineer approved equivalent
    - a. Leakage clamps are to be installed at locations where water main is within 50 feet of leach fields and 25 feet of septic tanks.
  - 10. Pipe is to be installed with a minimum of (2) each bronze conductive wedges at every joint.
- B. Copper Tubing: ASTM B88, Type K, Seamless, Annealed Temper, furnished in coils:
  - 1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
  - 2. Joints: Mueller 110 compression connection or approved equal.
- C. Polyethylene Pipe: AWWA C901:



1. Fittings: AWWA C901, molded or fabricated.
  2. Joints: Compression.
  3. Water Service Lines: HDPE water service lines shall be CTS DR11 conforming to ASTM D2737 with minimum working pressure of 200 psi.
  4. HDPE Sleeves: HDPE Sleeve Pipe: Shall be DR17 IPS.
  5. HDPE Mains: HDPE Main Pipe: Shall be DR9 IPS with minimum working pressure of 200 psi.
  6. Each pipe length shall be clearly marked with manufacturer's name or trademark, nominal pipe size, material designation, pressure class, dimensional ratio, quality control code, and AWWA/ASTM designation.
- D. Pipe and Tube Fittings:
1. Refer to Part 3 Article "Piping Applications" for identification of systems where pipe and tube fitting materials specified below are used.
  2. Ductile Iron and Cast Iron Pipe Fittings: AWWA C110, ductile iron or cast iron, 250 psig minimum pressure rating; or AWWA C153, ductile iron compact fittings, 350 psig pressure rating.
- E. Service Connection:
- a. Lining: AWWA C104, cement mortar.
  - b. Gaskets: AWWA C111, rubber.
  2. Ductile Iron Pipe, Grooved End Fittings: ASTM A 47 malleable iron or ASTM A 536 ductile iron, AWWA pipe size, grooved end fittings having cement lining or Food and Drug Administration (FDA) approved interior coating, designed to accept AWWA C606 couplings, for AWWA size grooved end piping joints.
  3. Ductile Iron and Gray Iron Flanged Fittings: AWWA C110, 250 psig minimum pressure rating, with AWWA C104 cement mortar lining.
  4. Bronze Corporation Stops and Valves, ball valve type:
  5. Ductile Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical joint ends conforming to AWWA C110 or AWWA C153. Units have 2 gasketed ball joint sections and 1 or more gasketed sleeve sections, rated for 250 psig minimum working pressure and with FDA approved epoxy interior coating, for offset and expansion indicated.
  6. Ductile Iron Deflection Fittings: Compound coupling fitting with sleeve and flexing sections, gaskets, and restrained joint ends conforming to AWWA C110 or AWWA C153. Units rated for 250 psig minimum working pressure, and with cement lining or FDA approved epoxy interior coating, for up to 20 degrees deflection.
  7. Restrained Joint Ductile Iron Pipe: U.S. Pipe and Foundry Co. TR Flex or Engineer Approved Equal.
    - a. Ford Meter Box Co., Inc. FB 1000-X-Q-NL
  8. Ductile Iron Expansion Joints: 3 piece assembly consisting of telescoping sleeve with gaskets and restrained type, ductile iron bell and spigot end sections conforming to AWWA C110 or AWWA C153. Units rated for 250 psig minimum working pressure, and with cement lining or FDA approved epoxy interior coating, for expansion indicated.
  9. Copper Tube Fittings: ASME B16.22, wrought copper, solder joint pressure type.

F. Anchorages:

1. Clamps, Straps, and Washers: ASTM A 506, steel.
2. Rods: ASTM A 575, steel.
  - a. Regardless of manufacturer all corporations shall be No-Lead and in compliance with NSF-61 and Town Ordinance.
3. Rod Couplings: ASTM A 197, malleable iron.
4. Bolts: ASTM A 307, steel. Fluorocarbon Bolts and Nuts meeting AWWA C111 and ANSI/ASME B1.1.
5. Cast Iron Washers: ASTM A 126, gray iron.
6. Concrete Thrust Blocks: Portland cement concrete mix, 3000 psi.
  - a. Cement: ASTM C 150, Type I.
  - b. Fine Aggregate: ASTM C 33, sand.
  - c. Coarse Aggregate: ASTM C 33, crushed gravel.
  - d. Water: Potable.

G. Pipe Insulation:

1. Buried Insulation Board: Dow Styrofoam Highload 40 meeting ASTM C578 or Engineer approved equal with the following specifications:
  - a. 5.0 R-Value min - Thermal Resistance per inch, ASTM C518, C177, @ 75 degrees mean temp
  - b. 40 psi min Compressive Strength, ASTM D1621
  - c. 0.3 max % by volume, water absorption, ASTM C272
  - d. 1.0 perms water vapor permeance, ASTM E96
  - e. 165 degrees F maximum use temperature
  - f.  $3.5 \times 10^{-5}$  Coefficient of Linear Thermal Expansion
  - g. 60 psi, min Flexural Strength, ASTM C203
  - h. Type VI Complies with ASTM C578
2. Bronze Curb Stops, Valves, and Fittings:
  - a. Curb stops shall be open left, full flow, ball valve type as manufactured by Ford, Mueller, or approved equal with tracer wire nut connection and Quick Joint Coupling.
  - b. Ford Meter Box Co., Inc. B41-xxx-TW-Q-NL
  - c. Ford Meter Box Co., Inc. C84-xx-Q-NL
  - d. Curb stops shall be equipped with a sliding adjustable, cast iron curb box with two-hole cover marked "water". The box shall be arch-type so as to enclose the curb stop and rest on a concrete base and not transfer force to the service or curb stop. Boxes for curb stops larger than 1" shall have a heavy foot piece. Box length shall be adequate to allow a minimum of 4" of overlap of sections with top extended to final grade.
  - e. A 30" stainless steel stationary operating rod shall be affixed to the key of the curb stop with stainless steel cotter pin.
  - f. All curb stops shall be No-Lead.

3. Quick Joint Tee
  - a. Ford Meter Box Co., Inc. T444-xxx-Q-NL.
4. Interior Plumbing
  - a. Backflow Preventors: To meet Town Water Department Specifications.
    - 1) Watts Regulator Co. Dual Check Valve.
  - b. Residential Water Meters 1" to 1.5": To meet Town Water Department Specifications
    - 1) Neptune Water Div., Schlumberger Industries, Inc. T-10 Integrated E-Coder R900i.
  - c. Residential Water Meters 2" to 3": To meet Town Water Department Specifications.
    - 1) Neptune Water Div., Schlumberger Industries, Inc. TRU/FLO Compound Meter Integrated E-Coder R900i with strainer.
  - d. Booster Pumps
    - 1) DuraMAC – Residential Booster
    - 2) Booster pumps shall be rated to provide a minimum of 35 psi additional pressure to the system.
    - 3) Booster Pumps shall be installed with an approved testable double check valve and low pressure cut off switch calibrated to cut off when the incoming service pressure falls below 12 psi.
  - e. Expansion Tanks: Amtrol THERM-X-TROL In Line Model or approved equal.

## 2.06 VALVES

- A. Valves: Manufacturer's name, pressure rating, and year in which manufactured cast on valve body.
- B. Gate Valves 3 Inches (75 mm) and Over:
  1. Manufacturers:
    - a. Kennedy Valve Div., McWane Inc..
    - b. Mueller Co, Grinnell Corp.
    - c. Waterouse Co.
  2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends, control rod, post indicator, valve key, and extension box.
  3. Minimum working pressure of 250 psi. Inlet flange shall be Class 125 conforming to ANSI Specification B 16.1 and outlet connection shall be as specified on Contract Drawings for the type of pipe specified.
  4. Gate Valves shall be open right and an operating rod extension shall be provided where the valve depth exceeds 6 feet.
  5. Gate valves shall have stainless steel (304) nuts and bolts.
- C. Valve Boxes
  1. Buried valves shall have adjustable, flanged, 5.25" diameter, cast iron valve box with flush cover marked "water". The box shall enclose the valve operating nut and stuffing box. Box length shall be adequate to allow a minimum 4" overlap of sections with top extended to final grade.

2. Valve boxes shall be installed to prevent section stops from transferring loads from surface traffic to the valve. Stops shall be a minimum of 4 inches from bottom section.

#### 2.07 HYDRANTS

- A. Hydrants: AWWA C502, UL 246, dry barrel type. Hydrants to have minimum burial of 6', maintain a minimum 15" between bottom of the streamer cap and finish grade, all bolts to be stainless steel (304), and shall be factory painted red conforming to NFPA Standards (contractor to field touch up paint as necessary). Hydrants to open right and contractor to verify fitting requirements with local Water and Fire Departments
  1. Manufacturers:
    - a. Kennedy GUARDIAN.
- B. Hydrant Extensions: Fabricate in multiples of 6 inches (150 mm) with rod and coupling to increase barrel length.
- C. Hose and Streamer Connection: Match sizes with utility company, two hose nozzles , one pumper nozzle.
- D. Hydrant Drains to be plugged in areas of high ground water as defined by the Town Water Department.
- E. Hydrant Markers: All hydrants shall be equipped with a hydrant marker. The hydrant marker shall be approved by the municipality having jurisdiction.

#### 2.08 FLUSHING HYDRANTS

- A. Hydrants to open right and contractor to verify fitting requirements with local Water and Fire Departments.
  1. Manufacturers
    - a. Kupferle ECLIPSE #2 Post type or Engineer Approved Equal
- B. Hydrants to have minimum burial of 6', maintain a minimum 15" between bottom of the streamer cap and finish grade, all bolts to be stainless steel (304), and shall be factory painted red conforming to NFPA Standards (contractor to field touch up paint as necessary).
- C. Hydrant Drains to be plugged in areas of high ground water as defined by the Town Water Department.
- D. Hydrant Markers: All hydrants shall be equipped with a hydrant marker. The hydrant marker shall be approved by the municipality having jurisdiction.

#### 2.09 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 312316.13.
- B. Cover: As specified in Section 312316.13.

#### 2.10 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in Section 033000.
- B. Trace Wire: All non-metallic water main and service lines shall be equipped with blue Trace Wire designed specifically for detecting buried utilities and shall be certified for direct burial applications. Tracer wire shall be a minimum #12 AWG copper clad and connected to a magnesium grounding rod.
  1. Connectors: All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector or two 3-way connectors with a short jumper wire.

- a. Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
    - b. Non locking friction fit, twist on or taped connectors are prohibited.
  - 2. Termination/Access: All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
    - a. All grade level/in-ground access boxes shall be appropriately identified with "water" cast into the cap and shall be color coded.
    - b. A minimum of 2 feet of excess/slack wire is required in all trace wire access boxes after meeting final elevation.
- C. Water Sampling Stations
- a. All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.
    - b. Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.
    - c. In lieu of trace wire access boxes, trace wire may be terminated at gate valve boxes at the end of lines. If this is done, tracer wire shall be wrapped around the exterior of the valve box to a point 6 inches below grade, and a hole will be drilled in the side of the valve box. The trace wire shall be looped a minimum of 2 feet inside the valve box.
  - 2. Spacing: At intervals not less than 500 linear feet, trace wire shall be extended from the mainline with an approved connector, ran to a curb box, and extended to grade. All curb boxes with connected trace wire shall be delineated using a minimum 48-inch polyethylene marker post, color coded per APWA standard for the specific utility being marked.
  - 3. Grounding. Trace wire must be properly grounded at all dead ends/stubs. Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20 feet of #14 red HDPE insulated copper clad steel wire connected to anode (minimum 0.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.
    - a. When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.
    - b. When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.
  - 4. Kupferle ECLIPSE #88-XC "Extreme Cold" with a lockable cast-aluminum enclosure.
    - a. Where the anode wire will be connected to a trace wire access box, a minimum of 2 feet of excess/slack wire is required after meeting final elevation.

- D. Tapping Sleeve: Ductile Iron Watermain: To be split sleeve design, constructed with two solid half sleeves bolted together. Sleeves shall be constructed of Stainless Steel Type 304 (ASTM A240), and shall have a minimum working pressure of 250 psi.
  - 1. Stainless steel, Model #3490MJ Manufactured by Powerseal Pipeline Products Corporation, or approved equal, with mechanical joint gate valve.
- E. Tapping Tee: HDPE Watermain: Service line connections from new HDPE watermain shall be accomplished with molded electrofusion tapping tees or transition saddles with a minimum working pressure of 200 psi, installed in accordance with the manufacturers recommendations. Direct connections shall not be allowed.
- F. Yard Hydrants: Sanitary Type: Nonfreeze, post type, with nondraining chamber for storing water trapped downstream of inlet valve. Hydrants have 1 inch (25 mm) inlet, integral or field installed vacuum breaker with outlet conforming to ASME B1.20.7, 3/4 11.5NH threads for garden hose, brass or bronze casing, and other parts in contact with water, and are handle or key operated.
  - 1. Body of hydrant is of length required for installation of storage chamber below frost line. Furnish 2 keys for each key operated hydrant.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

#### **3.02 PREPARATION**

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

#### **3.03 TRENCHING**

- A. See the sections on excavation and fill for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required square feet thrust restraint bearing on subsoil.
- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

#### **3.04 PIPING APPLICATIONS**

- A. Refer to Part 2 of this Section for detailed specifications for pipe and fittings products listed below. Use pipe, tube, fittings, and joining methods according to the following applications. Piping in pits and inside building may be joined with flanges or couplings, instead of joints indicated, for grooved end AWWA size piping.

#### **3.05 JOINT CONSTRUCTION**

- A. Ductile Iron Piping Gasketed Joints: Construct joints according to AWWA C600.
- B. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.

#### **3.06 INSTALLATION - PIPE**



- A. Threaded Joints: Thread pipes with tapered pipe threads according to ASME B1.20.1, apply tape or joint compound, and apply wrench to valve ends into which pipes are being threaded.
- B. Ductile Iron, Grooved End Pipe and Fitting Joints: Cut groove pipes. Assemble joints with grooved couplings, gaskets, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

### 3.07 PIPING SYSTEMS COMMON REQUIREMENTS

- A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated except where deviations to layout are approved on coordination drawings.
- B. Install piping at indicated slope.
- C. Maintain separation of water main from sewer piping in accordance with State of Vermont code.
- D. Install components having pressure rating equal to or greater than system operating pressure.
- E. Install piping free of sags and bends.
- F. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- G. Establish elevations of buried piping to ensure not less than [5.5] feet ([\_\_\_\_\_] m) of cover.
- H. Install pipe to indicated elevation to within tolerance of 5/8 inches (16 mm).
- I. Install ductile iron piping and fittings to AWWA C600.
- J. Route pipe in straight line unless otherwise indicated on the plans. Deflections shall not exceed 2 degrees.
- K. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- L. Install tapping sleeve and tapping valve according to manufacturer's installation instructions.
- M. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
- N. Install access fittings to permit disinfection of water system performed under Section 330110.58.
- O. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water service piping.
- P. Install service clamps and corporation stops in size, quantity, and arrangement required by utility company standards and according to manufacturer's installation instructions.
- Q. Install service clamps on pipe to be tapped. Position outlet for corporation stop.
- R. Install corporation stops into service clamps. Install valve with stem pointing up and with cast iron valve box.
- S. Install curb stop in service piping with head pointing up and with cast iron service box.
- T. Install manifold for multiple taps in water main.
- U. Use drilling machine compatible with service clamp and corporate stop. Drill hole in main. Remove drilling machine and connect water service piping.
- V. Comply with requirements of NFPA 24 for materials and installation.

- W. Install copper tube and wrought copper fittings according to CDA No. 404/0 "Copper Tube Handbook."
- X. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- Y. Welding, installation, and fittings of HDPE pipe shall be performed In Accordance With AWWA Standard C906-07 for Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch, and AWWA Standard M55 PE Pipe – Design and Installation.
- Z. Install TR Flex Restrained Joint Ductile Iron Pipe where pipe is installed at an aerial crossing or in a sleeved condition
- AA. Slope water pipe and position drains at low points.
- BB. Install marking tape 18 inches above top of pipe.
- CC. Trace Wire
  - 1. Electrical Conductivity Testing: All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the CONTRACTOR, ENGINEER and CITY prior to acceptance. Continuity testing in lieu of actual line tracing shall not be accepted.
  - 2. Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.
  - 3. Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
  - 4. Trace wire shall be installed at the 3 o'clock or 9 o'clock position and secured (taped/tied) at 5' intervals.
  - 5. Trace wire must be properly grounded as specified.
  - 6. At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire.
  - 7. Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end, ground using an approved waterproof connection to a grounding anode buried at the same depth as the trace wire.
  - 8. All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
  - 9. In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.
  - 10. A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
  - 11. Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.
  - 12. The following products and methods shall be expressly prohibited:
    - a. Uninsulated trace wire.
    - b. Trace wire insulations other than HDPE.

- c. Trace wires not domestically manufactured.
- d. Non-locking, friction fit, twist on or taped connections.
- e. Brass or copper ground rods.
- f. Wire connections utilizing taping or spray-on waterproofing.
- g. Looped wire or continuous wire installations with multiple side-by-side wires or wires in close proximity.
- h. Trace wire wrapped around corresponding utility.
- i. Brass fittings with trace wire connection lugs.
- j. Wire terminations within the roadway.
- k. Trace wire connections to existing conductive utilities.

### 3.08 INSTALLATION - ANCHORAGES

- A. Anchorages: Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

- 1. Gasketed Joint, Ductile Iron Piping: According to AWWA C600.

### 3.09 INSTALLATION - VALVES AND HYDRANTS

- 1. Fire Service Piping: According to NFPA 24.
- B. Apply full coat of asphalt or other acceptable corrosion retarding material to surfaces of installed ferrous anchorage devices.
- C. Set valves on solid bearing concrete block or approved equal. Install valve with stem pointing up and with cast iron valve box.
- D. Install gate valve onto tapping sleeve. Comply with AWWA C600.
- E. Center and plumb valve box over valve. Set box cover flush with finished grade.
- F. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- G. Set hydrants to grade, with nozzles at least 15 inches ([ ] mm) above ground.
- H. Locate control valve minimum 36 inches ([ ] mm) away from hydrant.
- I. Provide a drainage pit 36 inches (900 mm) square by 12 inches ([ ] mm) deep filled with [3/4] inches ([ ] mm) crushed stone. Encase elbow of hydrant in gravel to 6 inches (150 mm) above drain opening. Do not connect drain opening to sewer.
- J. Bronze Corporation Stops and Curb Stops: Comply with manufacturer's installation instructions. Install buried curb stops with head pointed up and with cast iron curb box.

### 3.10 INSTALLATION - CONNECTION TO EXISTING MAIN

- A. Prior to making any connection to an existing water main, the Contractor shall obtain permission and coordinate on the connection schedule with the municipality having jurisdiction.

### 3.11 INSTALLATION - SERVICE CONNECTIONS

- A. Foundation wall penetration shall be three times the diameter of the service line.
- B. Provide sleeve in foundation wall for service main as per plan details. Calk enlarged sleeve watertight.
- C. Anchor service main to interior surface of foundation wall.
- D. Seal service line penetration watertight with link seal.

- E. Modify Internal building plumbing as directed on the Project Drawings. Internal building modifications shall be completed by a Vermont Licensed Plumber in accordance with applicable State and Local plumbing codes.
- F. Contractor shall apply for and purchase all State plumbing and electrical permits.
- G. Install restrained joints for buried piping within 5 feet (1.5 m) of building. Use restrained joint pipe and fittings, thrust blocks, anchors, tie rods and clamps, and other supports at vertical and horizontal offsets.

### 3.12 INSTALLATION - YARD HYDRANT

- A. Install sanitary type yard hydrants in pavement or with concrete anchor as indicated.
- B. Install post type yard hydrants in pavement or with concrete anchor, and make provision for drainage into drywell as indicated.

### 3.13 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Piping Tests: Conduct piping tests after thrust blocks have hardened sufficiently. All tests shall comply with State of Vermont Water Supply Rules. Fill pipeline 24 hours prior to testing and apply test pressure to stabilize system. Use only potable water. Prior to beginning any tests, watermain shall be flushed at a minimum of 3.0 ft/sec to remove particulates. All connections to existing water supply system necessary to obtain flush and test water shall contain adequate cross-connection control devices.
  - 1. Hydrostatic Tests:
    - a. Test at not less than 1 1/2 times working pressure for 2 hours. Minimum test pressure of 200 psi.
    - b. Testing must be witnessed and report filed by a Vermont Licensed Professional Engineer.
    - c. Maximum pipe length to be run per test is not to exceed 1,200 LF unless approved by Project Engineer.
    - d. Contractor shall provide all necessary valves, gauges, pumps, temporary connections, etc. to run the test as part of base bid. Equipment, at a minimum, must consist of a volumetrically calibrated water tank with cover, oil filled pressure gage graduated in feet of water or psi, flexible hoses, leak free valves and gas driven pump with capability to develop 200 psi of discharge pressure.
    - e. Any damage done to the piping will be repaired by the Contractor at no additional cost to the owner.
    - f. The pressure and leakage test shall include all new components of the water system including, but not limited to, valves, fittings, hydrants, and branch lines
  - 2. Polyethylene Hydrostatic Tests:
    - a. During the test procedure, Contractor will not allow test pressure to drop below 5 psi of said test pressure, if it does system shall be pumped up to maintain pressure and water volume recorded.
    - b. No pipe installation shall be accepted if the leakage is greater than that determined by the following
      - 1)  $L = (S \times D \times P^{1/2}) / (148,000)$
      - 2) L = the allowable leakage, in gallons per hour.
      - 3) S = the length of pipe being tested, in feet.

- 4) D = the nominal diameter of the pipe, in inches.
  - 5) P = the average test pressure, in psig.
  - c. All testing be in accordance with State of Vermont Agency of Natural Resources Regulations and AWWA C600, latest revisions.
  - d. Test in accordance with ASTM F2164 – 13, Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure.
- C. Trace Wire Electrical Conductivity Testing: All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the CONTRACTOR, ENGINEER and CITY prior to acceptance. Continuity testing in lieu of actual line tracing shall not be accepted.
1. Conductivity testing shall be performed within one week of pressure testing completion.

### 3.14 CLEANING

- A. Clean and disinfect water distribution piping as follows:
1. Purge/flush new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired to pressure testing and chlorination. Flushing to be in accordance with AWWA C600. If line is being connected to a fire suppression system it needs to meet NFPA24 and 30 and associated NFPA test certifications for flushing and pressure test be completed by Contractor.
  2. After satisfactory pressure test results, system shall be chlorinated in accordance with Vermont Agency of Natural Resources Regulations, AWWA C600 and ANSI/AWWA C651, latest revisions. The chlorination is to be left standing a minimum of 24 hours and a minimum of 2 bacteria tests are to be passed, tests to be taken at least 24 hours apart. The Testing Lab must be Certified by the State of Vermont Department of Health and approved by Project Engineer.
  3. After satisfactory test results, system will be flushed again. The super chlorinated water must be disposed of/treated in accordance with State and Local Regulations. Any special discharge permits/fees are the responsibility of the Contractor.
  4. If any of the noted testing must be re-certified by Project Engineer due to system failures all extra Engineering fees will be paid by the Contractor at no additional cost to the Owner.
- B. Tie-in connections to existing mains shall be sterilized either by immersing in a chlorine solution of 500 ppm for one-half hour or by swabbing with a five percent hypochlorite solution.

**END OF SECTION**

**SECTION 333113**  
**SANITARY SEWERAGE GRAVITY PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Sanitary sewerage drainage piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to municipal sewers.

**1.02 RELATED REQUIREMENTS**

- A. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.

**1.03 REFERENCE STANDARDS**

- A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).
- B. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications 2014.
- C. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2011.

**PART 2 PRODUCTS**

**2.01 SEWER PIPE MATERIALS**

- A. Provide products that comply with applicable code(s).
- B. Plastic Pipe: ASTM D1785, Schedule 40, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of 4 inches (s), bell and spigot style solvent sealed joint end.
- C. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- D. Couplings: All couplings shall be Max Adaptor AISI 304 Series Stainless Steel or approved equivalent.

**2.02 PIPE ACCESSORIES**

- A. Trace Wire: All non-metallic sewer lines shall be equipped with green Trace Wire designed specifically for detecting buried utilities and shall be certified for direct burial applications. Tracer wire shall be a minimum #12 AWG copper clad imprinted with "Sewer Service" in large letters.
- B. Connectors: All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector or two 3-way connectors with a short jumper wire.
- C. Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
- D. Non locking friction fit, twist on or taped connectors are prohibited.
- E. Marking tape: Install marking tape 2 feet above top of pipe.

**2.03 BEDDING AND COVER MATERIALS**

- A. Pipe Bedding Material: As specified in Section 312323.
- B. Pipe Cover Material: As specified in Section 312323.

**PART 3 EXECUTION**



### 3.01 GENERAL

- A. Perform work in accordance with applicable code(s).

### 3.02 TRENCHING

- A. See Section 312316.13 for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

### 3.03 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
  - 1. Plastic Pipe: Also comply with ASTM D2321.
- B. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).
- C. Connect to building sanitary sewer outlet and municipal sewer system , through installed sleeves.

**END OF SECTION**

**SECTION 334211  
STORMWATER GRAVITY PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Storm drainage piping, fittings, and accessories.
- B. Connection of drainage system to municipal sewers.
- C. Bedding, backfilling and slope protections at pipe end.

**1.02 RELATED REQUIREMENTS**

- A. Section 312316 - Excavation: Excavating of trenches.
- B. Section 312323 - Fill: Bedding and backfilling.
- C. Section 330513 - Manholes and Structures.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories.

**PART 2 PRODUCTS**

**2.01 PIPE MATERIAL**

- A. Corrugated polyethylene pipe, smooth walled, ADS-N12 or approved equal.
- B. Regulatory Requirements: Conform to applicable code for materials and installation of the work of this section.

**2.02 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 312323.
- B. Cover: As specified in Section 312323.

**2.03 ACCESSORIES**

- A. Fill at Pipe Inverts: Riprap as specified in Section 313700.

**PART 3 EXECUTION**

**3.01 TRENCHING**

- A. See Section 312316 - Excavation and Section 312323 - Fill for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

**3.02 INSTALLATION - PIPE**

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
- C. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.
- D. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).
- E. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.
- F. Maximum variation from intended elevation of culvert invert: 1/2 inch.
- G. Maximum offset of pipe from true alignment: 1 inch.

### 3.03 PIPE INVERTS

- A. Place rip rap at pipe inverts, at embankment slopes.
- B. Installed thickness: 12 inches average.

### 3.04 INSTALLATION - CATCH BASINS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

### 3.05 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

## PART 4 MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

- A. If specific items are listed on bid, Engineer will make measurement in accordance with each specific bid item. For lump sum (LS) bid items, measurements will not be made.

### 4.02 PAYMENT

- A. Payments for specific bid items shall be at the unit price bid and shall include all costs for labor, equipment and materials.

**END OF SECTION**

# LEGEND

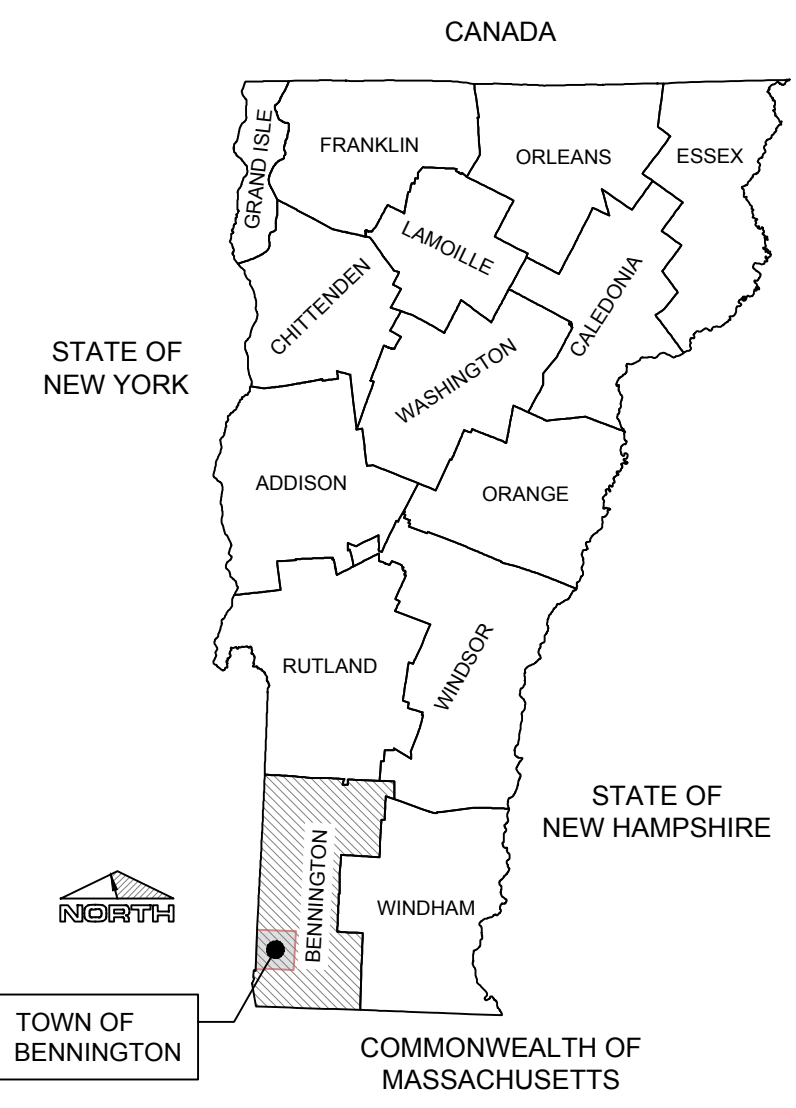
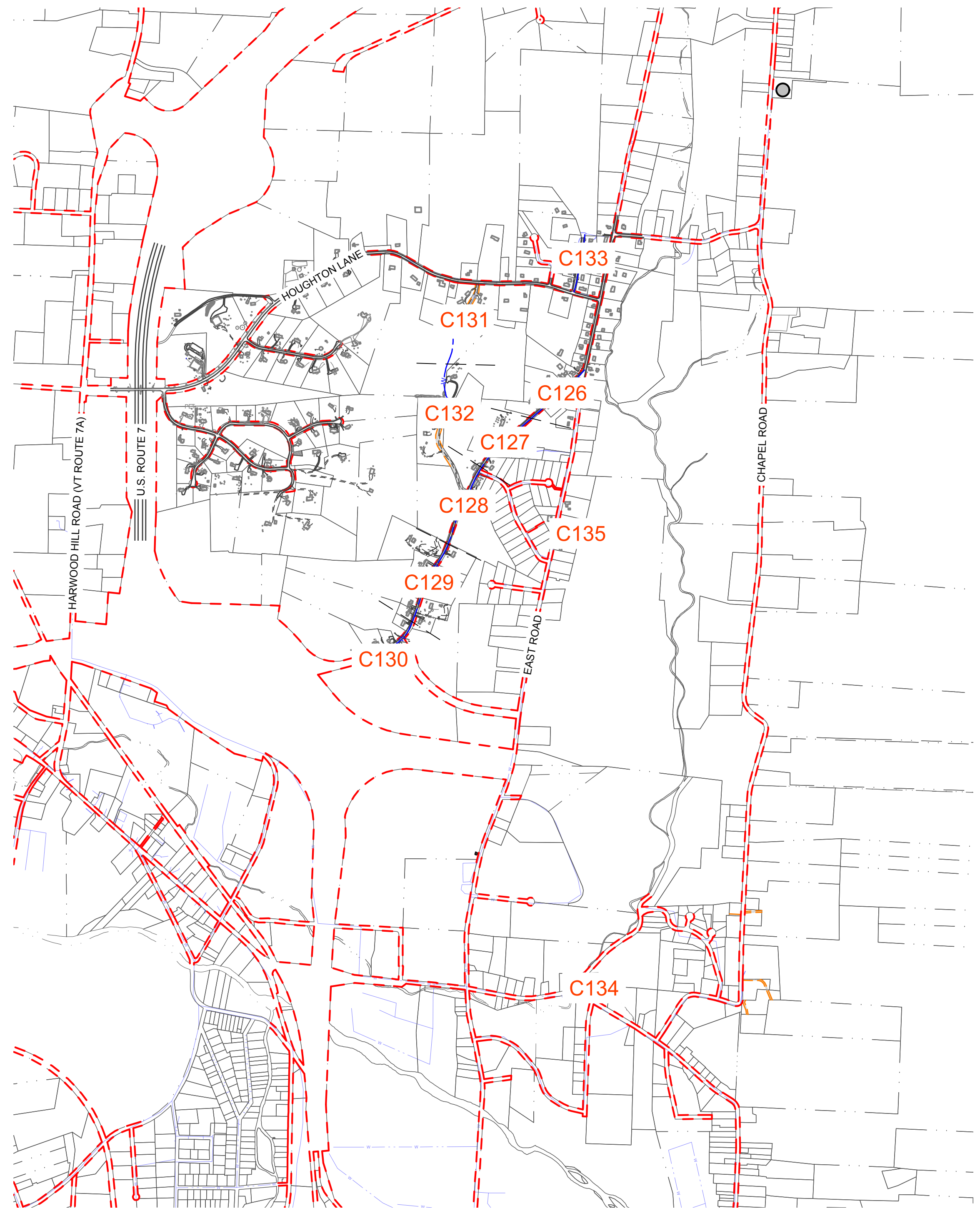
- BENCHMARK
- IRON PIN
- LEDGE PROBE OR BORING
- STATE OR MUNICIPAL RIGHT-OF-WAY
- EASEMENT
- SETBACK
- PROPERTY LINE
- ADJACENT PROPERTY LINE (ABUTTER)
- FENCE LINE
- PROJECT DEMARCATION FENCE
- SILT FENCE
- GUARD RAIL
- BOLLARD
- MAILBOX
- POST
- SIGN
- CATCH BASIN
- DRAINAGE MANHOLE
- STORM DRAIN
- SANITARY SEWER MANHOLE
- SANITARY SEWER
- ARV: AIR RELEASE VALVE (EXISTING)
- ARV: AIR RELEASE VALVE
- WATER SHUT-OFF (EXISTING)
- WATER SHUT-OFF
- GATE VALVE (EXISTING)
- GATE VALVE
- PRV: PRESSURE REDUCING VALVE (EXISTING)
- PRV: PRESSURE REDUCING VALVE
- FIRE HYDRANT (EXISTING)
- FIRE HYDRANT
- FLUSH HYDRANT (EXISTING)
- FLUSH HYDRANT
- SAMPLING STATION
- WELL
- WATER MAIN OR SERVICE (EXISTING)
- WATER MAIN (NEW)
- WATER SERVICE (NEW)
- STREET OR YARD LIGHT
- UTILITY MANHOLE
- UTILITY POLE
- GUY POLE/WIRE
- OVERHEAD UTILITY SERVICE
- UNDERGROUND ELECTRICAL SERVICE
- UNDERGROUND GAS SERVICE
- EDGE OF WATERWAY(OHW)  
RIVER, STREAM, LAKE OR POND
- TREE OR BRUSH LINE
- SHRUB
- DECIDUOUS TREE
- CONIFER TREE
- FLAGGED WETLAND LOCATION
- ROLLED EROSION CONTROL PRODUCT (REC)

NOTE: SOME SYMBOLS MAY NOT APPEAR ON ALL PLANS.

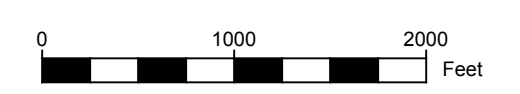
# TOWN OF BENNINGTON MUNICIPAL WATER SYSTEM REMEDIAL EXPANSION PHASE II BENNINGTON, VERMONT

## CONTRACT 7

WILLOW ROAD/MARION LANE/AUTUMN ACRES ROAD/CARPENTER LANE

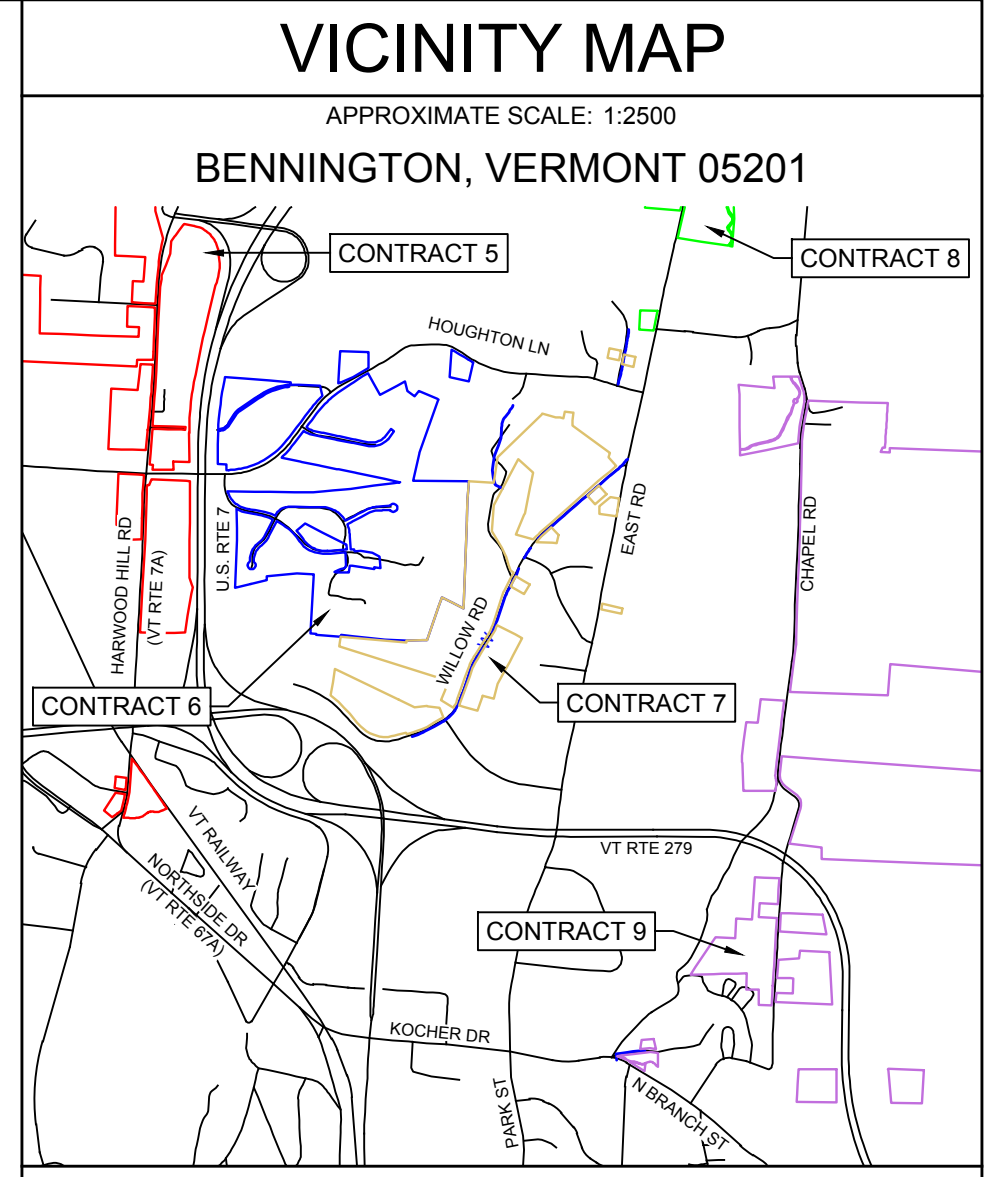


## 1 DISTRICT C COVER SHEET AND KEY PLAN



Scale: 1:1000

DATUM  
VERTICAL NAVD1988  
HORIZONTAL NAD 1983



## SHEET INDEX

CONTRACT 7	
SHEET NO.	SHEET TITLE
G007	COVER SHEET AND KEY PLAN
C126	PLAN
C126A	PROFILE
C127	PLAN
C127A	PROFILE
C128	PLAN
C128A	PROFILE
C129	PLAN
C129A	PROFILE
C130	PLAN
C130A	PROFILE
C131	PLAN
C131A	PROFILE
C132	PLAN
C132A	PROFILE
C133	PLAN
C133A	PROFILE
C134	PLAN
C134A	PROFILE
C135	PLAN
C501	TRAFFIC CONTROL DETAILS
C502	TRAFFIC CONTROL DETAILS
C503	CONSTRUCTION DETAILS
C504	CONSTRUCTION DETAILS
C505	CONSTRUCTION DETAILS
C506	EPSC DETAILS
C507	STABILIZATION DETAILS
C508	PLUMBING DETAILS
C509	CONNECTION DETAILS
C601	SERVICE ENTRANCE DIAGRAMS
C602	SERVICE ENTRANCE DIAGRAMS
C603	SERVICE ENTRANCE DIAGRAMS

## GENERAL NOTES

- THE CONTRACTOR SHALL ADHERE TO THE FOLLOWING GUIDELINES, UNLESS OTHERWISE NOTED:
- NEW 3/4" CORPORATION STOPS ARE TO BE INSTALLED FOR ALL SERVICES
  - NEW 3/4" K COPPER IS TO BE INSTALLED FROM CORPORATION STOPS TO CURB STOPS
  - NEW 1" HDPE IS TO BE INSTALLED FROM CURB STOPS TO SERVICE ENTRANCES OF ALL STRUCTURES
  - CURB STOPS SHALL BE LOCATED NO LESS THAN 6 FEET NOR MORE THAN 8 FEET FROM EDGES OF ROADWAYS, AND (MINIMUM) 1 FOOT INSIDE STATE OR MUNICIPAL RIGHT-OF-WAYS. AVOID INSTALLING CURB STOPS IN DRIVE SURFACES, WHERE POSSIBLE.
  - IN ACCORDANCE WITH VERMONT WASTEWATER AND POTABLE WATER SUPPLY RULES (04/12/2019), LEAKAGE CLAMPS ARE TO BE INSTALLED AT JOINTS ON WATER MAINS WITHIN 50' OF LEACH FIELDS AND SEPTIC TANKS, AND WITHIN 10' OF SANITARY PIPING. 8 mil POLYSTYRENE SLEEVES ARE TO BE APPLIED TO WATER SERVICES WITHIN 25' OF SANITARY SYSTEMS AND WITHIN 10' OF SANITARY PIPING.

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 441-1402 FAX: (802) 445-1291

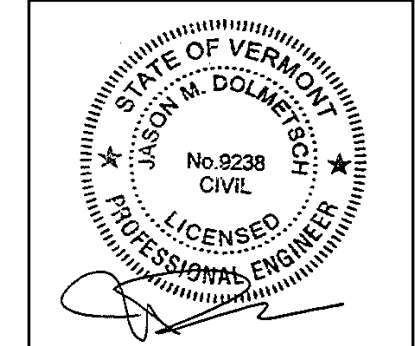
REVISIONS	
NO.	DESCRIPTION

## TOWN OF BENNINGTON MUNICIPAL WATER SYSTEM REMEDIAL EXPANSION PHASE II BENNINGTON, VERMONT

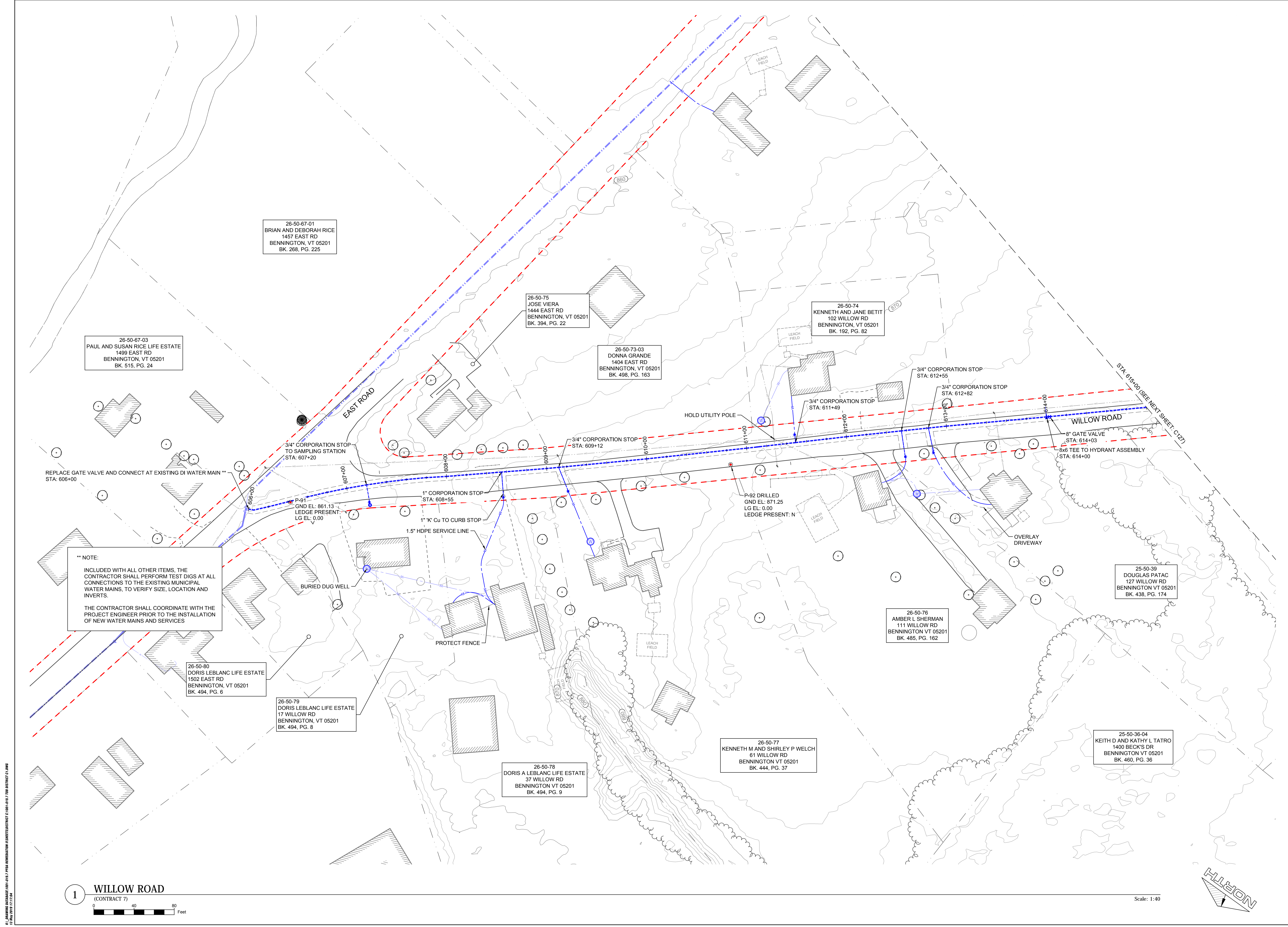
## CONTRACT 7 COVER SHEET AND KEY PLAN

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**G007**







**\*\* NOTE:**  
 INCLUDED WITH ALL OTHER ITEMS, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
 THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

26-50-67-01  
 BRIAN AND DEBORAH RICE  
 1457 EAST RD  
 BENNINGTON, VT 05201  
 BK. 268, PG. 225

26-50-67-03  
 PAUL AND SUSAN RICE LIFE ESTATE  
 1499 EAST RD  
 BENNINGTON, VT 05201  
 BK. 515, PG. 24

26-50-75  
 JOSE VIERA  
 1444 EAST RD  
 BENNINGTON, VT 05201  
 BK. 394, PG. 22

26-50-73-03  
 DONNA GRANDE  
 1404 EAST RD  
 BENNINGTON, VT 05201  
 BK. 498, PG. 163

26-50-74  
 KENNETH AND JANE BETIT  
 102 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 192, PG. 82

26-50-80  
 DORIS LEBLANC LIFE ESTATE  
 1502 EAST RD  
 BENNINGTON, VT 05201  
 BK. 494, PG. 6

26-50-79  
 DORIS LEBLANC LIFE ESTATE  
 17 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 494, PG. 8

26-50-78  
 DORIS A LEBLANC LIFE ESTATE  
 37 WILLOW RD  
 BENNINGTON VT 05201  
 BK. 494, PG. 9

26-50-77  
 KENNETH M AND SHIRLEY P WELCH  
 61 WILLOW RD  
 BENNINGTON VT 05201  
 BK. 444, PG. 37

26-50-76  
 AMBER L SHERMAN  
 111 WILLOW RD  
 BENNINGTON VT 05201  
 BK. 485, PG. 162

25-50-39  
 DOUGLAS PATAC  
 127 WILLOW RD  
 BENNINGTON VT 05201  
 BK. 438, PG. 174

25-50-36-04  
 KEITH D AND KATHY L TATRO  
 1400 BECK'S DR  
 BENNINGTON VT 05201  
 BK. 460, PG. 36

1 WILLOW ROAD  
 (CONTRACT 7)  
 0 40 80 Feet

Scale: 1:40

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

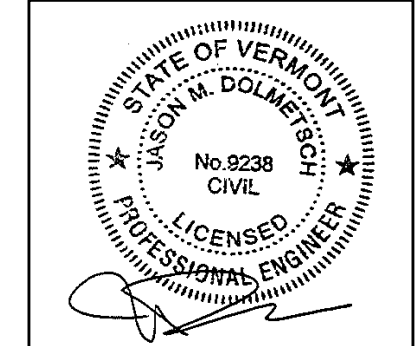
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**TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT**

**SERVICE DISTRICT C  
 PLAN**

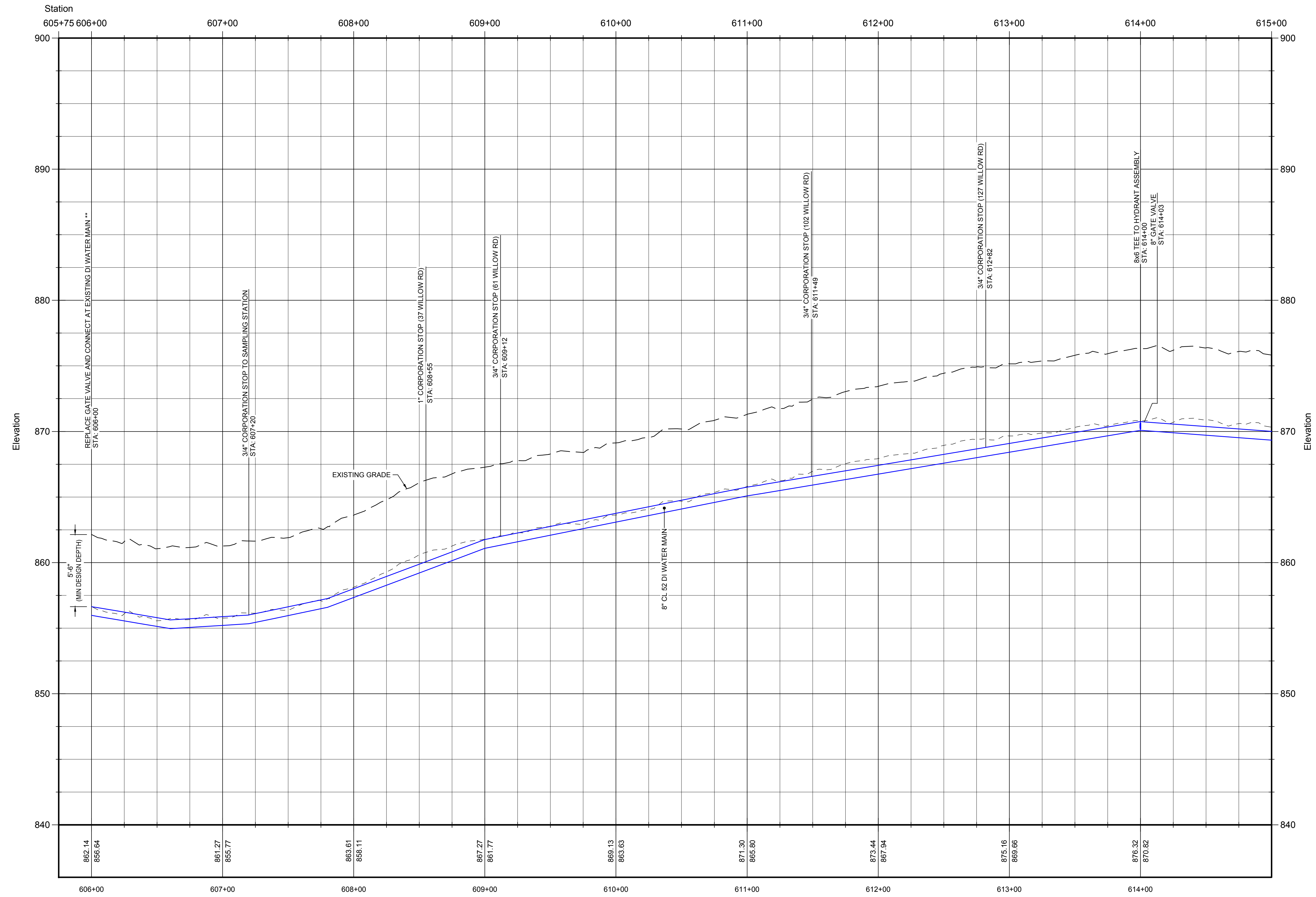
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C126**





WL - C1 Willow Rd PROFILE



**\*\* NOTE:**  
 AS PART OF THE BASE BID, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
 THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

1 WILLOW ROAD  
 (CONTRACT 7)  
 0 40 80 Feet

Scale: 1:40 HORIZONTAL; 1:4 VERTICAL



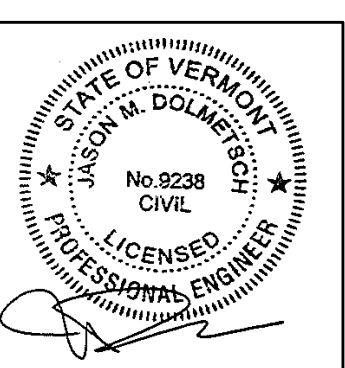
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PROFILE

NUMBER	DATE
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DRAWN	CHECKED
MSK	JMD

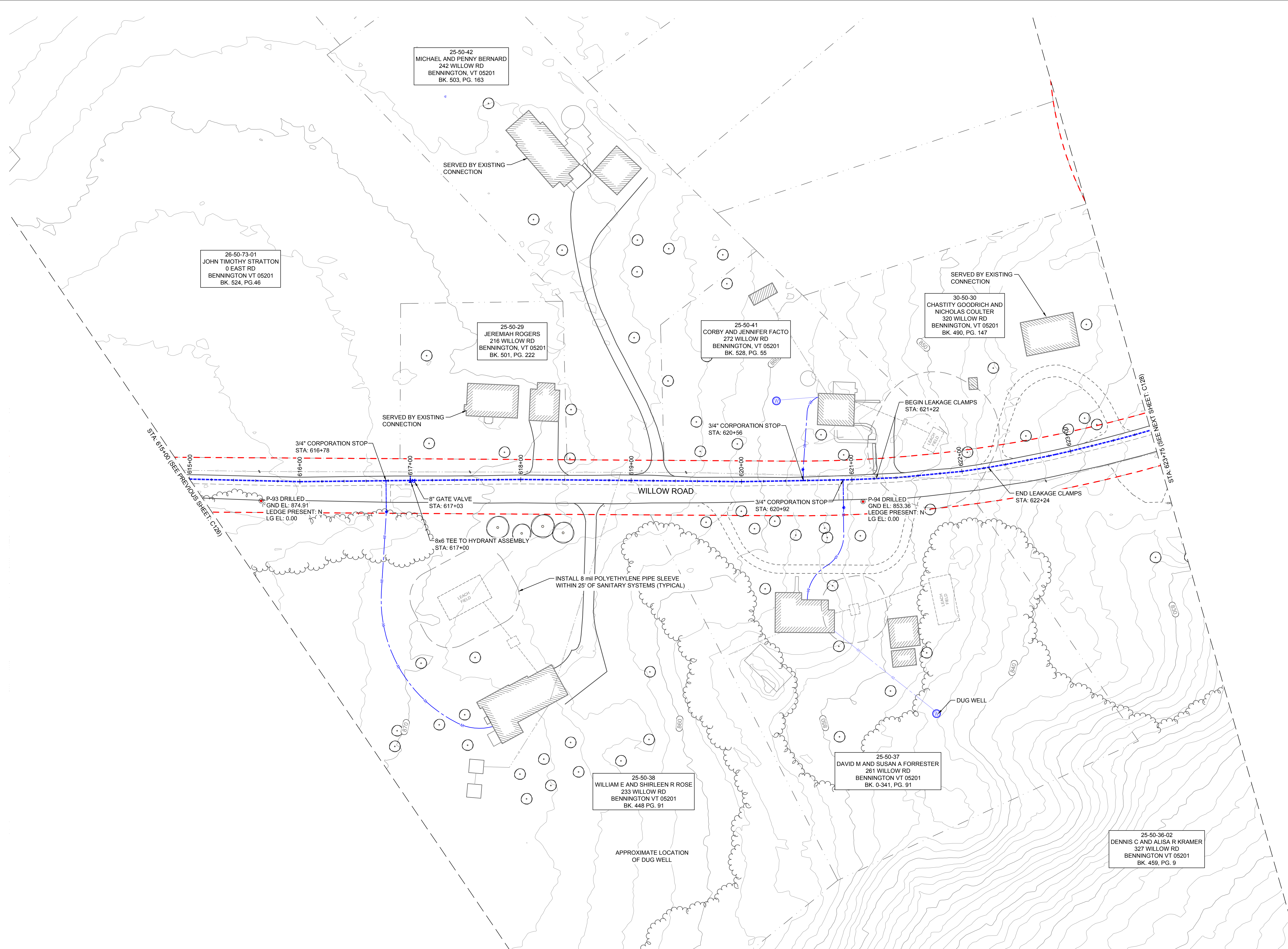
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 2 May 2019 09:30



ALL DRAWING INFORMATION FROM 2013-2017 PER A REVISION FROM ALBERTS DISTRICT C 1001-019.7 TO DISTRICT C 1001-019.7 (CONTRACT 7)  
 23 MAY 2019 17:16:10



25-50-42  
MICHAEL AND PENNY BERNARD  
242 WILLOW RD  
BENNINGTON, VT 05201  
BK. 503, PG. 163

26-50-73-01  
JOHN TIMOTHY STRATTON  
0 EAST RD  
BENNINGTON VT 05201  
BK. 524, PG. 46

25-50-29  
JEREMIAH ROGERS  
216 WILLOW RD  
BENNINGTON, VT 05201  
BK. 501, PG. 222

25-50-41  
CORBY AND JENNIFER FACTO  
272 WILLOW RD  
BENNINGTON, VT 05201  
BK. 528, PG. 55

30-50-30  
CHASTITY GOODRICH AND  
NICHOLAS COULTER  
320 WILLOW RD  
BENNINGTON, VT 05201  
BK. 490, PG. 147

25-50-38  
WILLIAM E AND SHIRLEEN R ROSE  
233 WILLOW RD  
BENNINGTON VT 05201  
BK. 448 PG. 91

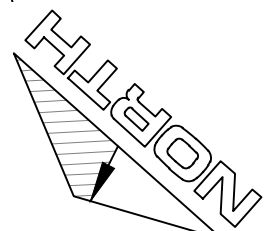
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DAVID M AND SUSAN A FORRESTER  
261 WILLOW RD  
BENNINGTON VT 05201  
BK. 0-341, PG. 91

25-50-36-02  
DENNIS C AND ALISA R KRAMER  
327 WILLOW RD  
BENNINGTON VT 05201  
BK. 459, PG. 9

1 WILLOW ROAD  
(CONTRACT 7)



Scale: 1:40



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 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
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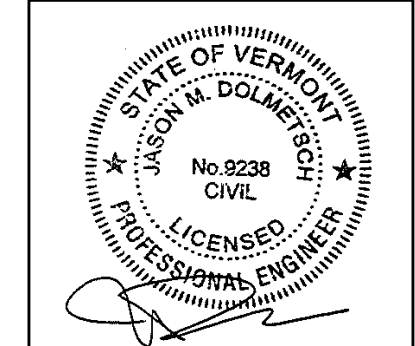
REVISIONS	
NO.	DESCRIPTION

**TOWN OF BENNINGTON**  
**MUNICIPAL WATER SYSTEM**  
**REMEDIATION EXPANSION PHASE II**  
**BENNINGTON, VERMONT**

**DRAWINGS THIS SHEET**  
**SERVICE DISTRICT C**  
**PLAN**

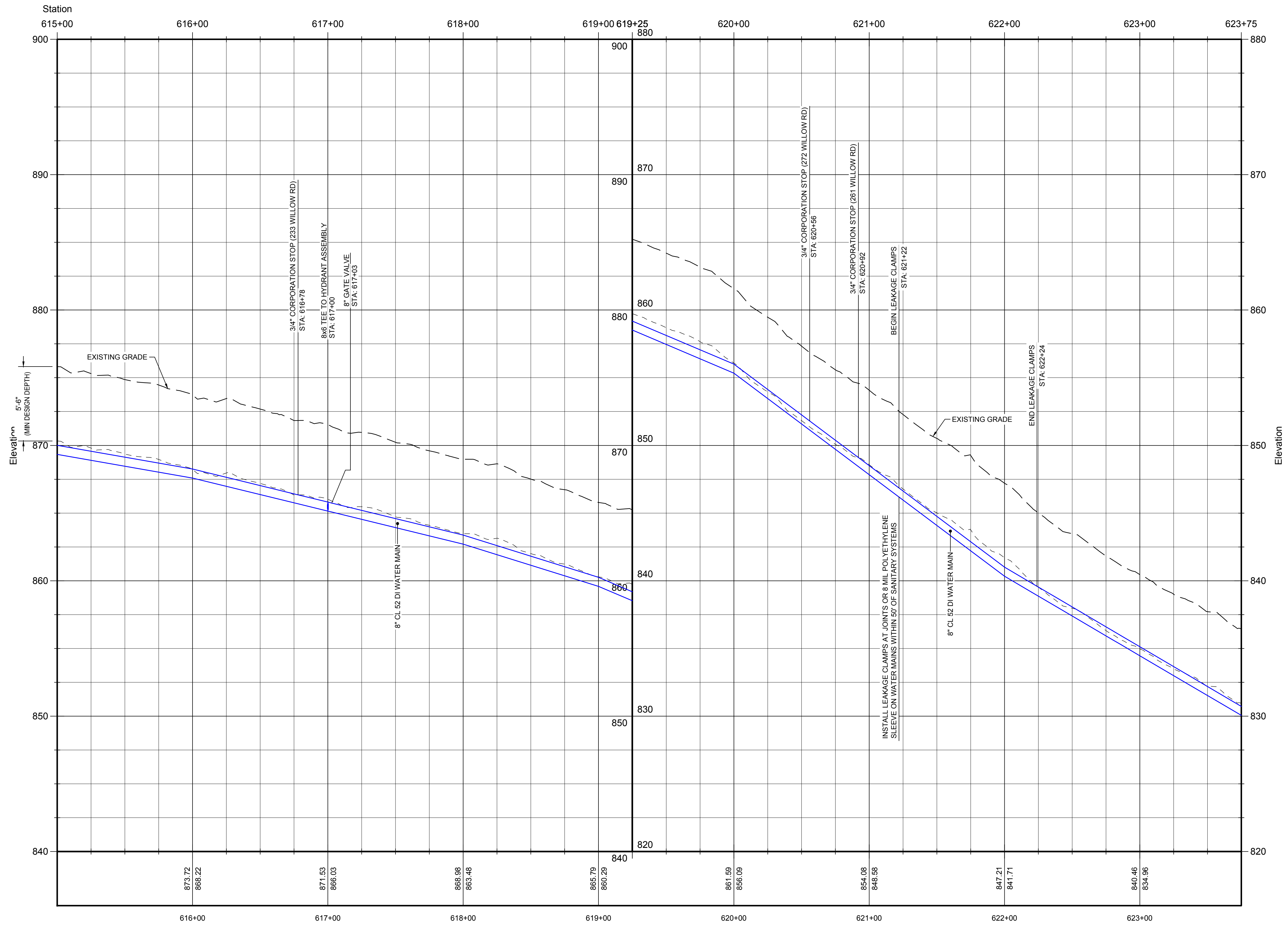
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DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C127**





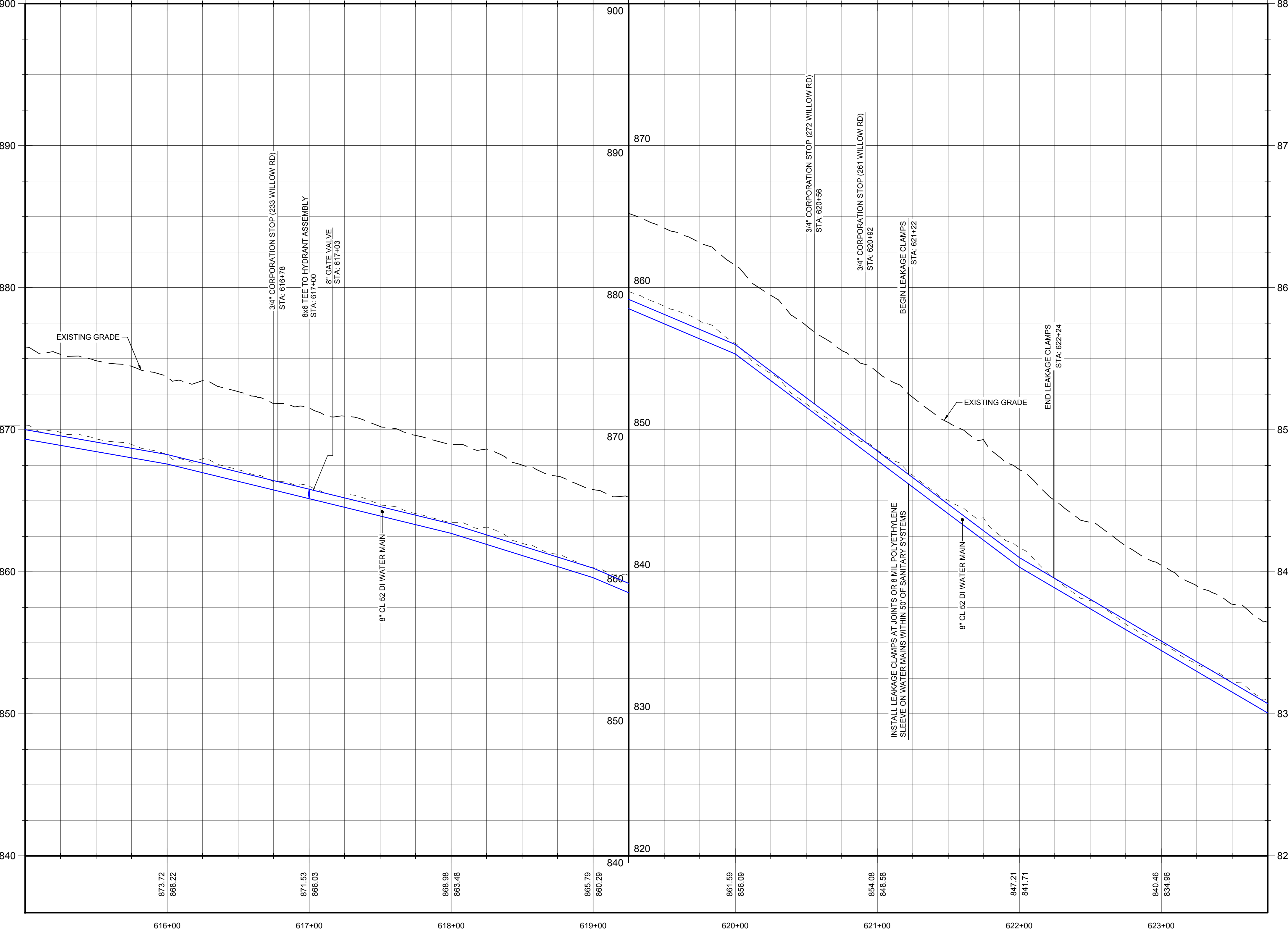
WL - C1 Willow Rd PROFILE



Elevation 5/8" (MIN DESIGN DEPTH)

Elevation

Station 615+00 616+00 617+00 618+00 619+00 619+25 620+00 621+00 622+00 623+00 623+75



616+00 617+00 618+00 619+00 620+00 621+00 622+00 623+00

1 WILLOW ROAD (CONTRACT 7)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C127A**



**\*\* NOTE:**  
 INCLUDED WITH ALL OTHER ITEMS, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
 THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

30-50-39  
 ROBERT WASHBURN  
 296 DUFFY DR  
 BENNINGTON, VT 05201  
 BK. 521, PG. 140

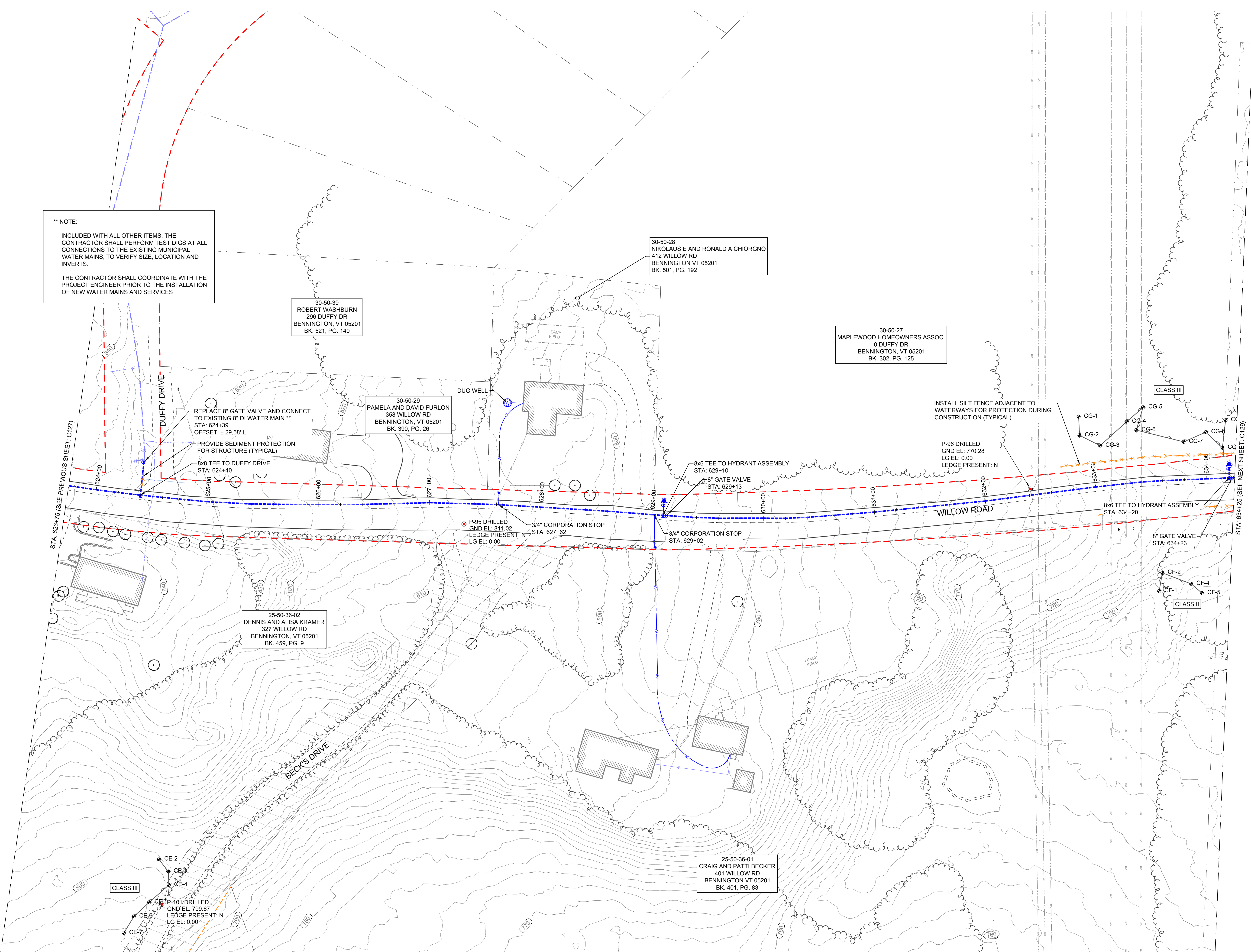
30-50-28  
 NIKOLAUS E AND RONALD A CHIARGNO  
 412 WILLOW RD  
 BENNINGTON VT 05201  
 BK. 501, PG. 192

30-50-27  
 MAPLEWOOD HOMEOWNERS ASSOC.  
 0 DUFFY DR  
 BENNINGTON, VT 05201  
 BK. 302, PG. 125

30-50-29  
 PAMELA AND DAVID FURLON  
 358 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 390, PG. 26

25-50-36-02  
 DENNIS AND ALISA KRAMER  
 327 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 459, PG. 9

25-50-36-01  
 CRAIG AND PATTI BECKER  
 401 WILLOW RD  
 BENNINGTON VT 05201  
 BK. 401, PG. 83



**1** WILLOW ROAD  
 (CONTRACT 7)  
 0 40 80 Feet

Scale: 1:40

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REVISIONS	
NO.	DESCRIPTION

**TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT**

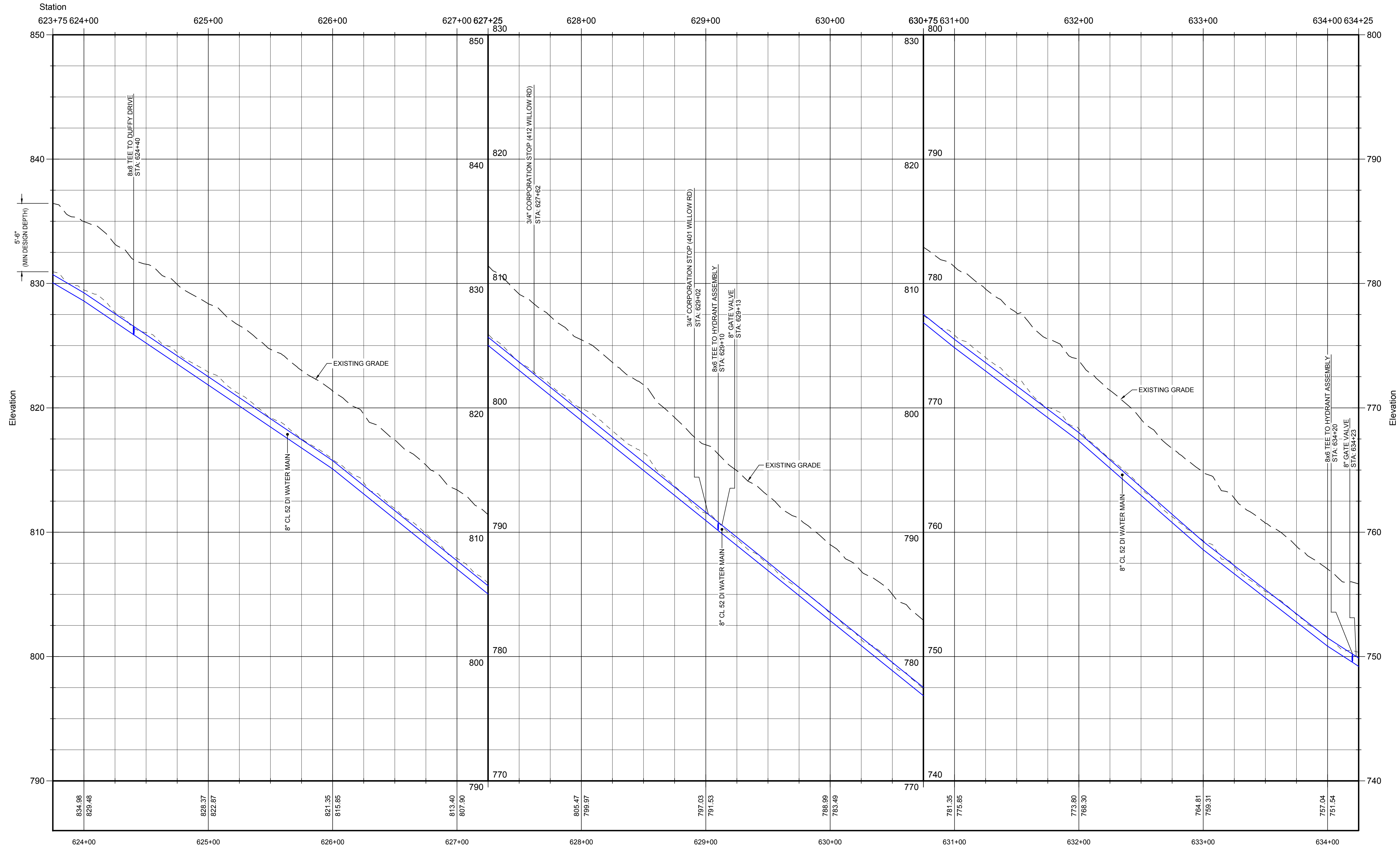
**SERVICE DISTRICT C  
 PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C128**



WL - C1 Willow Rd PROFILE



**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

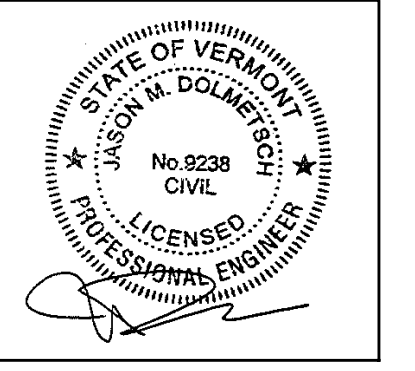
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C128A**

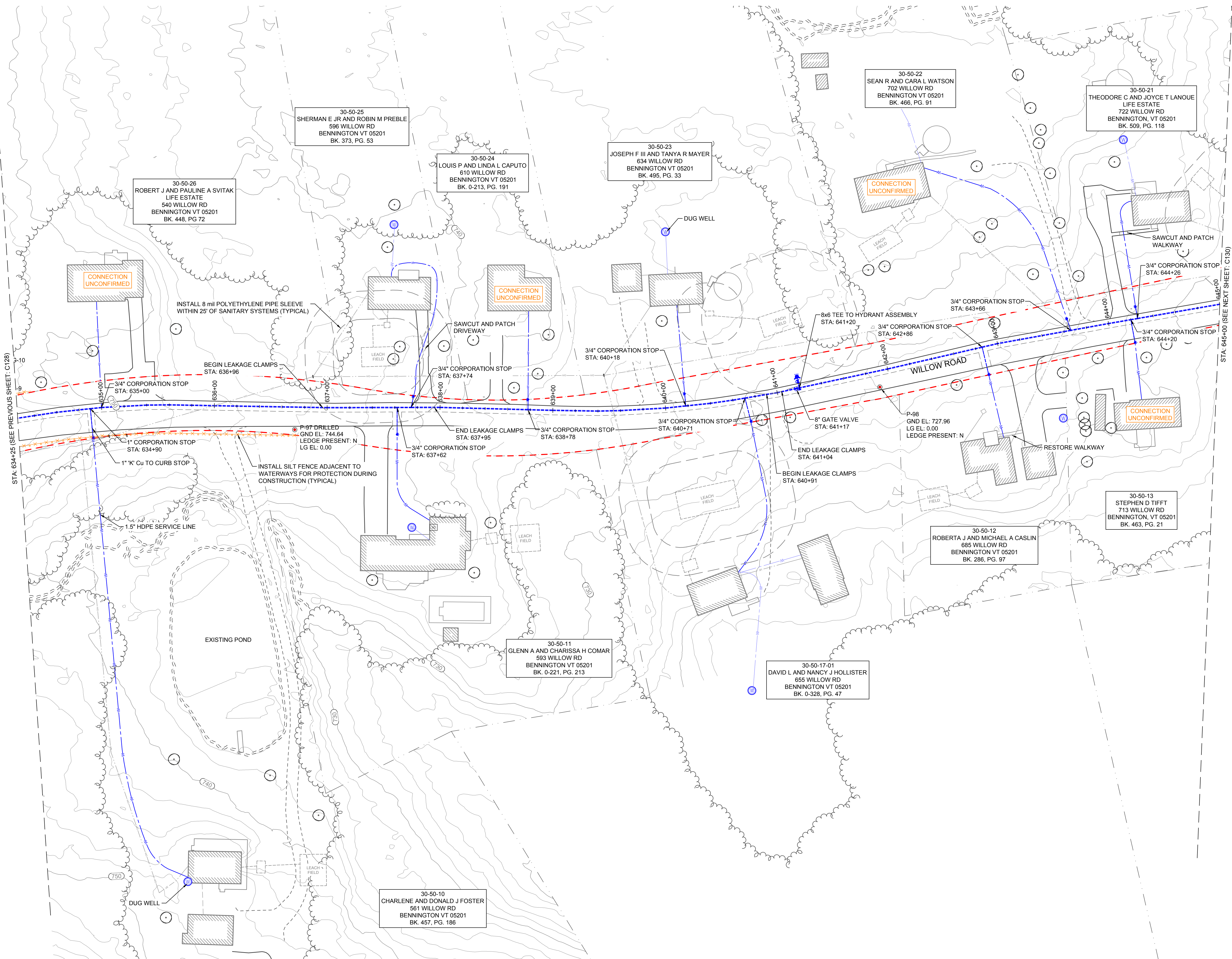


**1** WILLOW ROAD  
 (CONTRACT 7)

Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

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 13 May 2019 10:02:17





STA. 634+25 (SEE PREVIOUS SHEET: C128)

STA. 645+00 (SEE NEXT SHEET: C130)

1 WILLOW ROAD  
(CONTRACT 7)  
0 40 80  
Feet

Scale: 1:40

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 441-1402 FAX: (802) 445-1291



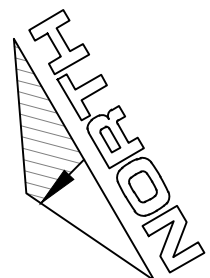
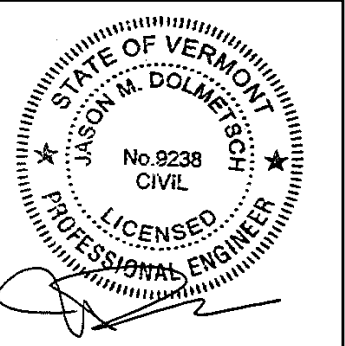
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TOWN OF BENNINGTON  
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REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PLAN

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MSK	JMD

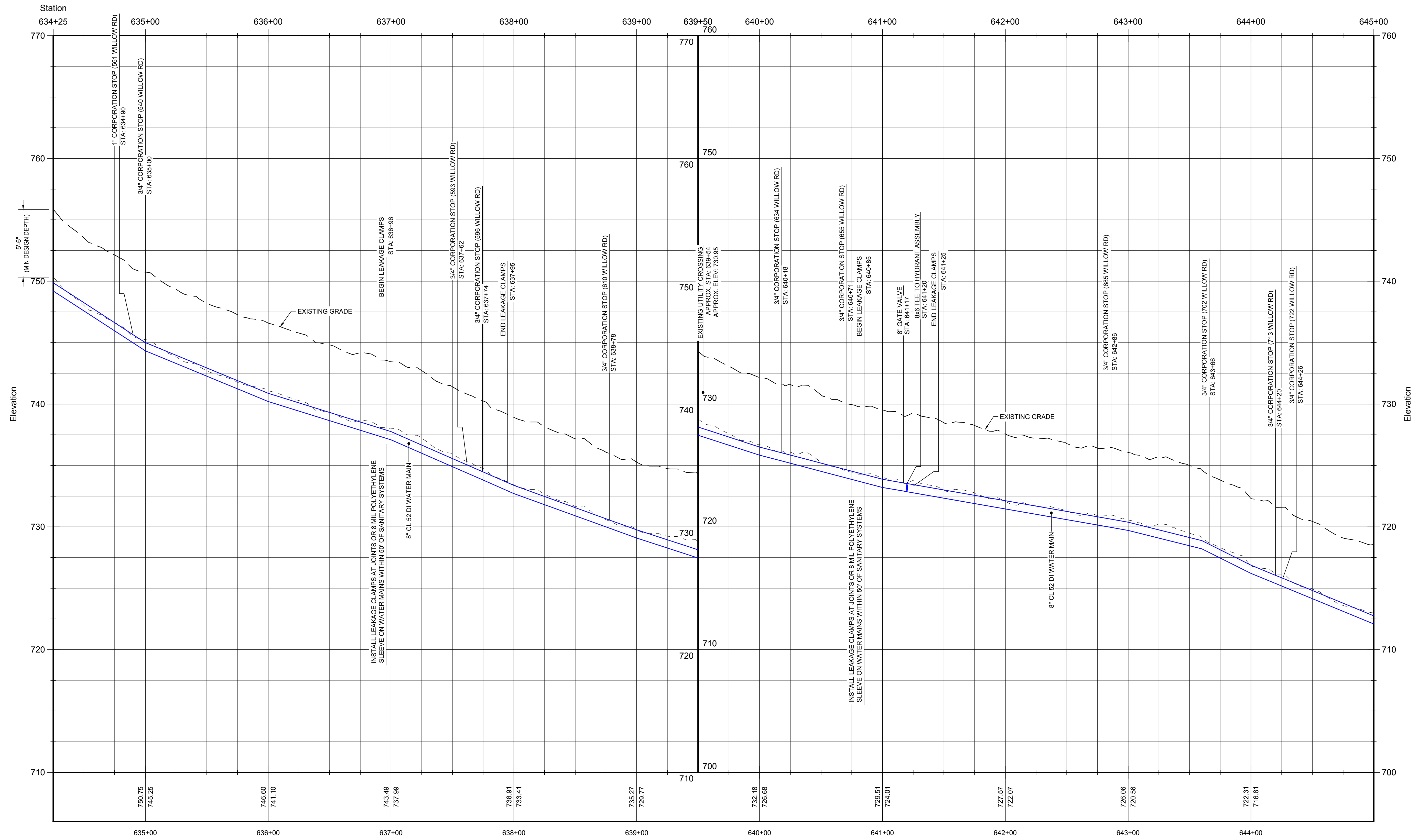
SHEET NUMBER  
C129



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 19-019.7  
 19-019.7  
 19-019.7



WL - C1 Willow Rd PROFILE



1 WILLOW ROAD  
(CONTRACT 7)  
0 40 80 Feet

Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

MSK ENGINEERING AND DESIGN, INC.  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291



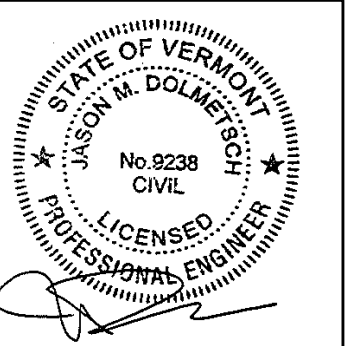
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
C129A







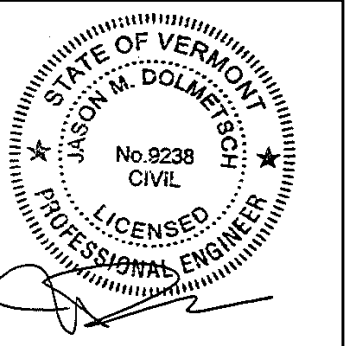
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PLAN

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C130**



30-50-66  
 DAVID AND CHRISTY SCHUELER  
 840 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 420, PG. 176

30-50-27  
 MAPLEWOOD HOMEOWNERS ASSOC.  
 0 DUFFY DR  
 BENNINGTON, VT 05201  
 BK. 302, PG. 125

30-50-15  
 CRAIG, KEVIN AND CLIFFORD BECKER  
 807 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 469, PG. 152

30-50-16  
 DAVID A AND BARBARA J JOHNSON  
 839 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 0-250, PG. 198

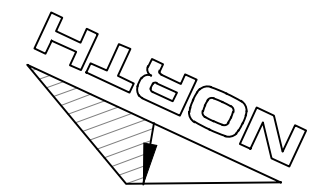
30-50-17-03  
 WILLIAM AND MONICA KINNEY  
 907 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 0-342, PG. 181

30-50-14  
 CAROL A HARDAWAY AND  
 MARGARET MARTIN  
 737 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 495, PG. 82

30-50-17-02  
 DAVID L HOLLISTER  
 785 WILLOW RD  
 BENNINGTON, VT 05201  
 BK. 0-342, PG. 181

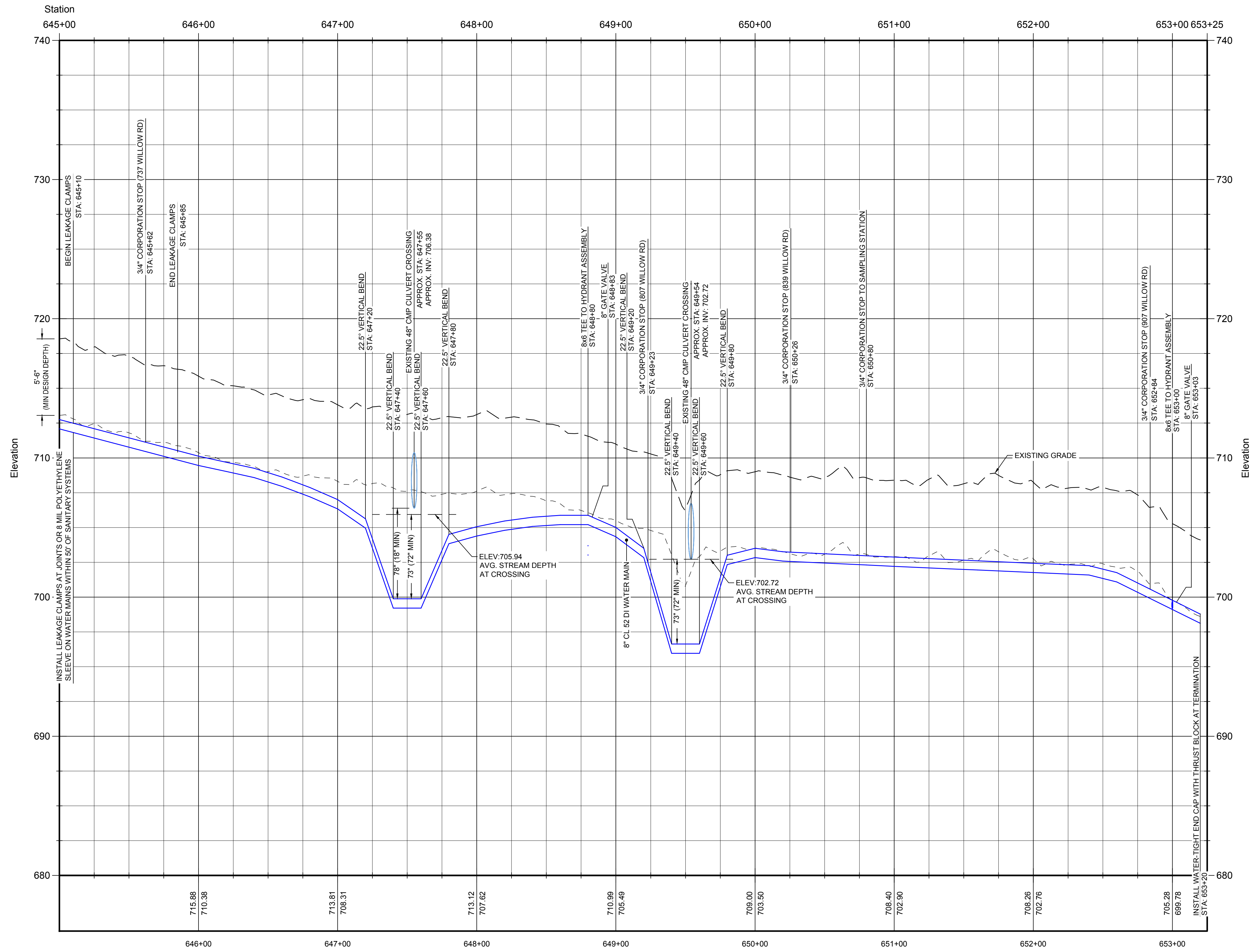
**1** WILLOW ROAD  
 (CONTRACT 7)  
 0 40 80 Feet

Scale: 1:40



ALL DRAWING INFORMATION FROM 2013 PERIOD INFORMATION ALLEGEDLY SUBJECT TO 1001-019.7 TOWN DISTRICT C1300  
 23 May 2019 17:00:17

WL - C1 Willow Rd PROFILE



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**1** WILLOW ROAD  
 (CONTRACT 7)  
 0 40 80  
 Feet

Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1281

REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

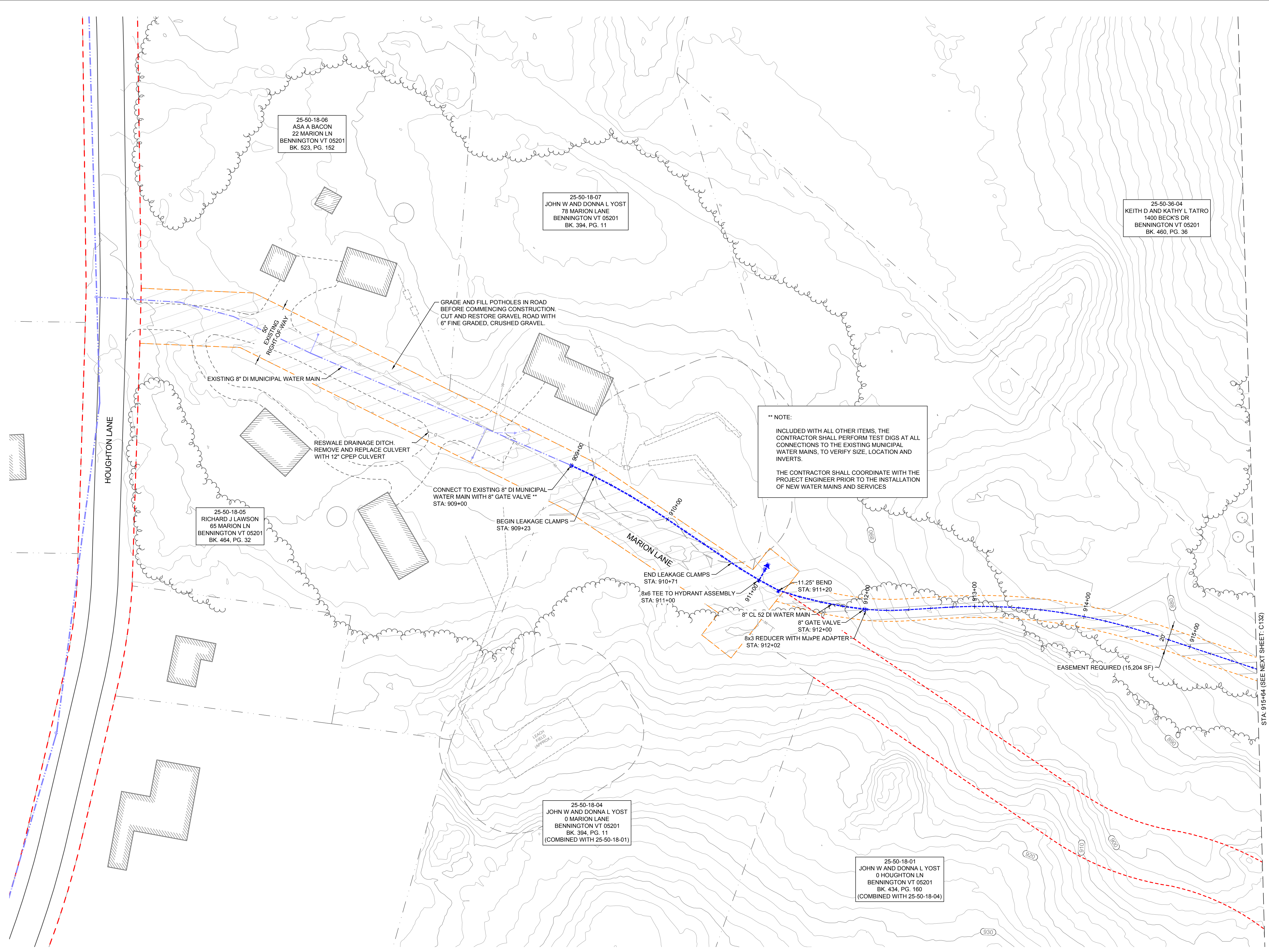
DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C130A**



PLANNING DATA: 1001-019.7 P100 REVISIONS: 01/17/2019 DISTRICT C MARION LANE  
 2 May 2019 11:24:20



**\*\* NOTE:**  
 INCLUDED WITH ALL OTHER ITEMS, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
 THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

25-50-18-06  
 ASA A BACON  
 22 MARION LN  
 BENNINGTON VT 05201  
 BK. 523, PG. 152

25-50-18-07  
 JOHN W AND DONNA L YOST  
 78 MARION LANE  
 BENNINGTON VT 05201  
 BK. 394, PG. 11

25-50-36-04  
 KEITH D AND KATHY L TATRO  
 1400 BECK'S DR  
 BENNINGTON VT 05201  
 BK. 460, PG. 36

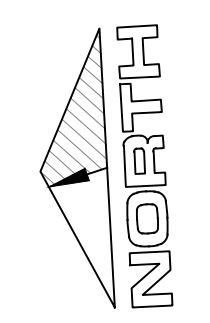
25-50-18-05  
 RICHARD J LAWSON  
 65 MARION LN  
 BENNINGTON VT 05201  
 BK. 464, PG. 32

25-50-18-04  
 JOHN W AND DONNA L YOST  
 0 MARION LANE  
 BENNINGTON VT 05201  
 BK. 394, PG. 11  
 (COMBINED WITH 25-50-18-01)

25-50-18-01  
 JOHN W AND DONNA L YOST  
 0 HOUGHTON LN  
 BENNINGTON VT 05201  
 BK. 434, PG. 160  
 (COMBINED WITH 25-50-18-04)

**1** MARION LANE  
 (CONTRACT 7)  
 0 40 80  
 Feet

Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

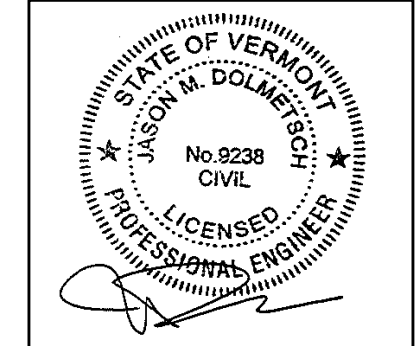
REVISIONS	
NO.	DESCRIPTION

**TOWN OF BENNINGTON**  
**MUNICIPAL WATER SYSTEM**  
**REMEDIATION EXPANSION PHASE II**  
**BENNINGTON, VERMONT**

**DRAWINGS THIS SHEET**  
**SERVICE DISTRICT C**  
**PLAN**

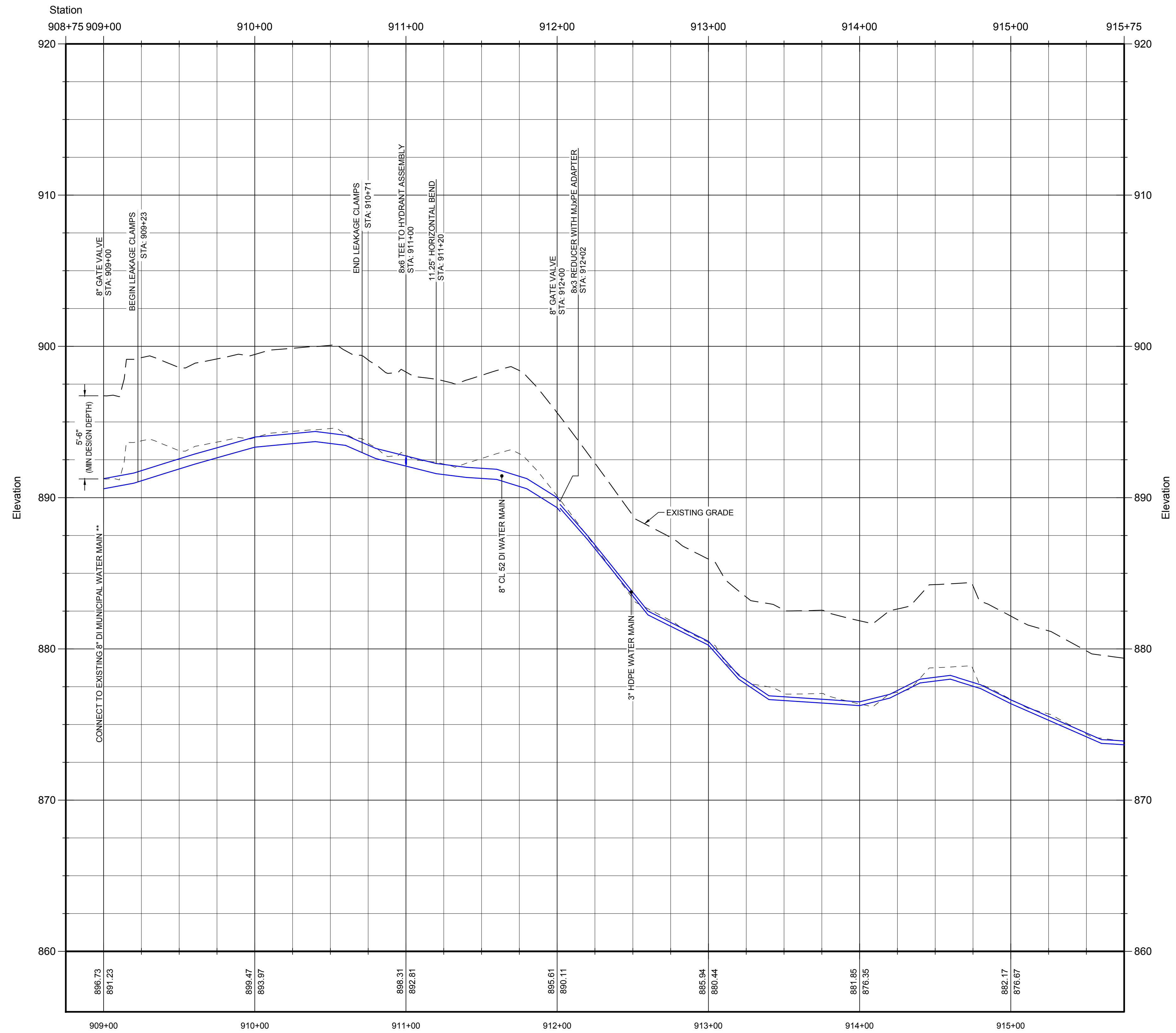
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

**SHEET NUMBER**  
**C131**





WL - C1 Marion Ln PROFILE



**\*\* NOTE:**  
 AS PART OF THE BASE BID, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
 THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

1 MARION LANE (TO BECK'S DRIVE)  
 (CONTRACT 7)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 441-1402 FAX: (802) 445-1281

REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PROFILE

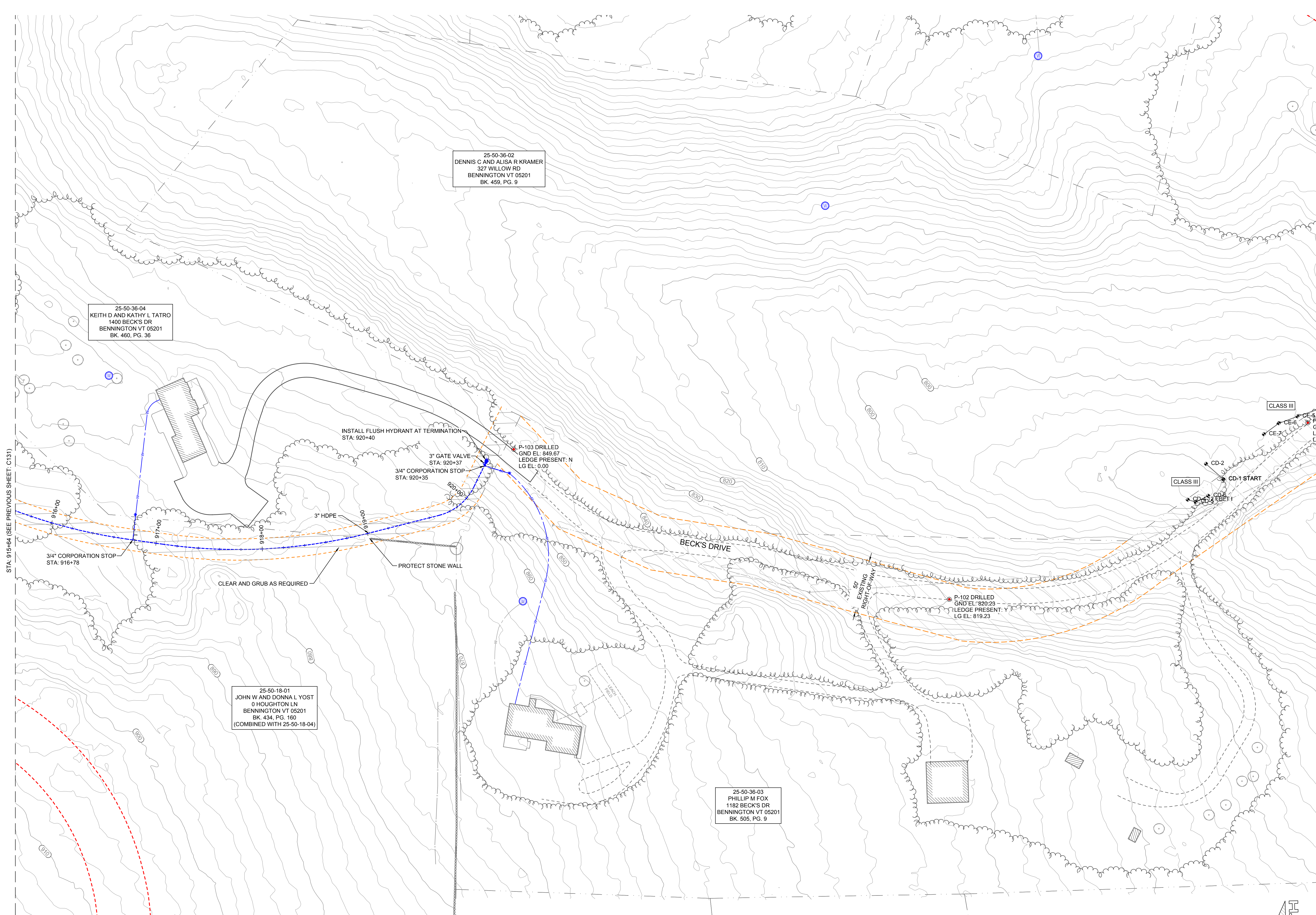
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C131A**

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 2 May 2019 08:57



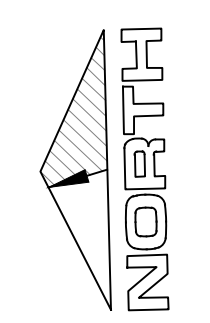
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STA. 915+64 (SEE PREVIOUS SHEET: C131)

**1** MARION LANE  
 (CONTRACT 7)  
 0 40 80  
 Feet

Scale: 1:40



25-50-36-02  
 DENNIS C AND ALISA R KRAMER  
 327 WILLOW RD  
 BENNINGTON VT 05201  
 BK. 459, PG. 9

25-50-36-04  
 KEITH D AND KATHY L TATRO  
 1400 BECK'S DR  
 BENNINGTON VT 05201  
 BK. 460, PG. 36

25-50-18-01  
 JOHN W AND DONNA L YOST  
 0 HOUGHTON LN  
 BENNINGTON VT 05201  
 BK. 434, PG. 160  
 (COMBINED WITH 25-50-18-04)

25-50-36-03  
 PHILLIP M FOX  
 1182 BECK'S DR  
 BENNINGTON VT 05201  
 BK. 505, PG. 9

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

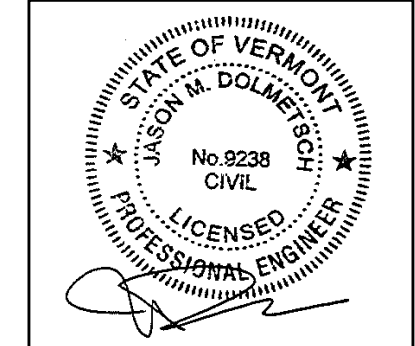
REVISIONS	
NO.	DESCRIPTION

**TOWN OF BENNINGTON**  
**MUNICIPAL WATER SYSTEM**  
**REMEDIATION EXPANSION PHASE II**  
**BENNINGTON, VERMONT**

**DRAWINGS THIS SHEET**  
**SERVICE DISTRICT C**  
**PLAN**

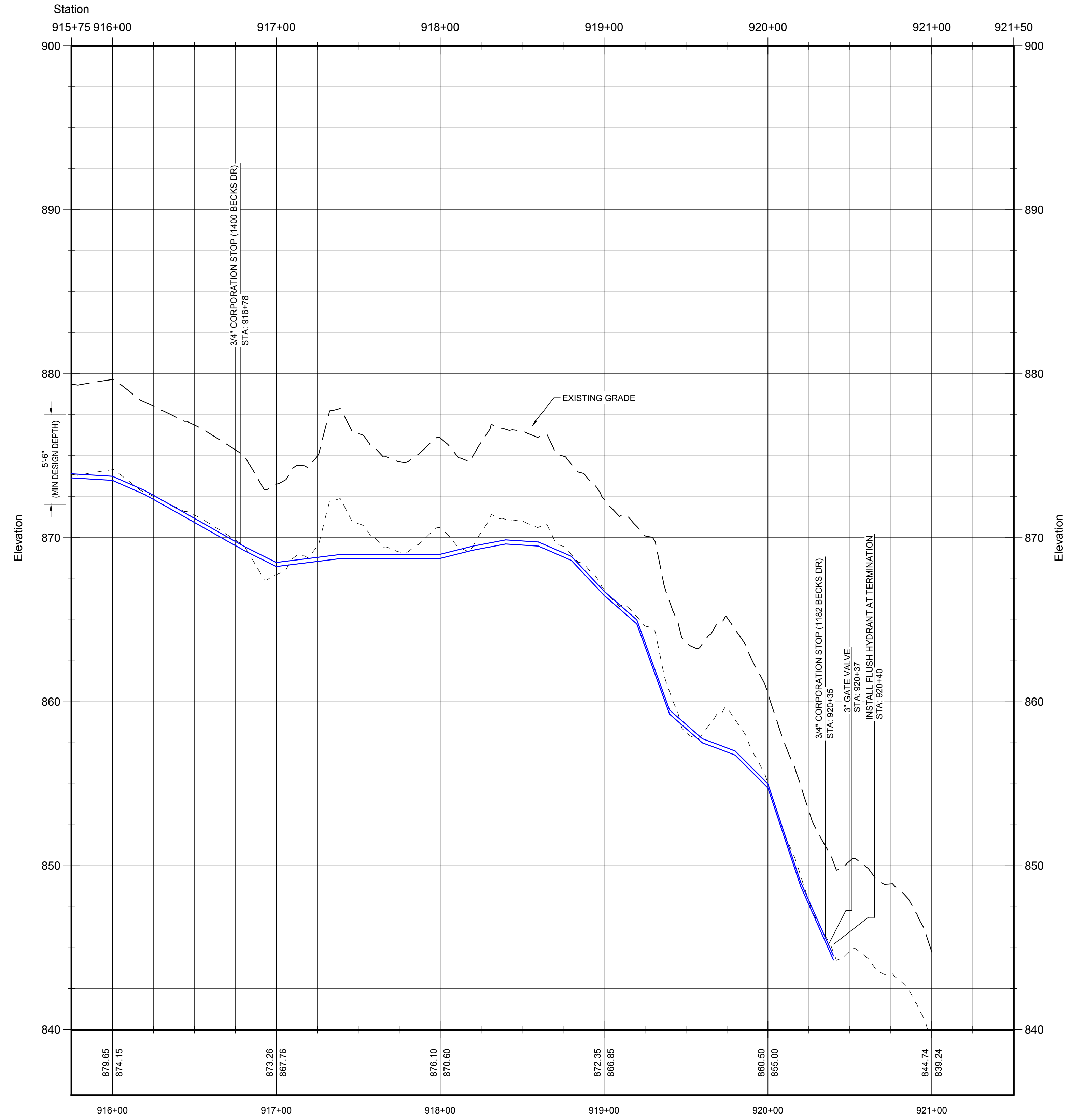
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MSK	JMD

SHEET NUMBER  
**C132**



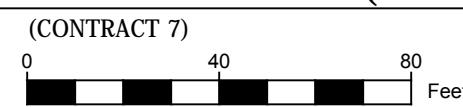


WL - C1 Marion Ln PROFILE



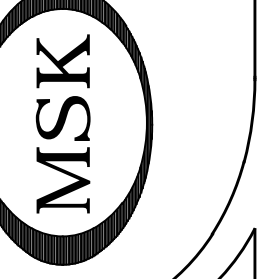
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**1** MARION LANE (TO BECK'S DRIVE)



Scale: 1:40 HORIZONTAL: 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1281



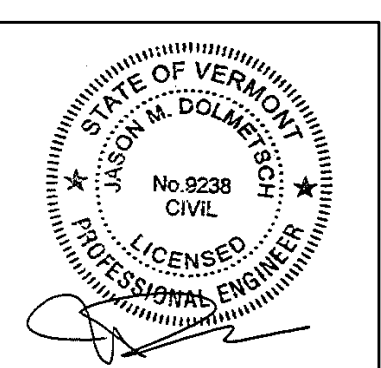
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**SERVICE DISTRICT C  
 PROFILE**

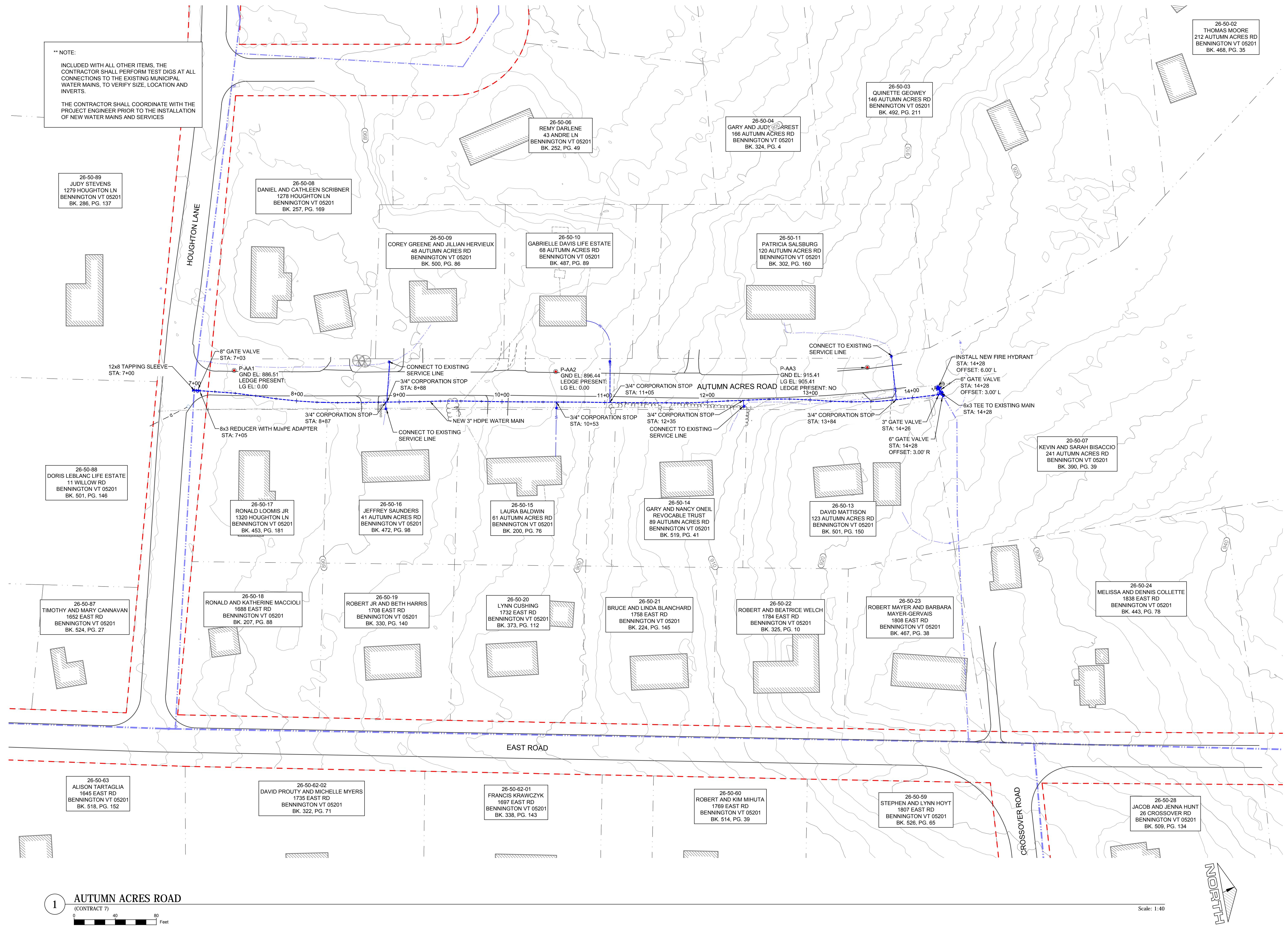
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C132A**





**\*\* NOTE:**  
 INCLUDED WITH ALL OTHER ITEMS, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
 THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES



26-50-89  
 JUDY STEVENS  
 1279 HOUGHTON LN  
 BENNINGTON VT 05201  
 BK. 286, PG. 137

26-50-08  
 DANIEL AND CATHEEN SCRIBNER  
 1278 HOUGHTON LN  
 BENNINGTON VT 05201  
 BK. 257, PG. 169

26-50-06  
 REMY DARLENE  
 43 ANDRE LN  
 BENNINGTON VT 05201  
 BK. 252, PG. 49

26-50-04  
 GARY AND JUDY ARREST  
 166 AUTUMN ACRES RD  
 BENNINGTON VT 05201  
 BK. 324, PG. 4

26-50-03  
 QUINETTE GEOWEY  
 146 AUTUMN ACRES RD  
 BENNINGTON VT 05201  
 BK. 492, PG. 211

26-50-02  
 THOMAS MOORE  
 212 AUTUMN ACRES RD  
 BENNINGTON VT 05201  
 BK. 468, PG. 35

26-50-88  
 DORIS LEBLANC LIFE ESTATE  
 11 WILLOW RD  
 BENNINGTON VT 05201  
 BK. 501, PG. 146

26-50-17  
 RONALD LOOMIS JR  
 1320 HOUGHTON LN  
 BENNINGTON VT 05201  
 BK. 453, PG. 181

26-50-16  
 JEFFREY SAUNDERS  
 41 AUTUMN ACRES RD  
 BENNINGTON VT 05201  
 BK. 472, PG. 98

26-50-15  
 LAURA BALDWIN  
 61 AUTUMN ACRES RD  
 BENNINGTON VT 05201  
 BK. 200, PG. 76

26-50-14  
 GARY AND NANCY ONEIL  
 REVOCABLE TRUST  
 89 AUTUMN ACRES RD  
 BENNINGTON VT 05201  
 BK. 519, PG. 41

26-50-13  
 DAVID MATTISON  
 123 AUTUMN ACRES RD  
 BENNINGTON VT 05201  
 BK. 501, PG. 150

26-50-07  
 KEVIN AND SARAH BISACCIO  
 241 AUTUMN ACRES RD  
 BENNINGTON VT 05201  
 BK. 390, PG. 39

26-50-87  
 TIMOTHY AND MARY CANNANAN  
 1652 EAST RD  
 BENNINGTON VT 05201  
 BK. 524, PG. 27

26-50-18  
 RONALD AND KATHERINE MACCIOLI  
 1688 EAST RD  
 BENNINGTON VT 05201  
 BK. 207, PG. 88

26-50-19  
 ROBERT JR AND BETH HARRIS  
 1708 EAST RD  
 BENNINGTON VT 05201  
 BK. 330, PG. 140

26-50-20  
 LYNN CUSHING  
 1732 EAST RD  
 BENNINGTON VT 05201  
 BK. 373, PG. 112

26-50-21  
 BRUCE AND LINDA BLANCHARD  
 1758 EAST RD  
 BENNINGTON VT 05201  
 BK. 224, PG. 145

26-50-22  
 ROBERT AND BEATRICE WELCH  
 1784 EAST RD  
 BENNINGTON VT 05201  
 BK. 325, PG. 10

26-50-23  
 ROBERT MAYER AND BARBARA  
 MAYER-GERVAIS  
 1808 EAST RD  
 BENNINGTON VT 05201  
 BK. 467, PG. 38

26-50-24  
 MELISSA AND DENNIS COLLETTE  
 1838 EAST RD  
 BENNINGTON VT 05201  
 BK. 443, PG. 78

26-50-63  
 ALISON TARTAGLIA  
 1645 EAST RD  
 BENNINGTON VT 05201  
 BK. 518, PG. 152

26-50-62-02  
 DAVID PROUTY AND MICHELLE MYERS  
 1735 EAST RD  
 BENNINGTON VT 05201  
 BK. 322, PG. 71

26-50-62-01  
 FRANCIS KRANOWCZYK  
 1697 EAST RD  
 BENNINGTON VT 05201  
 BK. 338, PG. 143

26-50-60  
 ROBERT AND KIM MIHUTA  
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 BENNINGTON VT 05201  
 BK. 514, PG. 39

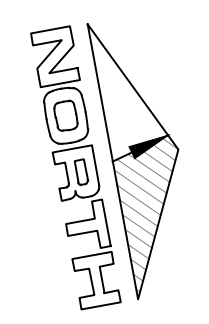
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 STEPHEN AND LYNN HOYT  
 1807 EAST RD  
 BENNINGTON VT 05201  
 BK. 526, PG. 65

26-50-28  
 JACOB AND JENNA HUNT  
 26 CROSSOVER RD  
 BENNINGTON VT 05201  
 BK. 509, PG. 134

**1 AUTUMN ACRES ROAD**  
 (CONTRACT 7)



Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291



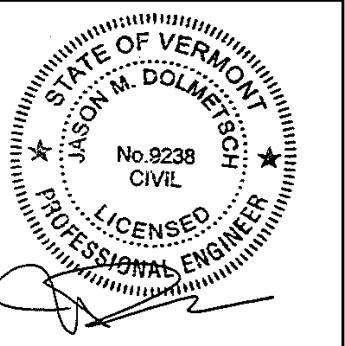
NO.	DATE	DESCRIPTION

**TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT**

**SERVICE DISTRICT C  
 PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

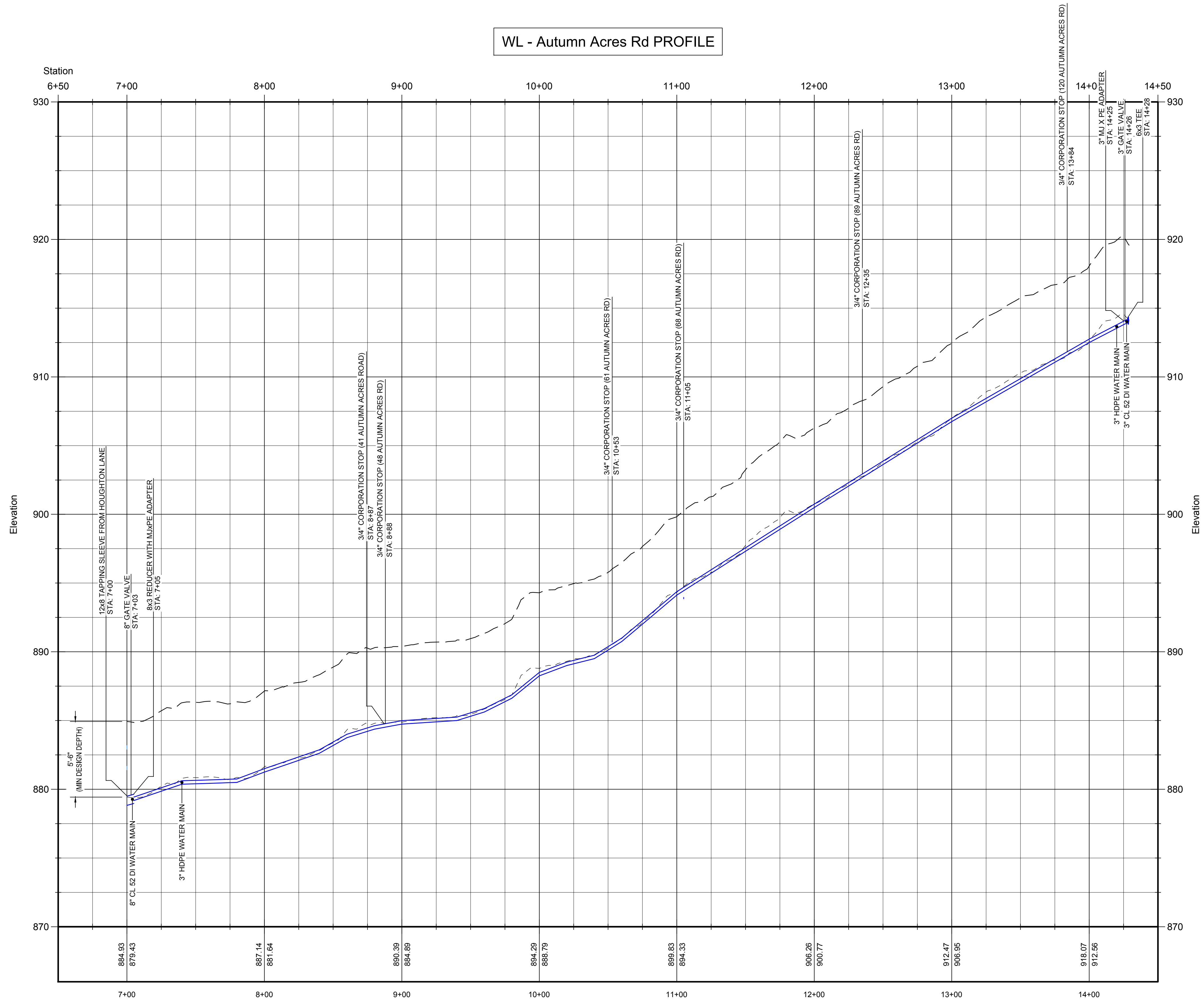
SHEET NUMBER  
**C133**



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 2 May 2019 14:08:57



WL - Autumn Acres Rd PROFILE



1 AUTUMN ACRES ROAD

(CONTRACT 7)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

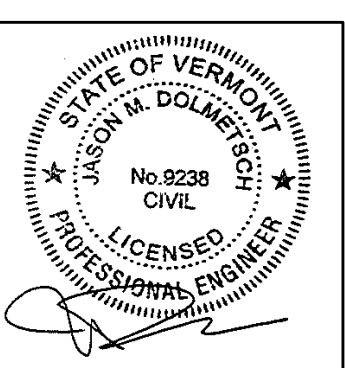
REVISIONS	
NO.	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 SERVICE DISTRICT C  
 PROFILE

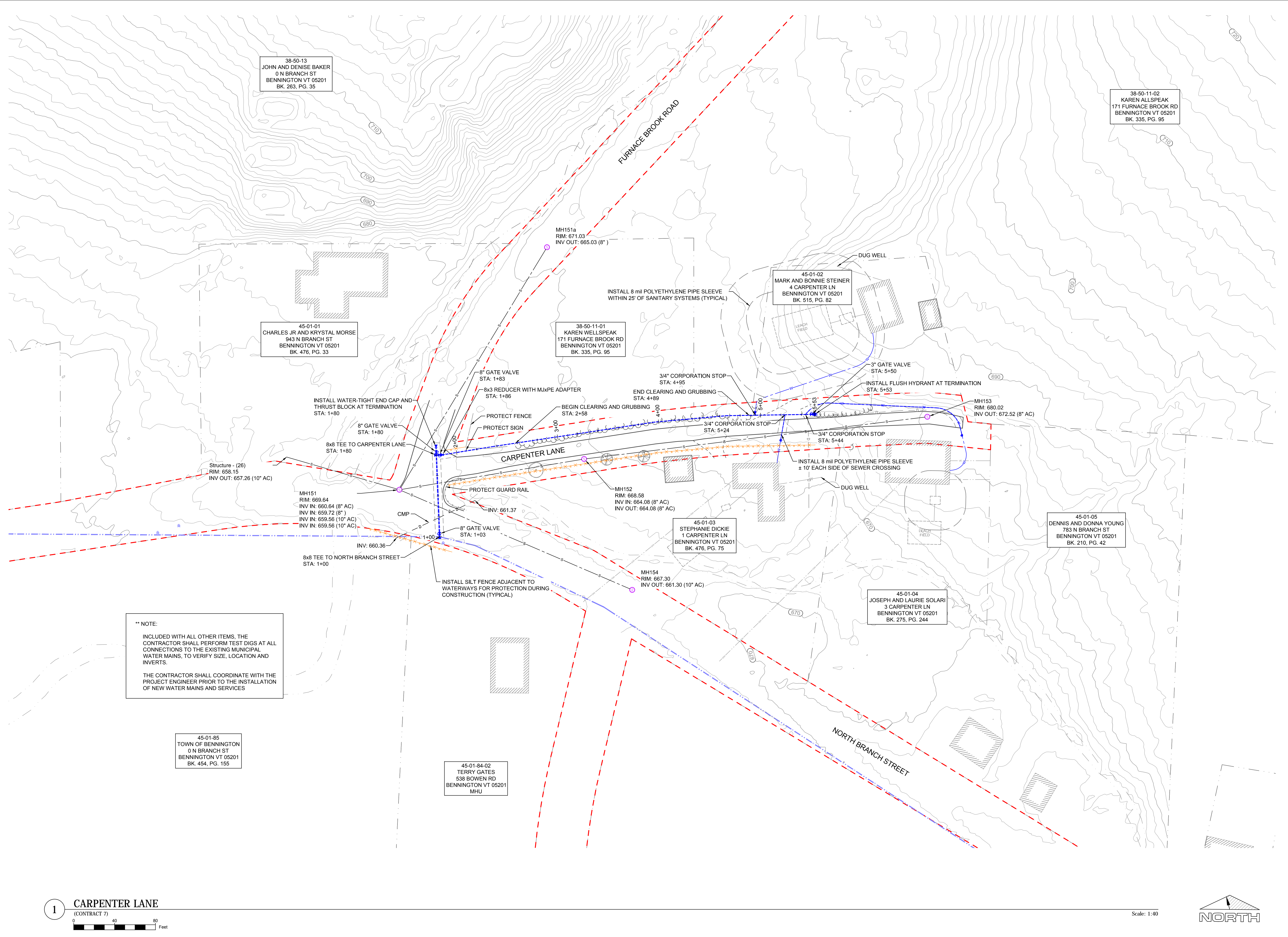
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C133A**



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 12 May 2019 09:00 AM





38-50-13  
JOHN AND DENISE BAKER  
0 N BRANCH ST  
BENNINGTON VT 05201  
BK. 263, PG. 35

38-50-11-02  
KAREN ALLSPEAK  
171 FURNACE BROOK RD  
BENNINGTON VT 05201  
BK. 335, PG. 95

45-01-01  
CHARLES JR AND KRISTAL MORSE  
943 N BRANCH ST  
BENNINGTON VT 05201  
BK. 476, PG. 33

38-50-11-01  
KAREN WELLSPEAK  
171 FURNACE BROOK RD  
BENNINGTON VT 05201  
BK. 335, PG. 95

45-01-02  
MARK AND BONNIE STEINER  
4 CARPENTER LN  
BENNINGTON VT 05201  
BK. 515, PG. 82

Structure - (26)  
RIM: 658.15  
INV OUT: 657.26 (10" AC)

MH151  
RIM: 669.64  
INV IN: 660.64 (8" AC)  
INV IN: 659.72 (8" )  
INV IN: 659.56 (10" AC)  
INV IN: 659.56 (10" AC)

MH152  
RIM: 668.58  
INV IN: 664.08 (8" AC)  
INV OUT: 664.08 (8" AC)

45-01-03  
STEPHANIE DICKIE  
1 CARPENTER LN  
BENNINGTON VT 05201  
BK. 476, PG. 75

MH154  
RIM: 667.30  
INV OUT: 661.30 (10" AC)

45-01-05  
DENNIS AND DONNA YOUNG  
783 N BRANCH ST  
BENNINGTON VT 05201  
BK. 210, PG. 42

45-01-04  
JOSEPH AND LAURIE SOLARI  
3 CARPENTER LN  
BENNINGTON VT 05201  
BK. 275, PG. 244

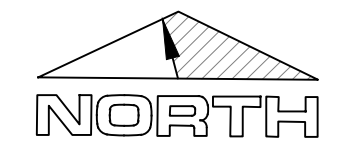
45-01-85  
TOWN OF BENNINGTON  
0 N BRANCH ST  
BENNINGTON VT 05201  
BK. 454, PG. 155

45-01-84-02  
TERRY GATES  
538 BOWEN RD  
BENNINGTON VT 05201  
MHU

**\*\* NOTE:**  
INCLUDED WITH ALL OTHER ITEMS, THE CONTRACTOR SHALL PERFORM TEST DIGS AT ALL CONNECTIONS TO THE EXISTING MUNICIPAL WATER MAINS, TO VERIFY SIZE, LOCATION AND INVERTS.  
THE CONTRACTOR SHALL COORDINATE WITH THE PROJECT ENGINEER PRIOR TO THE INSTALLATION OF NEW WATER MAINS AND SERVICES

**1 CARPENTER LANE**  
(CONTRACT 7)  
0 40 80 Feet

Scale: 1:40



**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1297

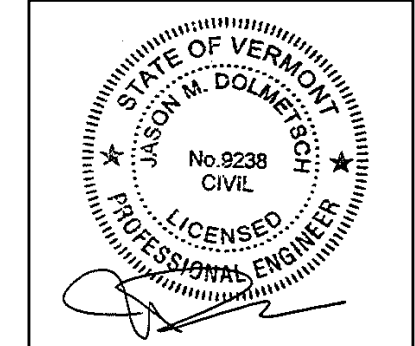
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**TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT**

**DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PLAN**

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

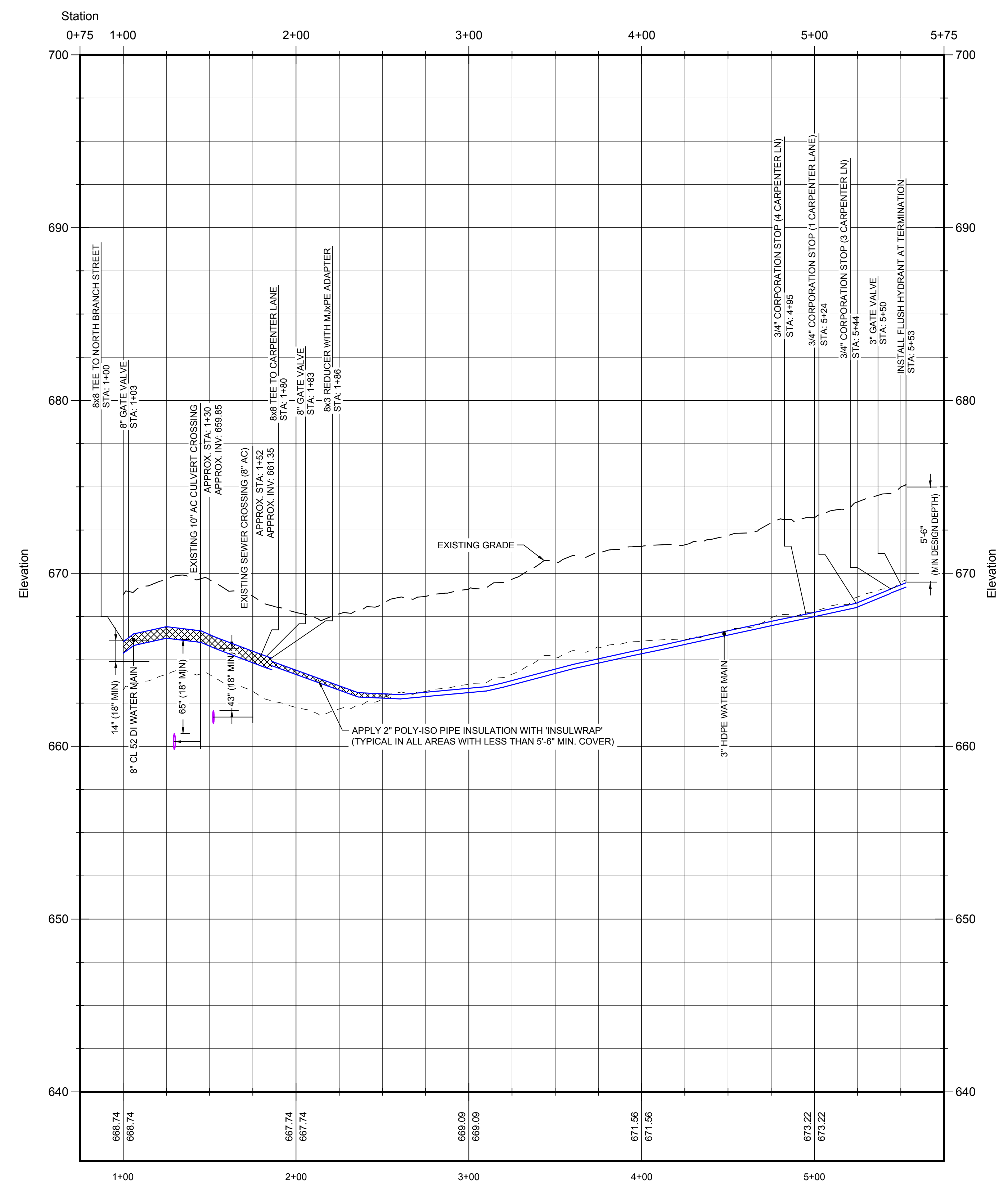
SHEET NUMBER  
**C134**



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WL - Carpenter Ln PROFILE



1 CARPENTER LANE  
(CONTRACT 7)



Scale: 1:40 HORIZONTAL; 1:4 VERTICAL

**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1291

NO.	DATE	DESCRIPTION

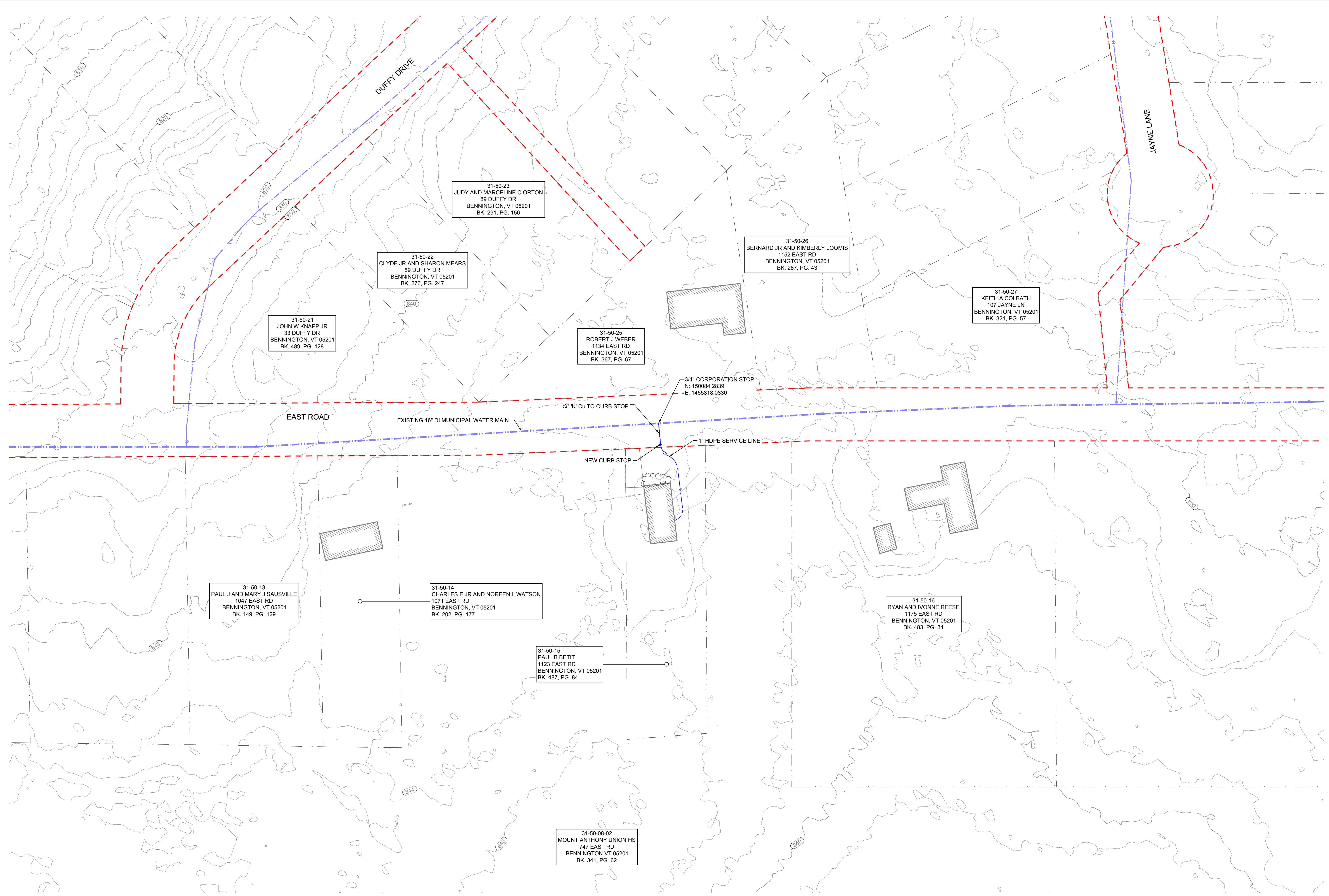
TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PROFILE

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C134A**

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 12 May 2019 09:46:59



31-50-21  
JOHN W KNAPP JR  
33 DUFFY DR  
BENNINGTON, VT 05201  
BK. 489, PG. 128

31-50-22  
CLYDE JR AND SHARON MEARS  
59 DUFFY DR  
BENNINGTON, VT 05201  
BK. 276, PG. 247

31-50-23  
JUDY AND MARCELINE C ORTON  
89 DUFFY DR  
BENNINGTON, VT 05201  
BK. 291, PG. 156

31-50-25  
ROBERT J WEBER  
1134 EAST RD  
BENNINGTON, VT 05201  
BK. 367, PG. 67

31-50-26  
BERNARD JR AND KIMBERLY LOOMIS  
1152 EAST RD  
BENNINGTON, VT 05201  
BK. 287, PG. 43

31-50-27  
KEITH A COLBATH  
107 JAYNE LN  
BENNINGTON, VT 05201  
BK. 321, PG. 57

31-50-13  
PAUL J AND MARY J SAUSVILLE  
1047 EAST RD  
BENNINGTON, VT 05201  
BK. 149, PG. 129

31-50-14  
CHARLES E JR AND NOREEN L WATSON  
1071 EAST RD  
BENNINGTON, VT 05201  
BK. 202, PG. 177

31-50-15  
PAUL B BETT  
1123 EAST RD  
BENNINGTON, VT 05201  
BK. 487, PG. 84

31-50-16  
RYAN AND IVONNE REESE  
1175 EAST RD  
BENNINGTON, VT 05201  
BK. 483, PG. 34

31-50-08-02  
MOUNT ANTHONY UNION HS  
747 EAST RD  
BENNINGTON VT 05201  
BK. 341, PG. 62

3/4" CORPORATION STOP  
N: 150084.2839  
E: 1455818.0830

3/4" K' Cu TO CURB STOP

NEW CURB STOP

1" HDPE SERVICE LINE

EXISTING 16" DI MUNICIPAL WATER MAIN

EAST ROAD

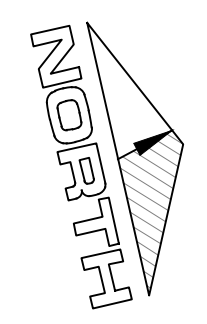
DUFFY DRIVE

JAYNE LANE

1 EAST ROAD  
(CONTRACT 7)



Scale: 1:40



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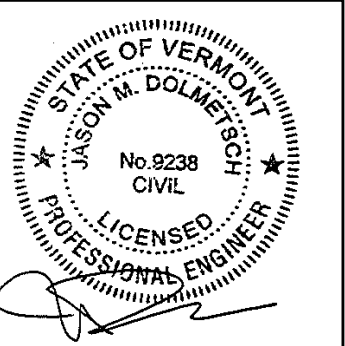
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
SERVICE DISTRICT C  
PLAN

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
C135



ALL DRAWING INFORMATION FROM 2013 PER A REVISION OF THE DISTRICT C EAST ROAD  
 2 May 2019 17:00:07



**GENERAL NOTES**  
(VERMONT AGENCY OF TRANSPORTATION STANDARD T-1)

1. TRAFFIC CONTROL DEVICES NOT DETAILED IN THE VERMONT AGENCY OF TRANSPORTATION (VAOT) "STANDARD DRAWINGS" OR THE PROJECT PLANS SHALL BE IN ACCORDANCE WITH THE CURRENT "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND THE "STANDARD HIGHWAY SIGNS AND MARKINGS" BOOK (SHM), AND THEIR LATEST REVISIONS, PUBLISHED BY THE FEDERAL HIGHWAY ADMINISTRATION (FHWA).
2. CONSTRUCTION SIGNS SHALL BE ERECTED BEFORE THE START OF ANY WORK AND SHALL BE COVERED UNTIL WORK COMMENCES, DURING PERIODS OF INACTIVITY, OR UPON COMPLETION OF THE WORK. EACH SIGN SHALL BE ERECTED IN A NEAT AND WORKMAN-LIKE MANNER.
3. DIAMOND SHAPED CONSTRUCTION SIGNS SHALL BE 48 INCH BY 48 INCH.
4. CONSTRUCTION SIGN COVERS SHALL CONSIST OF A PANEL, PAINTED FLAT BLACK, THE SAME AS THE SIGN IT COVERS. THE PANEL SHALL BE OF WOOD, PLYWOOD, HARDBOARD, OR ANY MATERIAL SATISFACTORY TO THE ENGINEER. NO MATERIAL WILL BE APPROVED THAT WILL DETERIORATE BY EXPOSURE TO THE WEATHER DURING THE PROJECT. MOUNTING OF THE PANEL SHALL BE DONE IN SUCH A WAY AS NOT TO DAMAGE THE SIGN FACE MATERIAL.
5. SIGNS SHALL BE MAINTAINED IN A CLEAN AND LEGIBLE CONDITION SATISFACTORY TO THE ENGINEER. THEY SHALL BE KEPT PLUMB AND LEVEL, AND ALWAYS PRESENT A NEAT APPEARANCE. DAMAGED, DEFACED, OR DIRTY SIGNS SHALL BE REPAIRED, CLEANED, OR REPLACED, AS ORDERED BY THE ENGINEER.
6. NO CROSS-BRACING OR BACK-BRACING TO KEEP POSTS PLUMB WILL BE ALLOWED. CONCRETE FOUNDATIONS, COLLARS, OR SOIL BEARING PLATES ARE NOT PERMITTED.
7. CONSTRUCTION SIGNS INSTALLED ON POSTS SHALL BE SET SECURELY IN THE GROUND ON TWO POSTS. THE BOTTOM OF THE SIGN SHALL BE AT LEAST FIVE FEET ABOVE THE EDGE OF THE PAVEMENT, AND THE NEAREST EDGE OF A SIGN SHALL BE AT LEAST SIX FEET OUTSIDE THE SHOULDER POINT. FOUR FEET OUTSIDE OF GUARDRAIL, OR TWO FEET OUTSIDE CURBING OR SIDEWALK. THE INSTALLATION OF SIGNS SHALL BE SUBJECT TO THE APPROVAL OF THE ENGINEER. IN URBAN AREAS, THE BOTTOM OF THE SIGN SHALL BE AT LEAST SEVEN FEET ABOVE THE SIDEWALK OR EDGE OF PAVEMENT, WHICHEVER IS HIGHER.
8. PORTABLE SIGNS SHALL BE PLACED ON THE EDGE OF THE ROADWAY AND A MINIMUM OF ONE FOOT ABOVE THE TRAVELED WAY. ALL VEGETATION WHICH INTERFERES WITH THE VISIBILITY OF THE SIGNS SHALL BE REMOVED. WHEN PLACED BEHIND GUARDRAIL, THE BOTTOM OF THE SIGN SHALL BE ABOVE THE TOP OF THE GUARDRAIL.
9. SIGNS SHALL BE REMOVED UPON THE COMPLETION OF THE WORK AT THE DISCRETION OF THE ENGINEER.
10. ROLL UP CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ("AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956) TYPE VII, UNLESS OTHERWISE NOTED.
11. SOLID SUBSTRATE CONSTRUCTION SIGNS SHALL HAVE RETROREFLECTIVE SHEETING EQUAL TO OR EXCEEDING THE "AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS" (AASHTO) M 268 ("AMERICAN SOCIETY FOR TESTING AND MATERIALS" (ASTM) D 4956) TYPE VIII OR IX REQUIREMENTS, UNLESS OTHERWISE NOTED.
12. WHERE CONSTRUCTION SIGN INSTALLATIONS ARE NOT PROTECTED BY GUARDRAIL OR OTHER APPROVED TRAFFIC BARRIERS, ALL SIGN STANDS AND POST INSTALLATIONS SHALL MEET "NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM" (NCHRP) REPORT 350 OR THE AASHTO "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH). THE APPROPRIATE RESOURCE SHALL BE DETERMINED AS DESCRIBED IN THE MASH PUBLICATION. NO SIGN POSTS SHALL EXTEND OVER THE TOP OF THE SIGN INSTALLED ON SAID POSTS. WHEN ANCHORS ARE INSTALLED, STUBS SHALL NOT BE GREATER THAN FOUR INCHES ABOVE THE EXISTING GROUND.
13. ROADWAY AND SHOULDER WIDTHS DEPICTED ON THE STANDARD DRAWINGS MAY VARY.
14. THESE STANDARD DRAWINGS ARE INTENDED TO SERVE AS VTRANS STANDARD OPERATING PROCEDURE. IT IS NOTED THAT COMPONENT PARTS OF A TEMPORARY TRAFFIC CONTROL WORK ZONE MAY BE MODIFIED, DUE TO FIELD CONDITIONS, AT THE DISCRETION OF THE ENGINEER.

**SIGN LEGEND**  
(VTRANS STANDARD T-1)

**A** W20-1

**B** W20-1

**C** VC-869

**D** VC-869

**E** VC-869

**F** VC-869

**G** G20-1

**H** G20-2

**GENERAL NOTES**  
(VERMONT AGENCY OF TRANSPORTATION STANDARD T-10)

1. SIGNS SHOWN ON THIS SHEET ARE INTENDED FOR USE IN PROVIDING ADVANCED WARNING AND INFORMATION ON CONSTRUCTION PROJECTS OVER WHICH TRAFFIC WILL BE MAINTAINED. WHEN ADDITIONAL APPROACH SIGNS OR OTHER TYPES OF ADVANCED SIGNING OR CONTROL ARE NECESSARY, THE PLANS AND/OR SPECIFICATIONS FOR THAT PROJECT WILL GIVE THE DETAILS OF THE SIGNS AND DEVICES REQUIRED. FOR ON-PROJECT CONSTRUCTION SIGNS, REFER TO THE APPROPRIATE STANDARDS SHEETS.
2. THE "ROAD WORK NEXT xx MILES" SIGN (G20-1) SHALL BE INSTALLED IN ADVANCE OF TEMPORARY TRAFFIC CONTROL ZONES THAT ARE MORE THAN TWO MILES IN LENGTH, OR AS DIRECTED BY THE ENGINEER. DISTANCES SHALL BE STATED TO THE NEAREST WHOLE MILE.
3. SIGNS SHALL BE LOCATED AS DETAILED ON THIS SHEET, OR AS OTHERWISE SHOWN ON THE PLANS. THE SIGNS SHALL APPEAR AT EACH END OF THE HIGHWAY UNDER CONSTRUCTION, AND ON ALL INTERSECTING PUBLIC HIGHWAYS. THE ENGINEER SHALL DETERMINE THE EXACT LOCATIONS

**SIGN LEGEND**

**E** VC-869

**F** VC-869

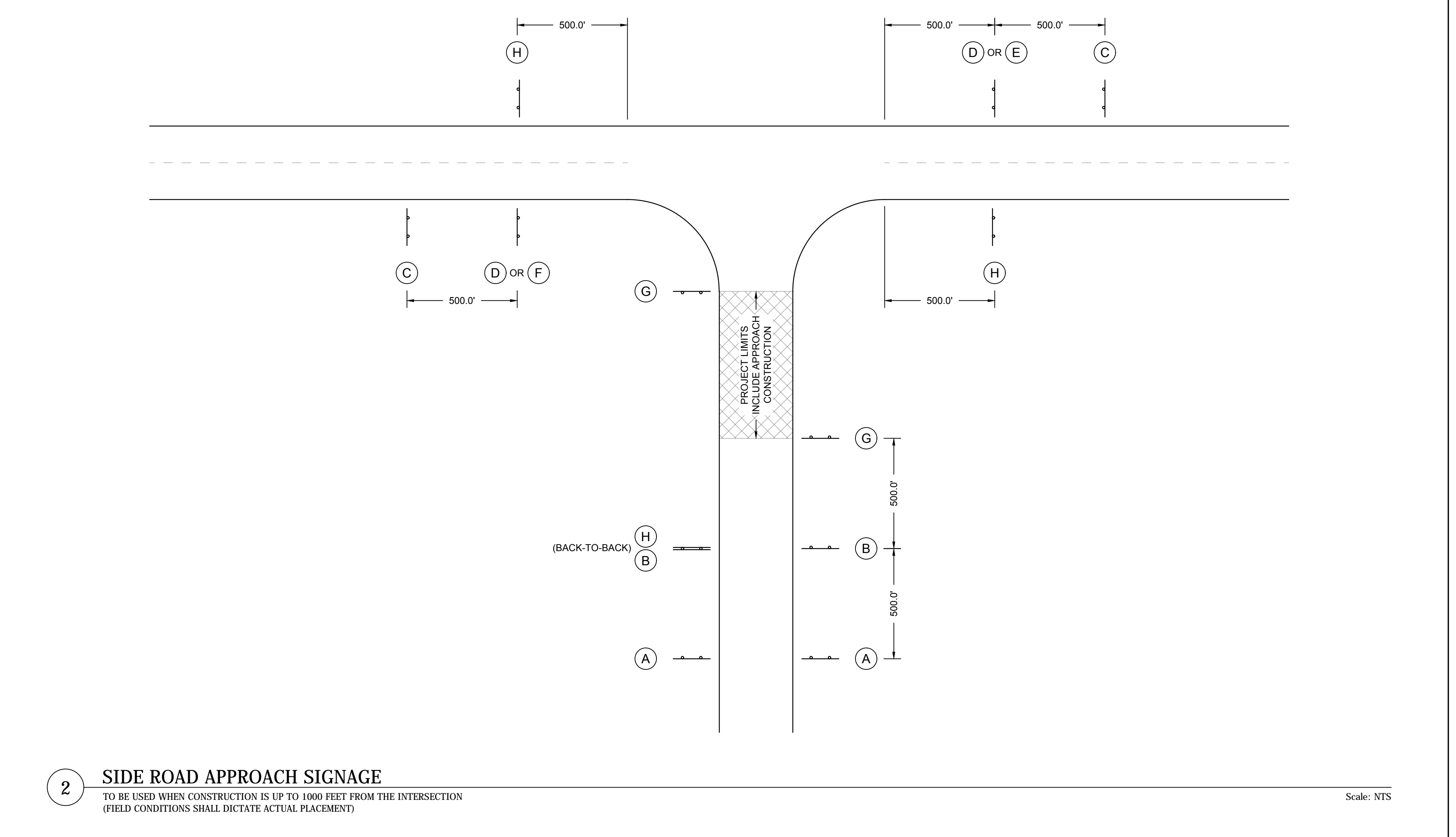
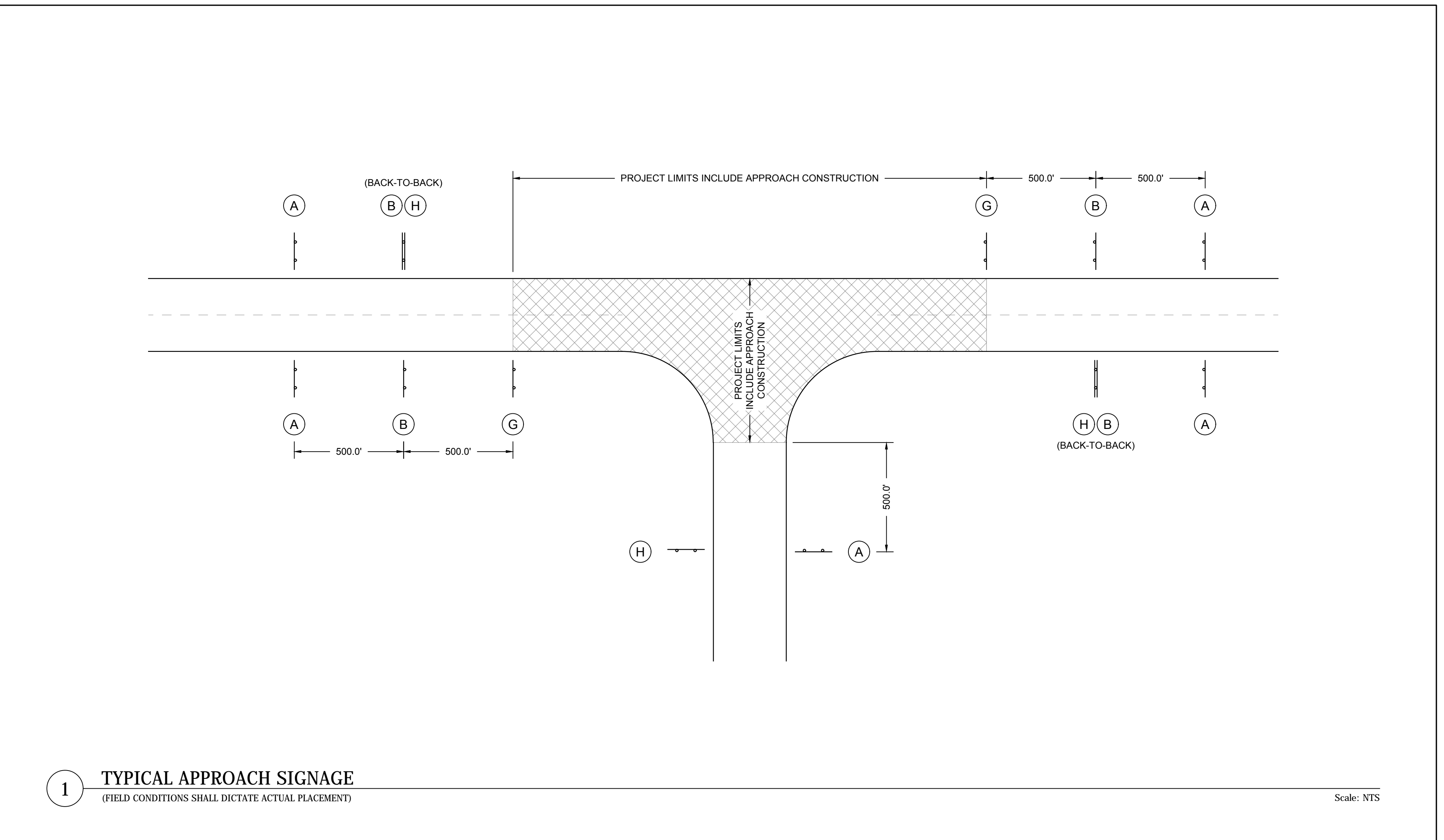
**GENERAL NOTES**  
(VERMONT AGENCY OF TRANSPORTATION STANDARD T-28)

1. COLORS FOR SIGNS SHALL BE BLACK LEGEND AND BORDER ON FLUORESCENT ORANGE BACKGROUND.
2. CONSTRUCTION SIGNS SHALL BE 48 INCH BY 48 INCH. IF SOLID SUBSTRATE SIGNS ARE USED, SIGNS SHALL HAVE CORNERS ROUNDED TO A THREE INCH RADIUS.
3. SIGNS SHALL HAVE 1/4 INCH WIDE BORDERS THAT ARE INDENTED 3/8 INCH FROM THE EDGE OF THE SIGN.
4. SIGNS SHALL HAVE THE LEGEND CENTERED HORIZONTALLY AND VERTICALLY ON THE SIGN, UNLESS OTHERWISE NOTED.
5. ALL SIGN DIMENSIONS ARE SHOWN IN INCHES.

**SIGN LEGEND**

**G** G20-1

**H** G20-2



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**REVISIONS**

NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
BENNINGTON, VERMONT

TRAFFIC CONTROL  
DETAILS

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C501**



# LEGEND

MUTCD TABLE 6H-2: MEANING OF SYMBOLS ON TYPICAL APPLICATION DIAGRAMS

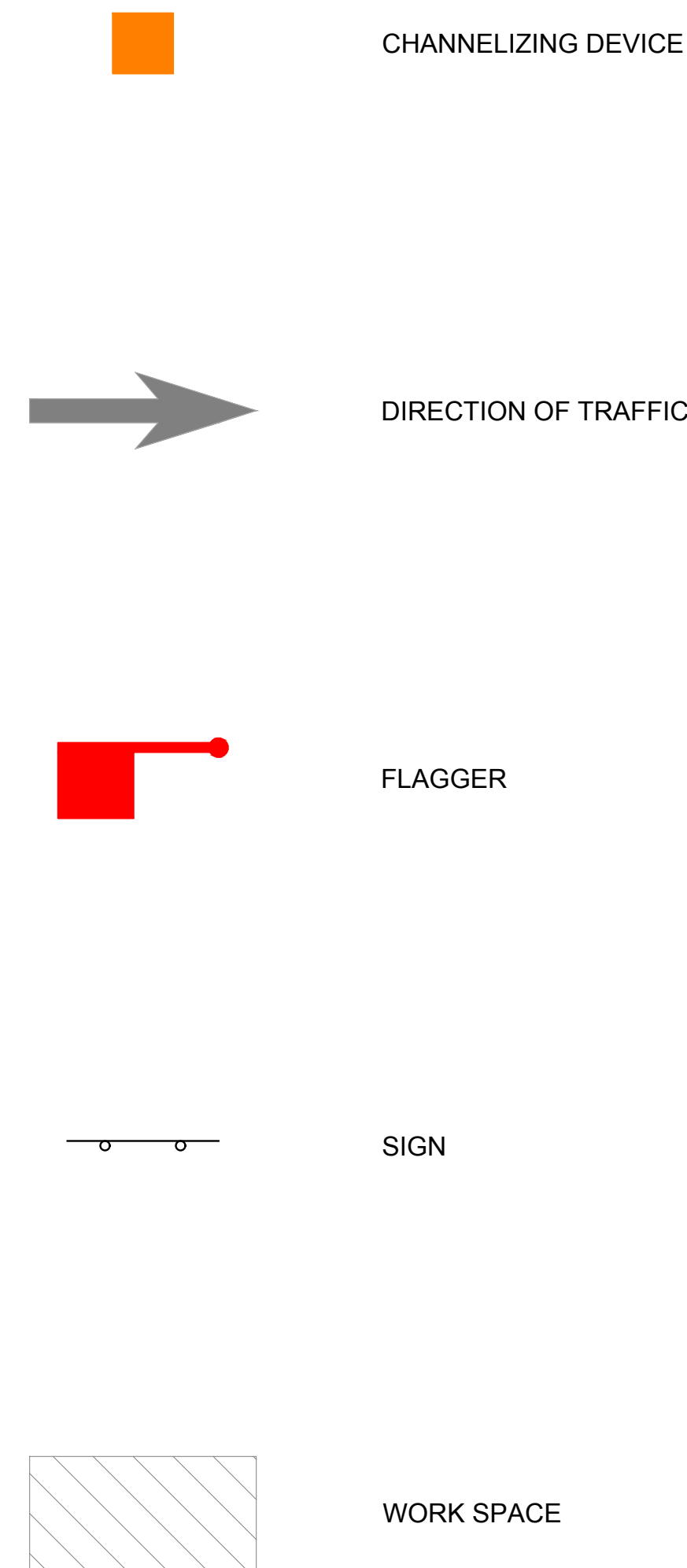


TABLE 6H-3: MEANING OF LETTER CODES ON TYPICAL APPLICATION DIAGRAMS

ROADWAY TYPE	DISTANCE BETWEEN SIGNS **		
	A	B	C
URBAN (LOW SPEED) *	100 FEET	100 FEET	100 FEET
URBAN (HIGH SPEED) *	350 FEET	350 FEET	350 FEET
RURAL	500 FEET	500 FEET	500 FEET
EXPRESSWAY/FREEWAY	1,000 FEET	1,500 FEET	2,640 FEET

\* SPEED CATEGORY TO BE DETERMINED BY HIGHWAY AGENCY  
 \*\* THE COLUMN HEADINGS A, B, AND C ARE THE DIMENSIONS SHOWN IN FIGURES 6H-3 AND 6H-10. THE DIMENSION A 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 "FIRST SIGN" IS THE SIGN IN A THREE-SIGN SERIES THAT IS CLOSEST TO THE TEMPORARY TRAFFIC CONTROL (TTC) ZONE. THE "THIRD SIGN" IS THE SIGN THAT IS LOCATED THE FURTHEST UPSTREAM FROM THE TTC ZONE.]

NOTES FOR FIGURE 6H-3: TYPICAL APPLICATION 3 "WORK ON THE SHOULDERS":

GUIDANCE

1. A "SHOULDER WORK" SIGN SHOULD BE PLACED ON THE LEFT SIDE OF THE ROADWAY FOR A DIVIDED OR ONE-WAY STREET ONLY IF THE LEFT SHOULDER IS AFFECTED.

OPTION

2. THE "WORKERS" SYMBOL SIGN MAY BE USED INSTEAD OF "SHOULDER WORK" SIGNS.
3. THE "SHOULDER WORK AHEAD" SIGN ON AN INTERSECTING ROADWAY MAY BE OMITTED WHERE DRIVERS EMERGING FROM THAT ROADWAY WILL ENCOUNTER ANOTHER ADVANCED WARNING SIGN PRIOR TO THIS ACTIVITY AREA.
4. FOR SHORT DURATION OPERATIONS OF 60 MINUTES OR LESS, ALL SIGNS AND CHANNELIZING DEVICES MAY BE ELIMINATED IF A VEHICLE WITH ACTIVATED HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS IS USED.
5. VEHICLE HAZARD WARNING SIGNALS MAY BE USED TO SUPPLEMENT HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS.

STANDARD

6. VEHICLE HAZARD WARNING SIGNALS SHALL NOT BE USED INSTEAD OF THE VEHICLE'S HIGH-INTENSITY ROTATING, FLASHING, OSCILLATING, OR STROBE LIGHTS.
7. WHEN PAVED SHOULDERS HAVING A WIDTH OF 8 FEET OR MORE ARE CLOSED, AT LEAST ONE ADVANCED WARNING SIGN SHALL BE USED. IN ADDITION, CHANNELIZING DEVICES SHALL BE USED TO CLOSE THE SHOULDER IN ADVANCE TO DELINEATE THE BEGINNING OF THE WORK SPACE AND DIRECT VEHICULAR TRAFFIC TO REMAIN WITHIN THE TRAVELED WAY.

TABLE 6H-4: FORMULAS FOR DETERMINING TAPER LENGTH

SPEED (S)	TAPER LENGTH (L) IN FEET
40 MPH OR LESS	$L = \frac{WS^2}{50}$
45 MPH OR MORE	$L = WS$

WHERE: L = TAPER LENGTH IN FEET  
 W = WIDTH OF OFFSET IN FEET  
 S = POSTED SPEED LIMIT, OR OFF-PEAK 85TH-PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED IN MPH

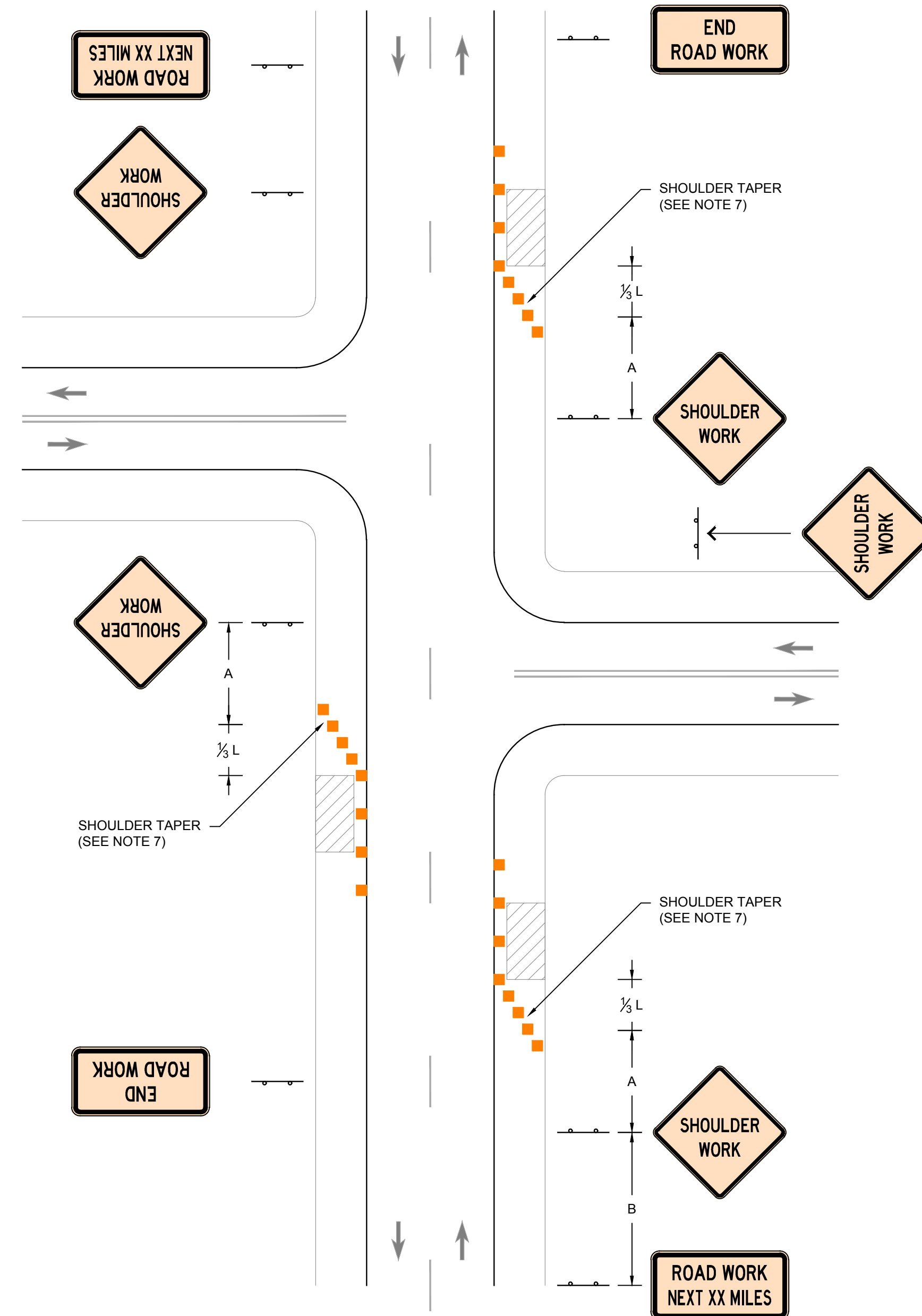
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1

## WORK ON THE SHOULDERS (TA-3)

MUTCD FIGURE 6H-3: TYPICAL APPLICATION 3

Scale: NTS

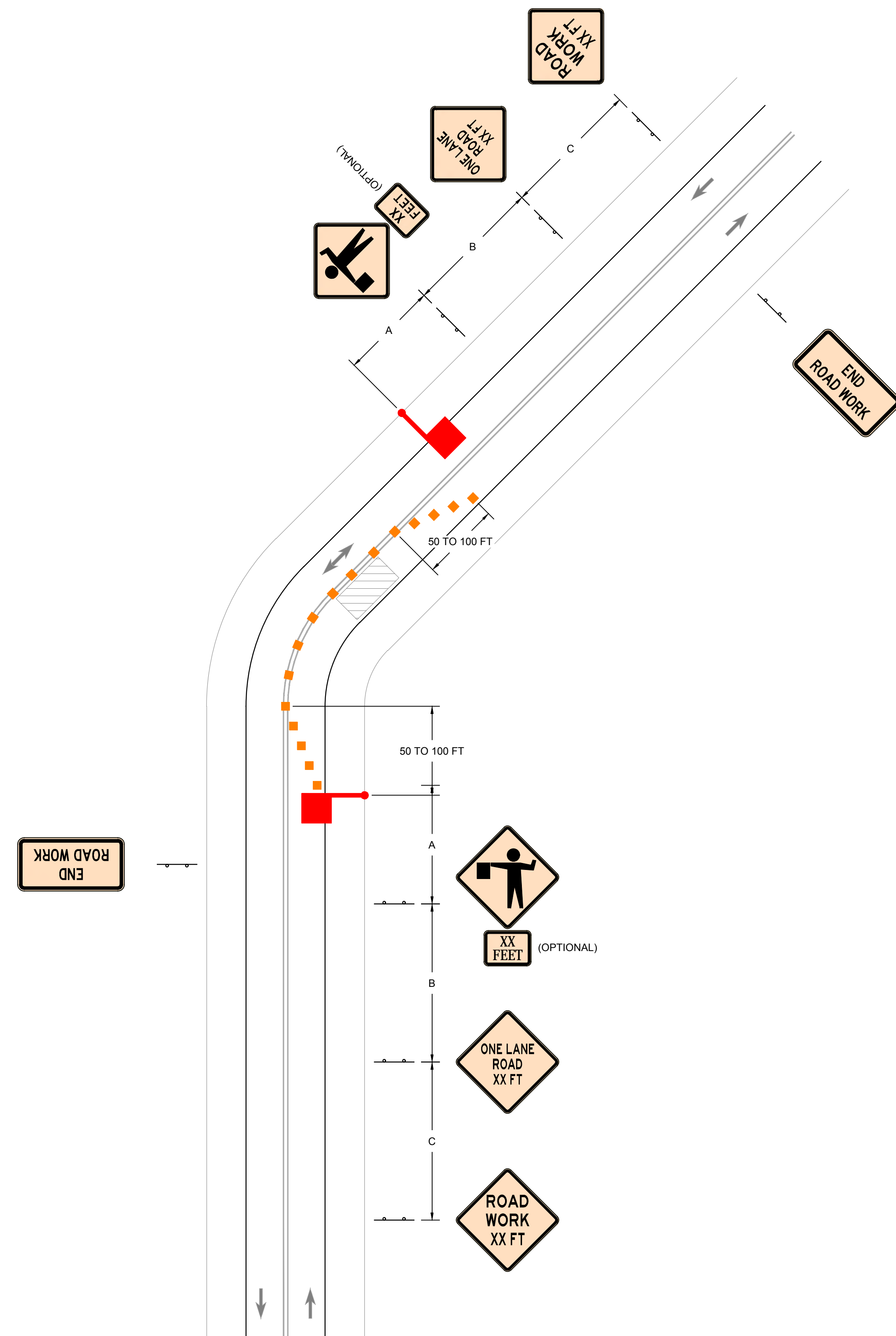


2

## LANE CLOSURE ON TWO-LANE ROAD USING FLAGGERS (TA-10)

MUTCD FIGURE 6H-10: TYPICAL APPLICATION 10

Scale: NTS



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REVISIONS	
NO.	DESCRIPTION

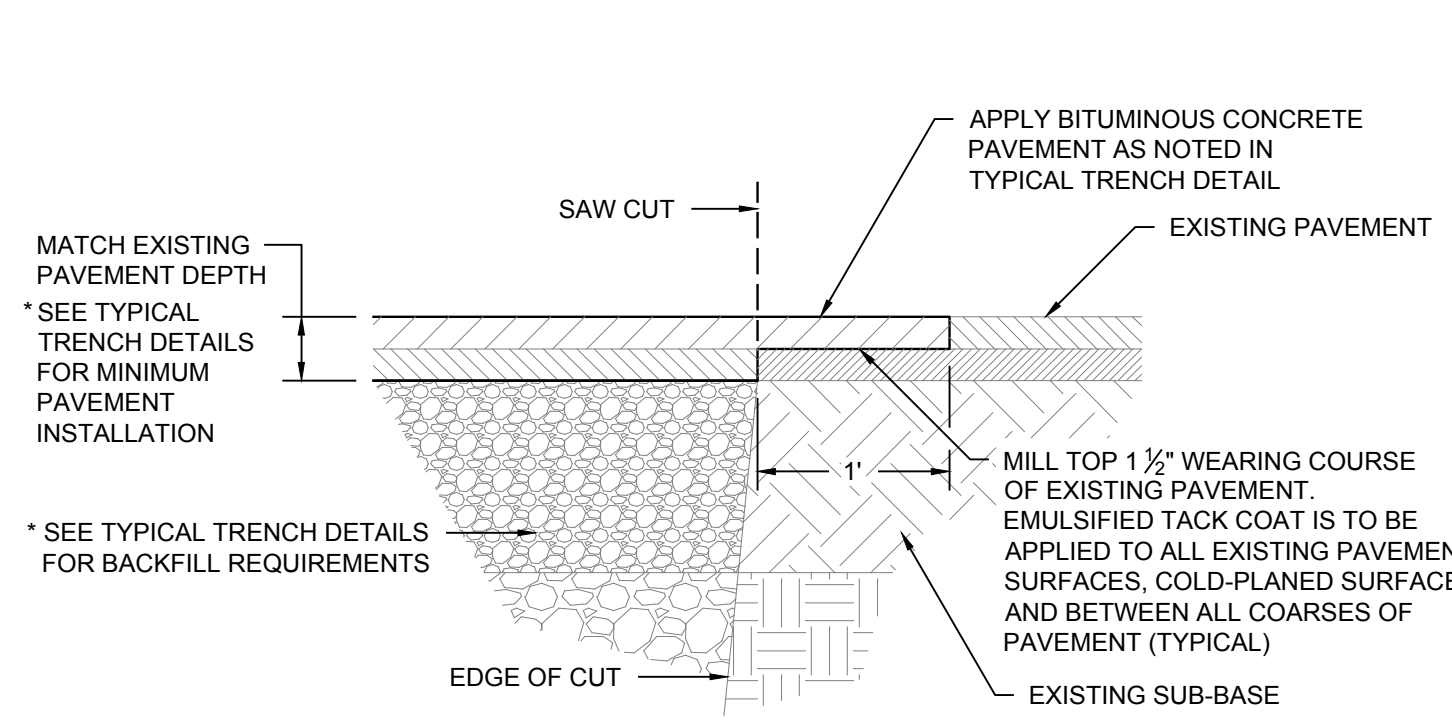
TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 TRAFFIC CONTROL  
 DETAILS

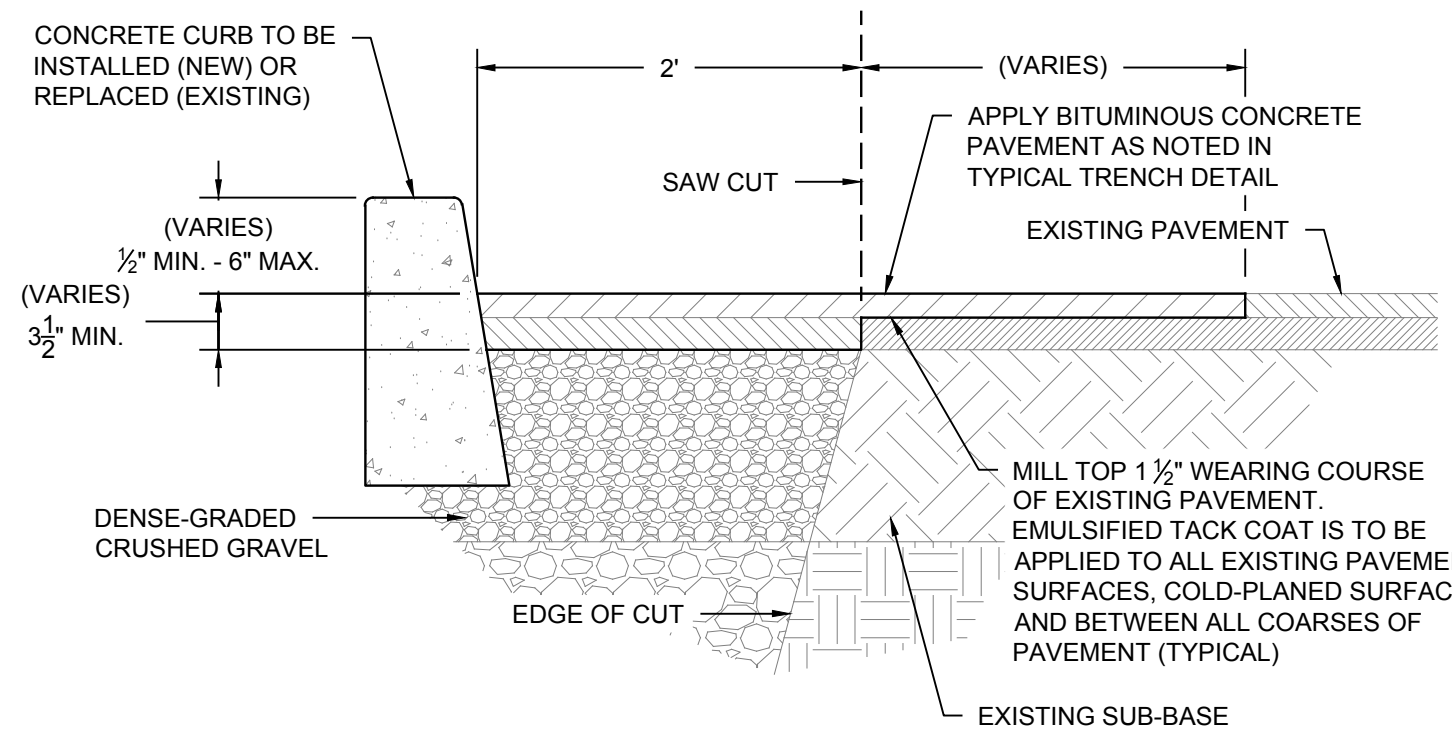
NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C502**

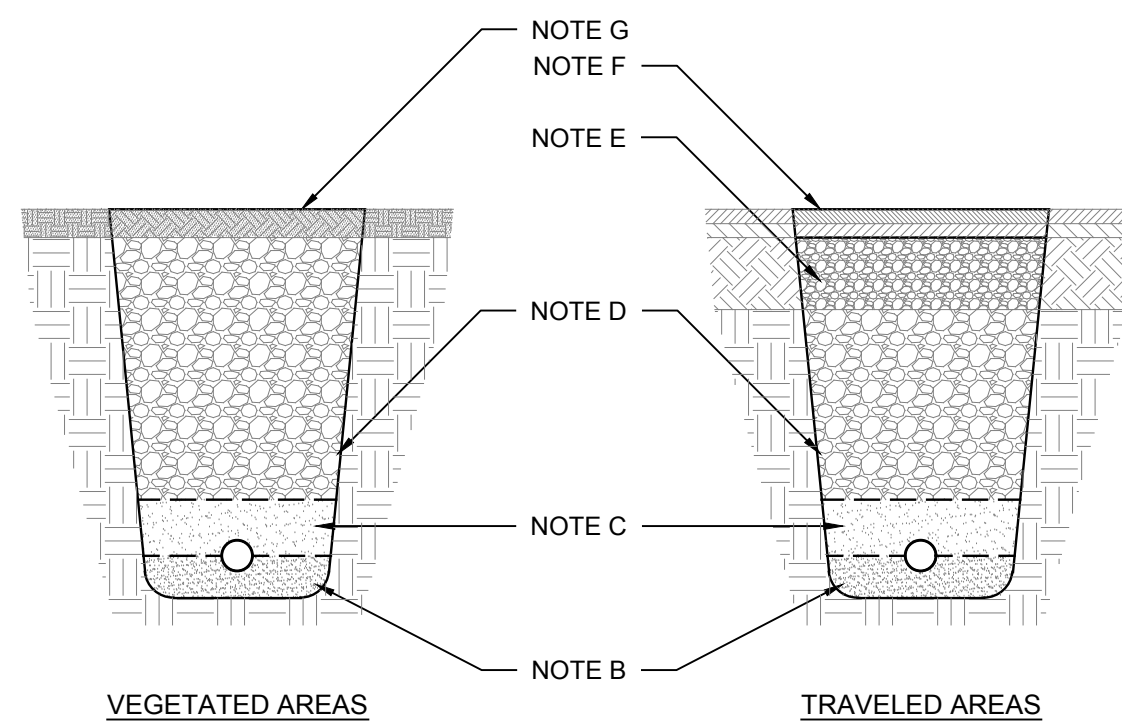




1 PAVEMENT REPAIR DETAIL  
Scale: NTS



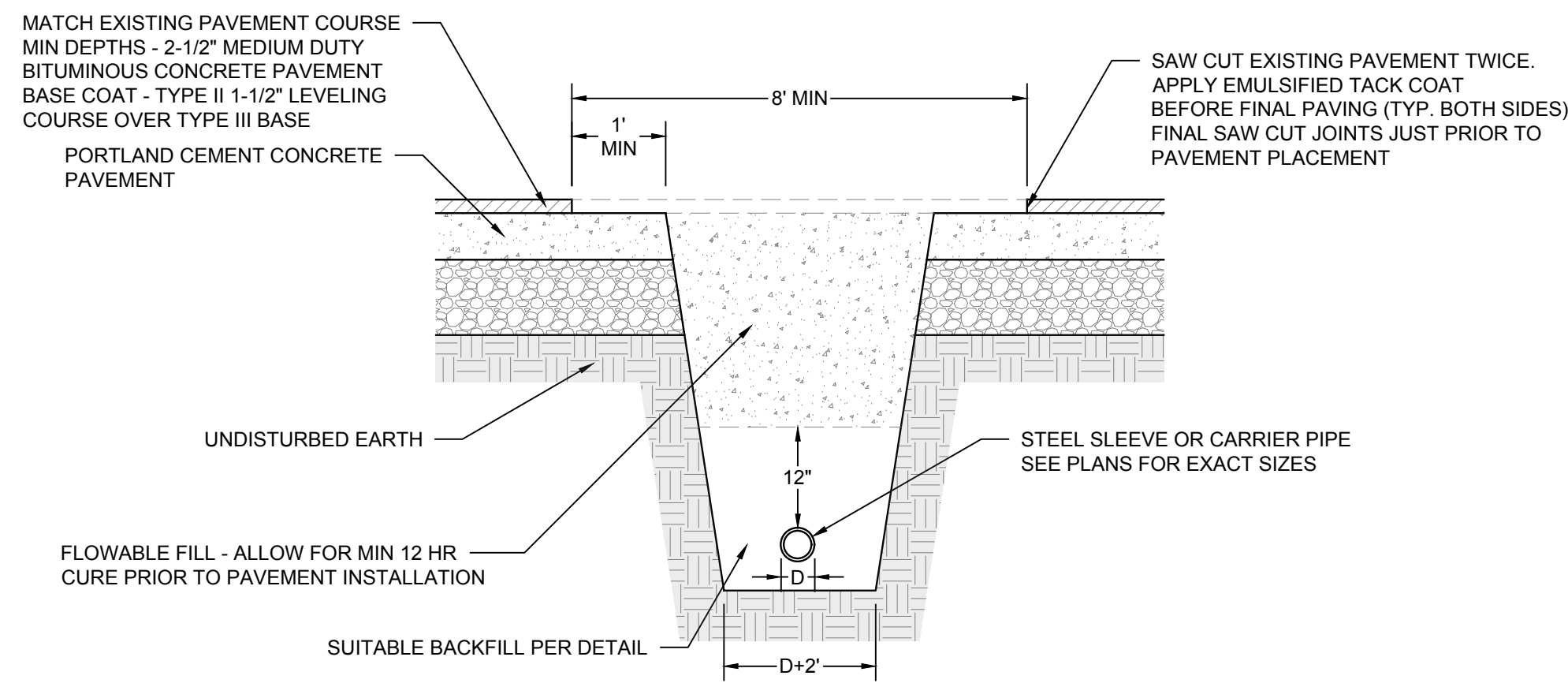
2 PAVEMENT REPAIR DETAIL  
(AT CURB) Scale: NTS



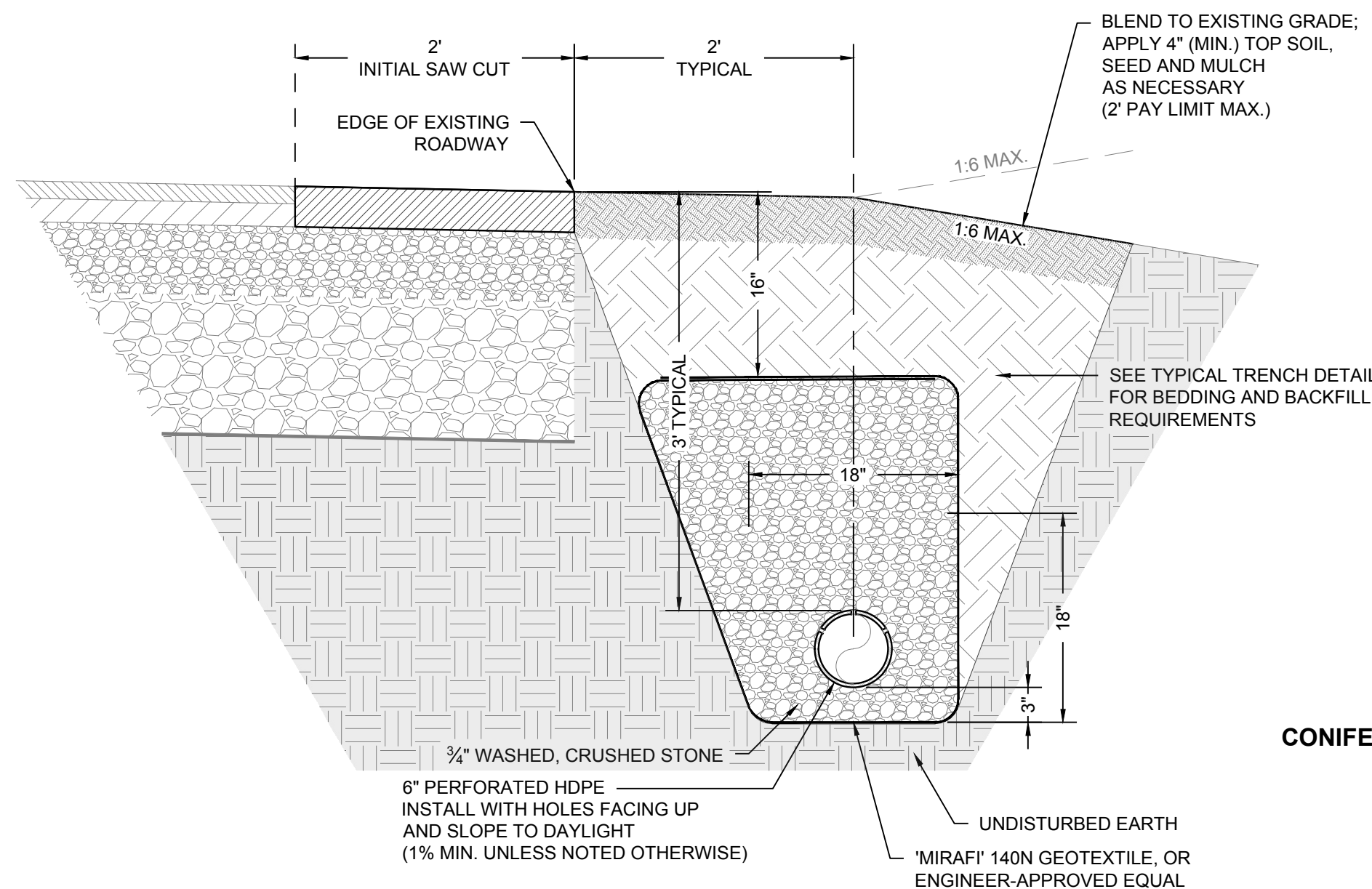
3 TYPICAL TRENCH DETAIL  
Scale: NTS

INSTALLATION SPECIFICATIONS

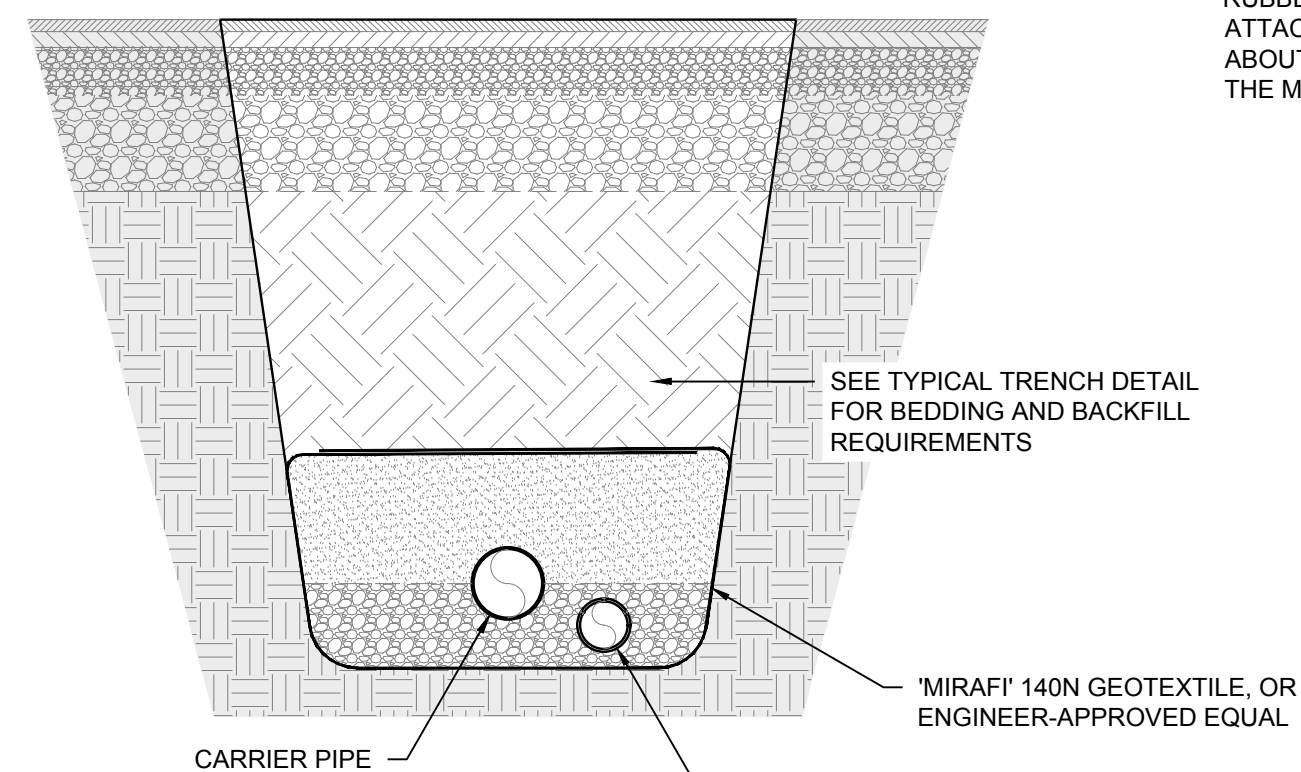
- A. MINIMUM BURIAL DEPTH 5'-6" (4'-0" FOR SEWER), IF CONDITIONS PREVENT MINIMUM BURIAL DEPTH, ALL SECTIONS OF LINE LESS THAN MINIMUM DEPTH IS TO BE INSULATED WITH 1" THICKNESS RIGID FOAM INSULATION PER FOOT LESS THAN MINIMUM (MIN. 2" THICKNESS).
- B. BED PIPE IN 6" OF BEDDING MATERIAL. PIPE IS NOT TO BE LAID IN UNCOMPACTED SOIL OR IN WATER. IF IN LEDGE CONDITIONS, BED PIPE IN A MINIMUM OF 6" OF SAND. DO NOT REST PIPE ON LEDGE ROCK.
- C. BACKFILL OVER PIPE WITH 12" MINIMUM SAND BEDDING MATERIAL, COMPACTED ENTIRE WIDTH OF TRENCH. BACKFILL WITH 3/4" STONE TO 12" DEPTH IF IN WATER.
- D. BACKFILL WITH SATISFACTORY SOIL MATERIAL COMPACTED IN 6" LIFTS TO 95% MAXIMUM DRY DENSITY IN ROADS AND PAVED AREAS, 85% MAXIMUM DRY DENSITY IN LAWN AND GRASSED AREAS..
- E. MINIMUM SUB-BASE INSTALLATION:
  - MUNICIPAL ROADWAYS: 12" COARSE-GRADED, CRUSHED GRAVEL  
6" FINE-GRADED, CRUSHED GRAVEL
  - STATE ROADWAY: 18" COARSE-GRADED, CRUSHED GRAVEL  
6" FINE-GRADED, CRUSHED GRAVEL
  - DRIVEWAY: 8" COARSE-GRADED, CRUSHED GRAVEL  
6" FINE-GRADED, CRUSHED GRAVEL
- F. EDGES OF PAVEMENT MUST BE CUT PRIOR TO EXCAVATION TO PREVENT LIFTING OF REMAINING PAVEMENT, AND FOLLOWING EXCAVATION PRIOR TO PAVEMENT REPAIR, APPLY EMULSION TO EDGE OF EXISTING PAVEMENT PRIOR TO PAVING.
  - MINIMUM PAVEMENT INSTALLATION:
    - MUNICIPAL ROADWAY: TOP: 1.5"/ TYPE 4  
BASE: 2.5"/ TYPE 2
    - STATE ROADWAY: TOP: 1.5"/ TYPE 3  
BASE: 2.5"/ TYPE 2
    - PAVED DRIVEWAYS: TOP: 1"/ TYPE 4  
BASE: 2"/ TYPE 2
- G. 4" MINIMUM TOPSOIL, SEEDED AND MULCHED.



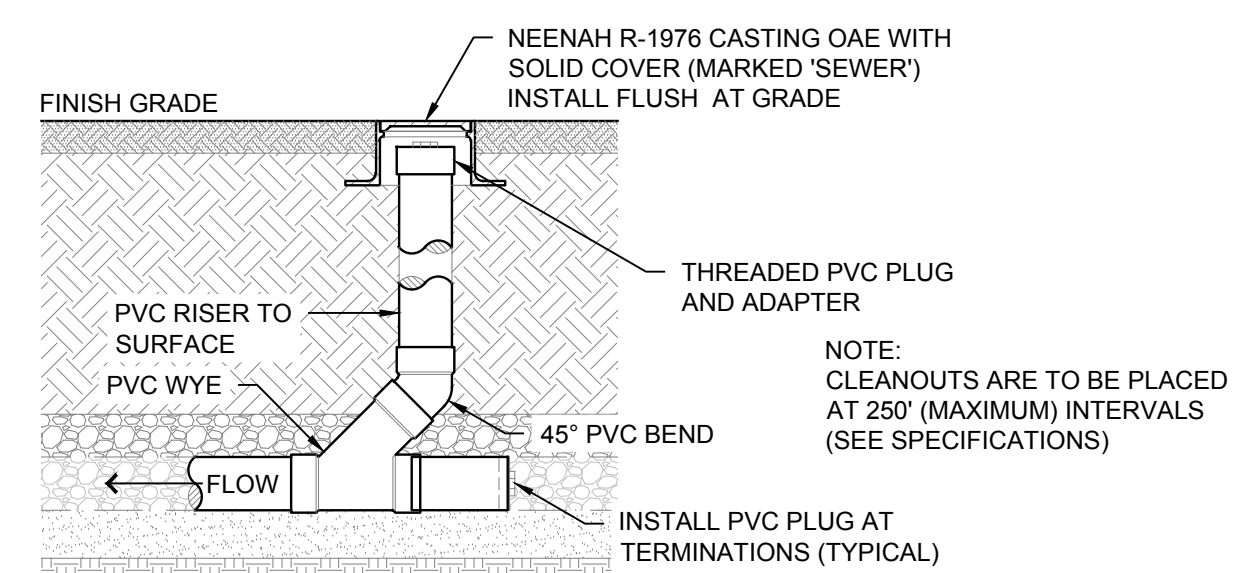
4 OPEN CUT PAVEMENT TRENCH DETAIL - CONCRETE ROADWAY  
Scale: NTS



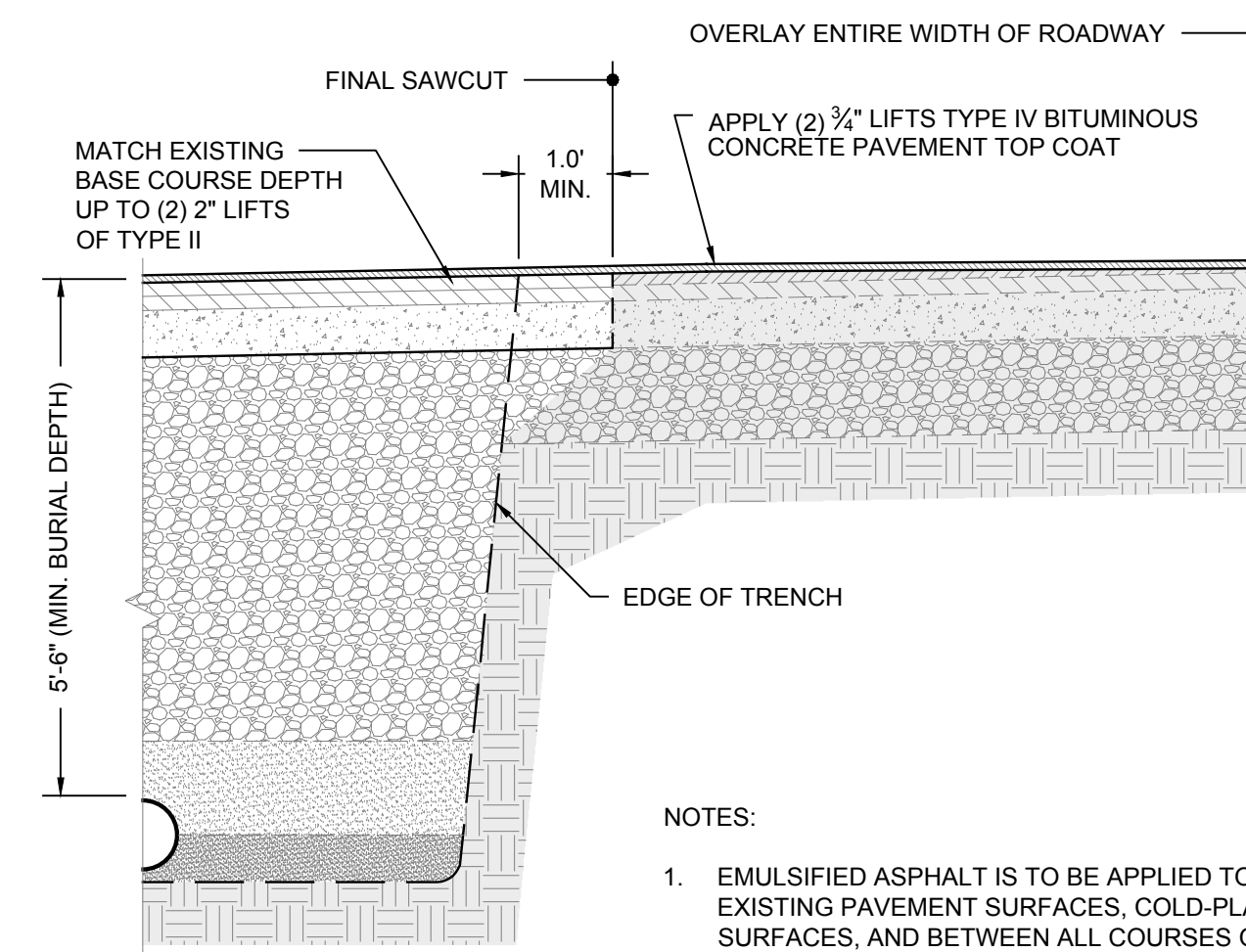
5 FRENCH DRAIN DETAIL  
Scale: NTS



6 FRENCH DRAIN DETAIL  
Scale: NTS



7 TYPICAL IN-LINE CLEANOUT  
Scale: NTS



8 PAVEMENT REPAIR AND OVERLAY DETAIL  
Scale: NTS

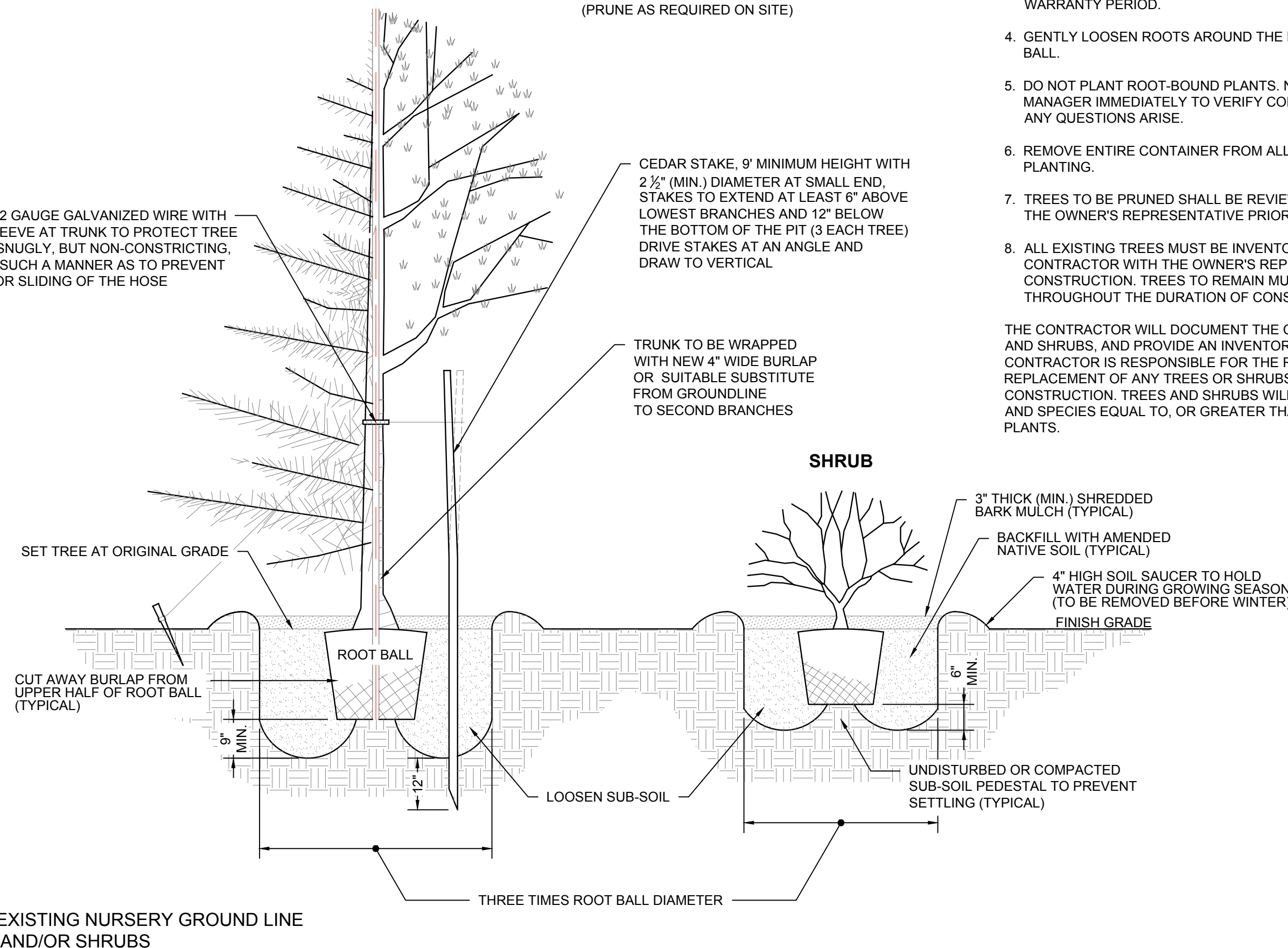
- NOTES:
1. EMULSIFIED ASPHALT IS TO BE APPLIED TO ALL EXISTING PAVEMENT SURFACES, COLD-PLANED SURFACES, AND BETWEEN ALL COURSES OF PAVEMENT AT A RATE OF 0.08 TO 0.10 GAL/SY, AND 0.04 GAL/SY BETWEEN ALL SUCCESSIVE LIFTS, REGARDLESS OF WHETHER IT IS PAVED ON THE SAME DAY, OR NOT.
  2. RESTORE ALL PAVEMENT MARKINGS.

NOTES:

1. PLANTS ARE TO BE SET PLUMB.
  2. DO NOT ALLOW AIR POCKETS TO FORM DURING BACKFILLING.
  3. GUY WIRES ARE TO BE REMOVED AT THE END OF THE WARRANTY PERIOD.
  4. GENTLY LOOSEN ROOTS AROUND THE EXTERIOR OF THE ROOT BALL.
  5. DO NOT PLANT ROOT-BOUND PLANTS. NOTIFY PROJECT MANAGER IMMEDIATELY TO VERIFY CONDITION OF PLANT IF ANY QUESTIONS ARISE.
  6. REMOVE ENTIRE CONTAINER FROM ALL PLANTS PRIOR TO PLANTING.
  7. TREES TO BE PRUNED SHALL BE REVIEWED IN THE FIELD WITH THE OWNER'S REPRESENTATIVE PRIOR TO INSTALLATION.
  8. ALL EXISTING TREES MUST BE INVENTORIED BY THE CONTRACTOR WITH THE OWNER'S REPRESENTATIVE PRIOR TO CONSTRUCTION. TREES TO REMAIN MUST BE PROTECTED THROUGHOUT THE DURATION OF CONSTRUCTION.
- THE CONTRACTOR WILL DOCUMENT THE CONDITION OF ALL TREES AND SHRUBS, AND PROVIDE AN INVENTORY TO THE OWNER. THE CONTRACTOR IS RESPONSIBLE FOR THE REMOVAL AND REPLACEMENT OF ANY TREES OR SHRUBS DAMAGED DURING CONSTRUCTION. TREES AND SHRUBS WILL BE REPLACED AT A SIZE AND SPECIES EQUAL TO, OR GREATER THAN, THE DAMAGED PLANTS.

CONIFEROUS TREE

DECIDUOUS TREE  
(PRUNE AS REQUIRED ON SITE)



9 TYPICAL PLANTING DETAIL FOR TREES AND SHRUBS  
Scale: NTS

\* MAINTAIN EXISTING NURSERY GROUND LINE OF TREES AND/OR SHRUBS

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NO.	DATE	DESCRIPTION

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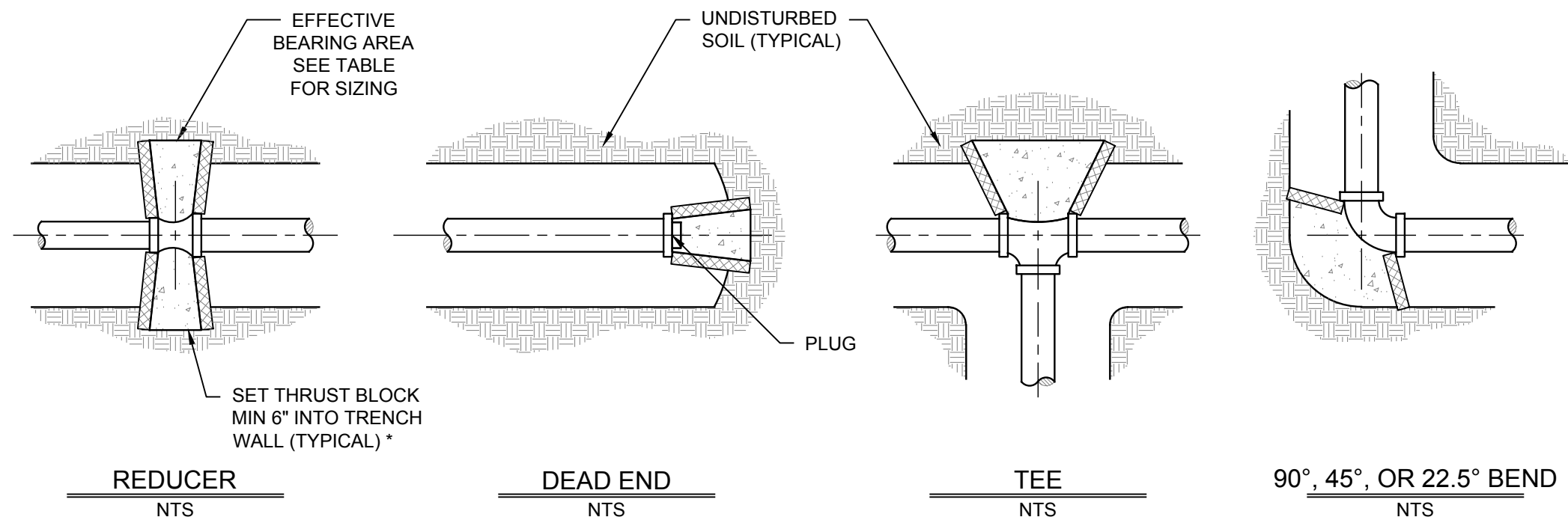
CONSTRUCTION  
DETAILS

NUMBER	DATE
1001-019.7	05-14-2019

SHEET NUMBER  
**C503**

ALL DRAWING DATA IS FOR 2017 PER A REVISION TO THE 2016 CONSTRUCTION DETAILS. REVISED 12/15/17 BY JMD





MINIMUM BEARING SURFACE AREA OF CONCRETE THRUST BLOCKS (IN SQUARE FEET)

REDUCERS		4-8"			10"			12"			SOIL CONDITION	SAFE BEARING LOAD (PSF)		
8x6	10x8	12x8	ENDS AND TEES	90° ELB	45° ELB	22.5° OR LESS	ENDS AND TEES	90° ELB	45° ELB	22.5° OR LESS				
3.0	5.0	6.0	4.0	6.0	3.0	2.0	6.0	8.0	5.0	2.0	8.0	3.0	SOUND SHALE	10000
3.0	5.0	6.0	4.5	6.5	3.5	2.0	8.0	11.0	6.0	3.0	10.0	14.0	CEMENTED GRAVEL AND SAND	4000
7.0	7.0	11.0	7.0	9.0	5.0	3.0	10.0	14.0	7.0	4.0	14.0	19.0	COARSE AND FINE COMPACT SAND	3000
8.0	9.0	14.0	15.0	20.0	10.0	5.0	21.0	31.0	15.0	8.0	30.0	40.0	MEDIUM CLAY (CAN BE SPADED)	2000
8.0	11.0	16.0	20.0	28.0	15.0	8.0	29.0	41.0	22.0	11.0	41.0	58.0	SOFT CLAY	1000

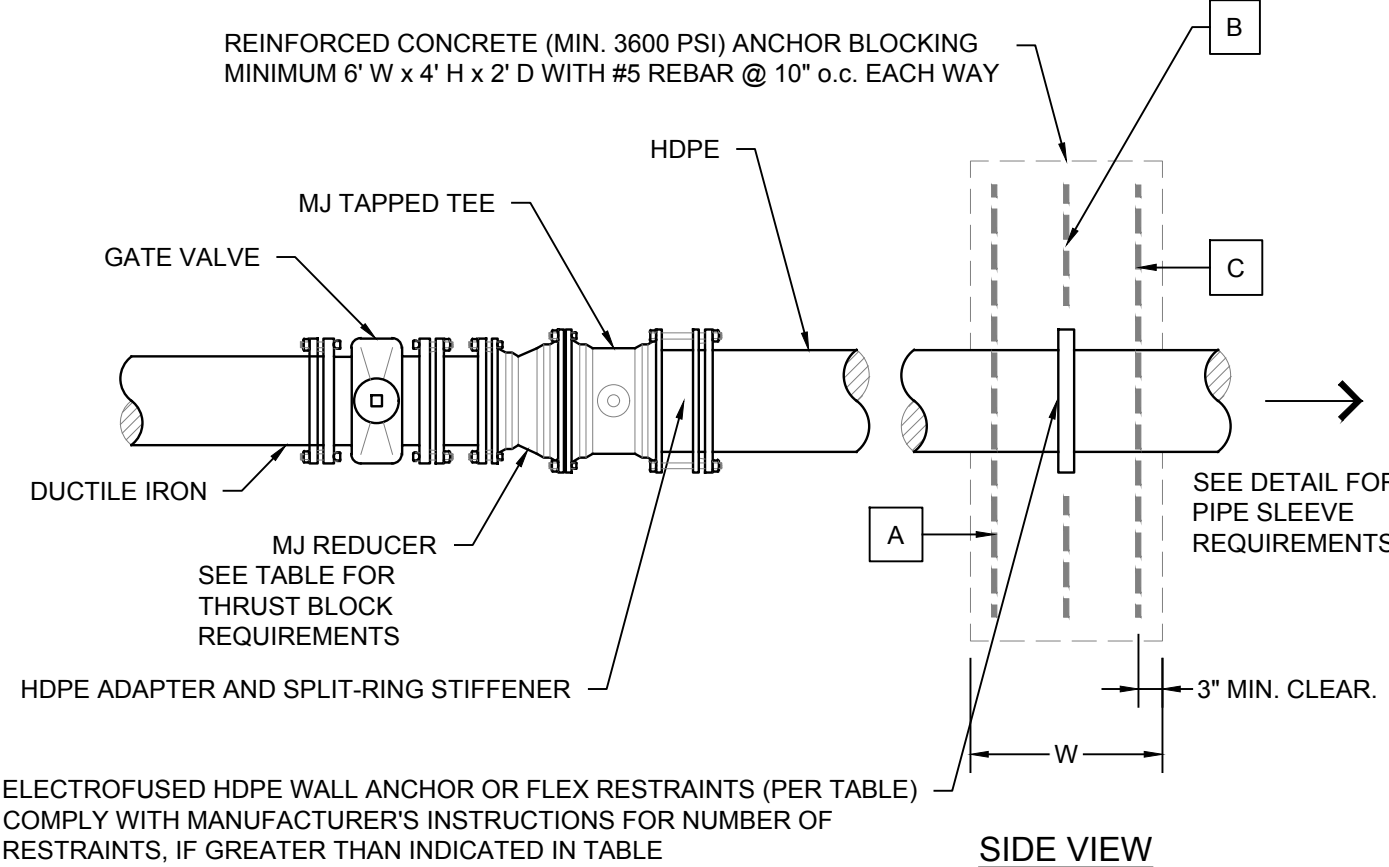
MAXIMUM WATER PRESSURE 300 PSI

\* THRUST BLOCKS ARE NOT REQUIRED AT REDUCERS OF ONE PIPE DIAMETER OR LESS  
 \*\* ALL THRUST BLOCKS ARE TO BE FORMED WITH 2" RIGID FOAM INSULATION TO MEET MINIMUM BEARING SURFACE AREA.  
 NON-FORMED THRUST BLOCKS WILL NOT BE PERMITTED.

**1 TYPICAL CONCRETE THRUST BLOCK DETAIL**

Scale: NTS

NOTES:  
 1. PLACE 3 MIL MINIMUM POLYETHYLENE SHEETING BETWEEN ALL CONCRETE THRUST BLOCKS AND PIPE AND/OR FITTINGS TO PREVENT BONDING



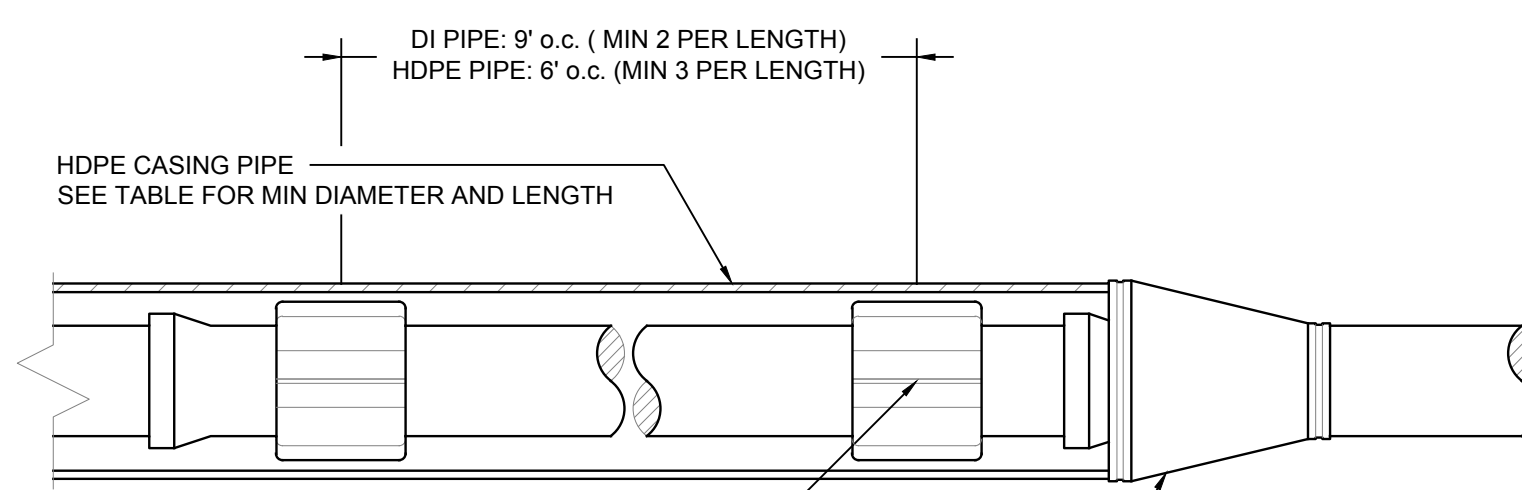
NOTES:

- INSTALL (2) EXTRA HIGH-STRENGTH # 12 - 14 AWG SOLID COPPER TRACER WIRE WITH BLUE 30 mil INSULATION. CONNECT AT DUCTILE IRON PIPE, RUN ABOVE HDPE, AND IN SLEEVE. TRACER WIRE TO BE ELECTRICALLY CONTINUOUS TO BOTH ENDS OF HDPE, AND BONDED TO DUCTILE IRON.
- FLEX RESTRAINTS MUST BE RATED AT 8,000 LBS OF FORCE OR HIGHER
- WHEN DIRECTED BY THE ENGINEER, THE CONCRETE ANCHOR BLOCK SIZE MAY BE ADJUSTED, BASED ON SOIL CLASSIFICATION AND PIPE DIAMETER
- ENGINEER TO CONFIRM ADEQUATE SOIL PRESSURE BEARING CAPACITY FOR CONCRETE ANCHOR BLOCKING
- REINFORCEMENT NOTES
  - FOR 4 TO 10 INCH PIPE, PLACE ONE MAT OF #5 REBAR AT LOCATION "B" AS SHOWN ON DIAGRAM
  - FOR 12 INCH PIPE, PLACE TWO MATS OF #5 REBAR, ONE AT LOCATION "A" AND ONE AT LOCATION "C" AS SHOWN ON THE DIAGRAM

HDPE NOMINAL PIPE SIZE (INCHES)	APPROX. DEAD END THRUST AT 200 PSI WATER PRESSURE		UNDISTURBED SOIL BEARING AREA (SQ FT)	APPROX. SOIL PRESSURE BEARING LOAD (LB/ SQ FT)	MINIMUM WIDTH "W" (INCHES)	APPROXIMATE CONCRETE VOLUME	
	HDPE	TOTAL THRUST (LBS)				CUBIC FT	CUBIC YARDS
4	2,130	15	142	10	20	0.74	
6	4,616	15	308	10	20	0.74	
8	7,823	15	522	12	24	0.89	
10	12,153	15	810	12	24	0.89	
12	17,094	15	1,140	14	28	1.04	

**2 TYPICAL HDPE TRANSITION DETAIL**

Scale: NTS

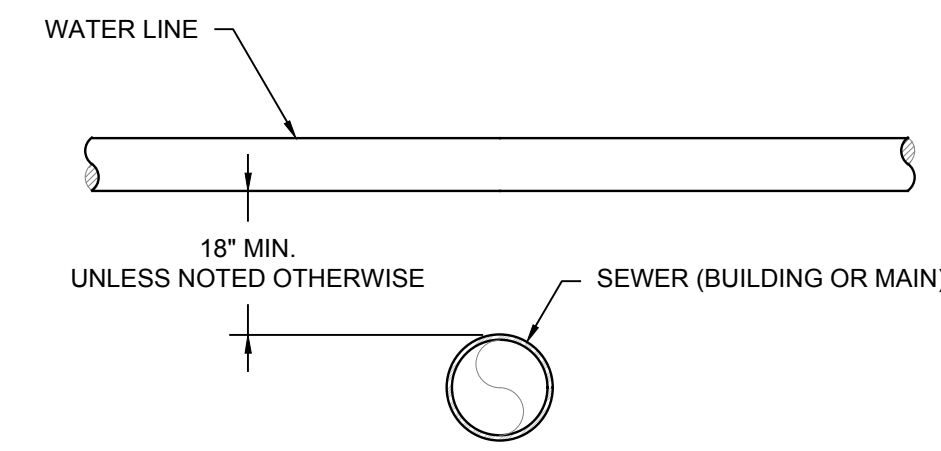


CARRIER DIA	CASING DIAM.ATL	MIN THICKNESS
3/4"-1" K' CU	4" HDPE	N/A
2" K' Cu	6" HDPE	DR 17
3" HDPE	10" HDPE	DR 17
4" DI	14" HDPE	DR 17
6" DI	16" HDPE	DR 17
8" DI	18" HDPE	DR 17
10" HDPE	18" HDPE	DR 17
10" HDPE *	24" HDPE	DR 17

\* BENEATH U.S. ROUTE 7 (SEE PLANS)

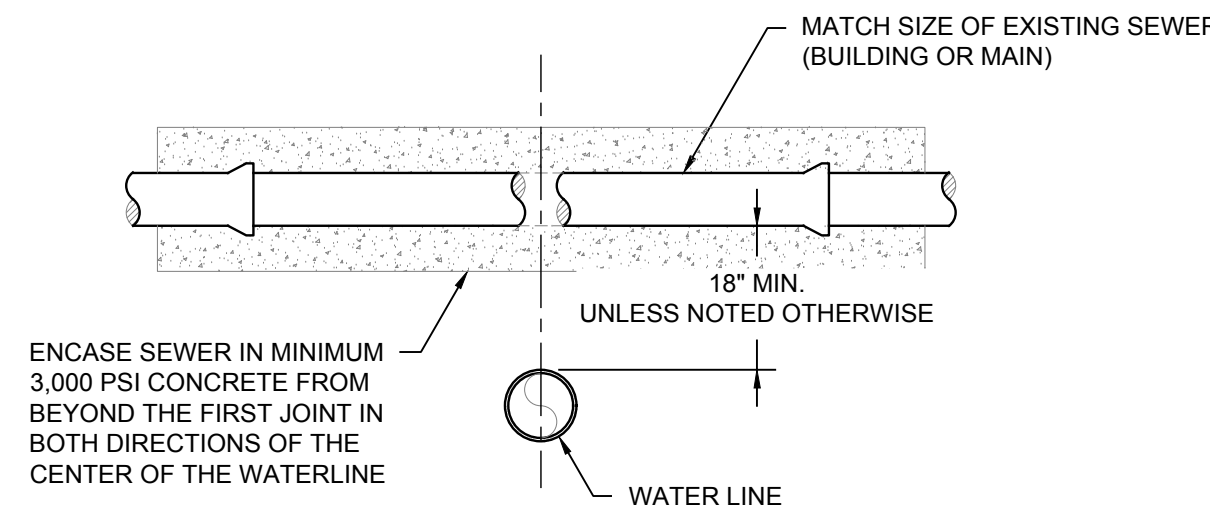
**3 SLEEVE PIPE DETAIL**

Scale: NTS



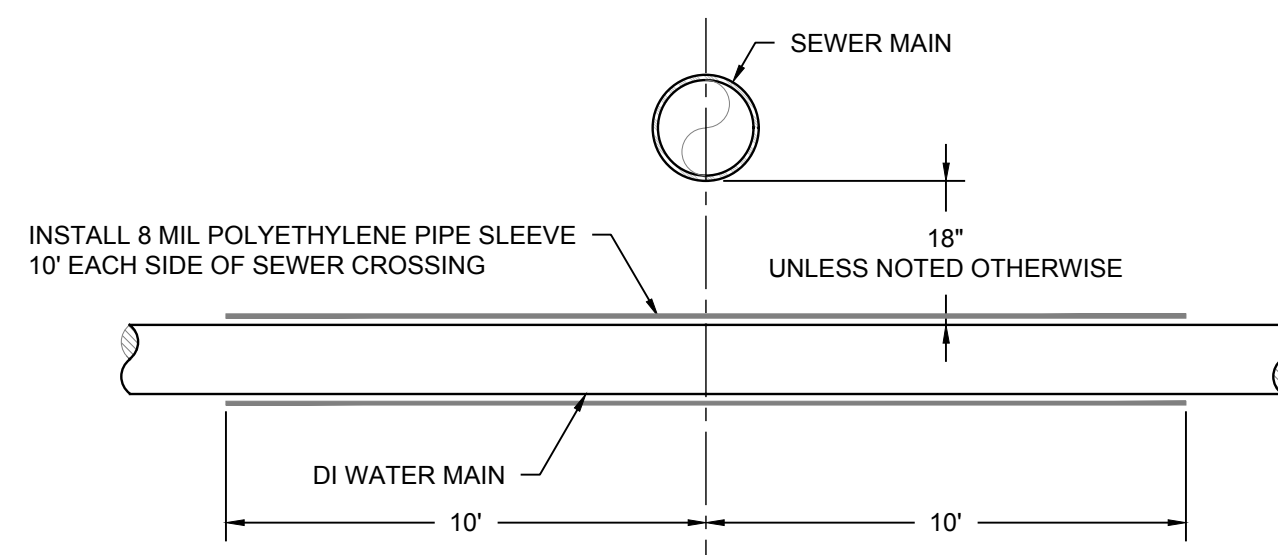
**4 WATER CROSSING SEWER - ABOVE**

Scale: NTS



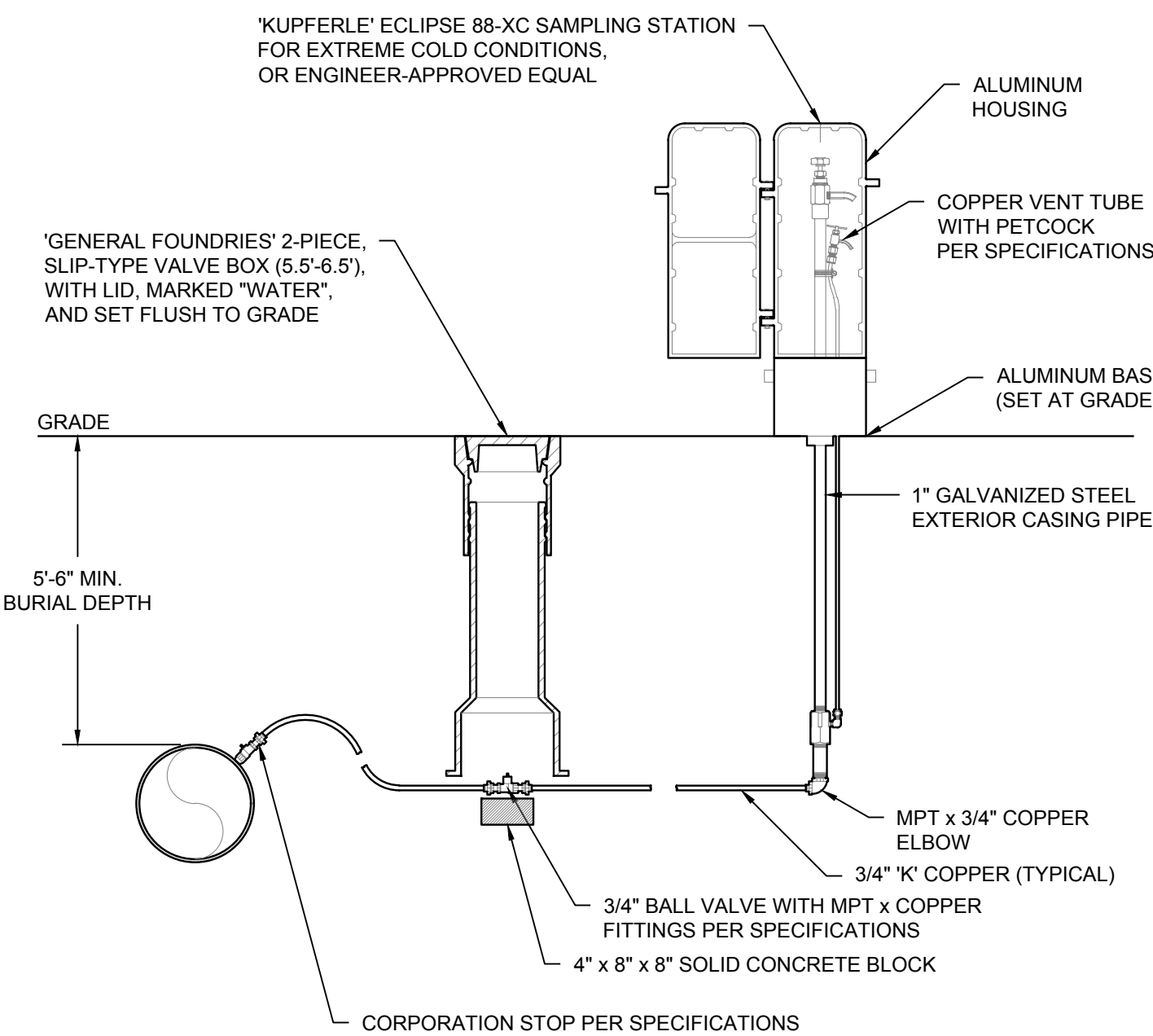
**5 WATER CROSSING SEWER - BELOW**

Scale: NTS



**6 WATER CROSSING SEWER - BELOW**

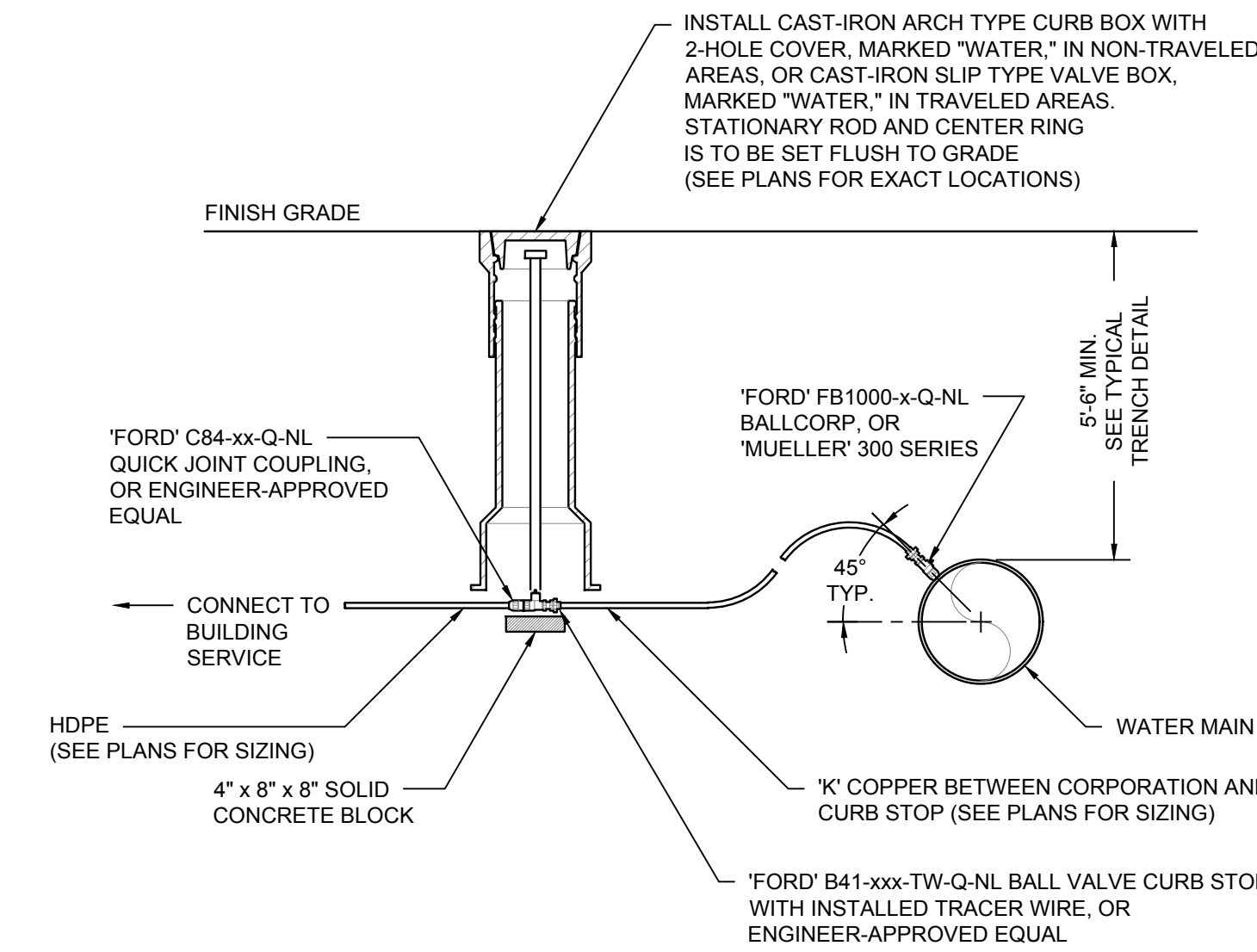
Scale: NTS



**7 TYPICAL SAMPLING STATION DETAIL**

Scale: NTS

- SAMPLING STATIONS ARE TO HAVE A 5'-6" MINIMUM BURIAL DEPTH, WITH 3/4" FIP INLET AND 3/4" HOSE OR UNTHREADED NOZZLE
- ALL STATIONS ARE TO BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE ALUMINUM-CAST HOUSING, AND ARE TO INCLUDE THE MANUFACTURER'S VACUUM PUMP SYSTEM
- WHEN OPENED, THE STATION MUST REQUIRE NO KEY FOR OPERATION, AND THE WATER WILL FLOW IN AN ALL BRASS WATERWAY
- ALL WORKING PARTS WILL ALSO BE OF BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DIGGING
- EXTERIOR PIPING ARE TO BE BRASS OR GALVANIZED
- A COPPER VENT TUBE WILL ENABLE EACH STATION TO BE PUMPED FREE OF STANDING WATER TO PREVENT FREEZING AND TO MINIMIZE THE GROWTH OF BACTERIA
- THE ECLIPSE No. 88-XC SAMPLING STATION, FOR EXTREME COLD CONDITIONS, WILL BE MANUFACTURED BY KUPFERLE FOUNDRY, ST. LOUIS, MO 63102

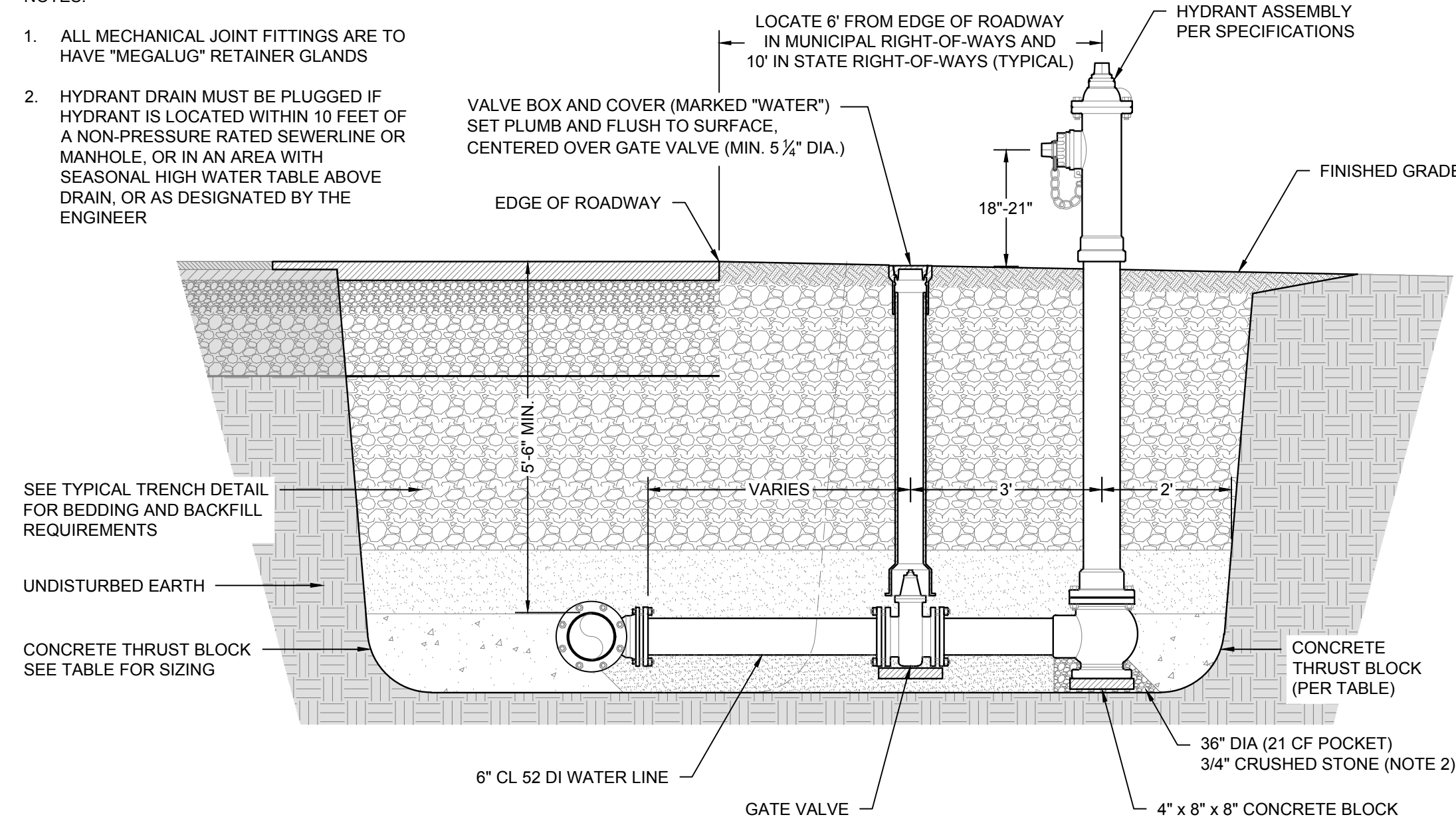


**8 TYPICAL CURB STOP**

Scale: NTS

NOTES:

- ALL MECHANICAL JOINT FITTINGS ARE TO HAVE "MEGALUG" RETAINER GLANDS
- HYDRANT DRAIN MUST BE PLUGGED IF HYDRANT IS LOCATED WITHIN 10 FEET OF A NON-PRESSURE RATED SEWERLINE OR MANHOLE, OR IN AN AREA WITH SEASONAL HIGH WATER TABLE ABOVE DRAIN, OR AS DESIGNATED BY THE ENGINEER

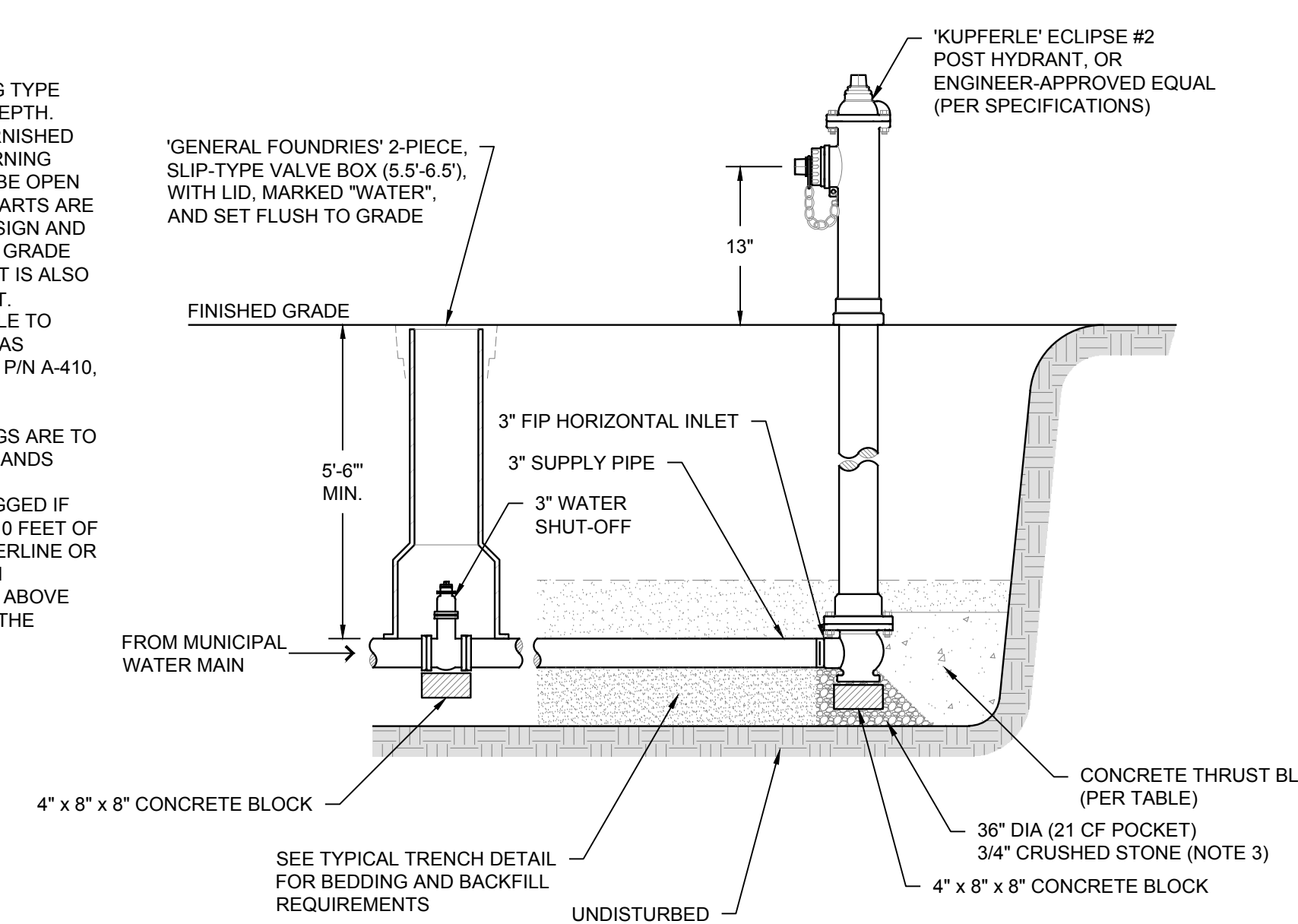


**9 HYDRANT ASSEMBLY DETAIL**

Scale: NTS

NOTES:

- POST HYDRANTS ARE TO BE NON-FREEZING, SELF-DRAINING TYPE WITH A 5'-6" MINIMUM BURIAL DEPTH. THESE HYDRANTS WILL BE FURNISHED WITH A 3" FIP INLET, A NON-TURNING OPERATING ROD, AND ARE TO BE OPEN TO THE RIGHT. ALL WORKING PARTS ARE TO BE BRONZE TO BRONZE DESIGN AND BE SERVICEABLE FROM ABOVE GRADE WITHOUT DIGGING. THE OUTLET IS ALSO TO BE BRONZE AND BE 2 1/2" NST. HYDRANTS ARE TO BE LOCKABLE TO PREVENT UNAUTHORIZED USE AS MANUFACTURED BY MUELLER, P/N A-410, OR APPROVED EQUAL.
- ALL MECHANICAL JOINT FITTINGS ARE TO HAVE "MEGALUG" RETAINER GLANDS
- HYDRANT DRAIN MUST BE PLUGGED IF HYDRANT IS LOCATED WITHIN 10 FEET OF A NON-PRESSURE RATED SEWERLINE OR MANHOLE, OR IN AN AREA WITH SEASONAL HIGH WATER TABLE ABOVE DRAIN, OR AS DESIGNATED BY THE ENGINEER



**10 FLUSH HYDRANT DETAIL**

Scale: NTS

NO.	DATE	DESCRIPTION

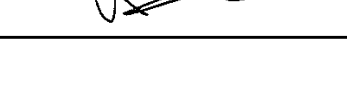
TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

CONSTRUCTION  
 DETAILS

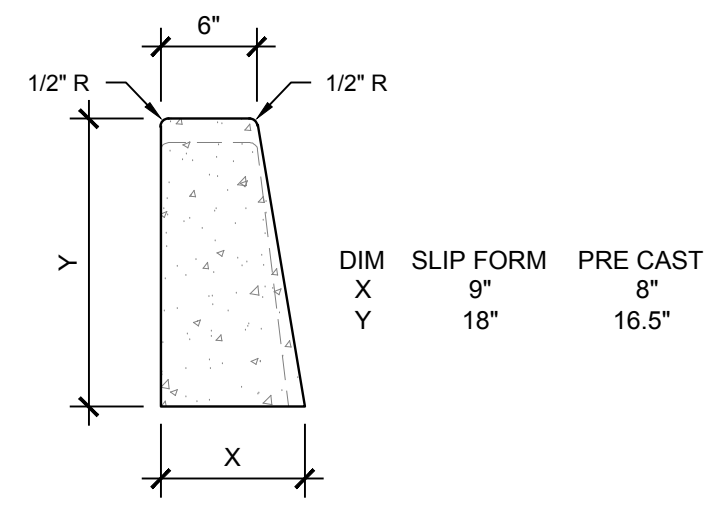
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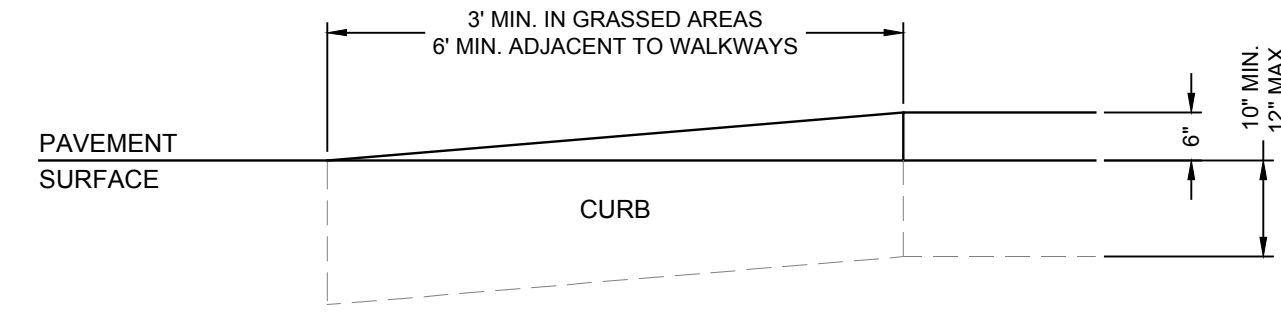
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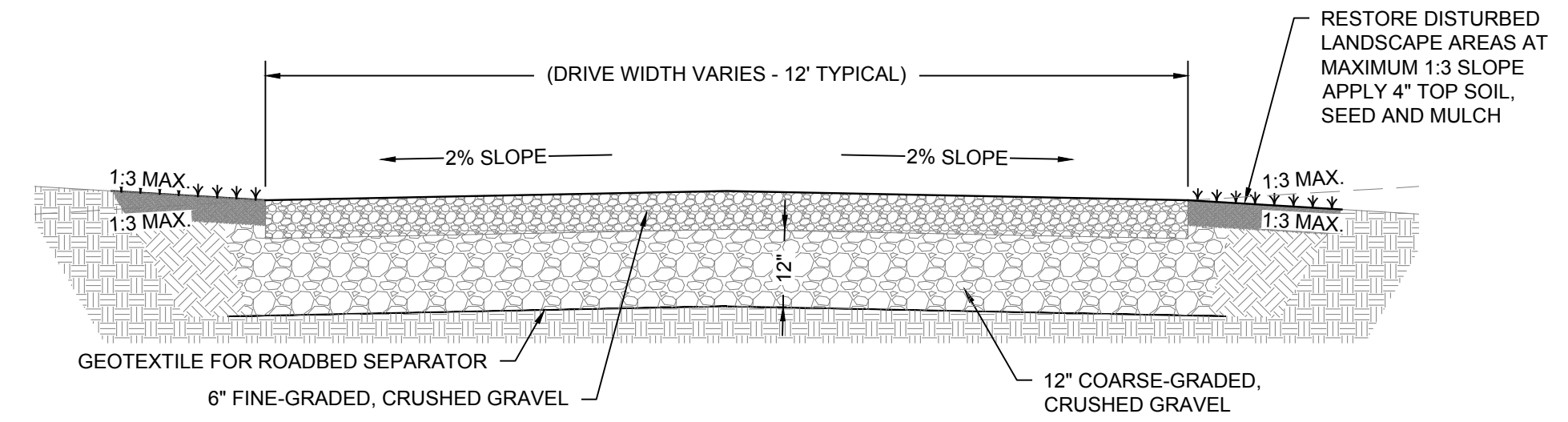
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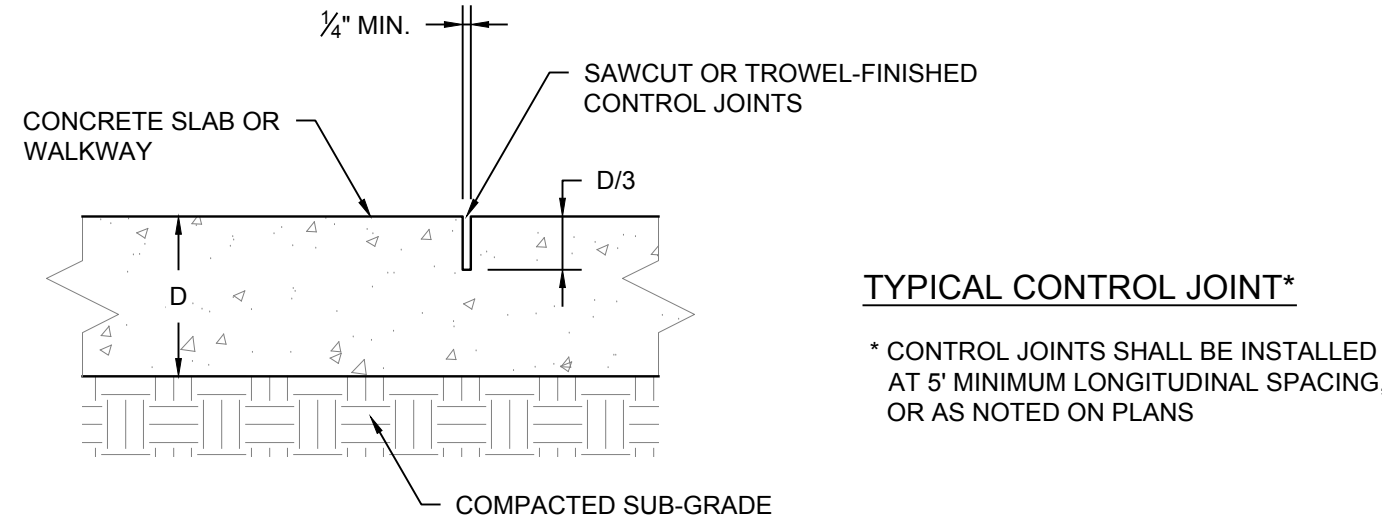
1 TYPICAL CURB  
TYPE B NTS



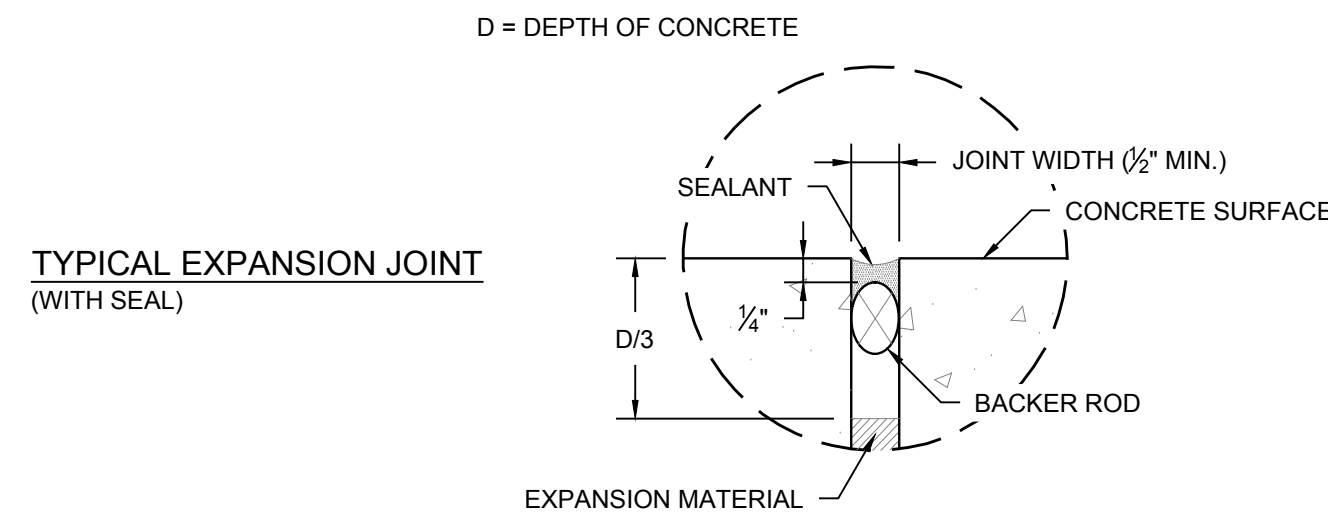
2 CURB - TAPERED END DETAIL  
NTS



9 TYPICAL GRAVEL DRIVE  
Scale: NTS



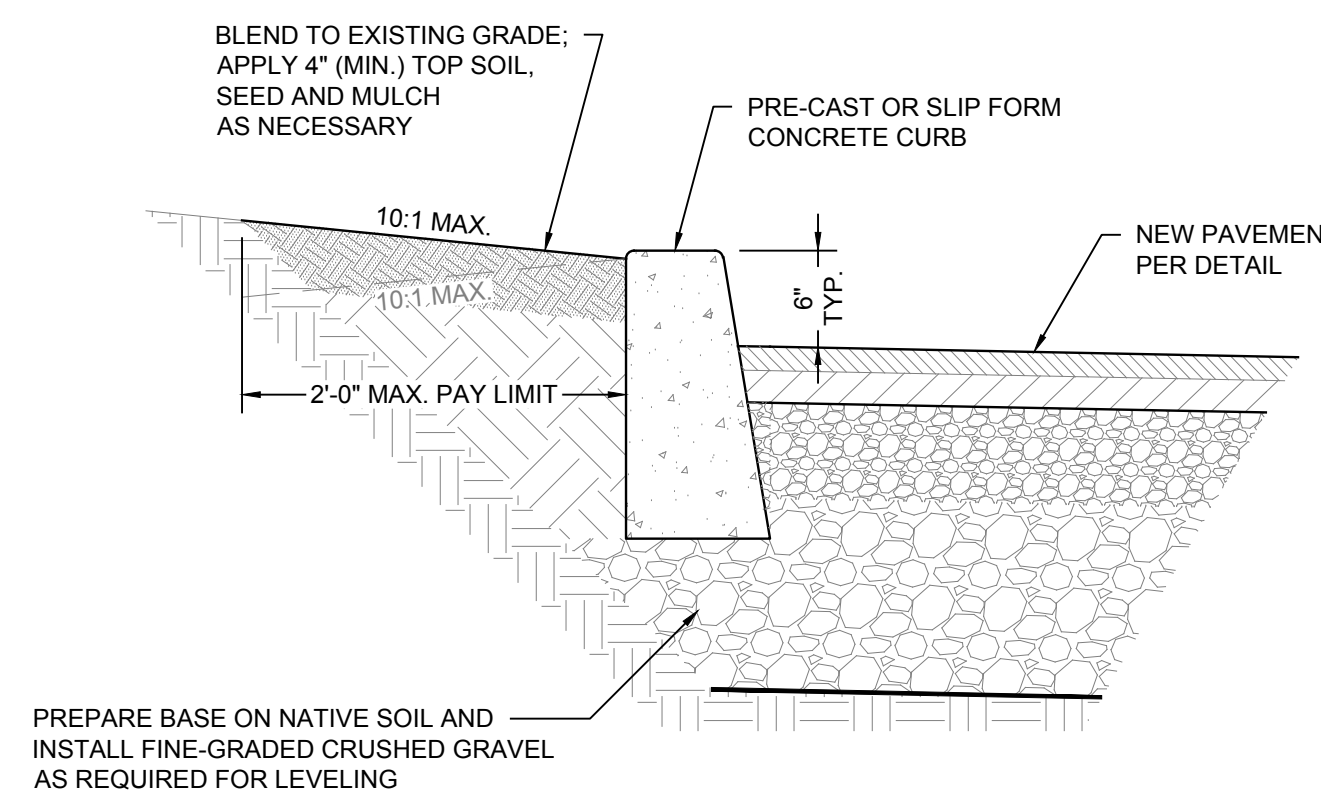
TYPICAL CONTROL JOINT\*  
\* CONTROL JOINTS SHALL BE INSTALLED AT 5' MINIMUM LONGITUDINAL SPACING, OR AS NOTED ON PLANS



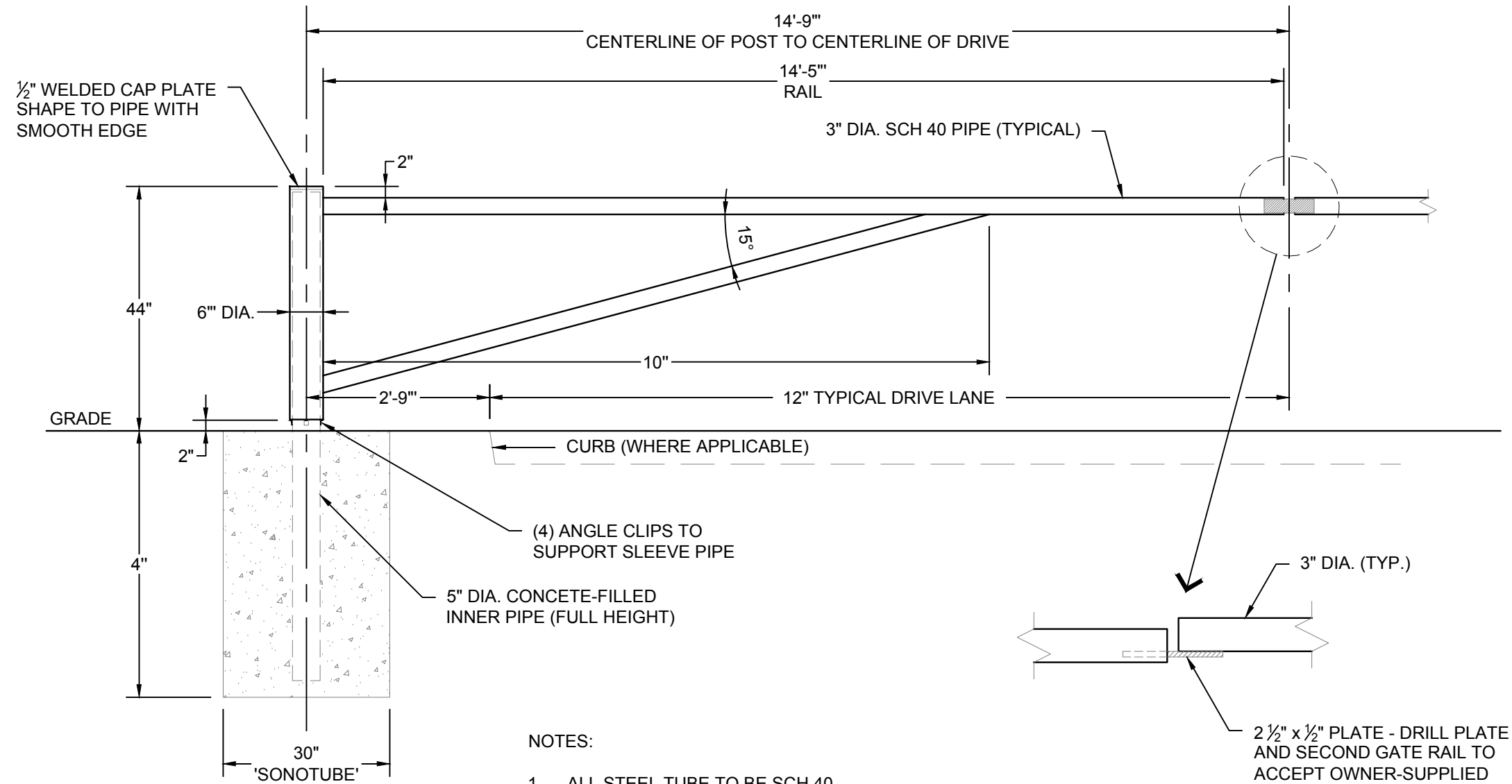
TYPICAL EXPANSION JOINT  
(WITH SEAL)

PRE-FORMED EXPANSION JOINT FILLER SHALL BE INSTALLED FOR THE FULL THICKNESS OF THE WALKWAY AND SHALL BE USED AT ALL JOINTS BETWEEN NEW WALKWAYS, EXISTING WALKWAYS, AND OTHER CONCRETE APPURTENANCES. EXPANSION JOINT SPACING SHALL NOT EXCEED 25' IN NEW CONSTRUCTION.

3 TYPICAL CONCRETE JOINT DETAILS  
Scale: NTS

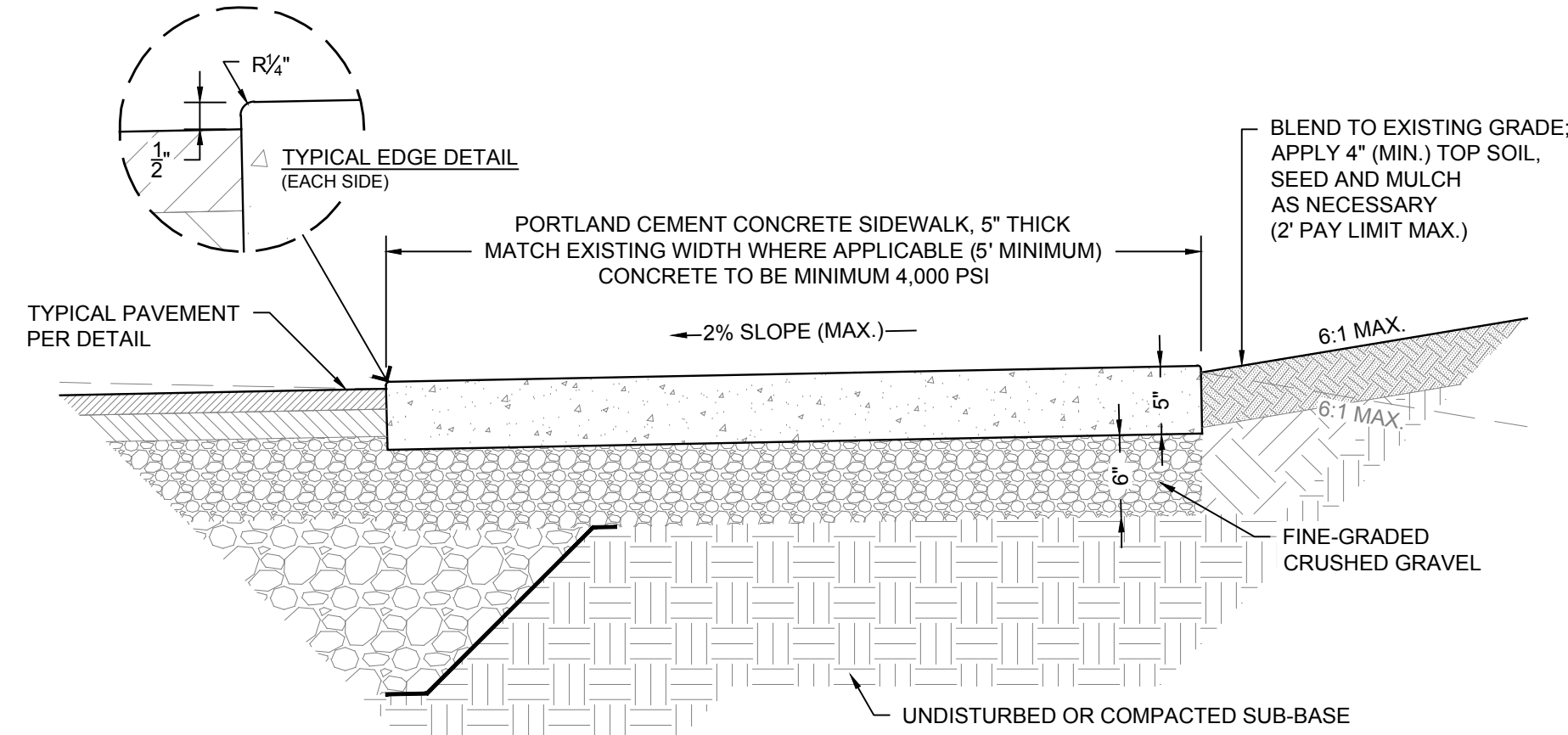


4 TYPICAL CURB DETAIL  
TYPE B Scale: NTS

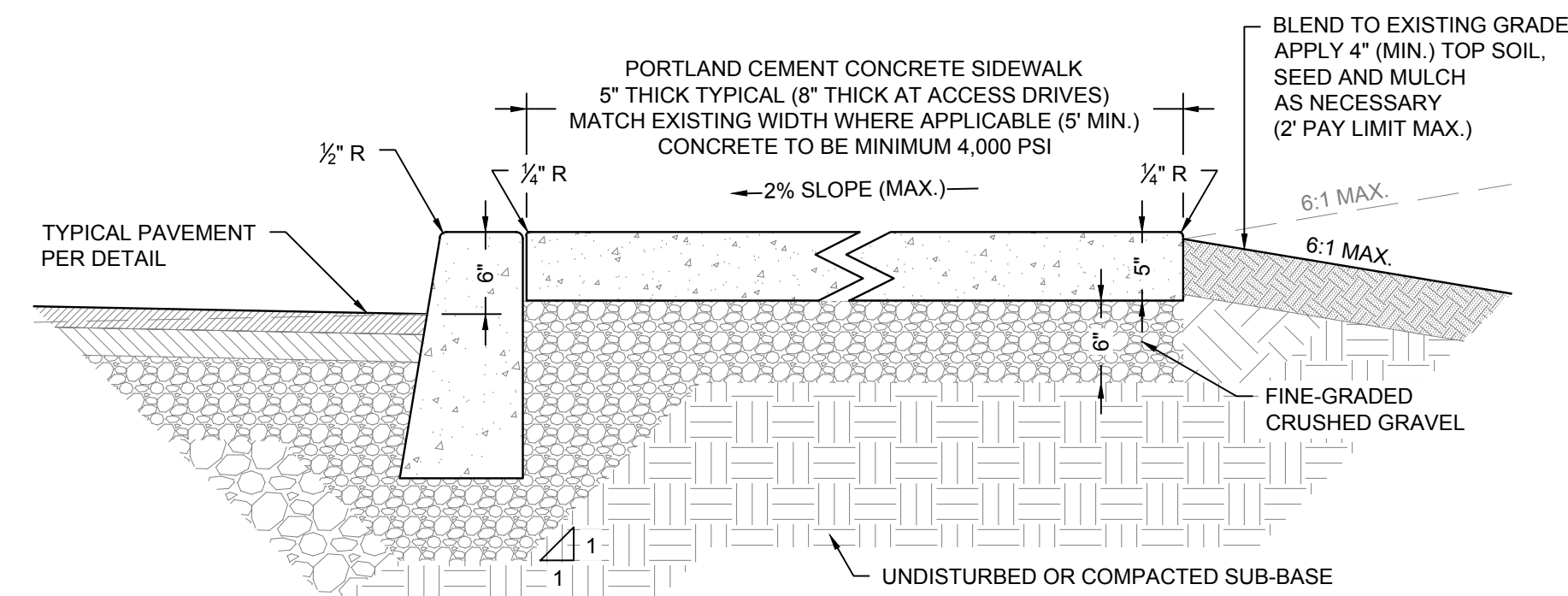


10 TYPICAL STEEL GATE DETAIL  
NTS

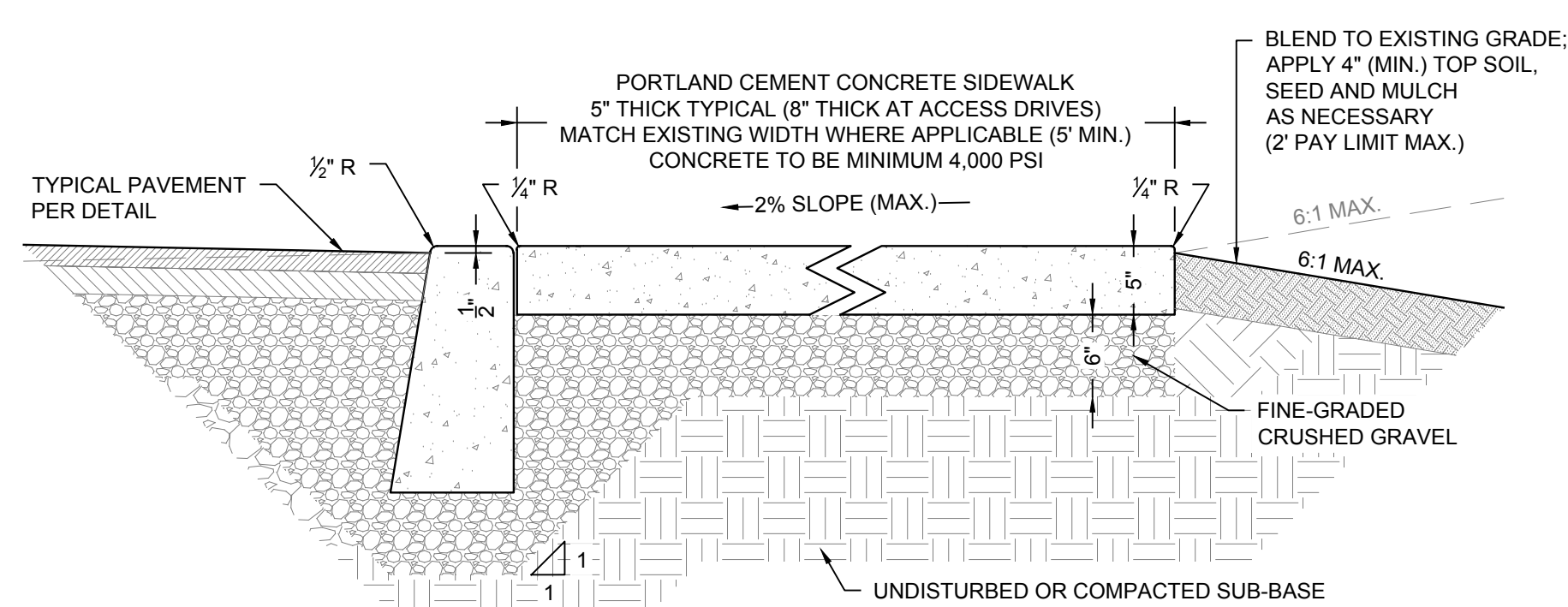
- NOTES:
1. ALL STEEL TUBE TO BE SCH 40
  2. APPLY PRIMER AND (2) COATS ENAMEL PAINT (COLOR TO BE SELECTED BY OWNER)



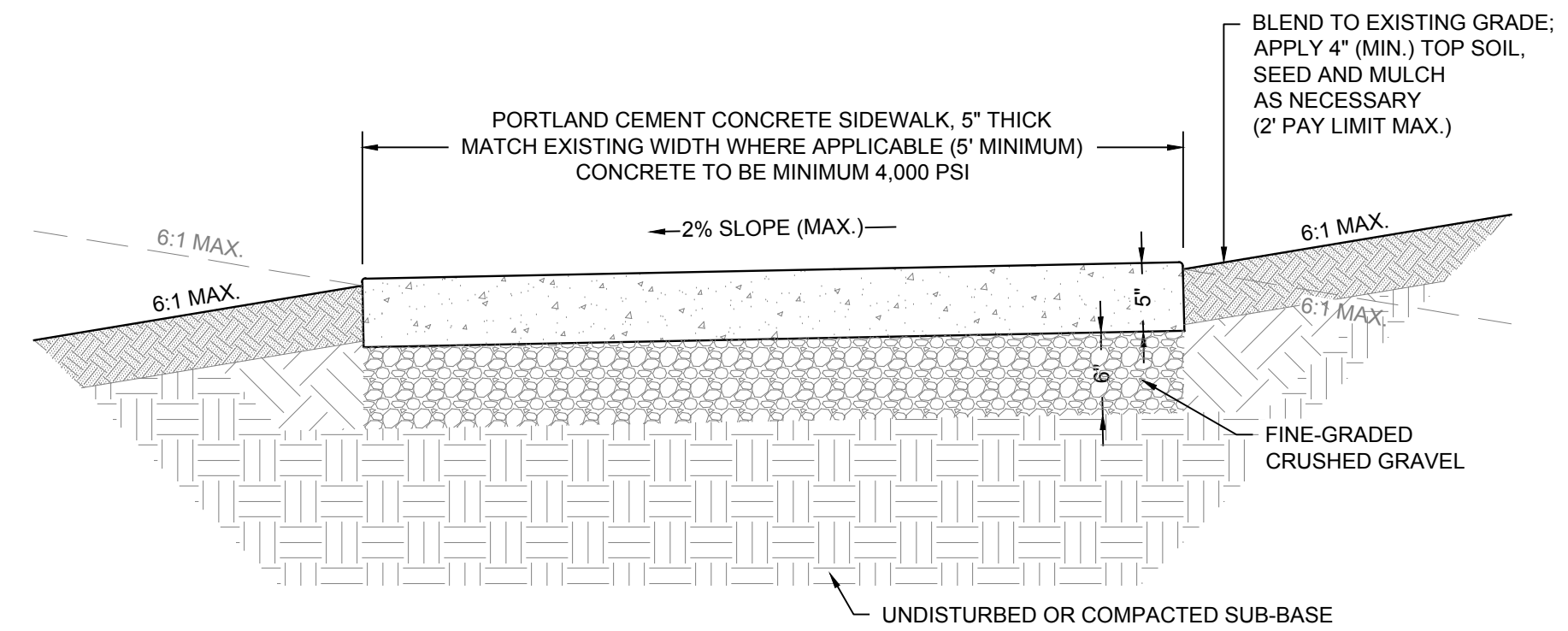
5 TYPICAL CONCRETE WALKWAY DETAIL  
Scale: NTS



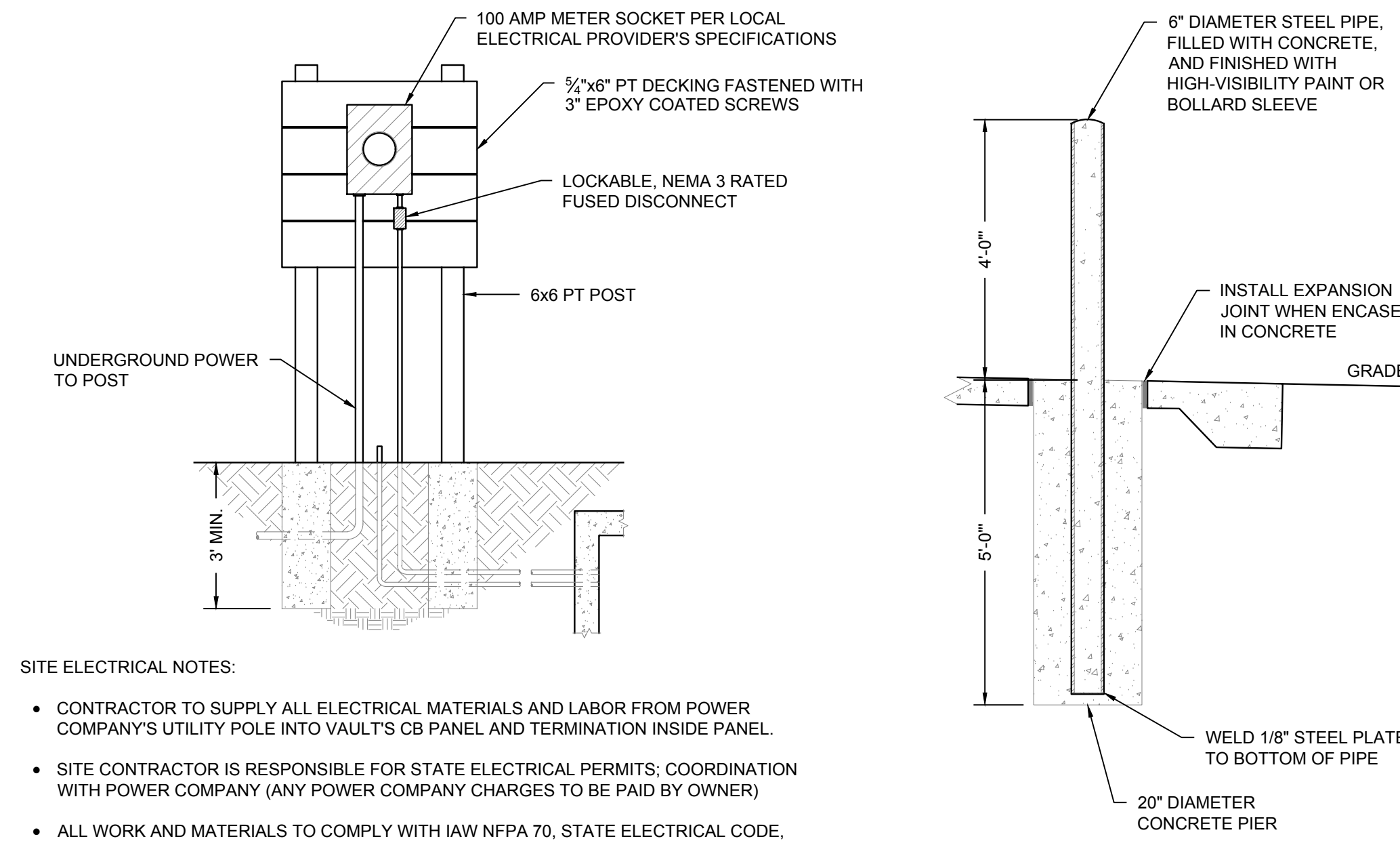
6 TYPICAL CONCRETE WALKWAY DETAIL  
(WITH CURB) Scale: NTS



7 TYPICAL CONCRETE WALKWAY DETAIL  
(WITH FLUSH CURB) Scale: NTS

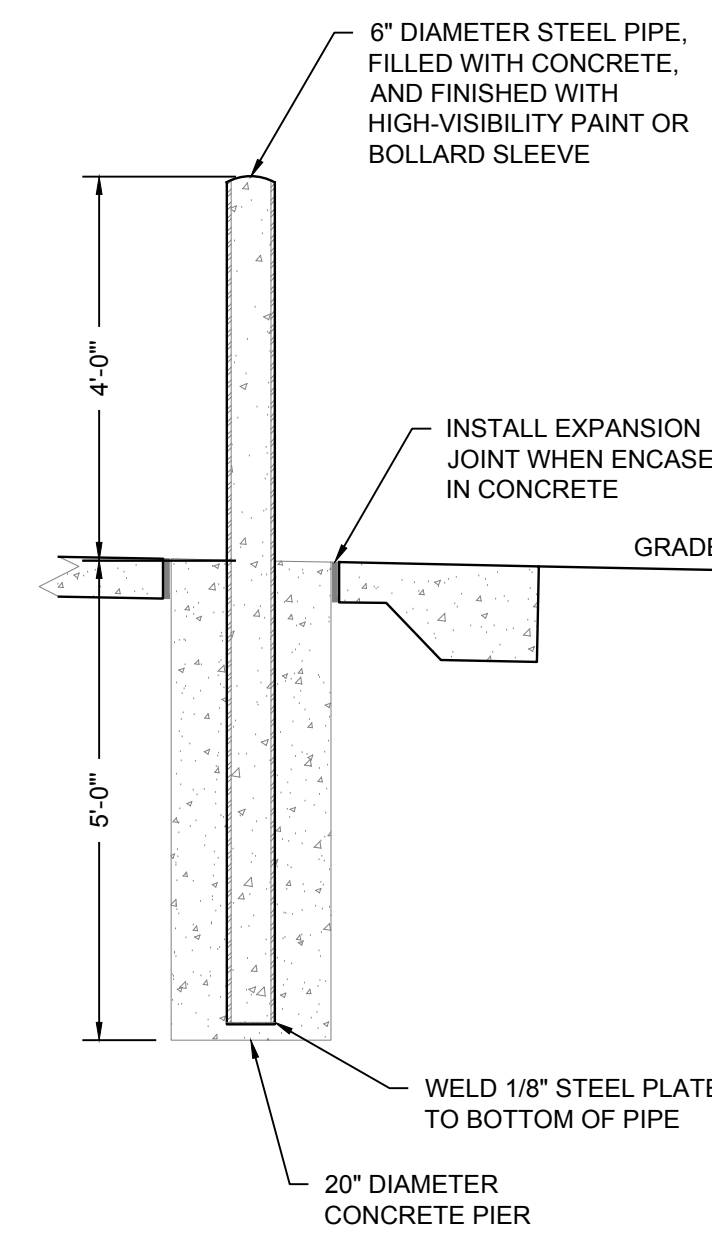


8 TYPICAL CONCRETE WALKWAY DETAIL  
Scale: NTS



11 ELECTRIC SERVICE PANEL DETAIL  
Scale: NTS

- SITE ELECTRICAL NOTES:
- CONTRACTOR TO SUPPLY ALL ELECTRICAL MATERIALS AND LABOR FROM POWER COMPANY'S UTILITY POLE INTO VAULT'S CB PANEL AND TERMINATION INSIDE PANEL.
  - SITE CONTRACTOR IS RESPONSIBLE FOR STATE ELECTRICAL PERMITS, COORDINATION WITH POWER COMPANY (ANY POWER COMPANY CHARGES TO BE PAID BY OWNER)
  - ALL WORK AND MATERIALS TO COMPLY WITH IAW NFPA 70, STATE ELECTRICAL CODE, AND POWER COMPANY SPECIFICATIONS/REQUIREMENTS



12 BOLLARD DETAIL  
Scale: NTS



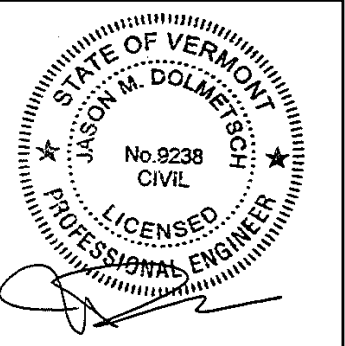
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

CONSTRUCTION  
DETAILS

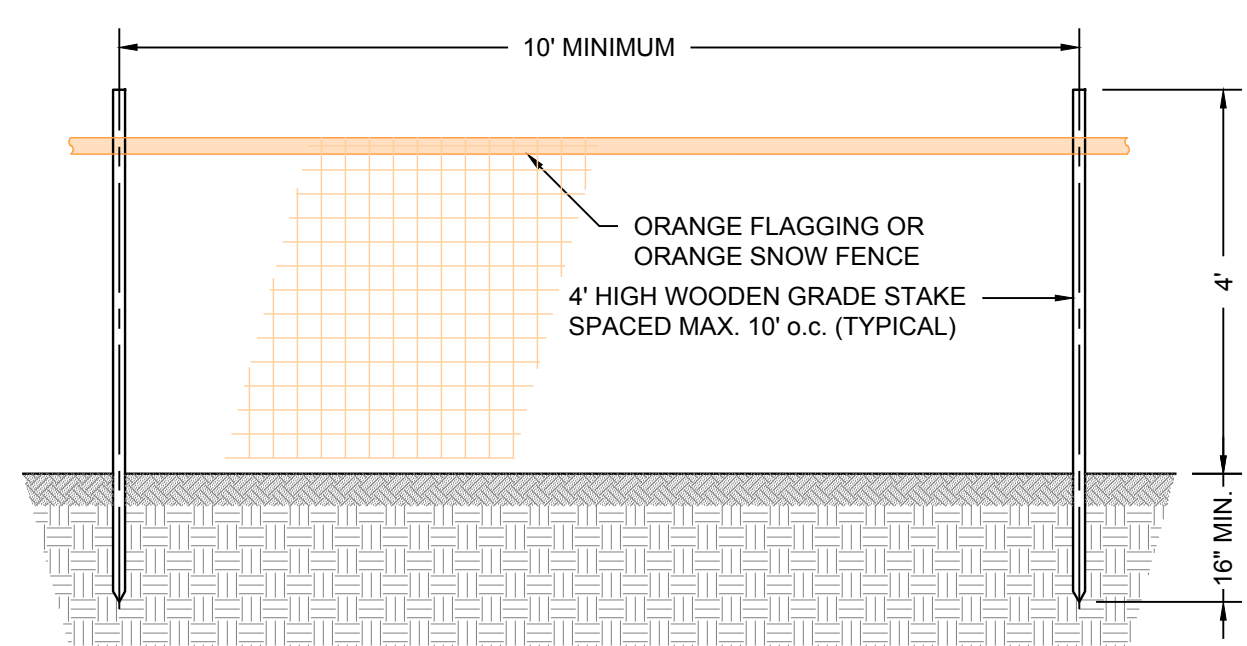
NUMBER	DATE
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SHEET NUMBER  
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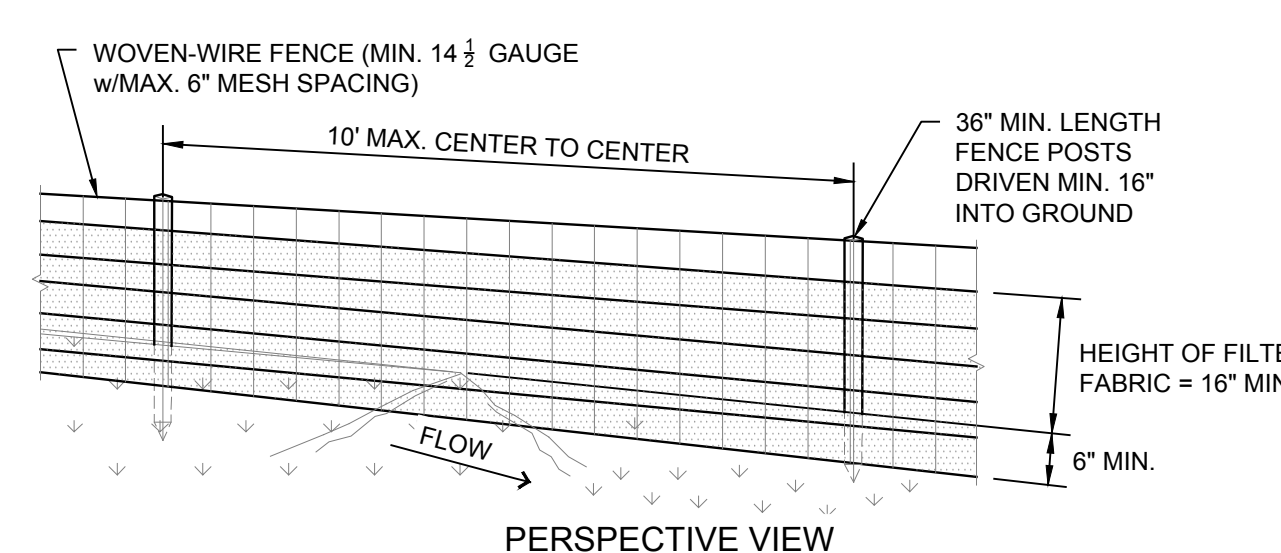


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 2: MSK 019 05-14-2019



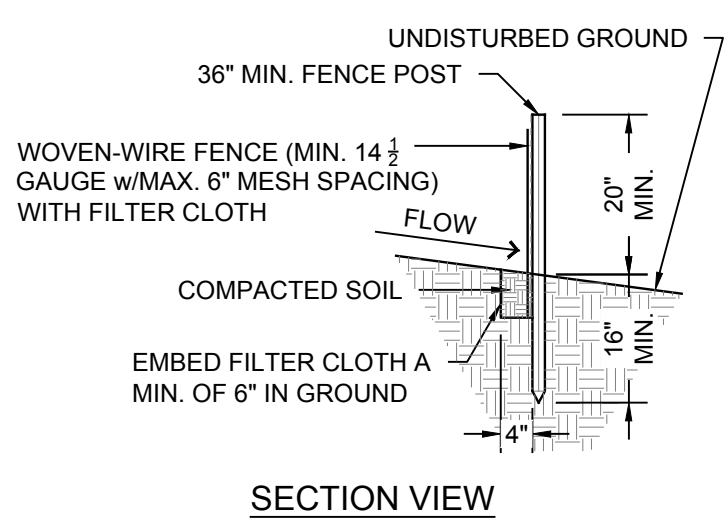


1 TYPICAL PROJECT DEMARCATION FENCE  
Scale: NTS



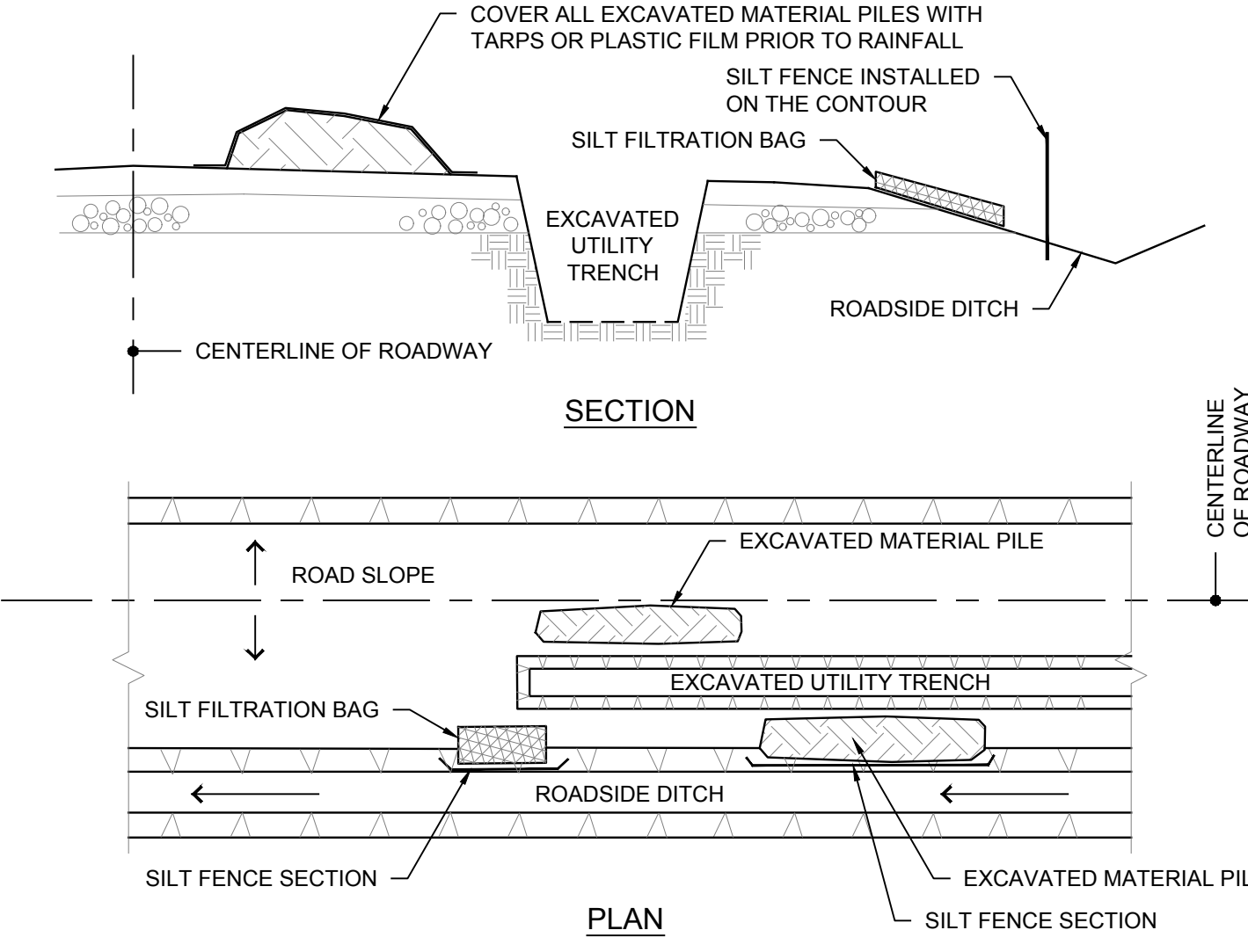
CONSTRUCTION SPECIFICATIONS

- WOVEN-WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL, EITHER "T" OR "U" TYPE, OR HARDWOOD.
- FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN-WIRE FENCE WITH TIES, SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN-WIRE, 6" MAXIMUM MESH SPACING.
- WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, "MIRAFI" 100X, "STABILINKA" T140N, OR APPROVED EQUIVALENT.
- PRE-FABRICATED UNITS SHALL BE "GEOFAB", "ENVIROFENCE", OR APPROVED EQUIVALENT.
- MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.



SECTION VIEW

2 TYPICAL SILT FENCE  
Scale: NTS



CONSTRUCTION SPECIFICATIONS

- UTILITY TRENCH EXCAVATION NOT TO EXCEED 500 LINEAR FEET OF OPEN TRENCH AT ANY ONE TIME.
- EXCAVATED SOIL MATERIAL SHOULD BE PLACED ON UPHILL SIDE, BUT NOT ON THE EDGE, OF THE TRENCH. ENCIRCLE PILES WITH SILT FENCE SECTIONS IF EXCAVATED MATERIAL IS ON THE DOWNHILL SIDE OF TRENCH.
- TRENCH DEWATERING ACTIVITIES MUST DISCHARGE INTO A SILT FILTRATION BAG OF WOVEN OR NON-WOVEN GEOTEXTILE. CONTRACTOR TO MONITOR BAG THROUGHOUT PUMPING OPERATIONS. SILT FENCE SECTION TO SURROUND DOWN SLOPE SIDE OF SILT FILTRATION BAG, DO NOT BLOCK FLOW OF RUNOFF WITHIN THE DITCH.
- EXCAVATED SOIL FROM TRENCH MUST BE PREVENTED FROM MIGRATING TO ADJACENT PROPERTY, CATCH BASINS, ROADSIDE DITCHES, OR RECEIVING WATERS. IF EXCAVATED SOIL MIGRATES, CLEAN UP IMMEDIATELY.
- MATERIAL STOCKPILES TO BE ENCLOSED WITH SILT FENCE SECTIONS, TO BE ACCESSED FROM PAVEMENT OVER A STONE TRACKING PAD, AND TO BE LOCATED MORE THAN 50 FEET FROM ANY RECEIVING WATERS.
- EXCAVATED SOIL FROM THE TRENCH TO BE COMPLETELY COVERED BY TARPS OR PLASTIC FILM DURING ALL RAINFALL EVENTS AND AT ANY TIME CONSTRUCTION ACTIVITIES ARE SUSPENDED DUE TO THE WEATHER.
- ACCUMULATED SOIL ON PAVEMENT TO BE SWEEPED PRIOR TO ALL FORECASTED RAINFALL EVENTS. ROADWAY TO BE SWEEPED AT END OF THE WORK DAY IF TRENCH EXCAVATION IS WITHIN 50' OF ANY RECEIVING WATER.
- WITHIN 24 HOURS OF BACKFILLING ANY TRENCH SECTION ON EXISTING PAVEMENT, A MINIMUM 6" LAYER OF COMPACTED SUB-BASE GRAVEL SHALL BE PLACED AS THE TOP COURSE OF MATERIAL. IF TRENCH IS WITHIN AN UNPAVED AREA, HAY OR STRAW MULCH MATERIAL AND GRASS SEED SHALL BE PLACED OVER DISTURBED AREAS WITHIN 24 HOURS OF BACKFILLING TRENCH SECTION. SEEDING TO BE TEMPORARY OR PERMANENT.

3 TYPICAL UTILITY TRENCH INSTALLATION DETAIL  
Scale: NTS

GENERAL NOTES

- THIS PROJECT IS PERMITTED UNDER AN INDIVIDUAL STORMWATER CONSTRUCTION PERMIT.
- SOIL DISTURBANCE IS TO BE LIMITED TO FIVE ACRES, OR LESS, AT ANY ONE TIME.
- THE OSPC IS RESPONSIBLE FOR ALL SITE INSPECTIONS AND AMENDING THE EROSION PROTECTION AND SEDIMENT CONTROL (EPSC) PLAN.
- INSPECTIONS TO BE CONDUCTED EVERY 7 DAYS AND WITHIN 24 HOURS OF STORM EVENTS RESULTING IN STORMWATER DISCHARGE FROM THE PROJECT SITE.
- THE OSPC MUST COMPLETE THE VTDEC FORM "CGP-9020 INSPECTION REPORT."
- AT THE END OF EACH WORK DAY:
  - GRADED AREAS ARE TO DRAIN TOWARD SWALES.
  - EXCAVATED AREAS SHALL BE SELF-CONTAINED AND BE OF A DEPTH OF TWO FEET OR GREATER.
  - MATERIAL SHALL NOT BE LEFT STOCKPILED, EXCEPT WITHIN STAGING AREAS, AND SHALL BE STABILIZED.
- ALL TRENCH DEWATERING ACTIVITIES MUST BE DISCHARGED INTO SWALES.
- ADEQUATE STABILIZATION MATERIAL IS TO BE STORED ON SITE AT ALL TIMES.
- THE WINTER CONSTRUCTION SEASON IS DEFINED AS THE PERIOD FROM OCTOBER 15 THROUGH APRIL 15.
- ALL SEEDING IS TO OCCUR BEFORE SEPTEMBER 15 OR SUITABLE ROLLED EROSION CONTROL PRODUCTS (RECP) SHALL BE USED.
- WORK PERFORMED BELOW THE ORDINARY HIGH WATER (OHW) LEVEL SHALL BE COMPLETED IN ACCORDANCE WITH THE ARMY CORP GENERAL PERMIT AND THE STATE OF VERMONT STREAM ALTERATION PERMIT AND IS NOT COVERED UNDER THE STORMWATER CONSTRUCTION PERMIT.
- ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR PERMANENT STABILIZATION WITHIN 7 DAYS OF THE INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY. THE FOLLOWING EXCEPTIONS APPLY:
  - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST WITHIN THE SAME 24 HOUR TIME PERIOD.
  - STABILIZATION NOT REQUIRED IF THE WORK IS OCCURRING WITHIN A SELF-CONTAINED EXCAVATION WITH A DEPTH OF TWO FEET OR GREATER.

EROSION PREVENTION/SEDIMENT CONTROL (EPSC) NOTES

- SEDIMENT BASINS/TRAPS, PERIMETER DIKES, SEDIMENT BARRIERS, STABILIZED CONSTRUCTION ENTRANCES, AND OTHER MEASURES CONSTRUCTED AS THE INITIAL STEP IN ANY LAND DISTURBING ACTIVITY AND SHALL BE MADE FUNCTIONAL BEFORE UPSLOPE LAND DISTURBANCE TAKES PLACE.
- CONCENTRATED RUNOFF SHALL NOT FLOW DOWN CUT OR FILL SLOPES UNLESS CONTAINED WITHIN AN ADEQUATE TEMPORARY OR PERMANENT CHANNEL, FLUME, OR SLOPE DRAIN STRUCTURE.
- WHENEVER WATER SEEPS FROM A SLOPE FACE, ADEQUATE DRAINAGE OR OTHER PROTECTION SHALL BE PROVIDED AND SHALL CONVEY CLEAN RUNOFF IN A NON-EROSIVE MANNER TO AN OUTLET.
- BEFORE NEWLY CONSTRUCTED STORMWATER CONVEYANCE CHANNELS OR PIPES ARE MADE OPERATIONAL, ADEQUATE OUTLET PROTECTION AND ANY REQUIRED TEMPORARY OR PERMANENT CHANNEL LINING SHALL BE INSTALLED IN BOTH THE CONVEYANCE AND RECEIVING CHANNEL.
- UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THESE STANDARDS AND OTHER APPLICABLE CRITERIA: NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME, EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES;
- ALL SEDIMENT REMOVED FROM SEDIMENT CONTROL PRACTICES AS A PART OF MAINTENANCE SHALL BE DISPOSED OF IN AN AREA THAT IS: LESS THAN 5% IN SLOPE AND SUFFICIENTLY VEGETATED; A MIN. 100 FT FROM ANY DOWNSLOPE WATER BODY OR CONVEYANCE TO A WATER BODY (STORM DRAIN INLET OR DITCH); PERMANENTLY STABILIZED IMMEDIATELY AFTER DISPOSAL.
- DISTURBED AREAS BORDERING AND DRAINING TO ANY ROADWAY MUST HAVE AN APPROPRIATE SEDIMENT BARRIER SPANNING THE DISTURBANCE EDGE TO PREVENT MIGRATION OF SEDIMENT.
- ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR PERMANENT STABILIZATION WITHIN 14 DAYS OF THE INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY. THE FOLLOWING EXCEPTIONS APPLY:
  - STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE SAME AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST FOR THE NEXT 24 HOURS.
  - STABILIZATION IS NOT REQUIRED IF THE WORK IS OCCURRING IN A SELF-CONTAINED EXCAVATION (I.E. NO OUTLET) WITH 2 FT OR GREATER DEPTH (E.G. FOUNDATION EXCAVATION, UTILITY TRENCHES).
- MAINTENANCE MUST BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION. EXCEPT AS NOTED BELOW, ALL SITES SHALL BE SEED AND STABILIZED WITH EROSION CONTROL MATERIALS, SUCH AS MULCH OR ROLLED EROSION CONTROL PRODUCTS, INCLUDING AREAS WHERE CONSTRUCTION HAS BEEN SUSPENDED OR SECTIONS COMPLETED:
  - ON THE CUT SIDE OF ROADS, DITCHES SHALL BE STABILIZED IMMEDIATELY WITH ROCK RIP-RAP OR OTHER NON-ERODIBLE LINERS (E.G. RECP), OR IF APPROPRIATE, VEGETATIVE MEASURES (SOD).
  - FOR ACTIVE CONSTRUCTION AREAS SUCH AS BORROW OR STOCKPILE AREAS, ROADWAY IMPROVEMENTS AND AREAS WITHIN 50 FT. OF A BUILDING UNDER CONSTRUCTION, A PERIMETER SEDIMENT CONTROL SYSTEM CONSISTING, FOR EXAMPLE, OF SILT FENCING, SHALL BE INSTALLED AND MAINTAINED TO CONTAIN SOIL. EXPOSED DISTURBED AREAS ADJACENT TO A CONVEYANCE THAT PROVIDES RAPID OFFSITE DISCHARGE OF SEDIMENT, SUCH AS A CUT SLOPE AT AN ENTRANCE, SHALL BE COVERED WITH PLASTIC OR GEOTEXTILE TO PREVENT SOIL LOSS UNTIL STABILIZED. STABILIZED CONSTRUCTION ENTRANCES WILL BE MAINTAINED TO CONTROL VEHICLE TRACKING MATERIAL OFF SITE.
  - PERMANENT SEEDING SHALL ONLY BE UNDERTAKEN IN THE SPRING FROM APRIL THROUGH MAY, AND IN LATE SUMMER AND EARLY FALL UNTIL SEPTEMBER 15. EXCEPT THAT PERMANENT SEEDING MAY BE UNDERTAKEN DURING THE SUMMER IF PLANS PROVIDE FOR ADEQUATE WATERING. DURING THE PEAK SUMMER MONTHS AND AFTER SEPTEMBER 15, IF SEEDING IS FOUND TO BE IMPRACTICABLE, AN APPROPRIATE TEMPORARY STABILIZATION IS STRAW/HAY MULCH OR WOODCHIPS.
  - TEMPORARY SEDIMENT TRAPPING DEVICES SHALL NOT BE REMOVED UNTIL PERMANENT STABILIZATION IS ESTABLISHED IN ALL CONTRIBUTORY DRAINAGE AREAS. SIMILARLY, STABILIZATION OF CONTRIBUTING DRAINAGE AREAS SHALL BE ESTABLISHED PRIOR TO CONVERTING SEDIMENT TRAPS/ BASINS INTO PERMANENT (POST-CONSTRUCTION) STORMWATER MANAGEMENT PRACTICES.
  - STABILIZATION MEASURES, TEMPORARY OR PERMANENT, SHALL BE APPLIED TO EARTHEN STRUCTURES SUCH AS DAMS, DIKES, AND DIVERSIONS IMMEDIATELY AFTER INSTALLATION.
  - UPON COMPLETION, ALL SLOPES STEEPER THAN 3:1 (H:V) OR 33.3%, PERIMETER DIKE/SWALES, SEDIMENT BASINS OR TRAPS, AND EMBANKMENTS SHALL BE IMMEDIATELY STABILIZED WITH SOD, SEED & ANCHORED STRAW MULCH, OR OTHER APPROVED STABILIZATION MEASURES (RECP). AREAS OUTSIDE OF THE PERIMETER SEDIMENT CONTROL SYSTEM SHALL NOT BE DISTURBED.
- IN ADVANCE OF A PREDICTED RAINFALL OR SNOWMELT EVENT, ALL MANAGEMENT PRACTICES APPROPRIATE TO CURRENT AREAS OF DISTURBANCE MUST BE INSPECTED AND REPAIRED AS NECESSARY TO ENSURE PROPER OPERATING CONDITION. IF NECESSARY TO PREVENT SEDIMENT DISCHARGE FROM THE CONSTRUCTION SITE TO WATERS OF THE STATE, THIS WILL INCLUDE TEMPORARY STABILIZATION OF ALL DISTURBED SOILS ON THE SITE IN ADVANCE OF THE ANTICIPATED RUNOFF PERIOD.
- ALL TEMPORARY EROSION AND SEDIMENT CONTROL MEASURES SHALL BE REMOVED WITHIN 30 DAYS AFTER FINAL SITE STABILIZATION OR AFTER TEMPORARY MEASURES ARE NO LONGER NEEDED.

REQUIREMENTS FOR WINTER SHUTDOWN

FOR PROJECTS COMPLETING EARTH DISTURBANCE ACTIVITIES PRIOR TO THE BEGINNING OF THE WINTER PERIOD (OCTOBER 15), THE FOLLOWING ARE REQUIREMENTS OF THE EPSC PLAN:

- FOR AREAS TO BE STABILIZED BY VEGETATION, SEEDING TO BE COMPLETED NO LATER THAN SEPTEMBER 15TH TO ENSURE ADEQUATE GROWTH AND COVER PRIOR TO THE WINTER PERIOD.
- FOR AREAS TO BE STABILIZED BY NONVEGETATIVE METHODS, STABILIZATION OF THESE AREAS OF DISTURBANCE WITHOUT VEGETATIVE COVER MUST OCCUR NO LATER THAN OCTOBER 15TH.
- FOR AREAS TO BE STABILIZED BY MULCH, DOUBLE THE REGULAR COVERAGE RATE, OR ROUGHLY 2 INCHES OF STRAW/HAY MULCH WITH 100% COVERAGE, WILL BE APPLIED ON ALL DISTURBANCES. MULCH WILL BE ANCHORED TO PREVENT MIGRATION OF MATERIAL THROUGHOUT THE WINTER PERIOD.

REQUIREMENTS FOR WINTER CONSTRUCTION

FOR PROJECTS INVOLVING EARTH DISTURBANCE WITHIN THE WINTER PERIOD (AFTER OCTOBER 15 AND BEFORE APRIL 15), THE FOLLOWING ARE REQUIREMENTS OF THE EPSC PLAN:

- ENLARGE ACCESS ROUTES TO ACCOMMODATE SNOW REMOVAL ACTIVITY. STABILIZE WITH STONE.
- LIMIT OF DISTURBANCE MOVED/REPLACED TO REFLECT BOUNDARY OF ANTICIPATED WINTER WORK.
- A SNOW MANAGEMENT PLAN INCLUDING ADEQUATE STORAGE LOCATIONS AND CONTROL OF SNOWMELT, REQUIRING CLEARED SNOW TO BE STORED DOWN GRADIENT OF ALL AREAS OF EARTH DISTURBANCE AND PROHIBITING STORAGE OF SNOW WITHIN STORMWATER TREATMENT STRUCTURES.
- A MINIMUM 25 FOOT BUFFER TO BE MAINTAINED FROM PERIMETER CONTROLS SUCH AS SILT FENCE, TEMPORARY SWALES OR PERIMETER DIKES TO ALLOW FOR SNOW CLEARING/MAINTENANCE.
- IN AREAS OF DISTURBANCE WITHIN 100 FT OF A RECEIVING WATER, SILT FENCE TO BE REINFORCED OR USED WITH PERIMETER DIKES OR OTHER PRACTICES RESISTANT TO THE FORCES OF SNOW LOADS.
- DRAINAGE STRUCTURES TO BE MONITORED TO REMAIN OPEN AND FREE OF SNOW AND ICE DAMS.
- INSTALL SILT FENCE SECTIONS, HAY BALE DIKES, PERIMETER DIKE/SWALES, WATERBARS, AND OTHER PRACTICES REQUIRING AN ASSOCIATED EARTH DISTURBANCE PRIOR TO GROUND FREEZING.
- MULCH STABILIZATION MEASURES TO BE USE OF DOUBLE THE STANDARD RATE OF COVERAGE.
- ALL MULCH MUST BE ANCHORED WITH AN APPROVED METHOD TO PREVENT REMOVAL BY WIND.
- TO ENSURE COVER OF DISTURBED SOIL IN ADVANCE OF A MELT EVENT, AREAS OF DISTURBED SOIL MUST BE STABILIZED AT THE END OF EACH WORK DAY, WITH THE FOLLOWING EXCEPTIONS:
  - IF NO PRECIPITATION, RAIN OR SNOW, WITHIN 24 HOURS IS FORECASTED AND WORK WILL RESUME IN THE SAME DISTURBED AREA WITHIN 24 HOURS, DAILY STABILIZATION IS NOT NECESSARY.
  - IF THE DISTURBED AREAS WILL COLLECT AND RETAIN RUNOFF, SUCH AS HOUSE FOUNDATIONS OR OPEN UTILITY TRENCHES, DAILY STABILIZATION IS NOT NECESSARY UNTIL EXCAVATION BACKFILLING OCCURS.
  - BEFORE STABILIZATION, REMOVE SNOW OR ICE TO LESS THAN 1" THICKNESS ABOVE THE SOIL.
  - STONE STABILIZATION (8" THICK) AT ACCESS POINTS FOR CONSTRUCTION VEHICLE TRAFFIC, I.E. FROM THE PAVEMENT TO THE BUILDING PUT A 15' WIDE PATH ON TOP OF THE PROPOSED DRIVEWAY.

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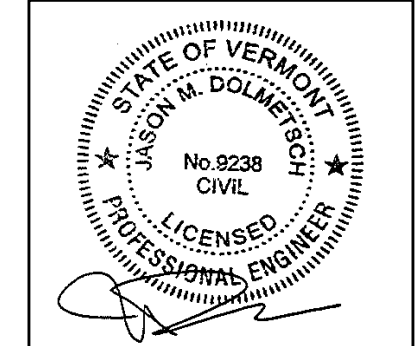
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MUNICIPAL WATER SYSTEM  
REMEDIATION EXPANSION PHASE II  
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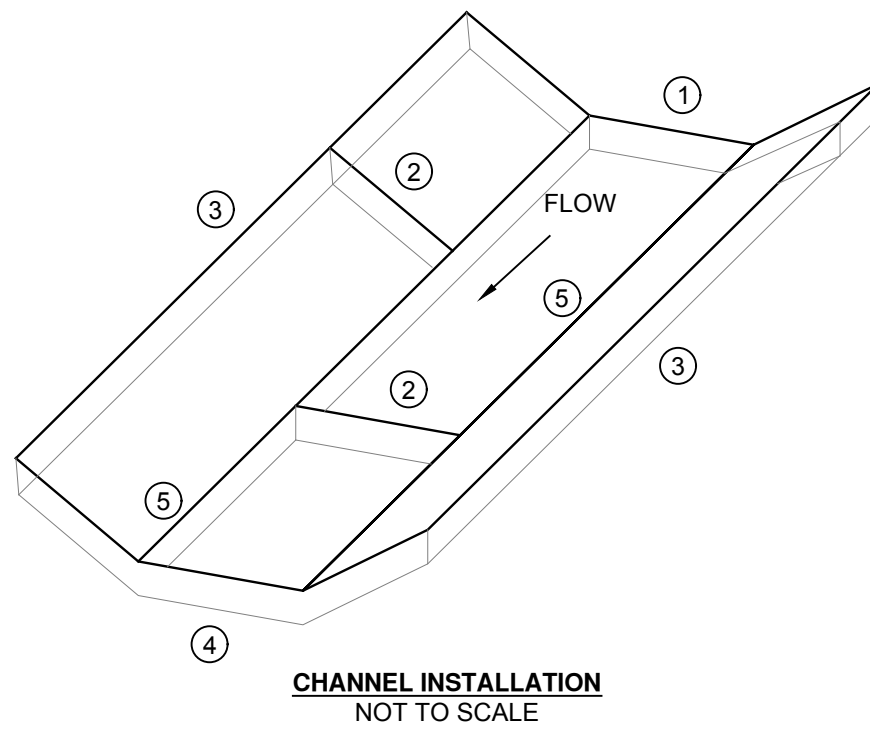
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MSK	JMD

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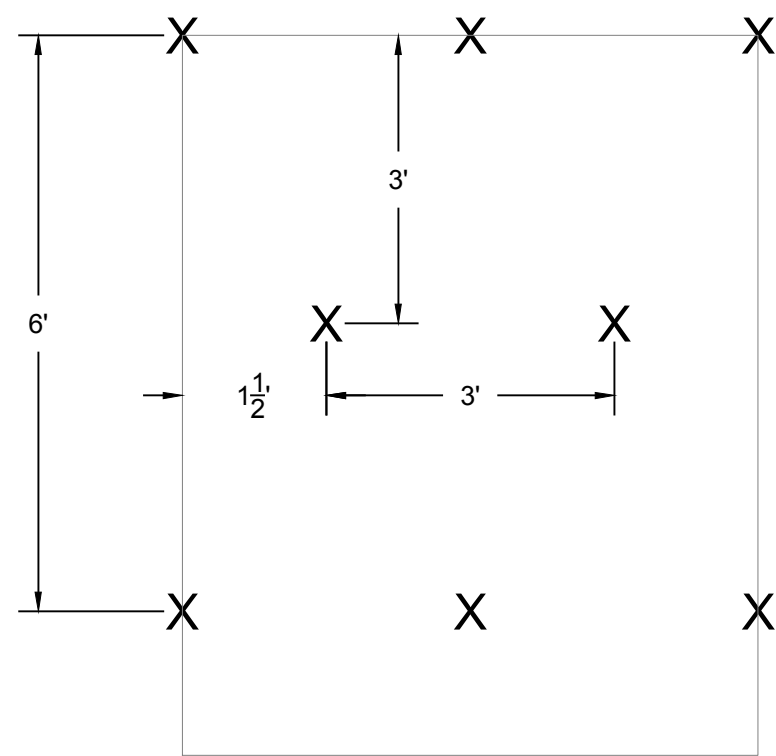




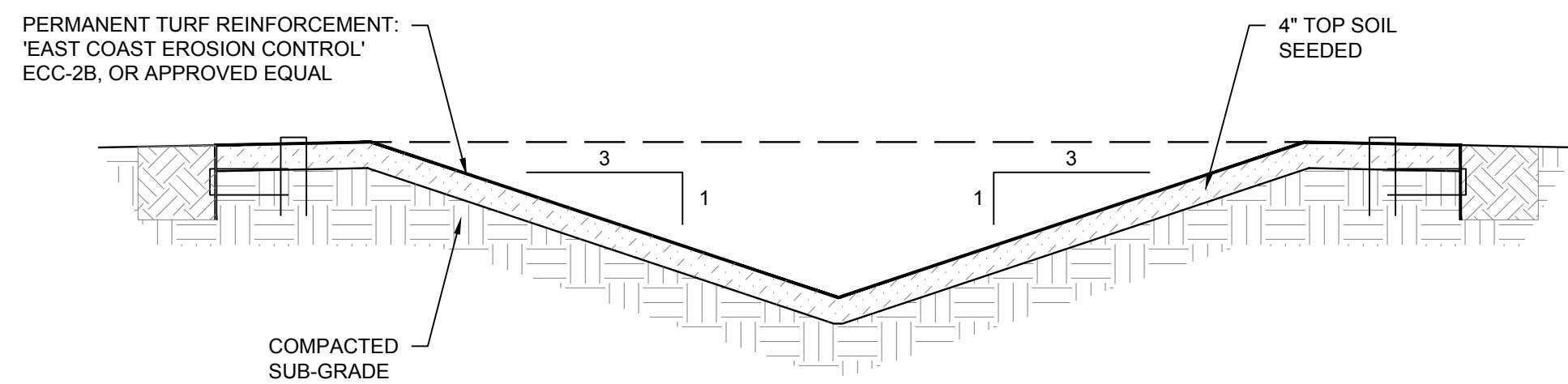


**CONSTRUCTION SPECIFICATIONS**

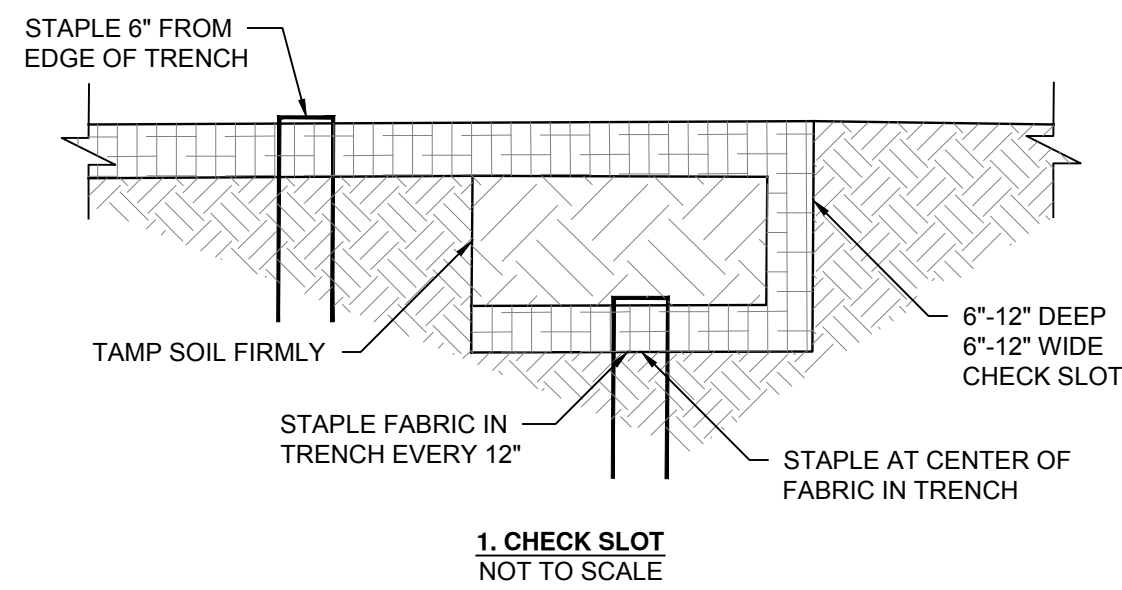
1. INSTALL RECP ON ALL SLOPES 3:1 OR GREATER AND IN CHANNELS
2. METAL STAPLES TO BE UNGALVANIZED U-SHAPED WIRE WITH 2" CROWN AND 6" TO 8" LONG LEG. SET STAPLE INTO THE FABRIC FLUSH WITH SURROUNDING SOIL. MAY BE MANUALLY OR MECHANICALLY HAMMERED DOWN.
3. METAL STAPLES ARE TO BE PLACED ALTERNATIVELY, IN COLUMNS ~ 2' APART AND IN ROWS ~ 3' APART. APPROXIMATELY 175 STAPLES ARE REQUIRED PER 4' x 225' ROLL OF MATERIAL AND ABOUT 125 STAPLES ARE REQUIRED PER 4' x 150' ROLL OF MATERIAL. ACTUAL STAPLE AMOUNTS VARY BASED UPON SOIL CONDITIONS.
4. DISTURBED AREA SHALL BE SMOOTHLY GRADED TO ENSURE CLOSE CONTACT BETWEEN RECP AND GROUND. REMOVE LARGE STONES AND WOODY DEBRIS THAT WILL PREVENT RECP FROM CONTACTING THE GROUND.
5. EROSION CONTROL MATERIAL SHALL BE PLACED LOOSELY OVER GROUND SURFACE. DO NOT STRETCH.
6. ENSURE EROSION CONTROL MATERIAL ROLLS ARE UNRAVELED DOWN SLOPE IN A CONTROLLED FASHION.
7. ALL RECP TERMINAL ENDS AND TRANSVERSE LAPS SHALL BE STAPLED AT APPROXIMATELY 12" INTERVALS.



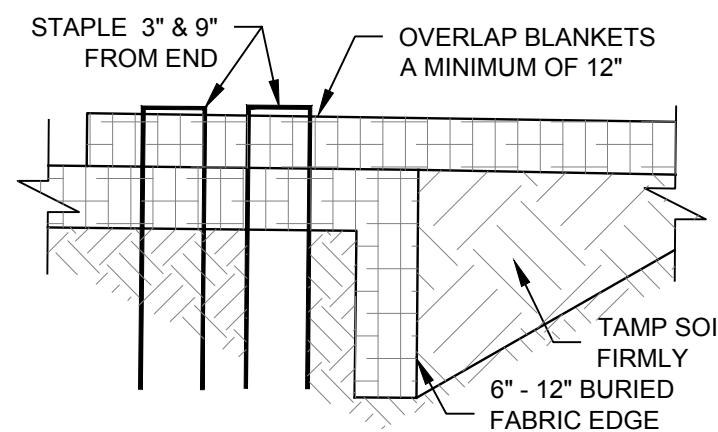
**1 ROLLED EROSION CONTROL PRODUCT (RECP) - TYPICAL**  
Scale: NTS



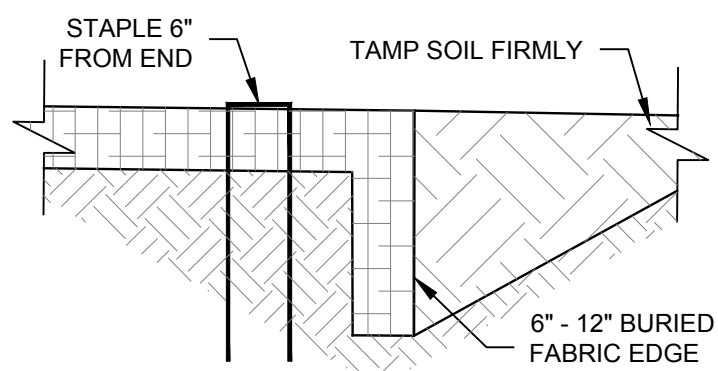
**2 TURF REINFORCEMENT SWALE DETAIL**  
Scale: NTS



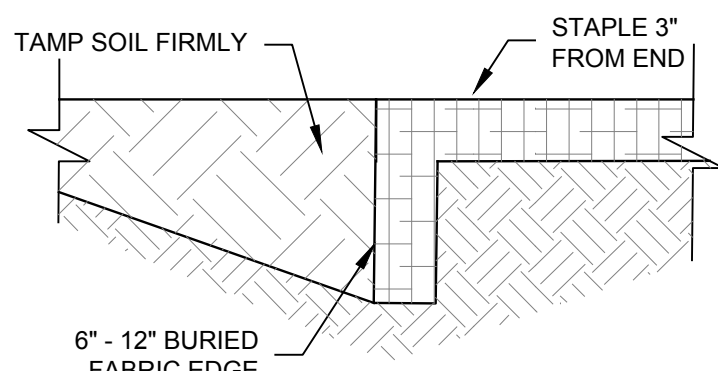
1. CHECK SLOT  
NOT TO SCALE



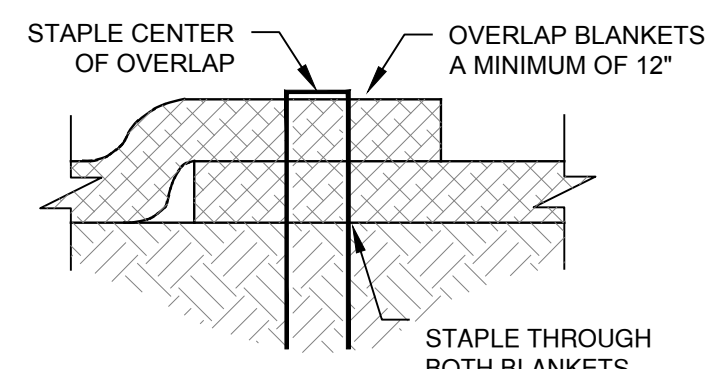
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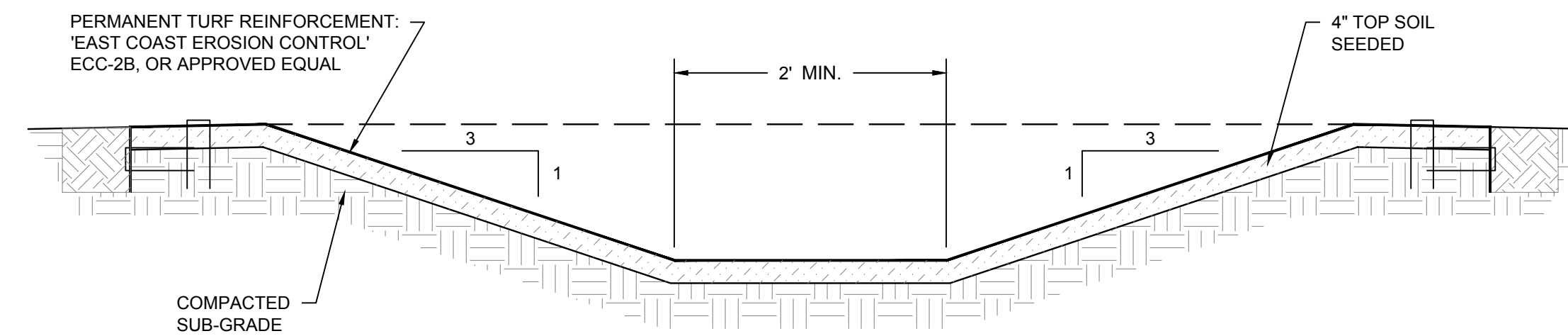
3. ANCHOR SLOT  
NOT TO SCALE



4. TERMINAL FOLD  
NOT TO SCALE



5. LAP JOINT  
NOT TO SCALE



**3 TURF REINFORCEMENT SWALE DETAIL**  
Scale: NTS

**STABILIZATION NOTES**

**TEMPORARY SEEDING**

**PREPARATION:** RUNOFF CONTROL PRACTICES MUST BE INSTALLED PRIOR TO STABILIZATION AS APPROPRIATE FOR THE SITE CONDITIONS. THE AREA MUST BE ROUGH GRADED AND SLOPES PHYSICALLY STABLE. LARGE DEBRIS AND ROCKS SHOULD BE REMOVED. AREA MUST BE SEEDED WITHIN 24 HOURS OF PREVIOUS DISTURBANCE OR SCARIFICATION OF SOIL SURFACE WILL BE NECESSARY PRIOR TO SEEDING.

**SEED TYPE:** IF: SPRING OR SUMMER OR EARLY FALL, THEN SEED THE AREA WITH REGIONAL RYEGRASS (ANNUAL OR PERENNIAL) AT 20 LBS PER ACRE (APPROXIMATELY 0.5 LBS/1,000 SF OR USE 1 LB/1,000 SF). IF: LATE FALL OR EARLY WINTER, THEN SEED CERTIFIED 'ARROSTOOK' WINTER RYE (CEREAL RYE) AT 90 LBS PER ACRE (2.0 LBS/1,000 SF).

**METHOD OF SEEDING:** ANY SEEDING METHOD MAY BE USED THAT WILL PROVIDE UNIFORM APPLICATION OF SEED ON THE AREA AND RESULT IN RELATIVELY GOOD SOIL TO SEED CONTACT. HAND SEEDING IS RECOMMENDED FOR AREAS OF THE SITE THAT CAN NOT BE ACCESSED WITH EQUIPMENT DUE TO SOIL MOISTURE.

**MULCHING:** MULCHING OVER SEED IS REQUIRED. MULCH THE AREA WITH HAY OR STRAW AT 2 TONS/ACRE (90 LBS/1,000 SF OR 2 BALES/1,000 SF). WOOD FIBER (CELLULOSE) HYDROMULCH OR SIMILAR SPRAYABLE PRODUCTS APPROVED FOR EROSION CONTROL MAY BE USED IF APPLIED ACCORDING TO THE MANUFACTURERS' SPECIFICATION BUT AT A MINIMUM OF 50 LBS/1,000 SF.

**ANCHORING:** MULCH ANCHORING WILL BE REQUIRED IN AREAS OF HIGH WIND, CONCENTRATED FLOWS OF RUNOFF, AND AREAS SEEDED BETWEEN OCTOBER 15 AND APRIL 15, I.E. DURING WINTER CONSTRUCTION.

**IRRIGATION:** WATERING OF SEED MAY BE IDEAL DURING SUMMER MONTHS TO ENSURE GERMINATION OF SEED.

**INSPECTION:** INSPECT AREAS EVERY 7 DAYS AND AFTER RAINFALL EVENTS RESULTING IN RUNOFF FROM THE SITE. DOCUMENT AREAS OF SIGNIFICANT EROSION (RILLS & GULLIES) AND/OR LOSS OF VEGETATIVE COVER.

**MAINTENANCE:** KEEP VEHICLES AND EQUIPMENT OFF OF MULCHED AND SEEDED AREAS TO PREVENT DISTURBANCE OF STABILIZED AREAS. RILLS AND GULLIES MUST BE REGARDED PRIOR TO PLACEMENT OF ADDITIONAL SEED AND MULCH. SCARIFY, SEED, AND MULCH BARE AREAS TO PREVENT CONTINUED EROSION.

**TEMPORARY MULCHING**

**PREPARATION:** SITE PREPARATION PRIOR TO MULCHING REQUIRES THE INSTALLATION OF NECESSARY EROSION CONTROL OR RUNOFF CONTROL PRACTICES AND DRAINAGE SYSTEMS. SLOPE, GRADE AND SMOOTH THE SITE TO FIT THE NEEDS OF SELECTED MULCH PRODUCTS. REMOVE ALL UNDESIRABLE STONES AND OTHER DEBRIS TO MEET THE NEEDS OF ANTICIPATED LAND USE AND EXPECTED MAINTENANCE REQUIRED.

**NOTE:** THE BEST COMBINATION FOR GRASS/LEGUME ESTABLISHMENT IS STRAW (CEREAL GRAIN) MULCH APPLIED AT 2 TON/ACRE (90 LBS/1,000 SF) AND ANCHORED IMMEDIATELY WITH WOOD FIBER MULCH (HYDROMULCH) AT 500 - 750 LBS/ACRE (11 - 17 LBS/1,000 SF).

MULCH MATERIAL	RATE PER 1,000 SF	COVERAGE	ANCHORING
WOOD CHIPS OR SHAVINGS	500-900 LBS	2" TO 7"	NONE
WOOD FIBER CELLULOSE	50 LBS BAG	100%	TACKIFIER
GRAVEL, CRUSHED STONE	9 CUBIC YARDS	3" TO 6"	COMPACTED
HAY OR STRAW	90-100 LBS, 2-3 BALES	90%	VARIOUS
JUTE/EXCELSIOR/COIR	VARIOUS SIZED ROLLS	100%	STAPLES
WELL AGED COMPOST	3-9 CUBIC YARDS	1" TO 3"	NONE

**ANCHORING METHODS:** BIODEGRADABLE NETTING - STAPLE TO GROUND AS PER MANUFACTURER'S SPECIFICATIONS. CRIMPING - USE DISKS OR TRACKS ALONG THE CONTOUR TO EMBED THE MULCH INTO THE SOIL. CELLULOSE OVERSPRAY - HYDROMULCH WOOD FIBERS AT 500 LBS PER ACRE. HAS GREEN DYE. TACKIFIERS - USE HYDROSEEDER TO MIX AND SPRAY CHEMICALS, APPLY WITH WOOD FIBER MULCH.

**\*TO ALLOW FOR PROPER CURING OF THESE CHEMICALS, TACKIFIERS MAY ONLY BE APPLIED IF RAINFALL IS NOT PREDICTED WITHIN 24 HRS AND SOIL TEMPERATURES ARE HIGHER THAN 45° F. DO NOT APPLY TACKIFIERS WITHIN 50 FEET OF ANY SURFACE WATER OR UPON VEGETATION, BUILDINGS, VEHICLES, AND/OR EQUIPMENT. TACKIFIERS WITH KNOWN AQUATIC TOXICITY ARE PROHIBITED.**

**PERMANENT SEEDING**

**PREPARATION:** ALL WATER CONTROL MEASURES WILL BE INSTALLED AS NEEDED PRIOR TO FINAL GRADING AND SEEDBED PREPARATION. ANY SEVERELY COMPACTED SECTIONS WILL REQUIRE CHISELING OR DISKING TO PROVIDE AN ADEQUATE ROOTING ZONE, TO A MINIMUM DEPTH OF 12". THE SEEDBED MUST BE PREPARED TO ALLOW GOOD SOIL TO SEED CONTACT, WITH THE SOIL NOT TOO SOFT AND NOT TOO COMPACT. ADEQUATE SOIL MOISTURE MUST BE PRESENT TO ACCOMPLISH THIS. IF SURFACE IS POWDER DRY OR STICKY WET, POSTPONE OPERATIONS UNTIL MOISTURE CHANGES TO A FAVORABLE CONDITION. IF SEEDING IS ACCOMPLISHED WITHIN 24 HOURS OF FINAL GRADING, ADDITIONAL SCARIFICATION IS NOT NEEDED. REMOVE ALL STONES AND OTHER DEBRIS FROM THE SURFACE THAT ARE GREATER THAN 4 INCHES, OR THAT WILL INTERFERE WITH FUTURE MOWING OR MAINTENANCE.

**AMENDMENTS:** SOIL AMENDMENTS MUST BE INCORPORATED INTO THE UPPER 2 INCHES OF SOIL. THE SOIL SHOULD BE TESTED TO DETERMINE THE AMOUNTS OF AMENDMENTS NEEDED. APPLY GROUND AGRICULTURAL LIMESTONE TO ATTAIN A PH OF 6.0 IN THE UPPER 2 INCHES OF SOIL. IF SOIL MUST BE FERTILIZED BEFORE RESULTS OF A SOIL TEST ARE OBTAINED TO DETERMINE FERTILIZER NEEDS, USE COMMERCIAL FERTILIZER AT 600 LBS PER ACRE OF 5-10-10 OR EQUIVALENT. IF MANURE IS USED, APPLY QUANTITY TO MEET THE NUTRIENTS OF THE ABOVE FERTILIZER. THIS REQUIRES AN APPROPRIATE MANURE ANALYSIS PRIOR TO APPLYING TO THE SITE. DO NOT USE IN AREAS OF CONCENTRATED WATER FLOW.

**GENERAL SEED MIXTURES:**

SEED MIXTURES MAY VARY DEPENDING ON LOCATION WITHIN THE STATE AND TIME OF SEEDING. GENERALLY, WARM SEASON GRASSES SHOULD ONLY BE SEEDED DURING EARLY SPRING, APRIL TO MAY. THESE GRASSES ARE PRIMARILY USED FOR VEGETATING EXCESSIVELY DRAINED SANDS AND GRAVELS. OTHER GRASSES MAY BE SEEDED ANY TIME OF THE YEAR WHEN THE SOIL IS NOT FROZEN AND IS WORKABLE. WHEN LEGUMES LIKE CLOVER ARE INCLUDED, SPRING SEEDING IS PREFERRED. ACTUAL GRASS SEED SPECIES USED ON THE SITE TO BE DETERMINED BY THE HOMEOWNER AND/OR LANDSCAPE PROFESSIONAL AND WILL REFLECT THE ULTIMATE LAND USE.

GRASS SPECIES	LBS/ACRE	LBS/1,000 SF	COMMENTS
COMMON WHITE CLOVER	8	0.20	ADD INOCULATES
TALL FESCUE	10	0.25	'REBEL' VARIETY
CREeping RED FESCUE	20	0.45	'PENNLAWN' VARIETY
PERENNIAL RYEGRASS	5	0.10	'PENNFINE' VARIETY

**TIME OF SEEDING:** THE OPTIMUM TIMING FOR THE GENERAL SEED MIXTURE IS EARLY SPRING. PERMANENT SEEDINGS MAY BE MADE ANY TIME OF YEAR IF PROPERLY MULCHED AND ADEQUATE MOISTURE IS PROVIDED. LATE JUNE THROUGH EARLY AUGUST IS NOT A GOOD TIME TO SEED, BUT MAY FACILITATE COVERING THE LAND WITHOUT ADDITIONAL DISTURBANCE IF CONSTRUCTION IS COMPLETED. PORTIONS OF THE SEEDING THAT FAIL DUE TO DROUGHT/HEAT MAY BE RE-SEEDED IN LATE SUMMER, FALL, OR SPRING.

**METHOD OF SEEDING:** BROADCASTING, DRILLING, CULTIPACK TYPE SEEDING, OR HYDROSEEDING ARE ACCEPTABLE METHODS. PROPER SOIL TO SEED CONTACT IS KEY TO SUCCESSFUL GERMINATION.

**MULCHING:** MULCHING IS ESSENTIAL TO OBTAIN A UNIFORM STAND OF SEEDED PLANTS. OPTIMUM BENEFITS OF MULCHING NEW SEEDINGS ARE OBTAINED WITH THE USE OF SMALL GRAIN STRAW APPLIED AT A RATE OF 2 TONS PER ACRE, AND ANCHORED WITH AN OVERSPRAY OF HYDROMULCH AND/OR TACKIFIER.

**IRRIGATION:** WATERING MAY BE ESSENTIAL TO ESTABLISH A NEW SEEDING WHEN A DROUGHT CONDITION OCCURS SHORTLY AFTER A NEW SEEDING EMERGES. IRRIGATION IS A SPECIALIZED PRACTICE AND CARE MUST BE TAKEN NOT TO EXCEED THE APPLICATION RATE FOR THE SOIL OR SUBSOIL. WHEN DISCONNECTING IRRIGATION PIPE, BE SURE PIPES DO NOT CAUSE EROSION.

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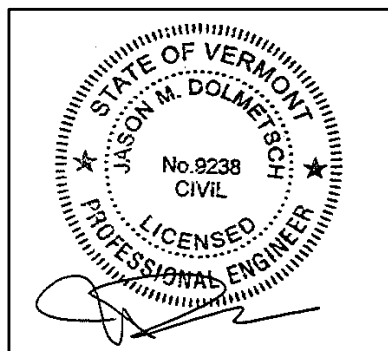
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MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

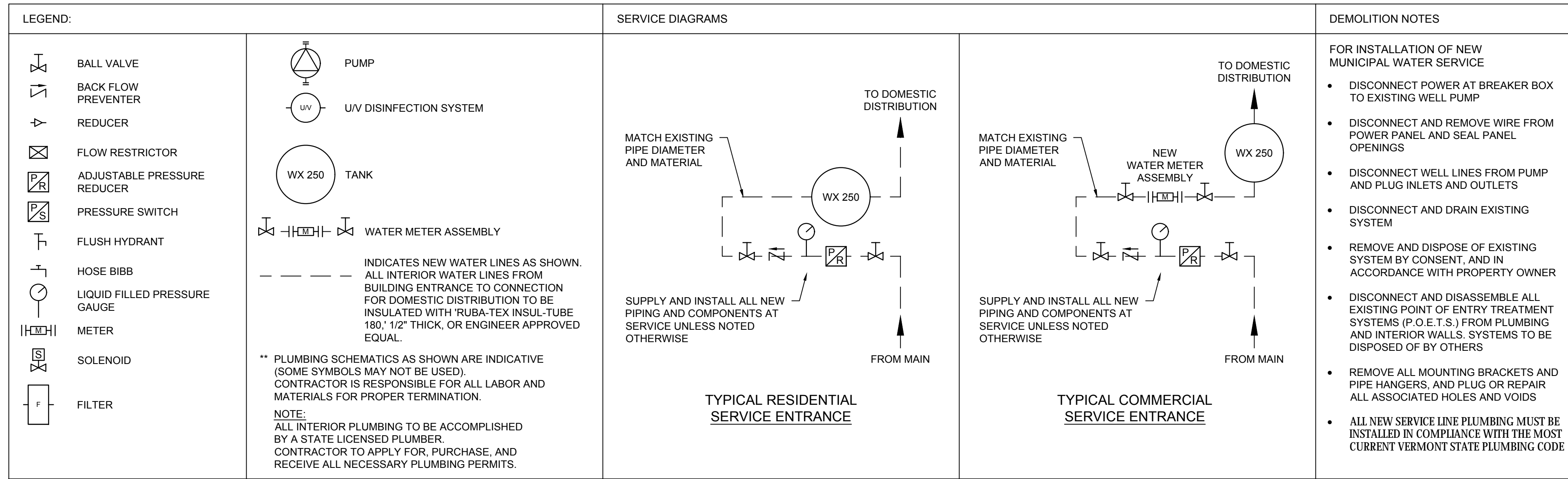
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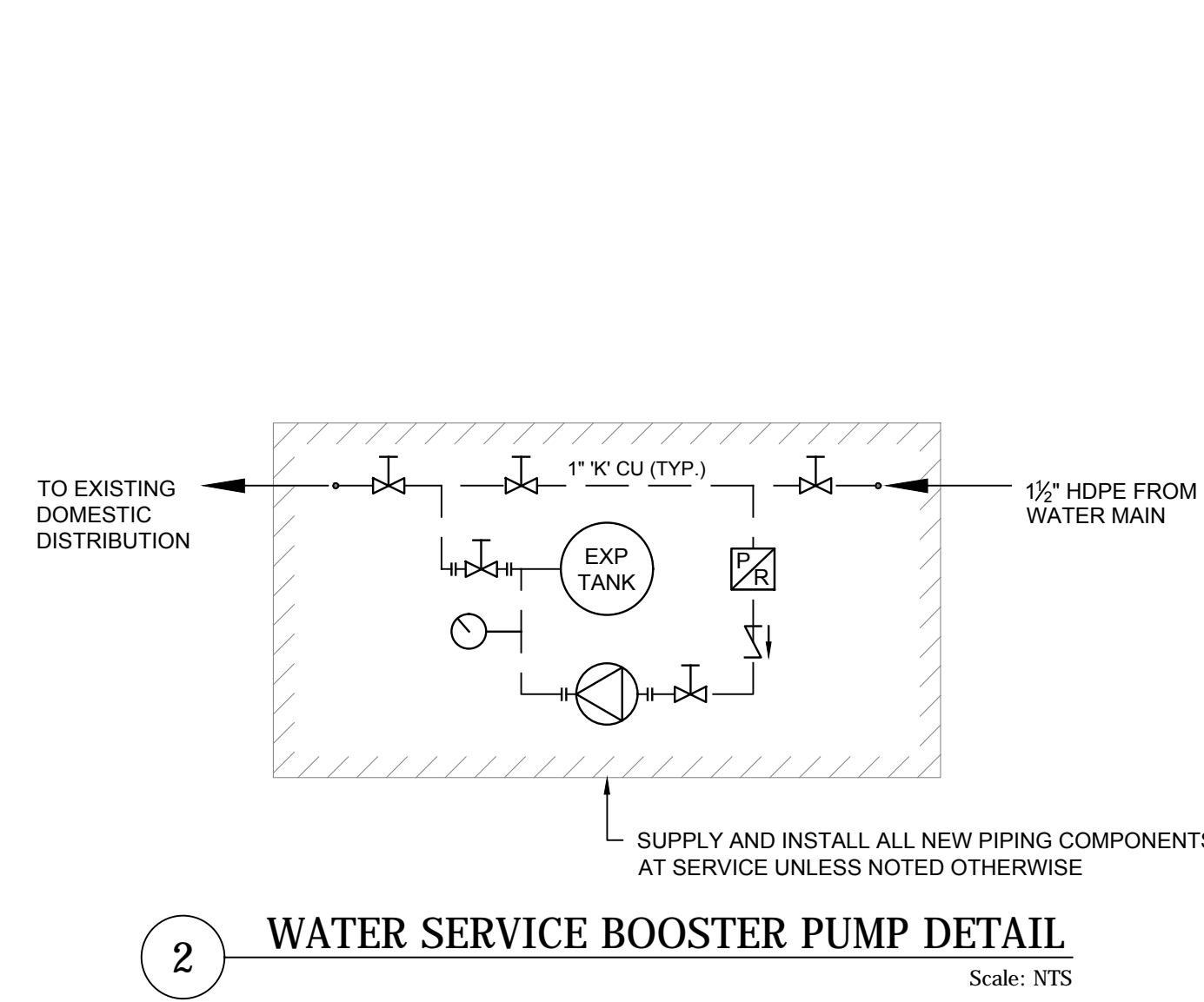
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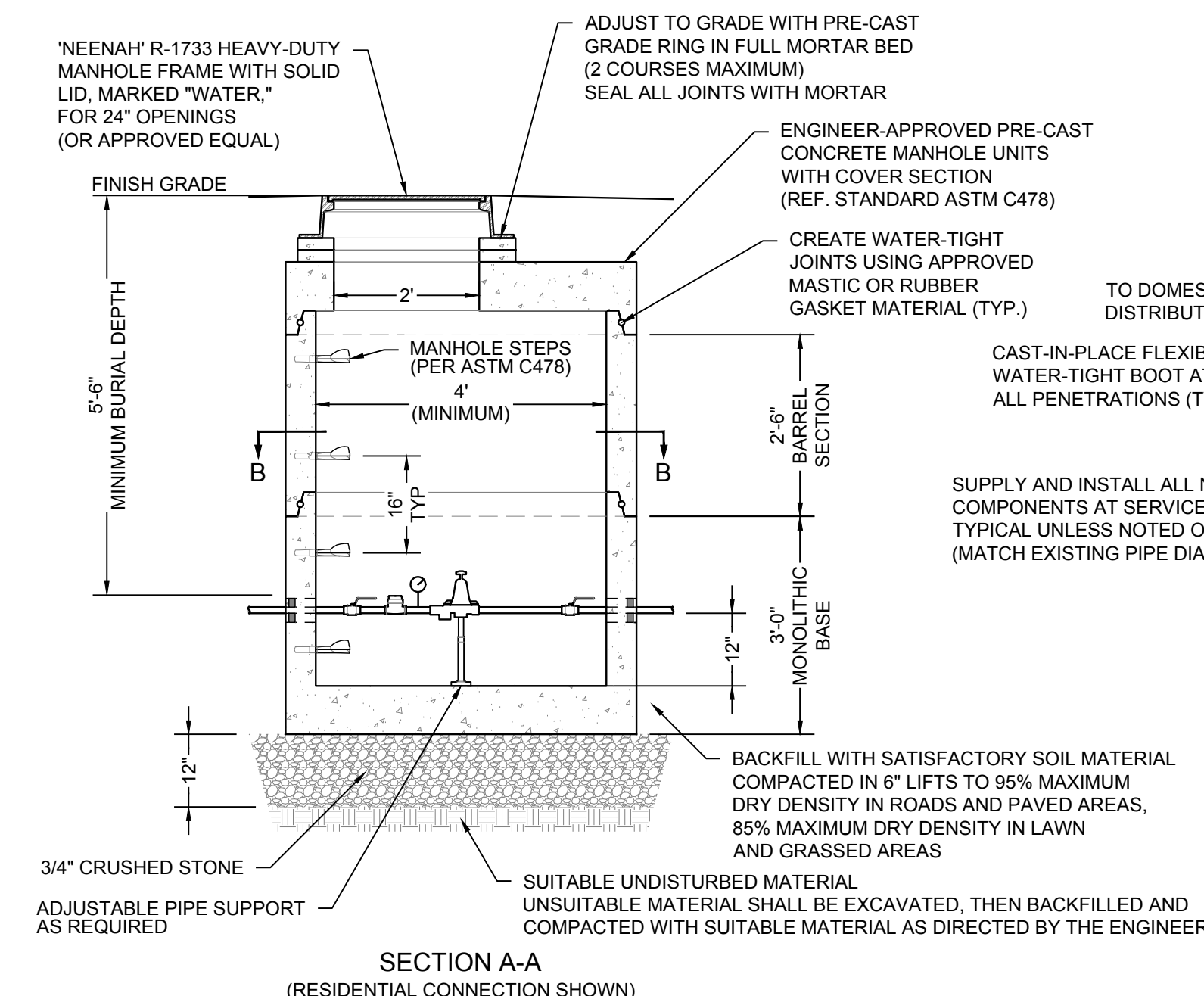
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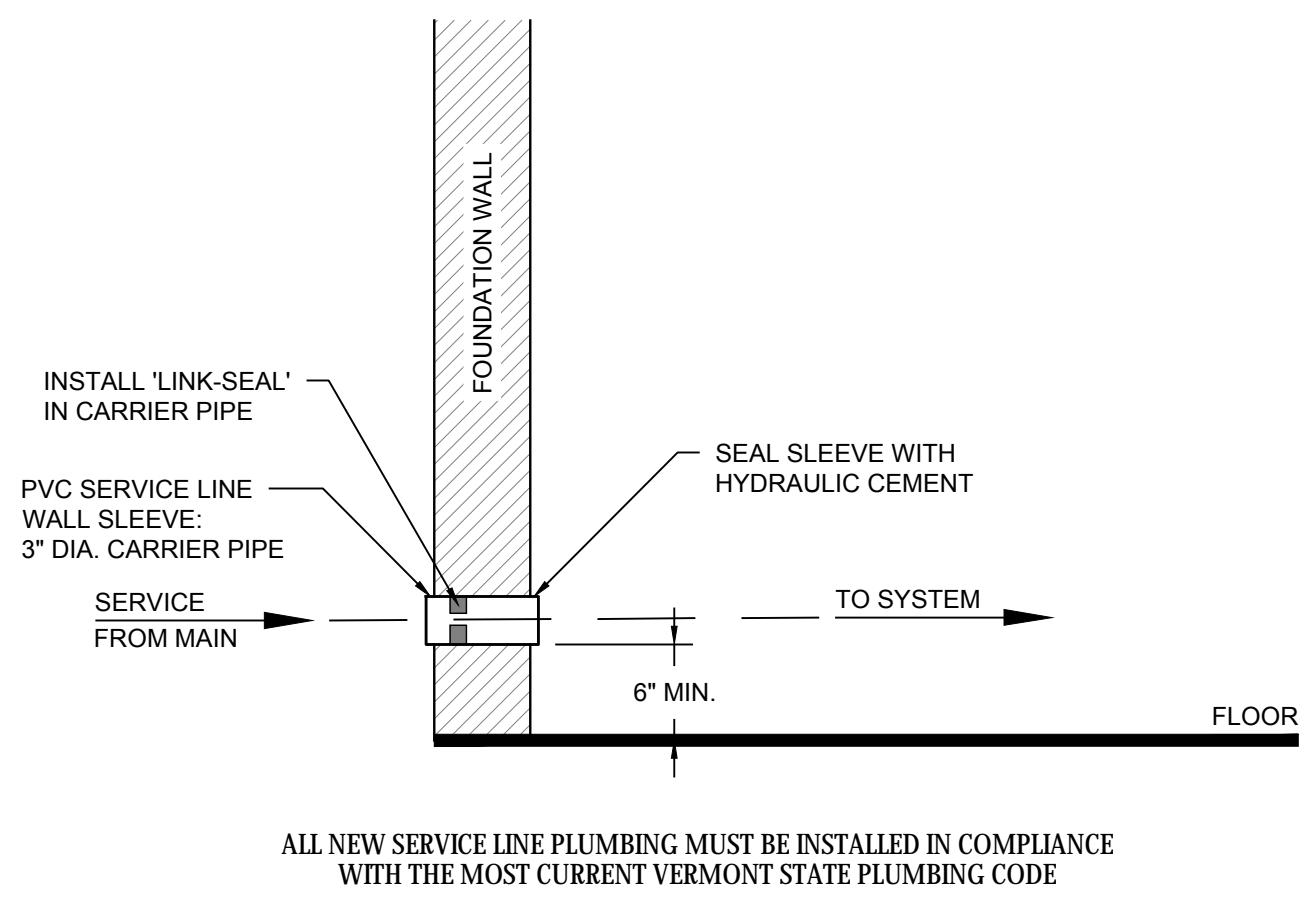
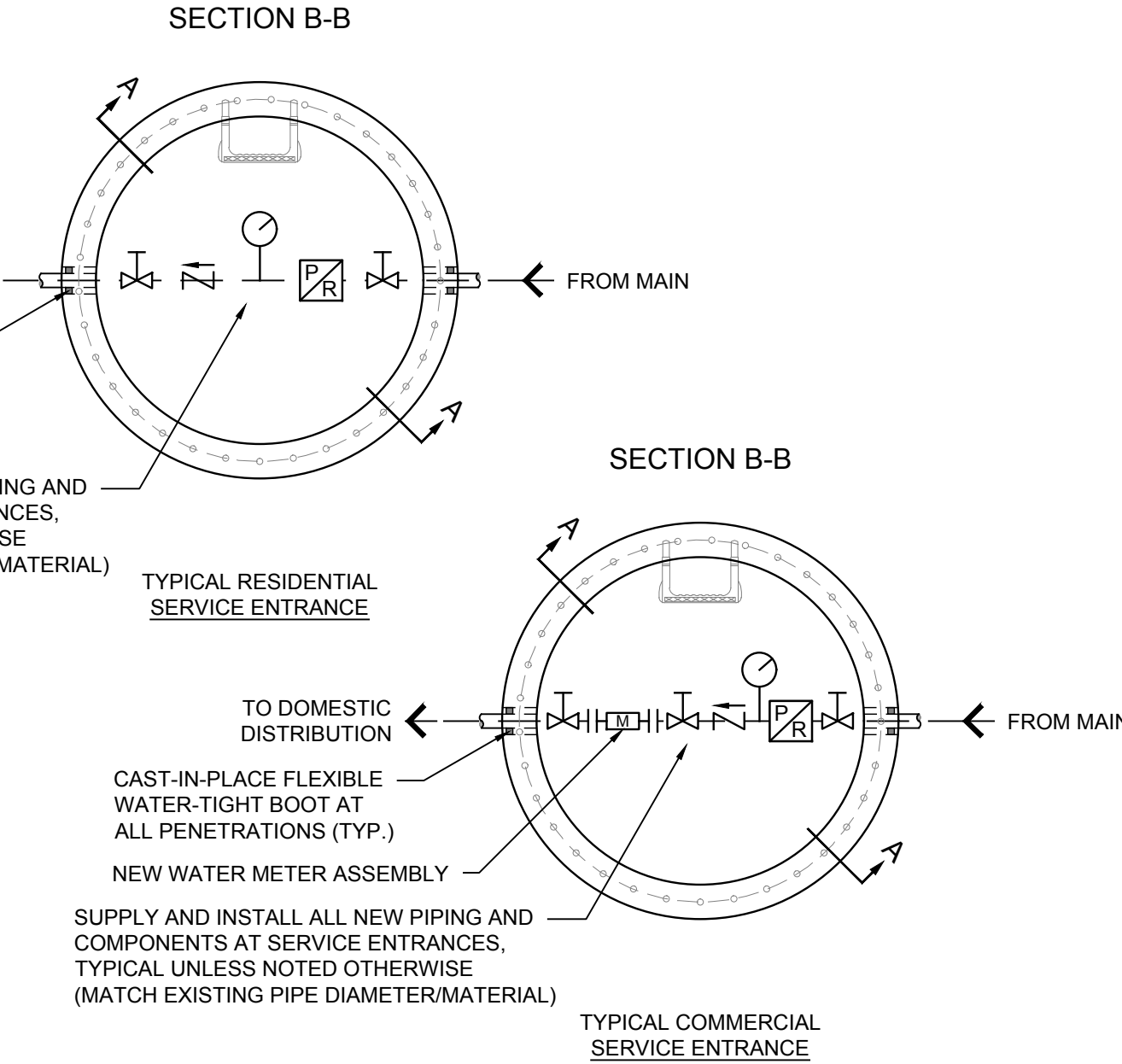
1 PLUMBING LEGEND AND TYPICAL WATER SERVICE ENTRANCE DETAILS  
Scale: NTS



2 WATER SERVICE BOOSTER PUMP DETAIL  
Scale: NTS

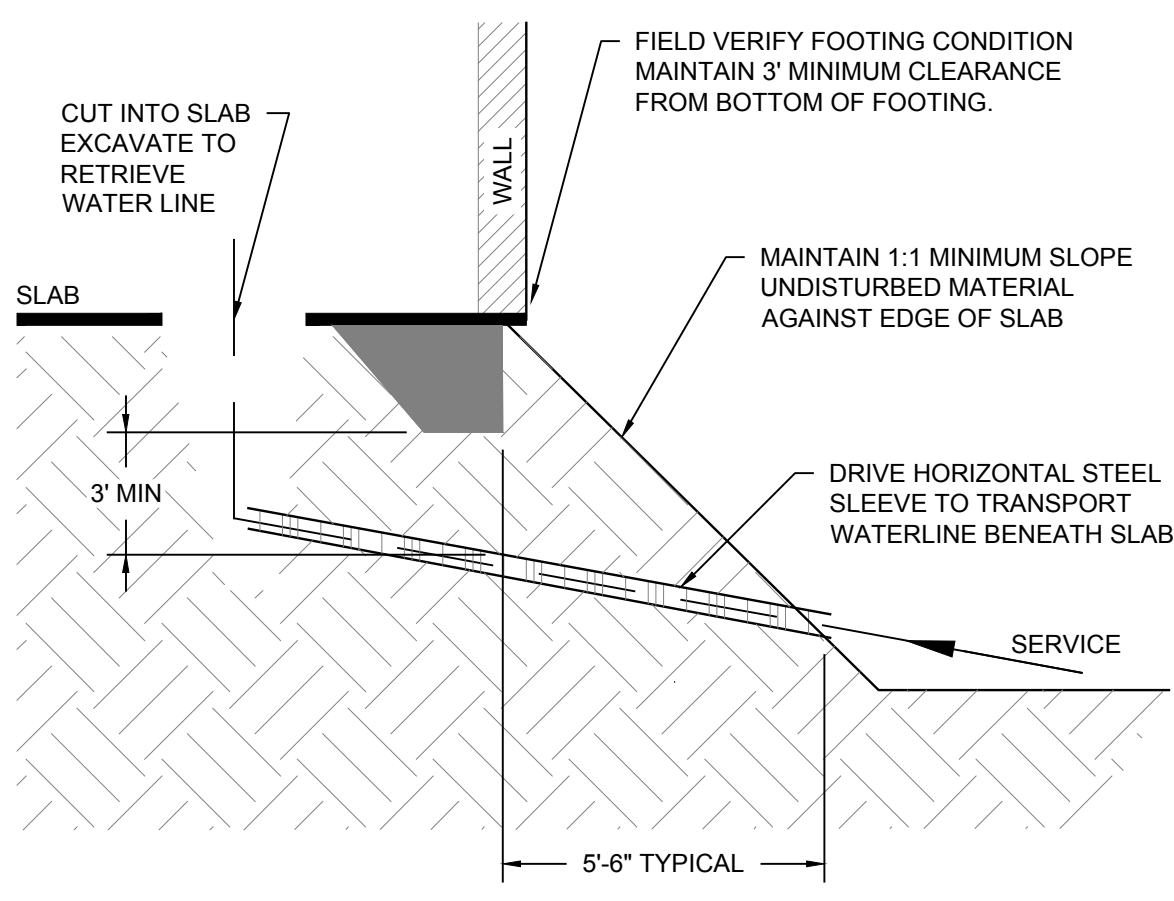


3 PRE-CAST CONCRETE METER PIT DETAIL  
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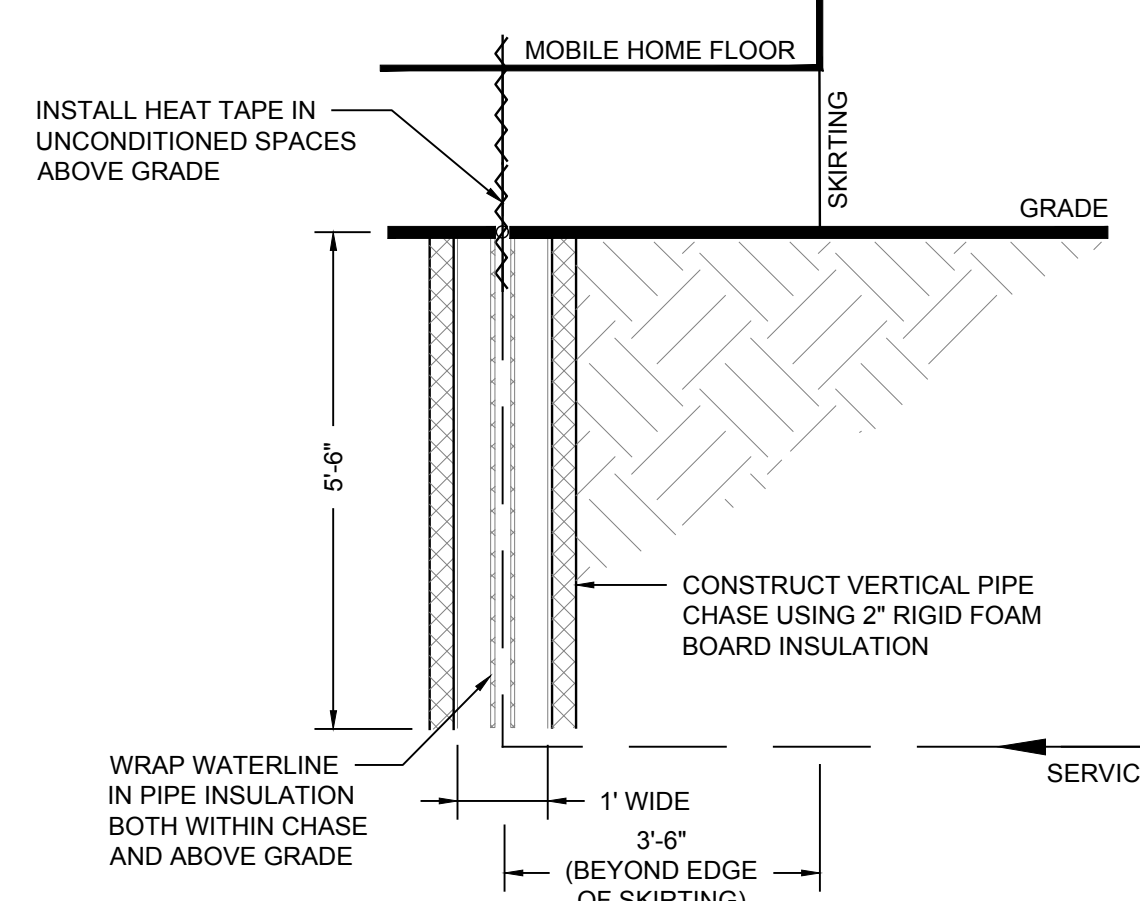


4 WATER SERVICE PIPE ENTRY (THROUGH FOUNDATION WALLS)  
Scale: NTS

ALL NEW SERVICE LINE PLUMBING MUST BE INSTALLED IN COMPLIANCE WITH THE MOST CURRENT VERMONT STATE PLUMBING CODE



5 WATER SERVICE VERTICAL PIPE ENTRY (THROUGH SLABS)  
Scale: NTS



6 WATER SERVICE VERTICAL PIPE ENTRY (FOR MOBILE HOMES)  
Scale: NTS

**NOTE:**

SERVICE ENTRANCE DIAGRAMS INCLUDED IN THE C600 SERIES OF THE SHEET SET ARE SCHEMATIC ONLY, AND BASED ON OBSERVATIONS MADE DURING PRELIMINARY DESIGN INSPECTIONS PERFORMED IN COOPERATION WITH THE PROPERTY OWNER. THESE DIAGRAMS ARE PROVIDED FOR GENERAL REFERENCE ONLY.

DUE TO SCHEDULING OR OTHER CIRCUMSTANCES, SOME PROPERTIES REQUIRING SERVICE CONNECTIONS WERE NOT INSPECTED, AND MAY NOT BE INCLUDED IN THE SHEET SET.

THE CONTRACTOR MUST VERIFY ALL INTERNAL PLUMBING COMPONENTS AND CONFIGURATIONS, AND COORDINATE CURB STOP AND SERVICE ENTRANCE LOCATIONS WITH THE ENGINEER AND PROPERTY OWNER PRIOR TO MAKING ANY CONNECTIONS.

ALL NEW INTERNAL PLUMBING, PIPING AND COMPONENTS SHALL BE COMPLETED BY A QUALIFIED PLUMBER, LICENSED TO PRACTICE IN THE STATE OF VERMONT, AND ALL WORK MUST BE PERFORMED IN COMPLIANCE WITH ALL APPLICABLE CODES, REGULATIONS AND PERMITS.

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NO.	DATE	DESCRIPTION

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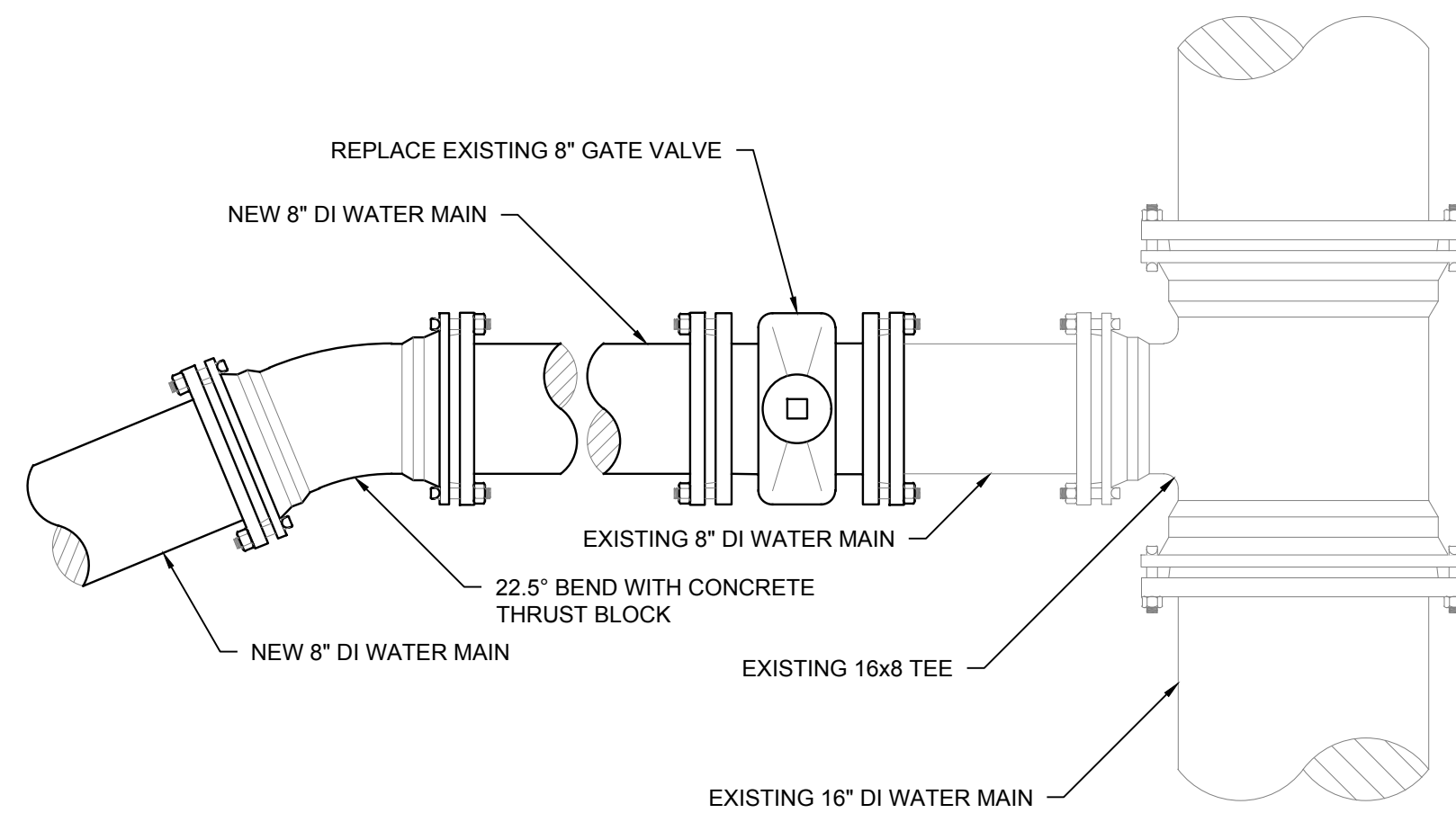
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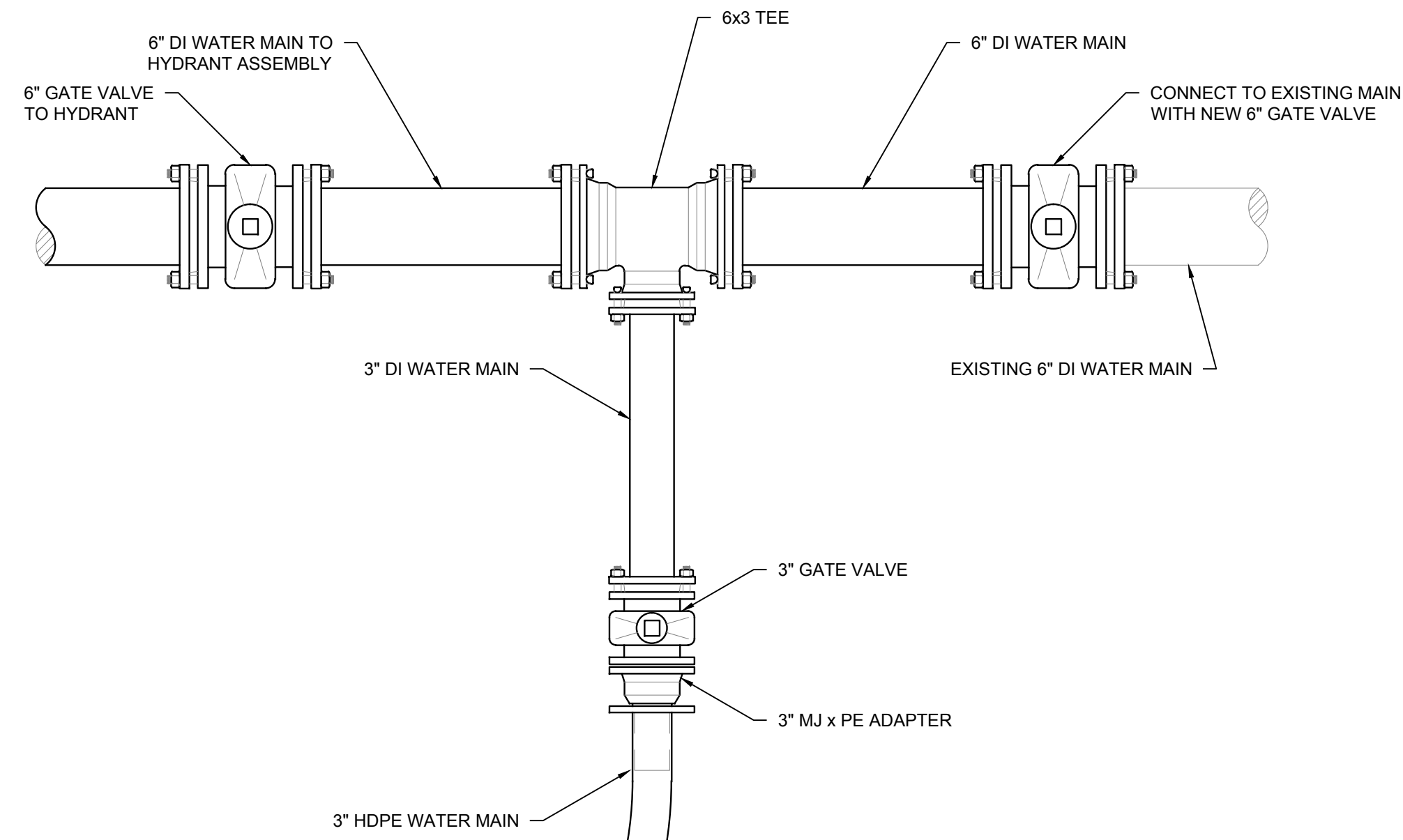
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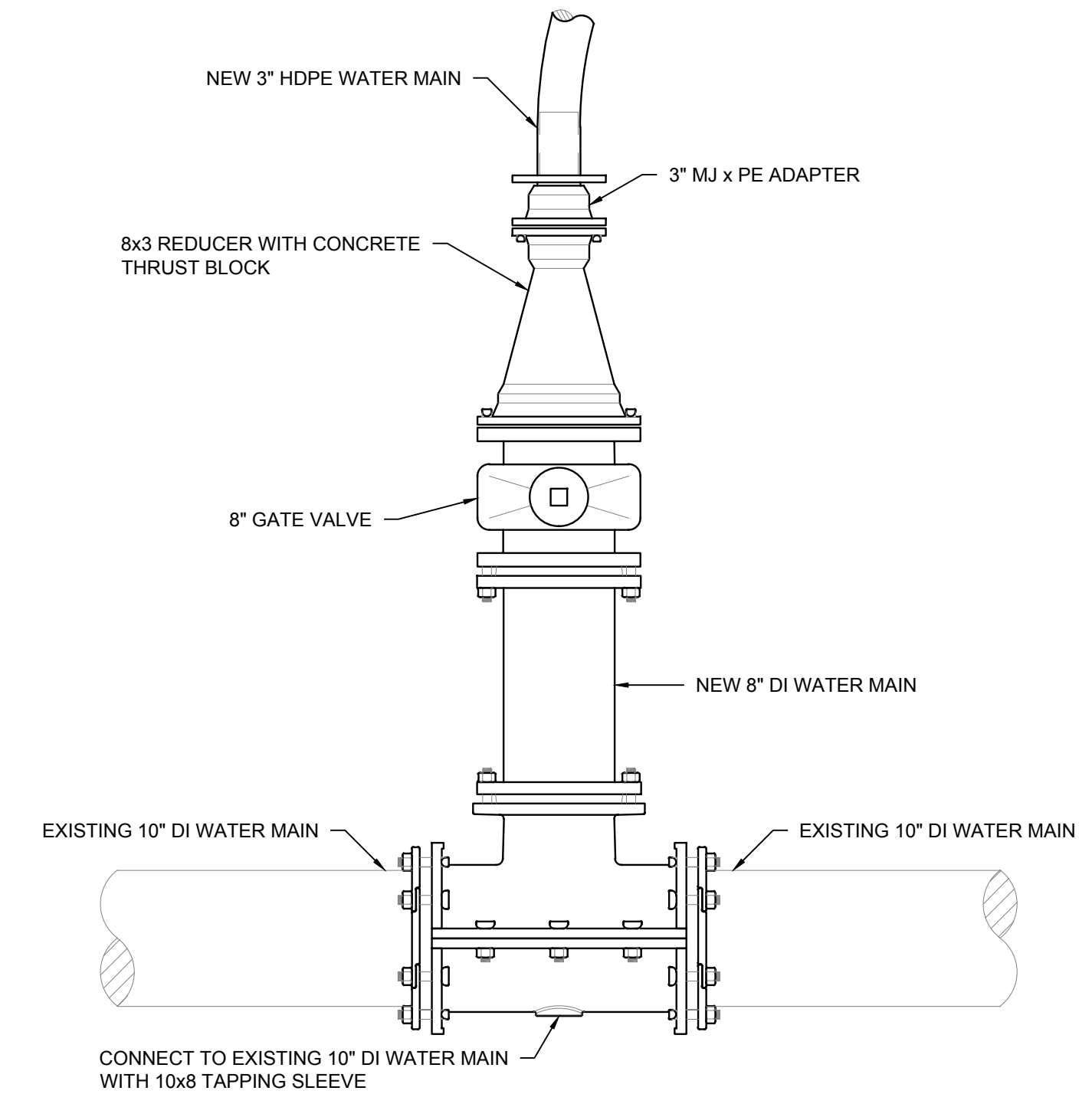
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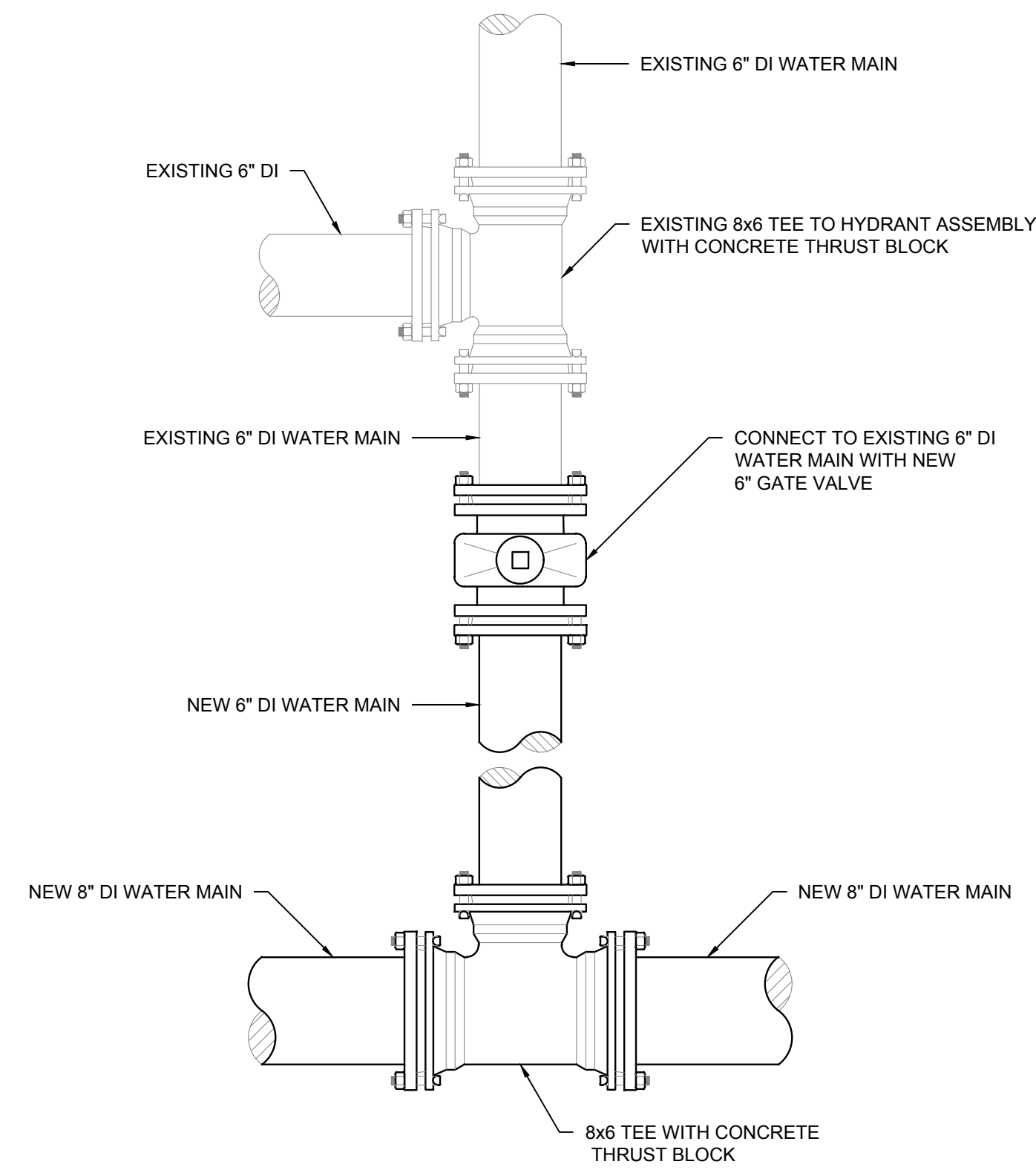
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WILLOW AND EAST ROAD Scale: NTS



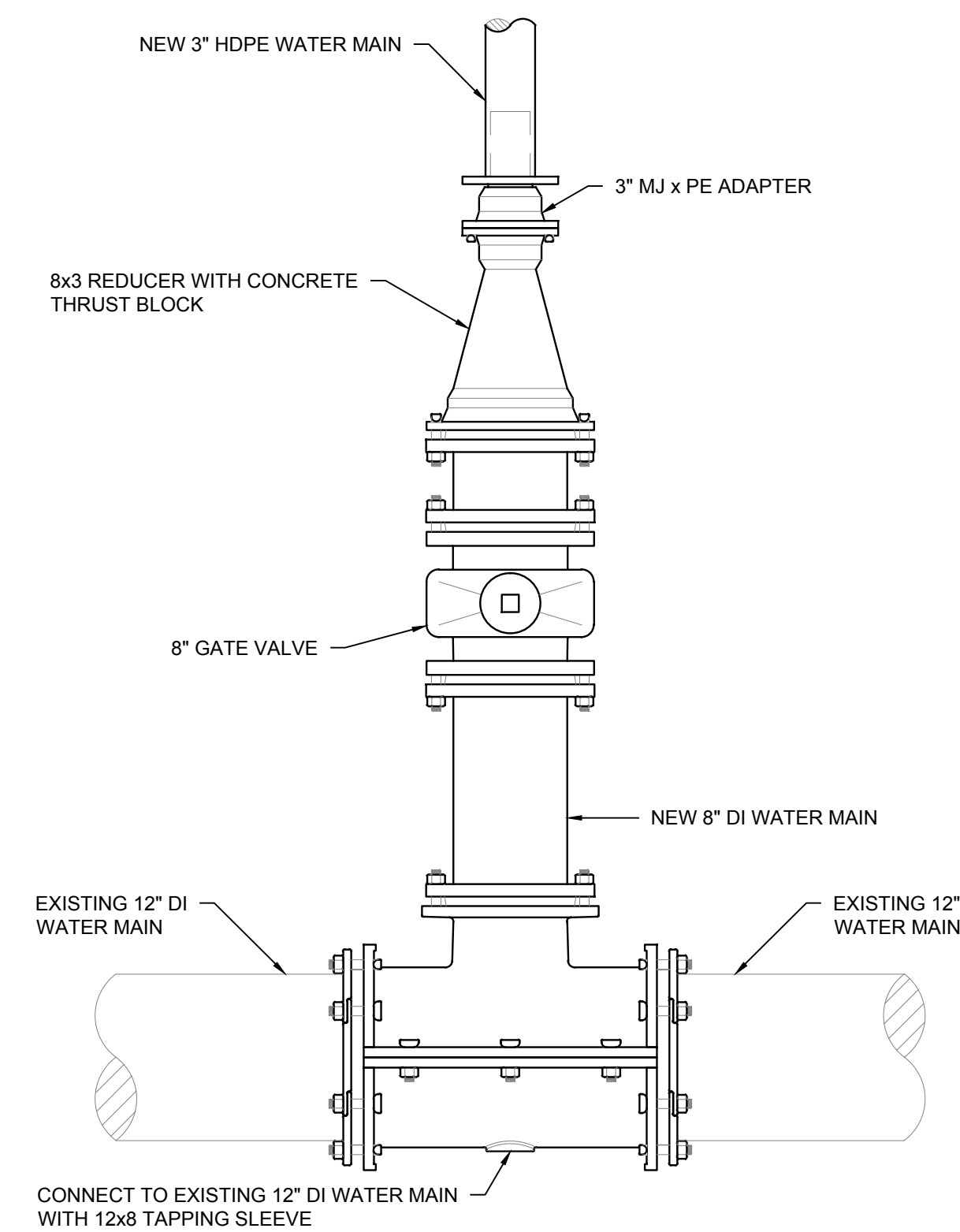
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AUTUMN ACRES ROAD (NORTH) Scale: NTS



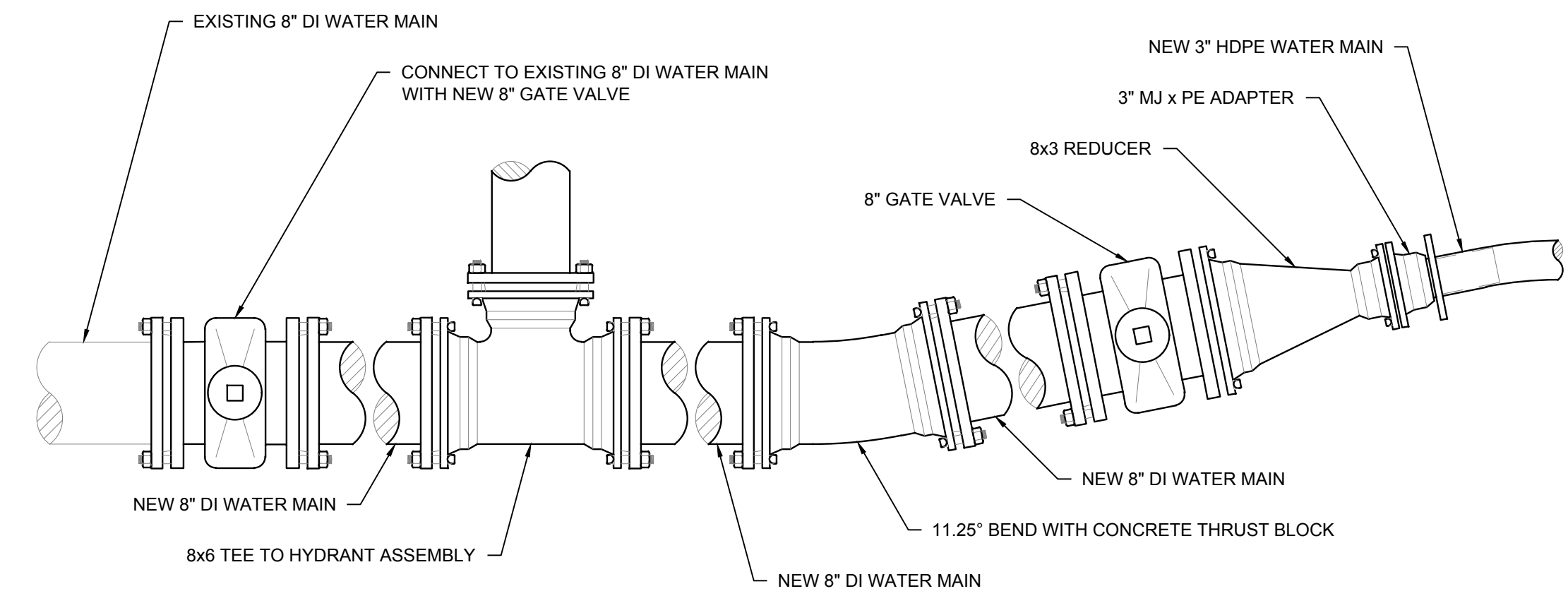
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CARPENTER LANE AND NORTH BRANCH STREET Scale: NTS



**2 CONNECTION TO EXISTING MUNICIPAL WATER MAIN**  
WILLOW ROAD AND DUFFY DRIVE Scale: NTS



**4 CONNECTION TO EXISTING MUNICIPAL WATER MAIN**  
AUTUMN ACRES ROAD AND HOUGHTON LANE Scale: NTS



**6 CONNECTION TO EXISTING MUNICIPAL WATER MAIN**  
MARION LANE Scale: NTS

**MSK ENGINEERING AND DESIGN, INC.**  
P.O. BOX 139, 150 DEPOT STREET  
BENNINGTON, VERMONT 05201  
PH: (802) 447-1402 FAX: (802) 445-1201



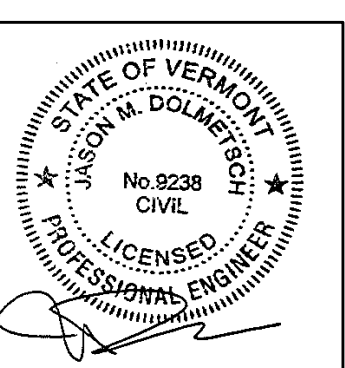
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TOWN OF BENNINGTON  
MUNICIPAL WATER SYSTEM  
REMEDIAL EXPANSION PHASE II  
BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**CONTRACT 7**  
CONNECTION DETAILS

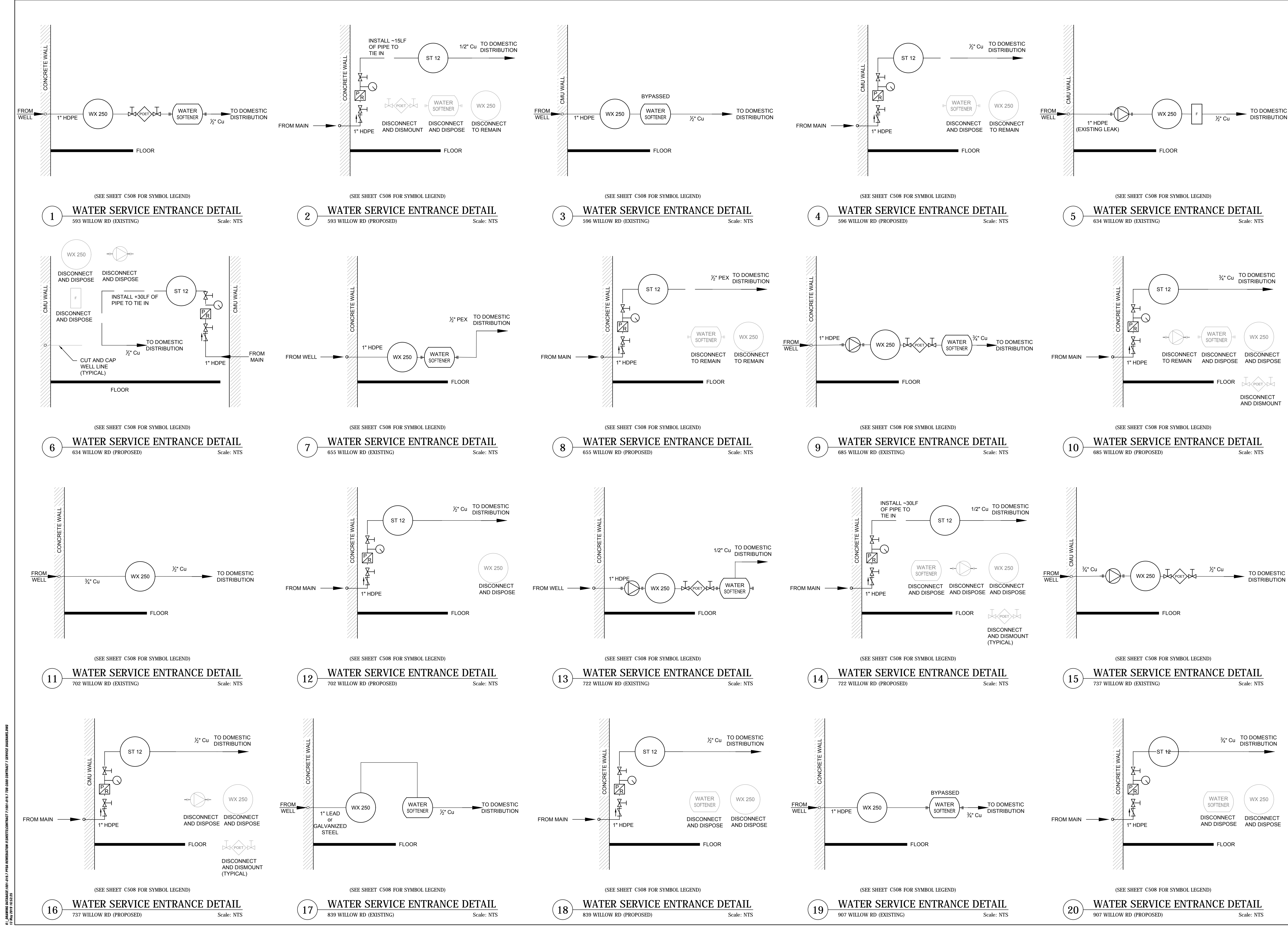
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DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C509**









PLANNING AND DESIGN, INC. 1001-019.7 05-14-2019  
 TOWN OF BENNINGTON MUNICIPAL WATER SYSTEM REMEDIAL EXPANSION PHASE II  
 SERVICE ENTRANCE DIAGRAMS  
 2 May 2019 08:25

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 447-1402 FAX: (802) 445-1291

NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
**CONTRACT 7**  
 SERVICE ENTRANCE  
 DIAGRAMS

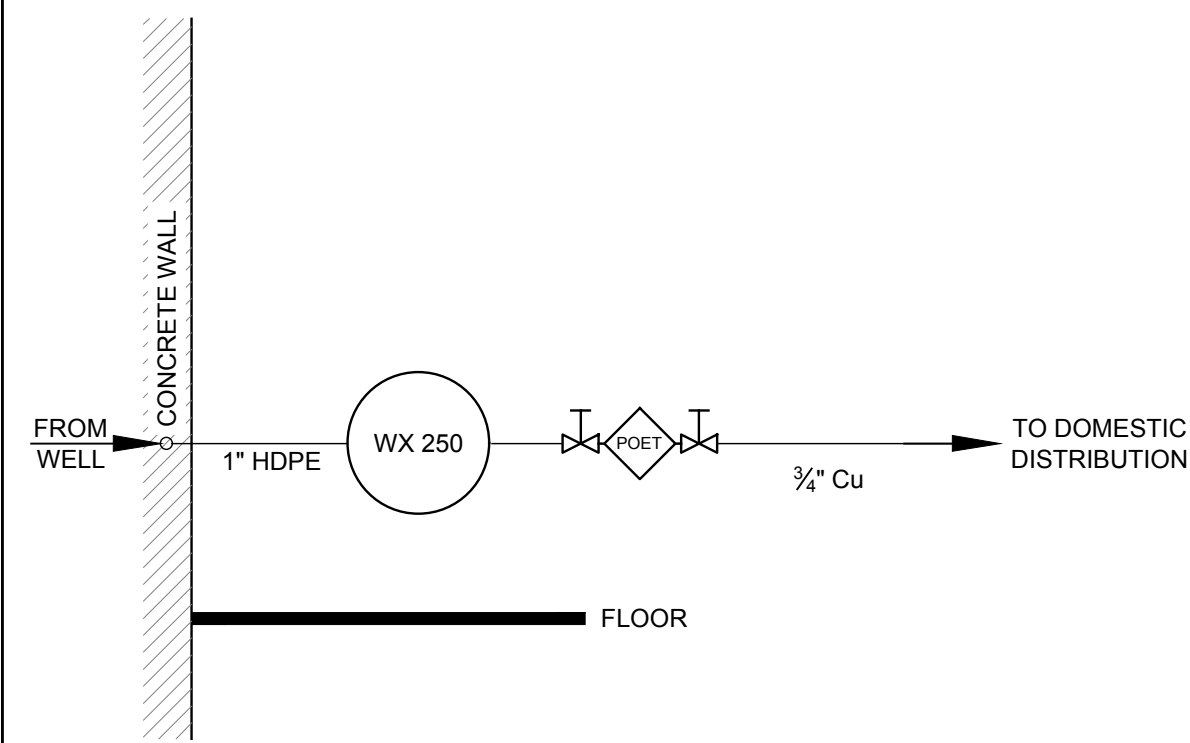
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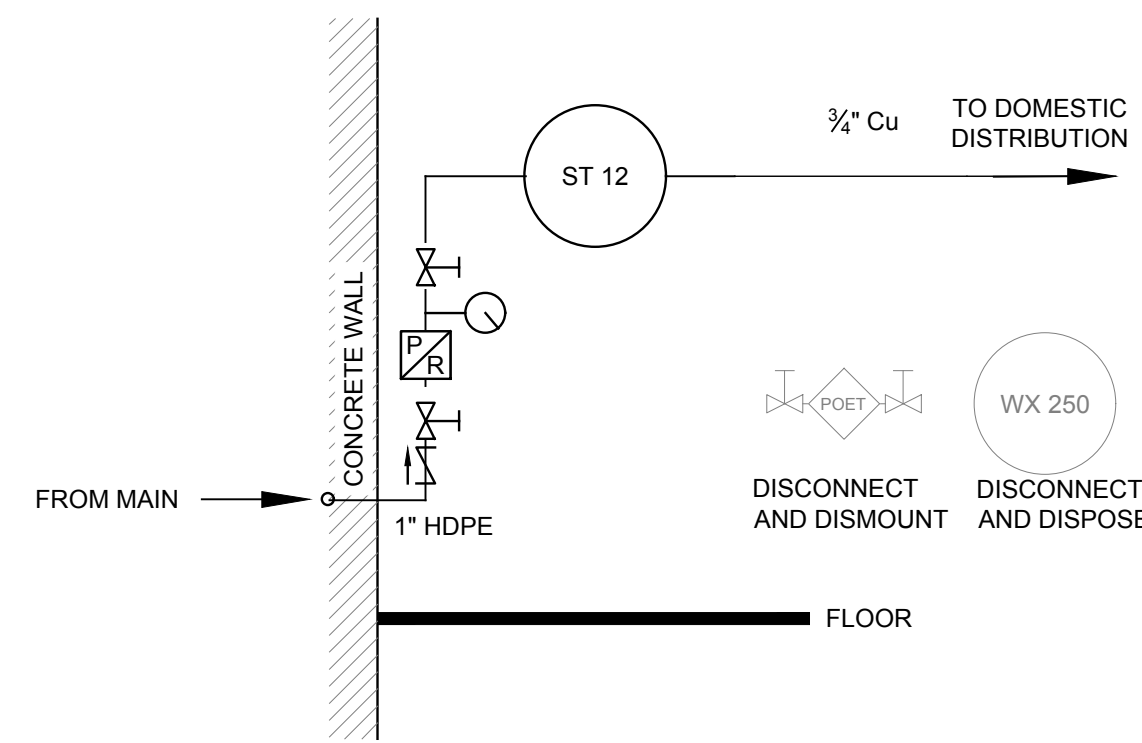
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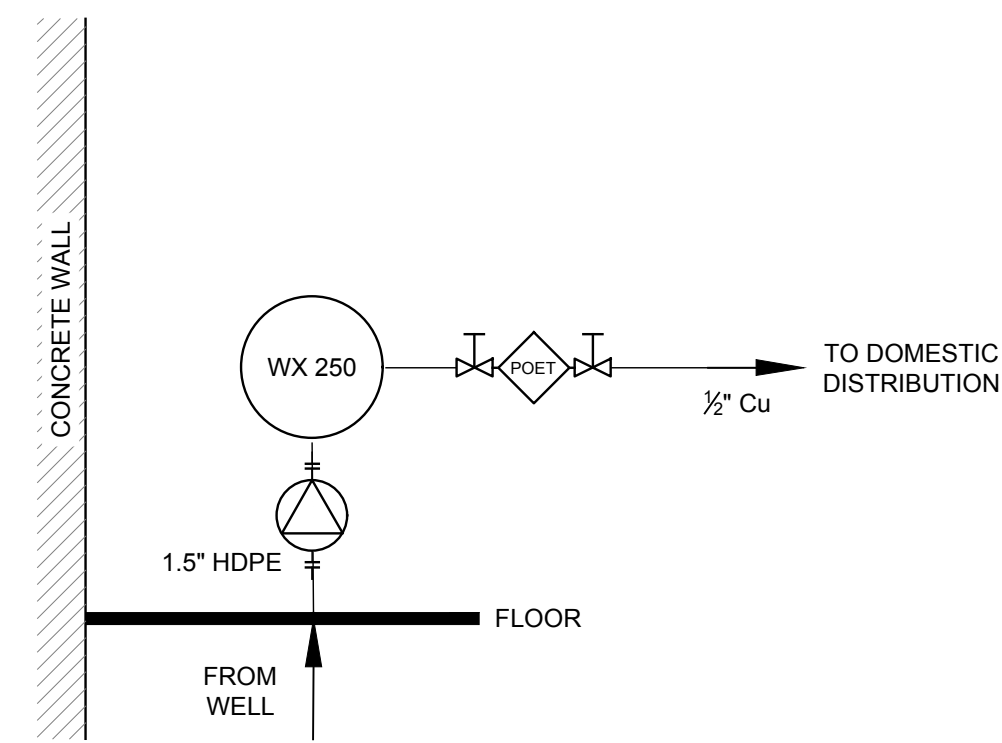
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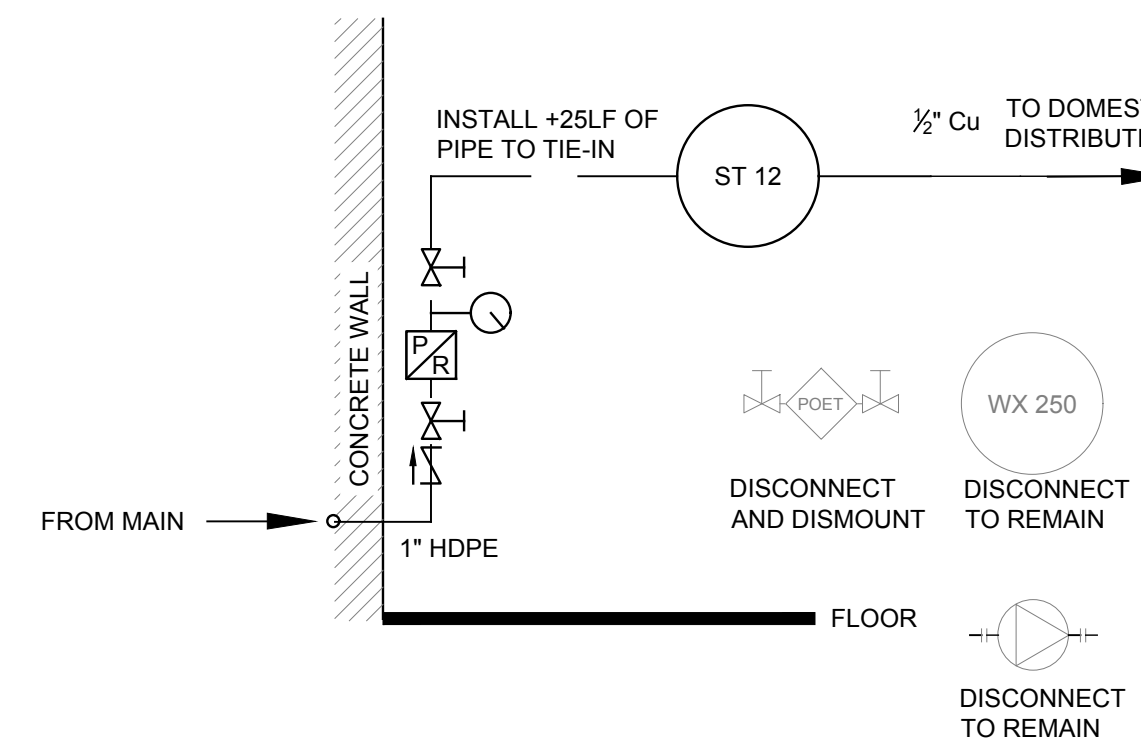
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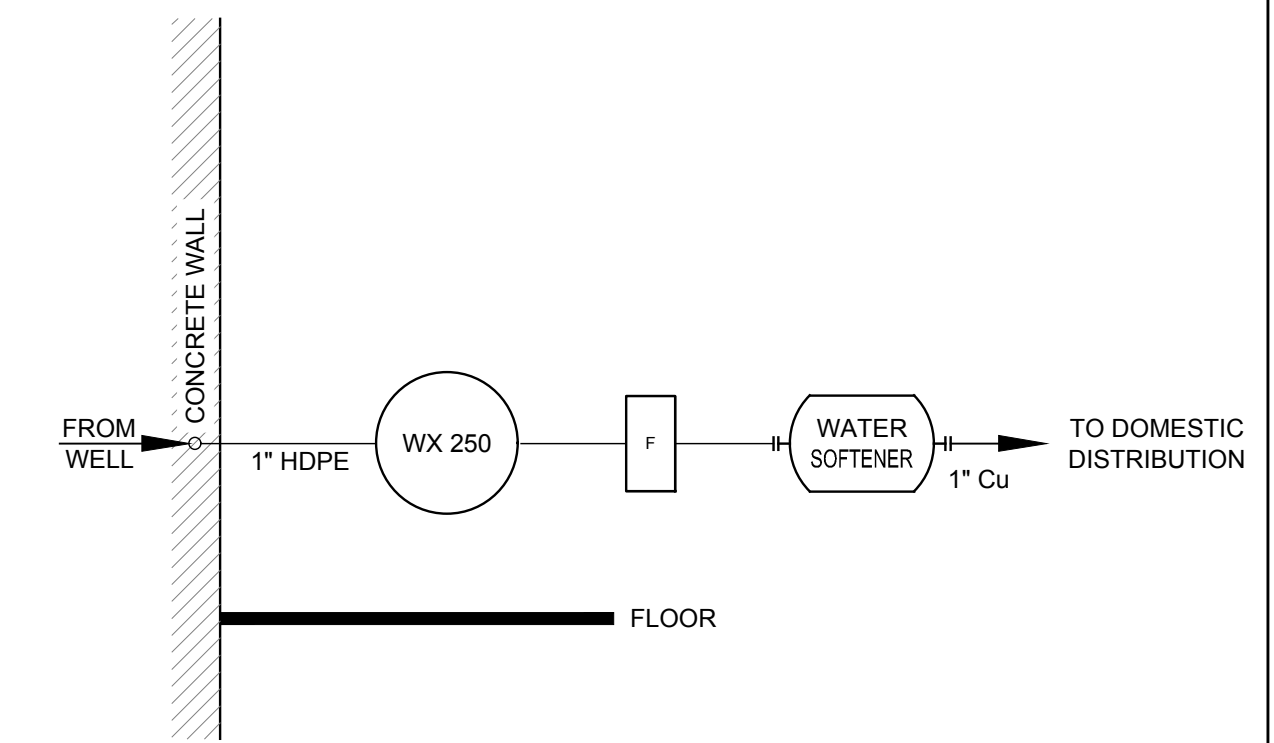
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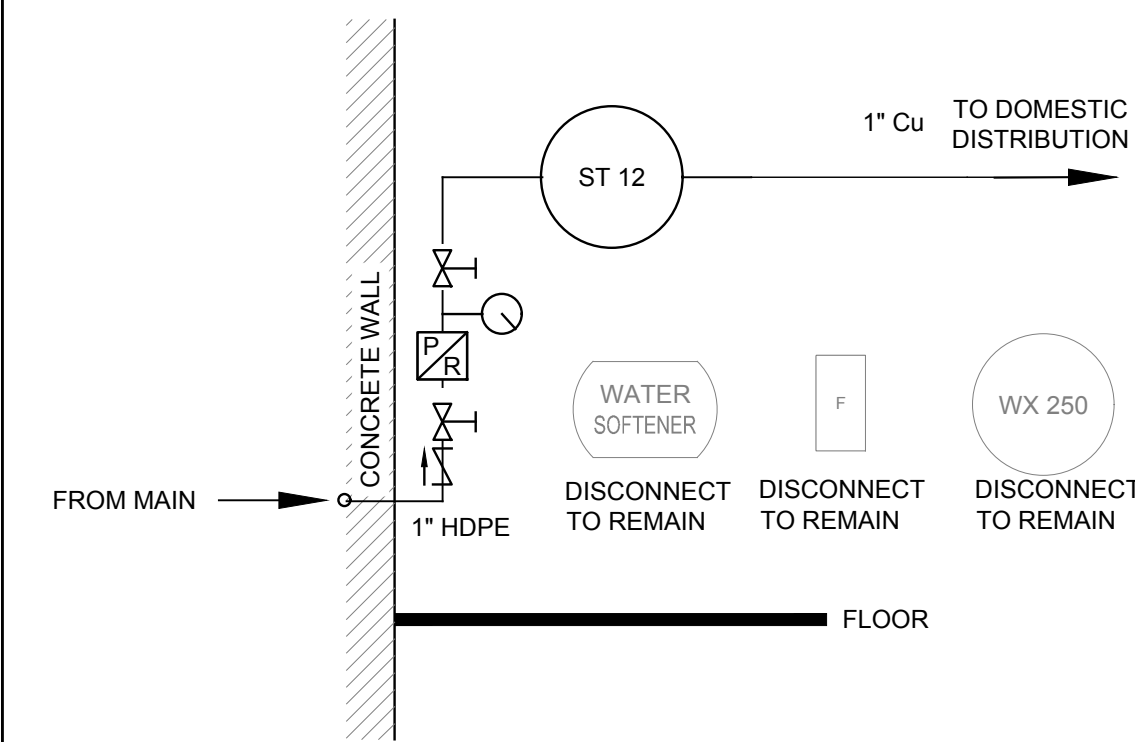
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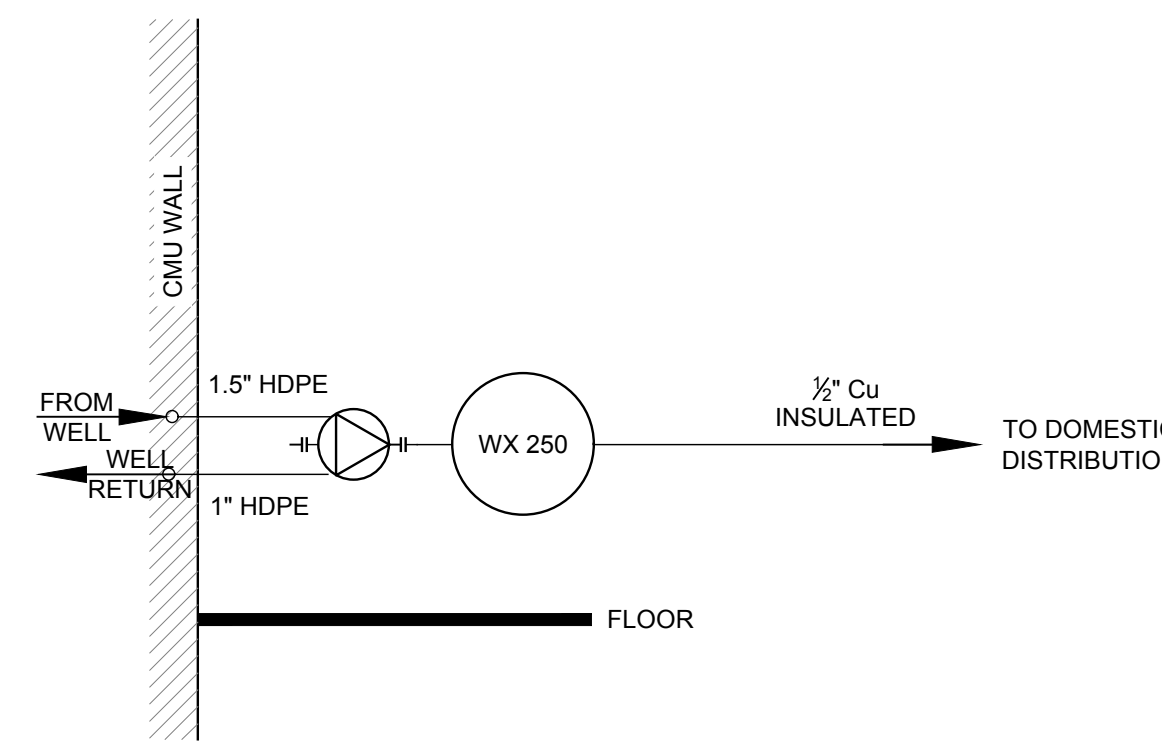
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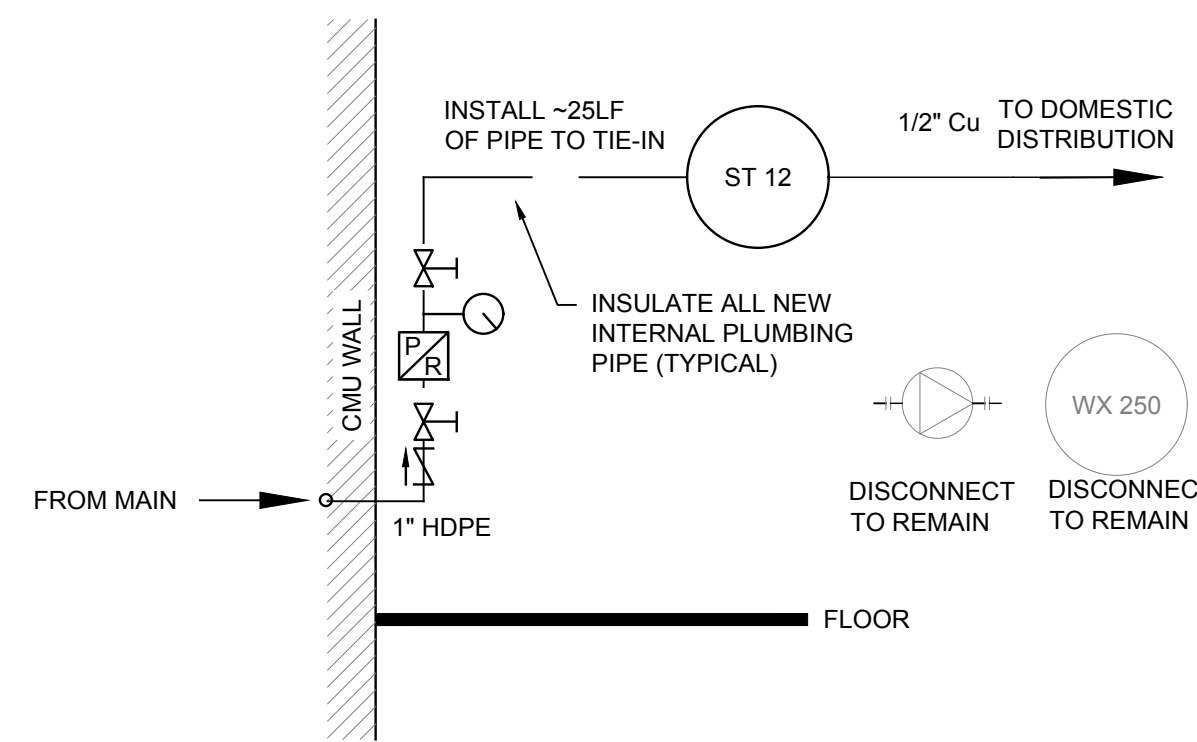
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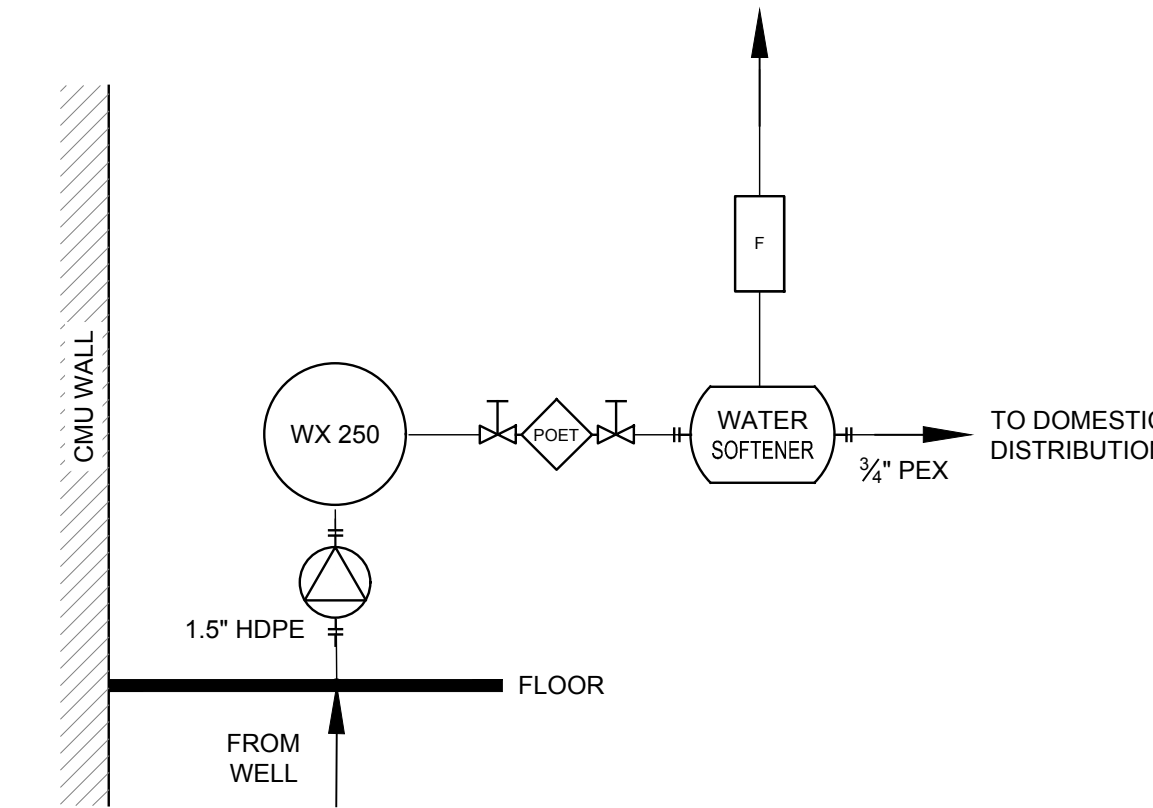
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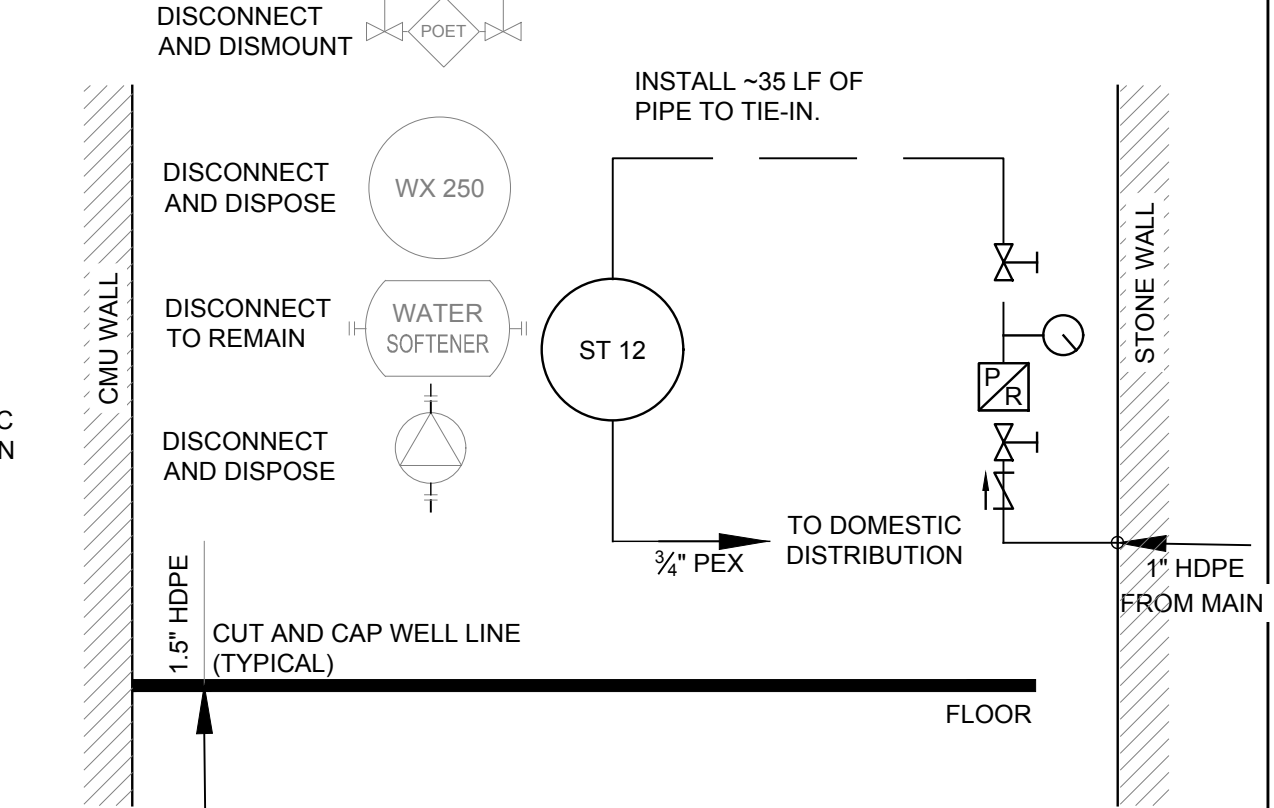
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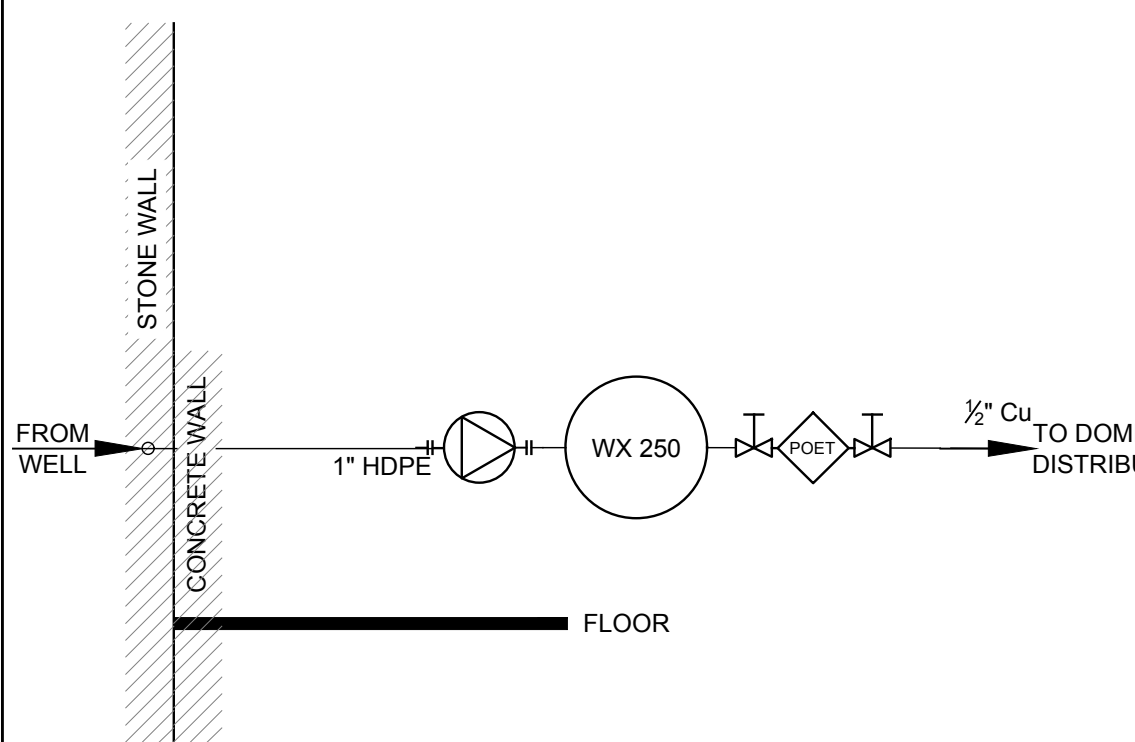
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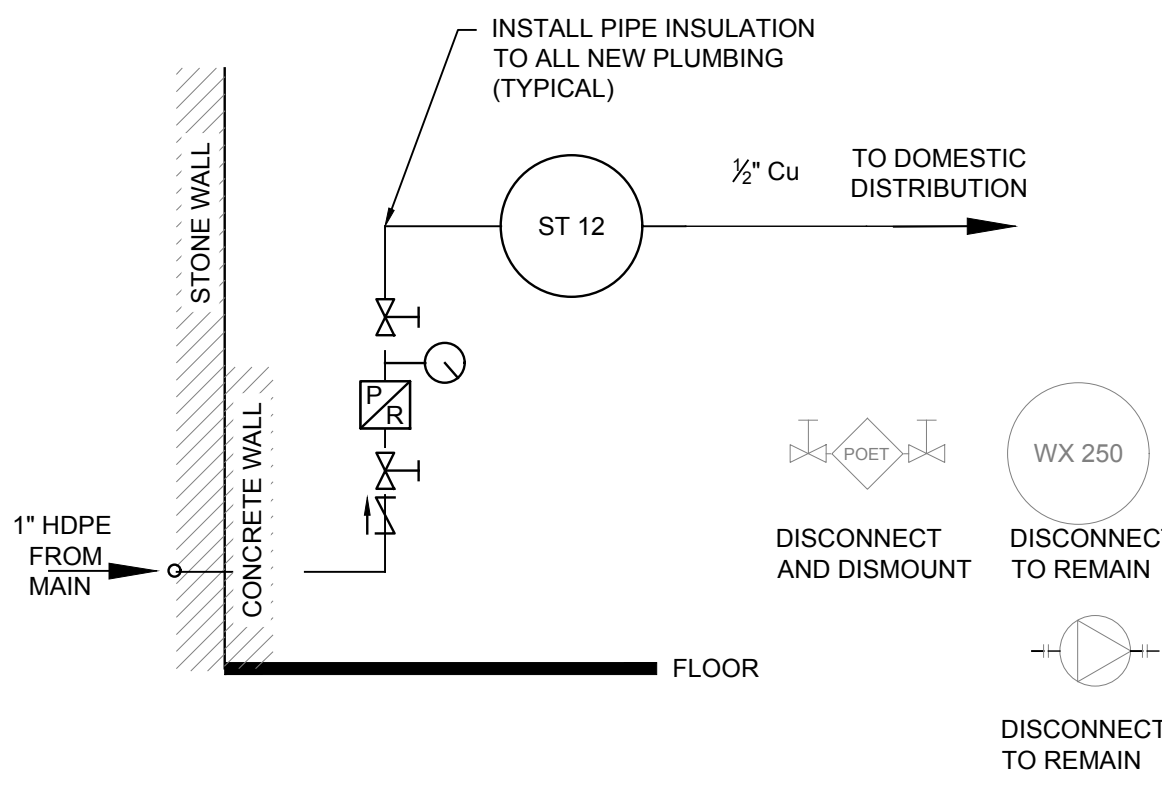
9 WATER SERVICE ENTRANCE DETAIL  
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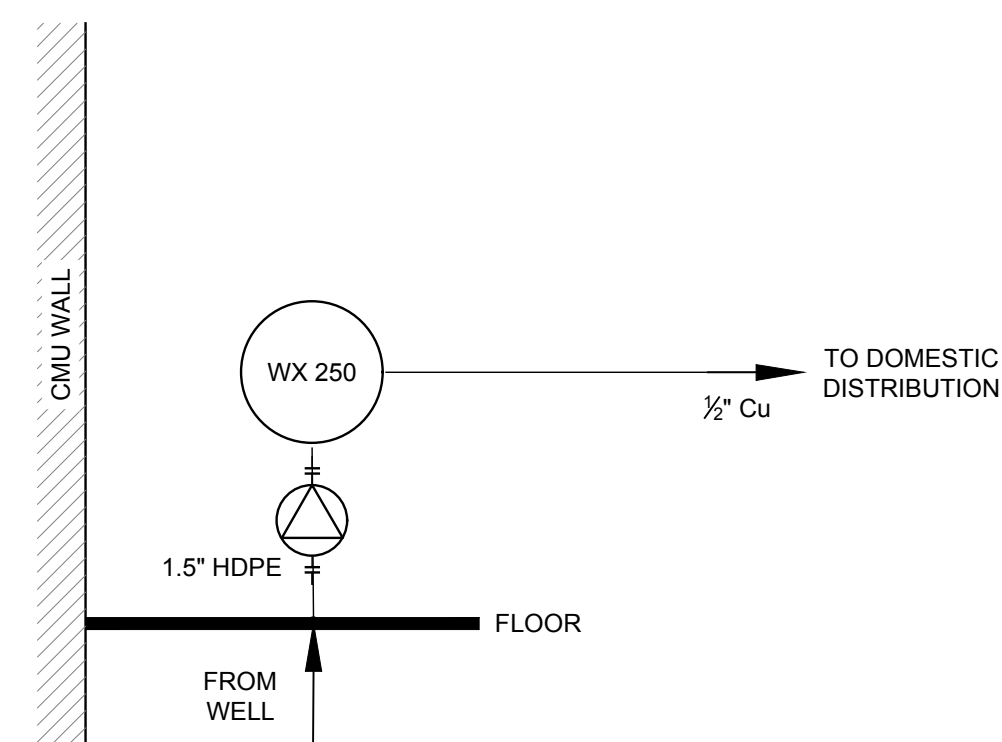
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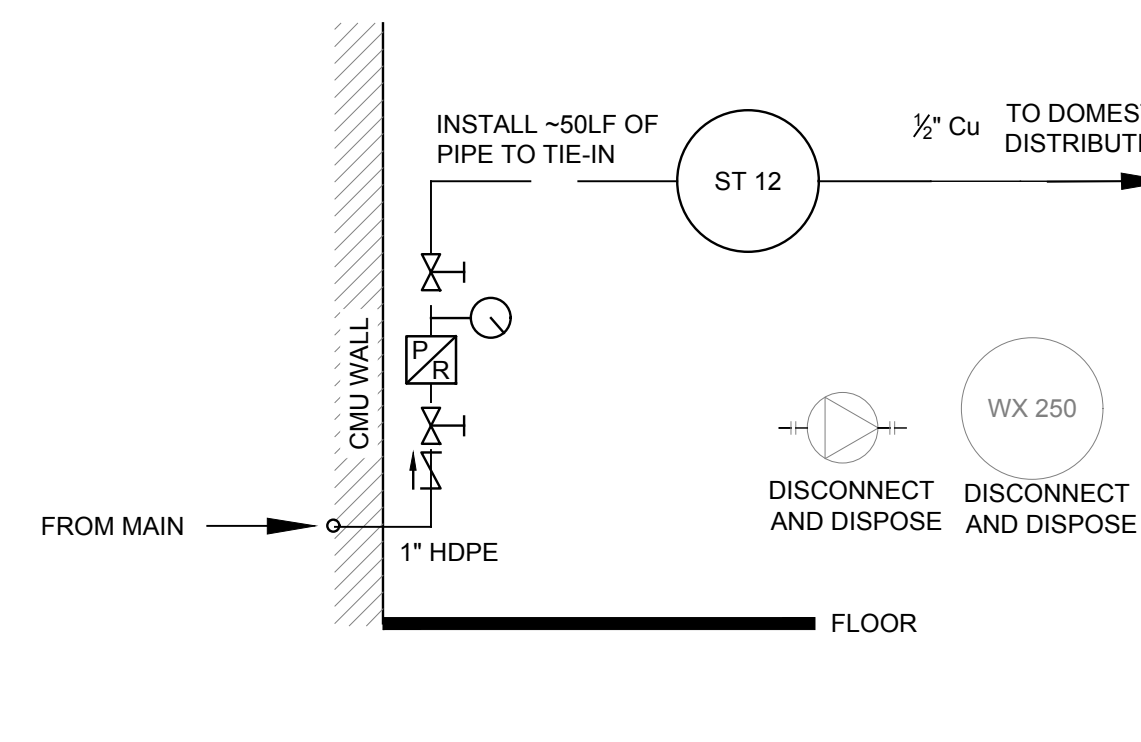
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12 WATER SERVICE ENTRANCE DETAIL  
1 CARPENTER LN (PROPOSED) Scale: NTS




13 WATER SERVICE ENTRANCE DETAIL  
4 CARPENTER LN (EXISTING) Scale: NTS



14 WATER SERVICE ENTRANCE DETAIL  
4 CARPENTER LN (PROPOSED) Scale: NTS

**MSK ENGINEERING AND DESIGN, INC.**  
 P.O. BOX 139, 150 DEPOT STREET  
 BENNINGTON, VERMONT 05201  
 PH: (802) 441-1402 FAX: (802) 445-1291



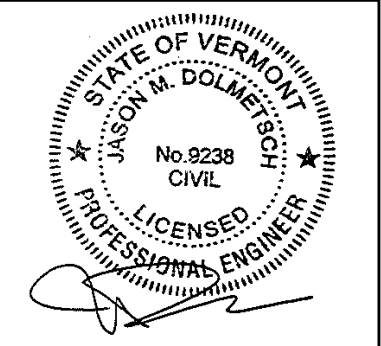
NO.	DATE	DESCRIPTION

TOWN OF BENNINGTON  
 MUNICIPAL WATER SYSTEM  
 REMEDIAL EXPANSION PHASE II  
 BENNINGTON, VERMONT

DRAWINGS THIS SHEET  
 CONTRACT 7  
 SERVICE ENTRANCE  
 DIAGRAMS

NUMBER	DATE
1001-019.7	05-14-2019
DRAWN	CHECKED
MSK	JMD

SHEET NUMBER  
**C603**





Civil – Environmental – Mechanical – Structural – Surveying  
Site & Facility Development – Construction- Compliance – Regulatory Permitting

Professional Engineering in Vermont – New Hampshire – New York

**Town of Bennington**  
**Water System Remedial Expansion Contract #7**  
**Bennington, Vermont**

Prepared by Project Engineer:

MSK Engineering & Design, Inc.  
Jason Dolmetsch, P.E.  
P.O. Box 139  
150 Depot Street  
Bennington, Vermont 05201  
Ph: 802-447-1402  
jdolmetsch@mskeng.com

For the Owners:

Town of Bennington  
205 South Street  
Bennington, VT 05201

Date of Issue: May 2019

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## **Contract Documents**

Town of Bennington  
Town of Bennington Water System Remedial Expansion  
Contract #7  
Bennington, Vermont  
May 2019

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Performance Bond  
Notice to Proceed  
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For Reference Only: Geotechnical Report from QCQA Labs dated 2/6/2017  
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- C126A PROFILE
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- C128 PLAN
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**ADVERTISEMENT FOR BIDS**

**Town of Bennington, Vermont**  
(OWNER)

**205 South Street Bennington, VT 05201**  
(Address)

Separate sealed BIDS for the construction of

**Town of Bennington Water System Remedial Expansion, Contract #7 – This project consists of the extension of water main line along Willow Road, Marion Lane, Autumn Acres Road, and Carpenter Lane in the Town of Bennington, Vermont. Specifically, the work will include trenching, removal of the existing asphalt and subbase, installation of water main, thrust blocks, hydrants, curb stops, service lines, and associated site work in accordance with the contract plans and specifications.**

will be received by **Town of Bennington, Vermont** at the office of **Town of Bennington, 205 South Street, Bennington, VT 05201**

until **4:00 pm**, (Prevailing Local Time) **June 6, 2019**, and then at said office publicly opened and read aloud.

Each BID must be accompanied by a certified check payable to the OWNER for five percent (5%) of the total amount of the BID. A BID bond may be used in lieu of a certified check.

The CONTRACT DOCUMENTS may be examined at the following locations:

**Town of Bennington – 205 South Street, Bennington, VT 05201**

**MSK Engineering & Design, Inc. – 150 Depot Street, Bennington, VT 05201**

Copies of the CONTRACT DOCUMENTS may be obtained by contacting Abby Chaloux at MSK Engineering & Design at (802) 447-1402, ext. 3 or [achaloux@mskeng.com](mailto:achaloux@mskeng.com). Copies may also be attained by contacting Nicholas Ratzer [nratzer@mskeng.com](mailto:nratzer@mskeng.com). CONTRACT DOCUMENTS will be sent electronically unless otherwise requested by the prospective bidder.

A Performance BOND and a Payment BOND each in an amount equal to one hundred percent (100%) of the contract price will be required.

A pre-bid conference for prospective bidders will be held at the **MSK Engineering and Design, Inc., 150 Depot Street, Bennington, VT 05201** on **May 28, 2019** at **1:00 pm**.

Representatives of the **Town of Bennington** will be present to answer questions from bidders.

**10 May 2019**  
Date



Authorized Representative

## **INFORMATION FOR BIDDERS**

BIDS will be received by **Town of Bennington, Vermont** (herein called the "OWNER"), at **205 South Street, Bennington, VT 05201**

until **June 6, 2019 at 2:00 pm**, (local prevailing time) and then at said office publicly opened and read aloud.

Each BID must be submitted in a sealed envelope, addressed to **Town of Bennington at 205 South Street, Bennington, VT 05201**. Each sealed envelope containing a BID must be plainly marked on the outside as BID for **Town of Bennington Water System Remedial Expansion, Contract #7** and the envelope should bear on the outside the name of the BIDDER, BIDDER'S address, license number if applicable, and the name of the project for which the BID is submitted. If forwarded by mail, the sealed envelope containing the BID must be enclosed in another envelope addressed to the OWNER at:

**Town of Bennington  
205 South Street  
Bennington, VT 05201**

All BIDS must be made on the required BID form. All blank spaces for BID prices must be filled in, in ink or typewritten, and the BID form must be fully completed (including Schedule A) and executed when submitted. Only one copy of the BID form is required.

The OWNER may waive any informalities or minor defects or reject any and all BIDS. A Bidder may withdraw any proposal submitted prior to the hour set for the closing of the Bids provided the request is signed in a manner identical with the proposal being withdrawn. Any BID received after the time and date specified, shall not be considered. No BIDDER may withdraw a BID within 30 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period the time may be extended by mutual agreement between the OWNER and the BIDDER.

BIDDERS must satisfy themselves of the accuracy of the estimated quantities in the BID Schedule by examination of the site and a review of the drawings and specifications including ADDENDA. After BIDS have been submitted, the BIDDER shall not assert that there was a misunderstanding concerning the quantities of WORK or of the nature of the WORK to be done.

All questions by prospective BIDDERS as to the interpretations of the INFORMATION FOR BIDDERS, Forms of PROPOSAL, Form of CONTRACT, Plans, Specifications or BONDS, must be submitted electronically in writing to the Consulting Engineer, at least seven (7) days before the date herein set for the opening of BIDS. An interpretation will be emailed with return receipt requested to prospective BIDDERS at the addresses given by them no later than five (5) days before the date of opening BIDS. Failure of any BIDDER to receive any such ADDENDUM or interpretation shall not relieve such BIDDER from any obligation under its BID as submitted. All ADDENDA so issued shall become part of the CONTRACT DOCUMENTS.

In the event there is any discrepancy in the PROPOSAL between any price in words, figures, or the extended totals, the price in words shall govern and the extended totals in each case shall be corrected accordingly. No BID will be accepted which does not contain a price for each item in this PROPOSAL.

Prospective BIDDERS and their agents will be permitted to make, at their own responsibility and expense, such borings, soundings, or other investigations over the site of the proposed work as they deem necessary. They must satisfy themselves by personal examination of the location of the proposed work, and by such other means as they deem necessary, as to the actual conditions and requirements of the WORK and as to the actual quantities required for the construction. Prices bid shall include every and all costs for the construction complete between the limits indicated on the plans and/or as set out in the specifications.

At the time of the opening of BIDS, each BIDDER will be presumed to have inspected the site and to have read and to be thoroughly familiar with the Drawings and CONTRACT DOCUMENTS (including all ADDENDA).

The failure or omission of any BIDDER to receive or examine any form, instrument, or document shall in no way relieve any BIDDER from the obligation in respect to its BID.

The OWNER shall provide to BIDDERS prior to BIDDING, all information which is pertinent to, and delineates and describes, the land owned and rights-of-way acquired or to be acquired.

The CONTRACT DOCUMENTS contain the provisions required for the construction of the PROJECT. Information obtained from an officer, agent, or employee of the OWNER or any other person shall not affect the risks or obligations assumed by the CONTRACTOR or relieve him from fulfilling any of the conditions of the contract.

Each BID must be accompanied by a certified check payable to the OWNER for five percent of the total amount of the BID. As soon as the BID prices have been compared, the OWNER will return the certified checks of all except the three lowest responsive, responsible BIDDERS. When the Agreement is executed, the certified checks of the two remaining unsuccessful BIDDERS will be returned. The certified check of the successful BIDDER will be retained until the payment BOND and performance BOND have been executed and approved, after which it will be returned. A BID BOND may be used in lieu of a certified check.

A performance BOND and a payment BOND, each in the amount of 100 percent of the CONTRACT PRICE, with a corporate surety approved by the OWNER, will be required for the faithful performance of the contract.

Attorneys-in-fact who sign BID BONDS or payment BONDS and performance BONDS must file with each BOND, a certified and effective dated copy of their power of attorney.

The party to whom the contract is awarded will be required to execute the Agreement and obtain the performance BOND and payment BOND within ten (10) calendar days from the date when NOTICE OF AWARD is delivered to the BIDDER. The NOTICE OF AWARD shall be accompanied by the necessary Agreement and BOND forms. In case of failure of the BIDDER to execute the Agreement, the OWNER may, at its option, consider the BIDDER in default, in which case the BID BOND or certified check accompanying the proposal shall become the property of the OWNER.

The OWNER, within ten (10) days of receipt of acceptable performance BOND, payment BOND and Agreement signed by the party to whom the Agreement was awarded, shall sign the Agreement and return to such party an executed duplicate of the Agreement. Should the OWNER not execute the Agreement within such period, the BIDDER may by WRITTEN NOTICE withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of the notice by the OWNER.

The OWNER shall issue the NOTICE TO PROCEED within ten (10) days of the execution of the Agreement. The "Date of Issuance" of the NOTICE TO PROCEED shall start the CONTRACT time. Should there be reasons why the NOTICE TO PROCEED cannot be issued within such period, the time may be extended only by mutual written agreement between the OWNER and CONTRACTOR.

If the NOTICE TO PROCEED has not been issued within the ten (10) day period or within the period mutually agreed upon, the CONTRACTOR may terminate the Agreement without further liability on the part of either party.

The OWNER may make such investigations as it deems necessary to determine the ability of the BIDDER to perform the WORK, and the BIDDER shall furnish to the OWNER all such information and data for this purpose as the OWNER may request. The OWNER reserves the right to reject any BID if the BIDDER fails to submit the requested information and data, or the evidence submitted by or investigation of such BIDDER fails to satisfy the OWNER that such BIDDER is properly qualified to carry out the obligations of the Agreement and to complete the WORK contemplated therein.

**A conditional or qualified BID will not be accepted.**

**Award will be made to the lowest responsive, responsible BIDDER.**

All applicable laws, ordinances, and the rules and regulations of all authorities having jurisdiction over construction of the PROJECT shall apply to the contract throughout.



Further, the BIDDER agrees to abide by the requirements under Executive Order No. 11246, as amended, including specifically the provisions of the "Equal Employment Opportunity" clause set forth in the SUPPLEMENTAL GENERAL CONDITIONS.

Successful BIDDERS must be prepared to comply in all respects with the CONTRACT provisions regarding non-discrimination and sign the nondiscrimination statement which is part of the BID.

Each BIDDER is responsible for inspecting the site and for reading and being thoroughly familiar with the CONTRACT DOCUMENTS. The failure or omission of any BIDDER to do any of the foregoing shall, in no way, relieve any BIDDER from any obligation in respect to his BID.

If the low BIDDER intends to award the WORK to SUBCONTRACTOR(S) in excess of fifty (50) percent of the CONTRACT PRICE, the OWNER'S written approval is required prior to CONTRACT AWARD. The low BIDDER shall, within five (5) calendar days after the BID date, make written request to OWNER and will supply the names and addresses of major material SUPPLIER(S) and SUB-CONTRACTOR(S) in support of the request.

Wherever it may be written that an equipment manufacturer must have a specified period of experience with its product, equipment which does not meet the specified experience period can be considered if the equipment SUPPLIER or manufacturer is willing to provide BOND or cash deposit for the duration of the specified time period which will guarantee replacement of that equipment in the event of a failure.

The BIDDER'S attention is directed to the "Supplemental General Conditions" of the CONTRACT SPECIFICATIONS, which contains requirements, provisions, policies and permits applicable to WORK under the CONTRACT.

The ENGINEER and contact is: **MSK Engineering and Design, Inc. – Jason M. Dolmetsch, P.E.**

Address and phone number is: **150 Depot Street, Bennington, VT 05201**

**Ph: 802 447-1402**

**Fx: 802 445-1291**

Inspection trips for prospective BIDDERS may be scheduled upon request.

**BID**

Proposal of \_\_\_\_\_ (hereinafter called "BIDDER"), organized and existing under the laws of the State of \_\_\_\_\_ doing business as: \_\_\_\_\_  
(a corporation, a partnership or an individual)

To the: **Town of Bennington, Vermont**  
(hereinafter called "OWNER".)

In compliance with your Advertisement for BIDS, BIDDER hereby proposes to perform all WORK for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #7**

---

in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, each BIDDER certifies, and in the case of a joint BID, each party thereto certifies as to his own organization, that his BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

BIDDER hereby agrees to commence MOBILIZATION AND CONSTRUCTION under this contract by JUNE 27, 2019 and to substantially complete the PROJECT by AUGUST 1, 2020. Final completion of the project shall take place on or before AUGUST 31, 2020. BIDDER further agrees to pay as liquidated damages, the sum of **\$750.00** for each consecutive calendar day thereafter as provided in Section 15 of the General Conditions.

BIDDER acknowledges receipt of the following ADDENDA:

- 1.
- 2.
- 3.
- 4.

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## BID SCHEDULE

BIDDER agrees to perform all the WORK described in the CONTRACT DOCUMENTS for the following unit prices:

ITEM NO.	ITEM DESCRIPTION	Unit	UNIT PRICE	ESTIMATED QUANTITY	EXTENDED AMOUNT
1	<b>Mobilization/Demobilization</b>	LS	\$	1	\$
	UNIT PRICE (written)				
2	<b>Erosion and Sediment Controls</b>	LS	\$	1	\$
	UNIT PRICE (written)				
3	<b>Traffic Control</b>	LS	\$	1	\$
	UNIT PRICE (written)				
4	<b>Trench Excavation of Rock</b>	CY	\$	450	\$
	UNIT PRICE (written)				
5	<b>French Drain</b>	LF	\$	1250	\$
	UNIT PRICE (written)				
6	<b>Removal and Replacement of Unsuitable Trench Material</b>	CY	\$	3060	\$
	UNIT PRICE (written)				
7	<b>Gravel Road</b>	CY	\$	210	\$
	UNIT PRICE (written)				
8	<b>2.5" Caliper Tree Installation</b>	EA	\$	5	\$
	UNIT PRICE (written)				
9	<b>Bituminous Concrete Pavement - Patching</b>	TON	\$	1120	\$
	UNIT PRICE (written)				

10	<b>Bituminous Concrete Pavement – Overlay</b>	TON	\$	1510	\$
	UNIT PRICE (written)				
11.1	<b>¾" Corporation Stops</b>	EA	\$	34	\$
	UNIT PRICE (written)				
11.2	<b>1" Corporation Stops</b>	EA	\$	2	\$
	UNIT PRICE (written)				
11.3	<b>1.5" Corporation Stops</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
11.4	<b>2" Corporation Stops</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
12.1	<b>¾" Curb Stop</b>	EA	\$	35	\$
	UNIT PRICE (written)				
12.2	<b>1" Curb Stop</b>	EA	\$	2	\$
	UNIT PRICE (written)				
12.3	<b>1.5" Curb Stop</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
12.4	<b>2" Curb Stops</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
13.1	<b>3" Gate Valve</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
13.2	<b>4" Gate Valve</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				



13.3	<b>6" Gate Valve</b>	EA	\$	2	\$
	UNIT PRICE (written)				
13.4	<b>8" Gate Valve</b>	EA	\$	13	\$
	UNIT PRICE (written)				
14	<b>Ductile Iron MJ Fittings</b>	LB	\$	445	\$
	UNIT PRICE (written)				
15.1	<b>4" Ductile Iron Pipe</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
15.2	<b>6" Ductile Iron Pipe</b>	LF	\$	30	\$
	UNIT PRICE (written)				
15.3	<b>8" Ductile Iron Pipe</b>	LF	\$	5120	\$
	UNIT PRICE (written)				
15.4	<b>1" HDPE Tubing Pipe</b>	LF	\$	3075	\$
	UNIT PRICE (written)				
15.5	<b>1.5" HDPE Tubing Pipe</b>	LF	\$	580	\$
	UNIT PRICE (written)				
15.6	<b>2" HDPE Tubing Pipe</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
15.7	<b>3" HDPE Tubing Pipe</b>	LF	\$	1960	\$
	UNIT PRICE (written)				
15.8	<b>3/4" Copper Tube</b>	LF	\$	835	\$
	UNIT PRICE (written)				

15.9	<b>1" Copper Tube</b>	LF	\$	55	\$
	UNIT PRICE (written)				
15.10	<b>1.5" Copper Tube</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
15.11	<b>2" Copper Tube</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.1	<b>4" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.2	<b>6" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.3	<b>10" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.4	<b>18" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
16.5	<b>24" HDPE Sleeve</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
17	<b>Trenchless Water Main</b>	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
18	<b>Pressure Reducing Valve Vault – Site Preparation</b>	LS	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
19	<b>Cast-in-Place Concrete Thrust Block</b>	EA	\$	10	\$
	UNIT PRICE (written)				

20	<b>Buried Rigid Insulation Board</b>	SF	\$	1300	\$
	UNIT PRICE (written)				
21	<b>Connection to Existing Mains</b>	EA	\$	6	\$
	UNIT PRICE (written)				
22	<b>Connection to Existing Gate Valves</b>	LS	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
23.1	<b>Building Service</b>	EA	\$	30	\$
	UNIT PRICE (written)				
23.2	<b>Slab on Grade Building Service</b>	EA	\$	1	\$
	UNIT PRICE (written)				
23.3	<b>Mobile Home Building Service</b>	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
23.4	<b>Meter Installation</b>	EA	\$	1	\$
	UNIT PRICE (written)				
23.5	<b>Booster Pump Installation</b>	EA	\$	1	\$
	UNIT PRICE (written)				
24	<b>Fire Hydrant Assembly</b>	EA	\$	9	\$
	UNIT PRICE (written)				
25	<b>Flush Hydrant Assembly</b>	EA	\$	2	\$
	UNIT PRICE (written)				
26.1	<b>Lockable Well Caps</b>	EA	\$	2	\$
	UNIT PRICE (written)				

26.2	<b>Water Sampling Stations</b>	EA	\$	2	\$
	UNIT PRICE (written)				
27.1	<b>Closure of Abandoned Wells: Drilled</b>	LF	\$	5000	\$
	UNIT PRICE (written)				
27.2	<b>Closure of Abandoned Wells: Dug</b>	EA	\$	12	\$
	UNIT PRICE (written)				
28	<b>Utility Crossings</b>	EA	\$	10	\$
	UNIT PRICE (written)				
29	<b>Sewer Crossing – Water Below</b>	EA	\$	12	\$
	UNIT PRICE (written)				
30.1	<b>Culvert Installation – 18" CPEP Pipe</b>	LF	\$	40	\$
	UNIT PRICE (written)				
30.2	<b>Culvert Installation – 24" CPEP Pipe</b>	LF	\$	40	\$
	UNIT PRICE (written)				
30.3	<b>Culvert Installation – 36" CPEP Pipe</b>	LF	\$	40	\$
	UNIT PRICE (written)				
30.4	<b>Culvert Installation – 48" CPEP Pipe</b>	LF	\$	90	\$
	UNIT PRICE (written)				
31	<b>Riprap Stone Installation</b>	TON	\$	50	\$
	UNIT PRICE (written)				
32	<b>Leakage Clamps</b>	EA	\$	30	\$
	UNIT PRICE (written)				

33	Heat Tape installation	EA	\$	5	\$
	UNIT PRICE (written)				
34	Large Diameter Tree Removal (18 inches or larger)	EA	\$	5	\$
	UNIT PRICE (written)				
35	Yard Hydrant Installation	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
36	Bollard Installation	EA	\$	4	\$
	UNIT PRICE (written)				
37	Fluoroelastomer Gaskets	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written)				
38	Meter Pit Installation	EA	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
39	Concrete Curb	LF	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				
40	Off-Site Activity Area Spoils Management	LS	\$ N/A	N/A	\$ N/A
	UNIT PRICE (written) N/A				

**TOTAL CONTRACT PRICE \$ \_\_\_\_\_**

**TOTAL CONTRACT PRICE (written) \_\_\_\_\_**

**BASIS FOR BID COMPARISON – TOTAL CONTRACT PRICE**



**BID BOND**

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned, \_\_\_\_\_ as Principal,  
and \_\_\_\_\_ as Surety, are hereby held and firmly bound unto  
\_\_\_\_\_ as OWNER in the penal sum of \_\_\_\_\_

for the payment of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and assigns.

Signed, this \_\_\_ day of \_\_\_\_\_, 20\_\_\_. The Condition of the above obligation is such that whereas the Principal has submitted to **Town of Bennington, Vermont** certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the

**Town of Bennington Water System Remedial Expansion, Contract #7**

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID, then this obligation shall be void, otherwise the same shall remain in force and effect, it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

The Surety, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.

IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

_____ (L.S.)	_____
Principal	Surety

By: \_\_\_\_\_

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

**NOTICE OF AWARD**

TO: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PROJECT Description:

OWNER's P.O. Number: \_\_\_\_\_  
Owners Project Name: \_\_\_\_\_

**Town of Bennington Water System Remedial Expansion, Contract #7 – This project consists of the extension of water main line along Willow Road, Marion Lane, Autumn Acres Road, and Carpenter Lane in the Town of Bennington, Vermont. Specifically, the work will include trenching, removal of the existing asphalt and subbase, installation of water main, thrust blocks, hydrants, curb stops, service lines, and associated site work in accordance with the contract plans and specifications.**

The OWNER has considered the BID submitted by you for the above described WORK in response to its ADVERTISEMENT FOR BIDS dated **10 May 2019** and Information for Bidders.

You are hereby notified that your BID has been accepted for items in the amount of \$ \_\_\_\_\_

You are required by the Information for Bidders to execute the Agreement and furnish the required certificates of insurance and IRS W9 form within (10) calendar days from the date of this NOTICE to you.

You are required to return an acknowledged copy of this NOTICE OF AWARD to the OWNER.

Dated this \_\_\_\_\_

\_\_\_\_\_  
**Town of Bennington**  
OWNER

\_\_\_\_\_  
(Print or Type Name)

Title: \_\_\_\_\_

\_\_\_\_\_  
Signature

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE OF AWARD is hereby acknowledged

Dated this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_

\_\_\_\_\_  
CONTRACTOR

\_\_\_\_\_  
(Print or Type Name)

Title: \_\_\_\_\_

\_\_\_\_\_  
Signature

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## AGREEMENT

THIS AGREEMENT, made this \_\_\_\_ day of \_\_\_\_\_, 2019, by and

Between the **Town of Bennington**, hereinafter called "OWNER" and \_\_\_\_\_ doing business as (an individual, a partnership or a corporation) hereinafter called "CONTRACTOR".

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned:

1. The CONTRACTOR will commence and complete the construction of **Town of Bennington Water System Remedial Expansion, Contract #7** (Project Name & OWNER's Project Number).
2. The CONTRACTOR will furnish all the material, supplies, tools, equipment, labor and other services necessary for the construction and completion of the PROJECT described herein.
3. The CONTRACTOR will commence the WORK required by the CONTRACT DOCUMENTS on the date of issuance of the NOTICE TO PROCEED and will complete the same **no later than 90 days after the issuance of the NOTICE TO PROCEED** unless the period for completion is extended otherwise by the CONTRACT DOCUMENTS.
4. The CONTRACTOR agrees to perform all the WORK described in the CONTRACT DOCUMENTS and comply with the terms therein for the sum of \$\_\_\_\_\_ or as shown in the BID schedule.
5. The term "CONTRACT DOCUMENTS" means and includes the following:
  - Advertisement for BIDS
  - Information for BIDDERS
  - BID
  - BID Bond
  - Notice of Award
  - Agreement
  - Payment BOND
  - Performance BOND
  - Notice to Proceed
  - Change Order Format
  - Partial Release and Waiver of Lien
  - Consent of Surety to Reduce Retainage at Substantial Completion
  - Certificate of Substantial Completion
  - Consent of Surety to Release Final Payment
  - Certificate of Final Completion and Acceptance of Work
  - General Conditions
  - Supplemental General Conditions
  - List of Permits
  - DRAWINGS prepared by **MSK Engineering and Design, Inc.** numbered **G007, C126 through C135, C501 through C509, and C601 through C603**, and dated **May 14<sup>th</sup>, 2019**
  - SPECIFICATIONS prepared or issued **MSK Engineering and Design, Inc.** and Dated **May 2019**

- 6. OWNER will pay to the CONTRACTOR in the manner and at such times as set forth in the General Conditions such amounts as required by the CONTRACT DOCUMENTS.
- 7. This Agreement shall be binding upon all parties hereto and their respective heirs, executors, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, this Agreement in 3 copies, each of which shall be deemed an original on the date first above written.

OWNER: **Town of Bennington** \_\_\_\_\_

ATTEST: \_\_\_\_\_  
(Signature)

BY: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

Name: \_\_\_\_\_  
(Print or Type)

(Seal)

Title: \_\_\_\_\_

Title: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

BY: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

(CONTRACTOR Seal if available)

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ Phone #

ATTEST: \_\_\_\_\_  
(Signature)

Name: \_\_\_\_\_  
(Print or Type)

Title: \_\_\_\_\_



**PAYMENT BOND**

KNOW ALL MEN BY THESE PRESENTS THAT:

\_\_\_\_\_  
(Name of CONTRACTOR)

\_\_\_\_\_  
(Address of CONTRACTOR)

a \_\_\_\_\_, hereinafter called Principal,  
(Corporation, Partnership or Individual)

and \_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

**Town of Bennington, Vermont**  
(Name of OWNER)

**205 South Street, Bennington, Vermont 05201**  
(Address of OWNER)

hereinafter called OWNER, in the penal sum of \_\_\_\_\_ Dollars,  
\$(\_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2019, a copy of which is hereto attached and made a part hereof for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #7**

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUBCONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of the WORK provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such WORK and all insurance premiums on said WORK, and for all labor performed in such WORK whether by SUBCONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2019.

ATTEST:

\_\_\_\_\_  
(Principal Secretary)

(Seal)

\_\_\_\_\_  
Witness as to Principal

\_\_\_\_\_  
Address

ATTEST:

\_\_\_\_\_  
Witness as to Surety

\_\_\_\_\_  
Address

\_\_\_\_\_  
Principal's Printed Name

By: \_\_\_\_\_(s)

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_  
Surety

By: \_\_\_\_\_  
Attorney-in-Fact

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570) as amended and be authorized to transact business in the State where the PROJECT is located.

**PERFORMANCE BOND**

KNOW ALL MEN BY THESE PRESENTS THAT:

\_\_\_\_\_  
(Name of CONTRACTOR)

\_\_\_\_\_  
(Address of CONTRACTOR)

a \_\_\_\_\_, hereinafter called Principal, and  
(Corporation, Partnership or Individual)

\_\_\_\_\_  
(Name of Surety)

\_\_\_\_\_  
(Address of Surety)

hereinafter called Surety, are held and firmly bound unto

**Town of Bennington, Vermont**  
(Name of OWNER)

**205 South Street, Bennington, Vermont 05201**  
(Address of OWNER)

hereinafter called OWNER, in the penal sum of \_\_\_\_\_ Dollars, \$(\_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain contract with the OWNER, dated the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, a copy of which is hereto attached and made a part hereof for the construction of:

**Town of Bennington Water System Remedial Expansion, Contract #7**

NOW, THEREFORE, if the principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay and expense which the OWNER may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the WORK to be performed hereunder or the SPECIFICATIONS accompanying the same shall in any wise affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2019.

ATTEST:

\_\_\_\_\_  
Principal's Printed Name  
\_\_\_\_\_  
(Principal Secretary)

(Seal)

\_\_\_\_\_  
Witness as to Principal  
\_\_\_\_\_  
Address

\_\_\_\_\_  
By: \_\_\_\_\_(s)  
Address: \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

ATTEST:

\_\_\_\_\_  
Witness as to Surety  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
Address

\_\_\_\_\_  
Surety  
By: \_\_\_\_\_  
Attorney-in-Fact  
Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

IMPORTANT: Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570) as amended and be authorized to transact business in the State where the PROJECT is located.

**NOTICE TO PROCEED**

To: \_\_\_\_\_  
(CONTRACTOR)

Date of Issuance: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Project: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

You are hereby notified to commence all WORK on this date in accordance with the Agreement dated \_\_\_\_\_, 2019. The date of completion of all WORK is **August 1, 2020**.

\_\_\_\_\_  
Town of Bennington, Vermont  
(OWNER)

By: \_\_\_\_\_  
(Printed or Typed Name)

By: \_\_\_\_\_  
(Signature)

Title: \_\_\_\_\_

**ACCEPTANCE OF NOTICE**

Receipt of the above NOTICE TO PROCEED

is hereby acknowledged by \_\_\_\_\_,  
(Name of CONTRACTOR)

this the \_\_\_\_ day of \_\_\_\_\_, 20\_\_

By: \_\_\_\_\_  
(Printed or Typed Name)

By: \_\_\_\_\_  
(Signature)

Title: \_\_\_\_\_



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**INSTRUCTIONS FOR CONTRACTORS OR SUBCONTRACTORS**  
**RELEASE AND WAIVER OF LIEN FORM**

1. At the preconstruction meeting, the OWNER will receive from the CONTRACTOR a list of all major items (s)he intends to subcontract.
2. Prior to the first requisition for payment, the OWNER will inform the CONTRACTOR as to which of these SUBCONTRACTORS or vendors may be required to complete a Release of Lien Form. Note that 40 CFR §33.302 requires CONTRACTOR to pay their SUBCONTRACTORS for satisfactory performance within 30 days of payment to CONTRACTOR by OWNER.
3. The CONTRACTOR shall include in the payment package a Release of Lien Form for the overall CONTRACT and those of any SUBCONTRACTORS or vendors so identified by the OWNER.
4. For all interim payments prior to 90% completion of the CONTRACT, the CONTRACTOR may delete, "...the undersigned does hereby waive, release and relinquish any and all claims, demands and rights of lien for all work, labor, materials, machinery or other goods, equipment or services done, performed or furnished..." from the first statement.
5. Final payment requires complete wording in the first statement and a fully executed form.

**GENERAL CONTRACTOR'S OR SUBCONTRACTOR'S**  
**RELEASE AND WAIVER OF LIEN**

For and in consideration of the receipt of \$ \_\_\_\_\_, in payment for labor and/or materials furnished, the undersigned does hereby waive, release and relinquish any and all claims, demands and rights of lien for all work, labor, materials, machinery or other goods, equipment or services done, performed or furnished for the construction located at the site hereinafter described, to wit:

**Town of Bennington Water System Remedial Expansion, Contract #7**  
 (Project Name and OWNER)

\_\_\_\_\_

\_\_\_\_\_, Vermont as of \_\_\_\_\_  
 (Date)

The undersigned further warrants and represents that any and all valid labor and/or materials and equipment bills, now due and payable on the property herein above described in behalf of the undersigned, have been paid in full to date of this waiver, or will be paid from these funds.

\$ \_\_\_\_\_  
 Total Paid to Date This Contract

\$ \_\_\_\_\_  
 Current Payment Due

\$ \_\_\_\_\_  
 Total Billed to Date This Contract

\_\_\_\_\_  
 CONTRACTOR/SUB-CONTRACTOR

\_\_\_\_\_  
 Witness Signature

By: \_\_\_\_\_

\_\_\_\_\_  
 Witness Printed Name

Title: \_\_\_\_\_

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**CHANGE ORDER # \_\_\_\_\_**

Owner's Project Number RF/VT/STAG # _____	Date: _____
Contract #: _____	Agreement Date: _____
Contract Title: _____	ORIGINAL PRICE: \$ _____
Owner: _____	Notice to Proceed Date: _____
Contractor: _____	Calendar Days: _____
Engineer: _____	Original Completion Date: _____

**The following changes are hereby made to the CONTRACT DOCUMENTS:**

**DESCRIPTION:**

**JUSTIFICATION:**

PRICE: This C.O.<sup>(1)</sup> will (not change/increase/decrease) the Contract Price By: \$ \_\_\_\_\_  
Current Contract Price per most recent C.O.: \$ \_\_\_\_\_  
The new Contract Price including this C.O. is: \$ \_\_\_\_\_

TIME: Current Contract Calendar Days as per most recent C.O.: Calendar Days \_\_\_\_\_  
This C.O. will (not change/increase/decrease) the Contract Calendar Days by: Calendar Days \_\_\_\_\_  
The new Contract Calendar Days including this C.O. is: Calendar Days \_\_\_\_\_  
The new Contract Completion Date is, therefore: \_\_\_\_\_

**NOTE: The CONTRACTOR must provide a Revised Project Schedule to reflect increases or decreases in Contract Time as authorized by this C.O.**

REQUESTED BY: \_\_\_\_\_  
Print or Type Name Signature

**SIGNATURES/APPROVALS:**

Stipulated price and time adjustment includes all costs and time associated with the above described change. CONTRACTOR waives all rights for additional compensation or time extension for said change. CONTRACTOR and OWNER agree that the price(s) and time adjustment(s) stated above are equitable and acceptable to both parties.

Recommended By (Engineer): \_\_\_\_\_  
Print or Type Name Signature

Accepted By (CONTRACTOR): \_\_\_\_\_  
Print or Type Name Signature

Ordered By (OWNER): \_\_\_\_\_  
Print or Type Name Signature

(1) C.O. means Change Order

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**Supply (with an original signature) the Consent of Surety to Reduction in Retainage, using AIA Document G707A or a similarly formed document, along with the original of the CONTRACTOR's request for the reduction of retainage. A sample of the CONTRACTOR's request form for reduction in retainage on page 3 of 3. This document will be submitted to the Engineer for review and recommended approval to the OWNER prior to the payment requisition which shows a reduction in retainage at successful completion of at least 50% of the work (not including materials stored on site) or at Substantial Completion for further reduction below 5% (but not less than the remaining value of work to be completed). Retainage will not be reduced until the Surety provides a document in the form (as noted above) to the CONTRACTOR for submission by the CONTRACTOR to the OWNER which indicates that the Surety agrees with the reduction.**

Note: if additional copies are needed, a copy of the Consent of Surety form and a copy of the CONTRACTOR's Request for Reduction of Retainage are acceptable.

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**CONTRACTOR'S REQUEST FOR REDUCTION OF RETAINAGE**

TO:

OWNER:

Date

FROM: CONTRACTOR Name, Address

OWNER'S PROJECT #:

**CONTRACT NO.:**

**CONTRACT WORK:**

Adjusted Total Contract (Including Change Orders)		\$	_____
Work Completed (Not Including Material Stored)	%	\$	_____
Current Retainage	%	\$	_____
Requested Retainage	%		_____

Consent of Surety Letter attached

CONTRACTOR Signature: \_\_\_\_\_

CONTRACTOR's Typed Name: \_\_\_\_\_

Title

Date

**PROFESSIONAL ENGINEER'S RECOMMENDATION FOR REDUCTION OF RETENTION**

Pursuant to the conditions of the Construction Documents and my evaluation of the satisfactory performance by the CONTRACTOR in the execution of the work, I do  do not  recommend release of retention and future percentage as set forth below.

Typed Name	Recommend Release/Sign	Do Not Recommend Release/Sign	Date
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____
_____	<input type="checkbox"/>	<input type="checkbox"/>	_____

**OWNER'S AUTHORIZATION FOR REDUCTION OF RETENTION**

Authorization is hereby granted for retention on the subject contract to be maintained at \_\_\_\_\_ % until further notice.

OWNER's Authorized Representative Signature: \_\_\_\_\_

Date: \_\_\_\_\_

OWNER's Authorized Representative Typed Name: \_\_\_\_\_

**E-MAIL THIS FORM:** This form may be submitted to OWNER/ENGINEER electronically for review by e-mail addressed to the OWNER'S Authorized Representative at: \_\_\_\_\_ and the ENGINEER at: \_\_\_\_\_

**NOTE:** Form may be submitted electronically only for review purposes. To meet contractual requirements, form submitted to OWNER must have original signatures and be accompanied by Consent of Surety. Reduction of Retainage does not release the CONTRACTOR or Surety of the requirements to satisfactorily complete the Contract. General Conditions Section 19.1 applies to this request.

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**CERTIFICATE OF SUBSTANTIAL COMPLETION**

OWNER \_\_\_\_\_

OWNER's Project Number \_\_\_\_\_

Project Name \_\_\_\_\_

=====

CONTRACTOR \_\_\_\_\_ Contract Date \_\_\_\_\_

Contract for \_\_\_\_\_

=====

Project or Specified Part Shall Include \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

=====

**DEFINITION OF SUBSTANTIAL COMPLETION**

**The date of Substantial Completion of a Project or specified part of a Project is the date when the construction is sufficiently completed, in accordance with the Contract Documents, so that the Project or specified part of the Project can be utilized for the purpose for which it was intended.**

=====

To: \_\_\_\_\_

(OWNER)

And To: \_\_\_\_\_

(CONTRACTOR)

The WORK performed under this CONTRACT has been inspected by authorized representatives of the OWNER, CONTRACTOR, and ENGINEER, and the Project or Specified Part of the Project is hereby declared to be Substantially Completed as of the following date:

Date of Substantial Completion: \_\_\_\_\_

If a tentative list of items to be completed or corrected is appended hereto, the failure to include an item on it does not alter the responsibility of the CONTRACTOR to complete all the WORK in accordance with the CONTRACT DOCUMENTS and CONTRACT TIME.



Recommended By:

ENGINEER	(Signature)	Date
	(Print or Type Name)	

Approved By:

OWNER	(Signature)	Date
	(Print or Type Name)	

=====

The CONTRACTOR accepts the above Certificate of Substantial Completion.

CONTRACTOR	(Signature)	Date
	(Print or Type Name)	

=====

EXCEPTIONS AS TO GUARANTEES AND WARRANTIES:

=====

ATTACHMENTS:

1) Punch List Dated: \_\_\_\_\_

2) List the CONTRACTOR's Warranty Start and End Dates along with any Extended Warranty information here. Some items (such as roofing) may have a manufacturer's warranty longer than one year. Any documentation to support warranty requests (bill of sale, etc.) need to be supplied as part of the OWNER's O&M Manual under the warranty section.

**Consent of Surety Company to release the Final Payment, using AIA Document G707 or a similarly formed letter (sample next page), with the original of the Consent attached to the original of the application, and a copy of the consent attached to each copy of the application.**

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**CONSENT OF SURETY COMPANY TO FINAL PAYMENT**

Project: \_\_\_\_\_  
Location: \_\_\_\_\_  
Contract #: \_\_\_\_\_

TO: \_\_\_\_\_, **OWNER**  
\_\_\_\_\_  
\_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

Contract Date: \_\_\_\_\_

---

In accordance with the provisions of the Contract between the OWNER and the CONTRACTOR as indicated above, the

\_\_\_\_\_ (here insert name and address of Surety Company and delete this reminder) \_\_\_\_\_, Surety Company,  
\_\_\_\_\_  
\_\_\_\_\_

on bond of

\_\_\_\_\_ (here insert name and address of CONTRACTOR and delete this reminder) \_\_\_\_\_, CONTRACTOR,  
\_\_\_\_\_  
\_\_\_\_\_

hereby approves of the final payment to the CONTRACTOR, and agrees that final payment to the CONTRACTOR shall not relieve the Surety Company of any of its obligations to the OWNER as set forth in the said Surety Company's bond. The Surety agrees to be bound to the warranty period under the same conditions as the CONTRACTOR. The warranty is defined as commencing with Substantial Completion (or with each Substantial Completion if there is more than one) of the Project, or any portion thereof, and continuing for one (1) calendar year from the date of Final Acceptance of the entire project unless otherwise modified in writing as part of the Substantial Completion or Final Acceptance.

IN WITNESS WHEREOF, \_\_\_\_\_  
the Surety Company has hereunto set its hand this \_\_\_\_\_ Day of \_\_\_\_\_, \_\_\_\_\_

\_\_\_\_\_  
Surety Company

\_\_\_\_\_  
Signature of Authorized Representative

Attest:  
(Seal)

\_\_\_\_\_  
Title

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**CERTIFICATE OF FINAL COMPLETION AND ACCEPTANCE OF WORK**

CONTRACT NO. \_\_\_\_\_ AGREEMENT DATE: \_\_\_\_\_

CONTRACT DESCRIPTION: \_\_\_\_\_

Notice to Proceed Date of Issuance: \_\_\_\_\_

Completion Date per Agreement and Change Orders # \_\_\_\_\_ thru # \_\_\_\_\_; \_\_\_\_\_  
(Date)

**FINAL CERTIFICATION OF CONTRACTOR**

I hereby certify that the WORK as identified in the Final Estimate of Payment for construction CONTRACT WORK dated \_\_\_\_\_, represents full compensation for the actual value of WORK completed. All WORK completed conforms to the terms of the AGREEMENT and authorized changes.

\_\_\_\_\_  
CONTRACTOR Signature  
\_\_\_\_\_  
Date Print or Type Name  
\_\_\_\_\_  
Title

**FINAL CERTIFICATION OF ENGINEER**

I have reviewed the CONTRACTOR'S Final Payment Request dated \_\_\_\_\_ and hereby certify that to the best of my knowledge, the cost of the WORK identified on the Final Estimate represents full compensation for the actual value of WORK completed and that the WORK has been completed in accordance with the terms of the AGREEMENT and authorized changes. This certification is provided in accord with the terms of GENERAL CONDITION number 20.1.

\_\_\_\_\_  
ENGINEER Signature  
\_\_\_\_\_  
Date Print or Type Name

**FINAL ACCEPTANCE OF OWNER**

I, as representative of the OWNER, accept the above Final Certifications and authorize Final Payment in the amount of \$ \_\_\_\_\_ and direct the CONTRACTOR'S attention to the GENERAL CONDITION #5. The guaranty for all WORK completed subsequent to the date of SUBSTANTIAL COMPLETION, expires one (1) year from the date of this Final Acceptance.

\_\_\_\_\_  
OWNER Signature  
\_\_\_\_\_  
Date Print or Type Name  
\_\_\_\_\_  
Title



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## **GENERAL CONDITIONS**

- |  |   |
|--|---|
| 1. Definitions                               | 16. Correction of Work                      |
| 2. Additional Instructions & Detail Drawings | 17. Subsurface Conditions                   |
| 3. Schedules, Reports and Records            | 18. Suspension of Work, Termination & Delay |
| 4. Drawings and Specifications               | 19. Payments to CONTRACTOR                  |
| 5. Shop Drawings                             | 20. Acceptance of Final Payment as Release  |
| 6. Materials, Services and Facilities        | 21. Insurance                               |
| 7. Inspection and Testing                    | 22. Contract Security                       |
| 8. Substitutions                             | 23. Assignments                             |
| 9. Patents and Copyrights                    | 24. Indemnification                         |
| 10. Surveys, Permits, Regulations            | 25. Separate Contracts                      |
| 11. Protection of Work, Property, Persons    | 26. Subcontracting                          |
| 12. Supervision by CONTRACTOR                | 27. Engineer's Authority                    |
| 13. Changes in the Work                      | 28. Land and Rights-of-Way                  |
| 14. Contract Change Orders                   | 29. Guaranty                                |
| 15. Time for Completion & Liquidated Damages | 30. Taxes                                   |

### 1. DEFINITIONS

1.1 Wherever used in the CONTRACT DOCUMENTS, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural thereof:

1.2 ADDENDA - Written or graphic instruments issued prior to the execution of the Agreement which modify or interpret the CONTRACT DOCUMENTS, DRAWINGS and SPECIFICATIONS, by additions, deletions, clarifications or corrections.

1.3 BID - The offer or proposal of the BIDDER submitted on the prescribed form setting forth the prices for the WORK to be performed.

1.4 BIDDER - Any person, firm or corporation submitting a BID for the WORK.

1.5 BONDS - Bid, Performance, and Payment Bonds and other instruments of security, furnished by the CONTRACTOR and his surety in accordance with the CONTRACT DOCUMENTS.

1.6 CHANGE ORDER - A written order to the CONTRACTOR authorizing an addition, deletion or revision in the WORK within the general scope of the CONTRACT DOCUMENTS, or authorizing an adjustment in the CONTRACT PRICE or CONTRACT TIME.

1.7 CONTRACT DOCUMENTS - The contract, including Advertisement For Bids, Information For Bidders, BID, Bid Bond, Agreement, Payment Bond, Performance Bond, NOTICE OF AWARD, NOTICE TO PROCEED, CHANGE ORDER, DRAWINGS, SPECIFICATIONS, and ADDENDA.

1.8 CONTRACT PRICE - The total monies payable to the CONTRACTOR under the terms and conditions of the CONTRACT DOCUMENTS.

1.9 CONTRACT TIME - The number of calendar days stated in the CONTRACT DOCUMENTS for the completion of the WORK.

1.10 CONTRACTOR - The person, firm or corporation with whom the OWNER has executed the Agreement.

1.11 DRAWINGS - The part of the CONTRACT DOCUMENTS which show the characteristics and scope of the WORK to be performed and which have been prepared or approved by the ENGINEER.

1.12 ENGINEER - The person, firm or corporation named as such in the CONTRACT DOCUMENTS.

1.13 FIELD ORDER - A written order effecting a change in the WORK not involving an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, issued by the ENGINEER to the CONTRACTOR during construction.

1.14 NOTICE OF AWARD - The written notice of the acceptance of the BID from the OWNER to the successful BIDDER.

1.15 NOTICE TO PROCEED - Written communication issued by the OWNER to the CONTRACTOR authorizing him to proceed with the WORK and establishing the date of commencement of the WORK.

1.16 OWNER - A public or quasi-public body or authority, corporation, association, partnership, or individual for whom the WORK is to be performed.

1.17 PROJECT - The undertaking to be performed as provided in the CONTRACT DOCUMENTS.

1.18 RESIDENT PROJECT REPRESENTATIVE - The authorized representative of the OWNER who is assigned to the PROJECT site or any part thereof.

1.19 SHOP DRAWINGS - All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the CONTRACTOR, a SUBCONTRACTOR, manufacturer, SUPPLIER or distributor, which illustrate how specific portions of the WORK shall be fabricated or installed.

1.20 SPECIFICATIONS - A part of the CONTRACT DOCUMENTS consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship.

1.21 SUBCONTRACTOR - An individual, firm or corporation having a direct contract with the CONTRACTOR or with any other SUBCONTRACTOR for the performance of a part of the WORK at the site.

1.22 SUBSTANTIAL COMPLETION - That date as certified by the ENGINEER when the construction of the PROJECT or a specified part thereof is sufficiently completed, in accordance with the CONTRACT DOCUMENTS, so that the PROJECT or specified part can be utilized for the purposes for which it is intended.

1.23 SUPPLEMENTAL GENERAL CONDITIONS - Modifications to General Conditions required by a Federal agency for participation in the PROJECT and approved by the agency in writing prior to inclusion in the CONTRACT DOCUMENTS, or such requirements that may be imposed by applicable state laws.

1.24 SUPPLIER - Any person or organization who supplies materials or equipment for the WORK, including that fabricated to a special design, but who does not perform labor at the site.

1.25 WORK - All labor necessary to produce the construction required by the CONTRACT DOCUMENTS, and all materials and equipment incorporated or to be incorporated in the PROJECT.

1.26 WRITTEN NOTICE - Any notice to any party of the Agreement relative to any part of this Agreement in writing and considered delivered and the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the WORK.

## 2. ADDITIONAL INSTRUCTION AND DETAIL DRAWINGS

2.1 The CONTRACTOR may be furnished additional instructions and detail drawings, by the ENGINEER, as necessary to carry out the WORK required by the CONTRACT DOCUMENTS.

2.2 The additional drawings and instruction thus supplied will become a part of the CONTRACT DOCUMENTS. The CONTRACTOR shall carry out the WORK in accordance with the additional detail drawings and instructions.

## 3. SCHEDULES, REPORTS AND RECORDS

3.1 The CONTRACTOR shall submit to the OWNER such schedule of quantities and costs, progress schedules, payrolls, reports, estimates, records and other data where applicable as are required by the CONTRACT DOCUMENTS for the WORK to be performed.

3.2 Prior to the first partial payment estimate the CONTRACTOR shall submit construction progress schedules showing the order in which he proposes to carry on the WORK, including dates at which he will start the various parts of the WORK, estimated date of completion of each part and, as applicable:

3.2.1 The dates at which special detail drawings will be required; and

3.2.2 Respective dates for submission of SHOP DRAWINGS, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The CONTRACTOR shall also submit a schedule of payments that he anticipates he will earn during the course of the WORK.

#### 4. DRAWINGS AND SPECIFICATIONS

4.1 The intent of the DRAWINGS and SPECIFICATIONS is that the CONTRACTOR shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the WORK in accordance with the CONTRACT DOCUMENTS and all incidental work necessary to complete the PROJECT in an acceptable manner, ready for use, occupancy or operation by the OWNER.

4.2 Any conflicts between the Contract Documents and Specifications, between Contract Drawings, and/or site conditions shall be brought to the attention of the ENGINEER in writing immediately upon discovery. The ENGINEER shall respond per General Conditions 27.4. If the CONTRACTOR requests additional compensation refer to General Condition 13. WORK done by the CONTRACTOR after his discovery of such discrepancies, inconsistencies or ambiguities shall be done at the CONTRACTOR's risk.

#### 5. SHOP DRAWINGS

5.1 The CONTRACTOR shall provide SHOP DRAWINGS as may be necessary for the prosecution of the WORK as required by the CONTRACT DOCUMENTS. The ENGINEER shall promptly review all SHOP DRAWINGS. The ENGINEER'S approval of any SHOP DRAWING shall not release the CONTRACTOR from responsibility for deviations from the CONTRACT DOCUMENTS. The approval of any SHOP DRAWING, which substantially deviates from the requirement of the CONTRACT DOCUMENTS, shall be evidenced by a CHANGE ORDER.

5.2 When submitted for the ENGINEER'S review, SHOP DRAWINGS shall bear the CONTRACTOR'S certification that he has reviewed, checked and approved the SHOP DRAWINGS and that they are in conformance with the requirements of the CONTRACT DOCUMENTS.

5.3 Portions of the WORK requiring a SHOP DRAWING or sample submission shall not begin until the SHOP DRAWING or submission has been approved by the ENGINEER. A copy of each approved SHOP DRAWING and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the ENGINEER.

#### 6. MATERIALS, SERVICES AND FACILITIES

6.1 It is understood that, except as otherwise specifically stated in the CONTRACT DOCUMENTS, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the WORK within the specified time.

6.2 Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the WORK. Stored materials and equipment to be incorporated in the WORK shall be located so as to facilitate prompt inspection.

6.3 Manufactured articles, materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the manufacturer.

6.4 Materials, supplies and equipment shall be in accordance with samples submitted by the CONTRACTOR and approved by the ENGINEER.

6.5 Materials, supplies or equipment to be incorporated into the WORK shall not be purchased by the CONTRACTOR or the SUBCONTRACTOR subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

## 7. INSPECTION AND TESTING

7.1 All materials and equipment used in the construction of the PROJECT shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the CONTRACT DOCUMENTS.

7.2 The OWNER shall provide all inspection and testing services not required by the CONTRACT DOCUMENTS.

7.3 The CONTRACTOR shall provide at his expense the testing and inspection services required by the CONTRACT DOCUMENTS.

7.4 If the CONTRACT DOCUMENTS, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any WORK to specifically be inspected, tested, or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the ENGINEER timely notice of readiness. The CONTRACTOR will then furnish the ENGINEER the required certificates of inspection, testing or approval.

7.5 Inspections, tests or approvals by the engineer or others shall not relieve the CONTRACTOR from his obligations to perform the WORK in accordance with the requirements of the CONTRACT DOCUMENTS.

7.6 The ENGINEER and his representatives will at all times have access to the WORK. In addition, authorized representatives and agents of any participating Federal or State agency shall be permitted to inspect all work, materials, payrolls, records of personnel, invoices of materials, and other relevant data and records. The CONTRACTOR will provide proper facilities for such access and observation of the WORK and also for any inspection, or testing thereof.

7.7 If any WORK is covered contrary to the written instructions of the ENGINEER it must, if requested by the ENGINEER, be uncovered for his observation and replaced at the CONTRACTOR'S expense.

7.8 If the ENGINEER considers it necessary or advisable that covered WORK be inspected or tested by others, the CONTRACTOR, at the ENGINEER'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the ENGINEER may require, that portion of the WORK in questions, furnishing all necessary labor, materials, tools, and equipment. If it is found that such WORK is defective, the CONTRACTOR will bear all the expenses of such uncovering, exposure, observation, inspection and testing and of satisfactory reconstruction. If, however, such WORK is not found to be defective, the CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction and an appropriate CHANGE ORDER shall be issued.

## 8. SUBSTITUTIONS

8.1 Whenever a material, article or piece of equipment is identified on the DRAWINGS or SPECIFICATIONS by reference to brand name or catalog number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and that other products of equal capacities, quality and function shall be considered. The CONTRACTOR may recommend the substitution of a material, article, or piece of equipment of equal substance and function for those referred to in the CONTRACT DOCUMENTS by reference to brand name or catalog number, and if, in the opinion of the ENGINEER, such material, article, or piece of equipment is of equal substance and function to that specified, the ENGINEER may approve its substitution and

use by the CONTRACTOR. Any cost differential shall be deductible from the CONTRACT PRICE and the CONTRACT DOCUMENTS shall be appropriately modified by CHANGE ORDER. The CONTRACTOR warrants that if substitutes are approved, no major changes in the function or general design of the PROJECT will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the CONTRACTOR without a change in the CONTRACT PRICE or CONTRACT TIME.

## 9. PATENTS and COPYRIGHTS

9.1 The CONTRACTOR shall pay all applicable royalties and license fees. He shall defend all suits or claims for infringement of any patent rights and copyrights, and save the OWNER harmless from loss on account thereof, except that the OWNER shall be responsible for any such loss when a particular process, design, or the product of a particular manufacturer or manufacturers is specified, however, if the CONTRACTOR has reason to believe that the design, process or product specified is an infringement of a patent or copyright, he shall be responsible for such loss unless he promptly gives such information to the ENGINEER.

## 10. SURVEYS, PERMITS, REGULATIONS

10.1 The OWNER shall furnish all boundary surveys and establish all base lines for locating the principal component parts of the WORK together with a suitable number of bench marks adjacent to the WORK as shown in the CONTRACT DOCUMENTS. From the information provided by the OWNER, unless otherwise specified in the CONTRACT DOCUMENTS, the CONTRACTOR shall develop and make all detail surveys needed for construction such as slope stakes, batter boards, stakes for pile locations and other working points, lines, elevations and cut sheets.

10.2 The CONTRACTOR shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction, he shall be charged with the resulting expense and shall be responsible for any mistake that may be caused by their unnecessary loss or disturbance.

10.3 Permits and licenses of a temporary nature necessary for the prosecution of the WORK shall be secured and paid for by the CONTRACTOR unless otherwise stated in the SUPPLEMENTAL GENERAL CONDITIONS. Permits, licenses and easements for permanent structures or permanent changes in existing facilities shall be secured and paid for by the OWNER, unless otherwise specified. The CONTRACTOR shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the WORK as drawn and specified. If the CONTRACTOR observes that the CONTRACT DOCUMENTS are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in Section 13, CHANGES IN THE WORK.

## 11. PROTECTION OF WORK, PROPERTY AND PERSONS

11.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the WORK. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the WORK and other persons who may be affected thereby, all the WORK and all materials or equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the WORK, all necessary safeguards for safety and protection. He will notify OWNERS of adjacent utilities when prosecution of the WORK may affect them. The CONTRACTOR will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the CONTRACTOR, any SUBCONTRACTOR or anyone directly or indirectly employed by any of them or anyone for whose acts any of them be liable, except damage or loss attributable to the fault of the CONTRACT DOCUMENTS or to the acts or omissions of the OWNER or the ENGINEER or anyone employed by either of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the CONTRACTOR.



11.3 In emergencies affecting the safety of persons or the WORK or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the ENGINEER or OWNER, shall act to prevent threatened damage, injury or loss. He will give the ENGINEER prompt WRITTEN NOTICE of any significant changes in the WORK or deviations from the CONTRACT DOCUMENTS caused thereby, and a CHANGE ORDER shall thereupon be issued covering the changes and deviations involved.

## 12. SUPERVISION BY CONTRACTOR

12.1 The CONTRACTOR will supervise and direct the WORK. He will be solely responsible for the means, methods, techniques, sequences and procedures of construction. The CONTRACTOR will employ and maintain on the WORK a qualified supervisor or superintendent who shall have been designated in writing by the CONTRACTOR as the CONTRACTOR'S representative at the site. The supervisor shall have full authority to act on behalf of the CONTRACTOR and all communications given to the supervisor shall be as binding as if given to the CONTRACTOR. **The supervisor shall be present on the site during any construction activity to perform adequate supervision and coordination of the WORK.**

## 13. CHANGES IN THE WORK

13.1 The OWNER may at any time, as the need arises, order changes within the scope of the WORK without invalidating the Agreement. If such changes increase or decrease the amount due under the CONTRACT DOCUMENTS, or in the time required for performance of the WORK, an equitable adjustment shall be authorized by CHANGE ORDER.

13.2 The ENGINEER may also at any time, by issuing a FIELD ORDER, make changes in the details of the WORK. The CONTRACTOR shall proceed with the performance of any changes in the WORK so ordered by the ENGINEER unless the CONTRACTOR believes that such FIELD ORDER entitles him to a change in CONTRACT PRICE or TIME, or both, in which event he shall give the ENGINEER WRITTEN NOTICE thereof within seven (7) days after the receipt of the ordered change. Thereafter the CONTRACTOR shall document the basis for the change in CONTRACT PRICE or TIME within thirty (30) days. The CONTRACTOR shall not execute such changes pending the receipt of an executed CHANGE ORDER or further instruction from the OWNER.

## 14. CONTRACT CHANGE ORDERS

14.1 All changes affecting the Project's construction cost, length of time, or modifications of the terms or conditions of the CONTRACT, must be authorized by means of a written CONTRACT Change Order which is mutually agreed to by the OWNER and CONTRACTOR. The CONTRACT Change Order will include extra WORK, WORK for which quantities have been altered from those shown in the BID Schedule, as well as decreases or increases in the quantities of installed units which are different from those shown in the BID Schedule because of final measurements. All changes must be recorded on a CONTRACT Change Order (which form is part of these CONTRACT Documents) and fully executed before they can be included in a partial payment estimate. Changes for WORK, quantities, and/or conditions will include any respective time adjustment, if justified. Time adjustments will require an updated Project Schedule with the Change Order.

14.2 When the Contract sum is, in whole or in part, based on unit prices, the OWNER reserves the right to increase or decrease a unit price quantity as may be deemed reasonable or necessary in order to complete the WORK contemplated by this CONTRACTOR. Overhead and Profit (OHP) will not be included in a unit quantity Change Order.

14.3 The CONTRACT PRICE may be changed only by a CHANGE ORDER. The value of any WORK covered by a CHANGE ORDER or of any claim for increase or decrease in the CONTRACT PRICE shall be determined by one or more of the following methods in the order of precedence listed below:

- (a) Unit prices previously approved, or
- (b) An agreed lump sum, or
- (c) Time and Materials (T&M) for labor, direct overhead, materials, supplies, equipment, and other services necessary to complete the WORK.

14.4 In addition, there may be added an amount to be agreed upon to cover the cost of general overhead and profit (OHP). The markup for OHP by the General CONTRACTOR may not exceed 15% if the General CONTRACTOR executes the WORK. If a SUBCONTRACTOR executes the WORK, the Sub-CONTRACTOR's OHP may not exceed 15% of the cost of the actual WORK, and the General CONTRACTOR may not apply for more than a 5% markup for OHP on the actual WORK (not including the SUBCONTRACTOR's OHP).

## 15. TIME FOR COMPLETION AND LIQUIDATED DAMAGES

15.1 The date of beginning and the time for completion of the WORK are essential conditions of the CONTRACT DOCUMENTS and the WORK embraced shall be commenced on a date specified in the NOTICE TO PROCEED.

15.2 The CONTRACTOR will proceed with the WORK at such rate of progress to insure final completion within the CONTRACT TIME. IT is expressly understood and agreed, by and between the CONTRACTOR and the OWNER, that the CONTRACT TIME for the completion of the WORK described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the WORK.

15.3 If the CONTRACTOR shall fail to complete the WORK within the CONTRACT TIME, or extension of time granted by the OWNER, then the CONTRACTOR will pay to the OWNER the amount for liquidated damages as specified in the BID for each calendar day that the CONTRACTOR shall be in default after the time stipulated in the CONTRACT DOCUMENTS.

15.4 The CONTRACTOR shall not be charged with liquidated damages or any excess cost when the delay in completion of the WORK is due to the following, and the CONTRACTOR has promptly given WRITTEN NOTICE of such delay to the OWNER or ENGINEER.

15.4.1 To any preference, priority or allocation order duly issued by the OWNER;

15.4.2 To unforeseeable causes beyond the control and without the fault or negligence of the CONTRACTOR, including but not restricted to, acts of God, or of the public enemy, acts of the OWNER, acts of another CONTRACTOR in the performance of a CONTRACT with the OWNER, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and abnormal and unforeseeable weather; and

15.4.3 To any delays of SUBCONTRACTORS occasioned by any of the causes specified in paragraphs 15.4.1. and 15.4.2 of this article.

## 16. CORRECTION OF WORK

16.1 The CONTRACTOR shall promptly remove from the premises all WORK rejected by the ENGINEER for failure to comply with the CONTRACT DOCUMENTS, whether incorporated in the construction or not, and the CONTRACTOR shall promptly replace and re-execute the WORK in accordance with the CONTRACT DOCUMENTS and without expense to the OWNER and shall bear the expense of making good all WORK of other CONTRACTORS destroyed or damaged by such removal or replacement.

16.2 All removal and replacement WORK shall be done at the CONTRACTOR's expense. If the CONTRACTOR does not take action to remove such rejected work within ten (10) days after receipt of WRITTEN NOTICE, the OWNER may remove such WORK and store the materials at the expense of the CONTRACTOR.

## 17. SUBSURFACE CONDITIONS

17.1 The CONTRACTOR shall promptly, and before such conditions are disturbed, except in the event of an emergency, notify the OWNER by WRITTEN NOTICE of:

17.1.1 Subsurface or latent physical conditions at the site differing materially from those indicated in the CONTRACT DOCUMENTS; or

17.1.2 Unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in the CONTRACT DOCUMENTS.

17.2 The OWNER shall promptly investigate the conditions, and if he finds that such conditions do so materially differ and cause an increase or decrease in the cost of, or in the time required for, performance of the WORK, an equitable adjustment shall be made and the CONTRACT DOCUMENTS shall be modified by a CHANGE ORDER. Any claim of the CONTRACTOR for adjustment hereunder shall not be allowed unless he has given the required WRITTEN NOTICE; provided that the OWNER may, if he determines the facts so justify, consider and adjust any such claims. If the OWNER finds that payment is not warranted he shall issue a written justification to the CONTRACTOR. The CONTRACTOR will have 14 calendars days to respond with additional written information or justification after which the claim for additional compensation may no longer be asserted.

## 18. SUSPENSION OF WORK, TERMINATION AND DELAY

18.1 The OWNER may suspend the WORK or any portion thereof for a period of not more than ninety days or such further time as agreed upon by the CONTRACTOR, by WRITTEN NOTICE to the CONTRACTOR and the ENGINEER which notice shall fix the date on which WORK shall be resumed. The CONTRACTOR will resume the WORK on the date so fixed. The CONTRACTOR will be allowed an increase in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, directly attributable to any suspension.

18.2 If the CONTRACTOR is adjudged as bankrupt or insolvent, or if he makes a general assignment for the benefit of his creditors, or if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, or if he files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or applicable laws, or if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, or if he repeatedly fails to make prompt payments to SUBCONTRACTORS or for labor, materials or equipment or if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction of the WORK or if he disregards the authority of the ENGINEER, or if he otherwise violates any provision of the CONTRACT DOCUMENTS, then the OWNER may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety a minimum of ten (10) days from delivery of a WRITTEN NOTICE, terminate the services of the CONTRACTOR and take possession of the PROJECT and of all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR, and finish the WORK by whatever method he may deem expedient. In such case the CONTRACTOR shall not be entitled to receive any further payment until the WORK is finished. If the unpaid balance of the CONTRACT price exceeds the direct and indirect costs of completing the PROJECT, including compensation for additional professional services, such excess SHALL BE PAID TO THE CONTRACTOR. If such costs exceed such unpaid balance, the CONTRACTOR will pay the difference to the OWNER. Such costs incurred by the OWNER will be determined by the ENGINEER and incorporated in a CHANGE ORDER.

18.3 Where the CONTRACTOR's services have been so terminated by the OWNER, said termination shall not affect any right of the OWNER against the CONTRACTOR then existing or which may thereafter accrue. Any retention or payment of monies by the OWNER due the CONTRACTOR will not release the CONTRACTOR from compliance with the CONTRACT DOCUMENTS.

18.4 After ten (10) days from delivery of a WRITTEN NOTICE to the CONTRACTOR and the ENGINEER, the OWNER may, without cause and without prejudice to any other right or remedy, elect to abandon the PROJECT and terminate the CONTRACT. In such case, the CONTRACTOR shall be paid for all WORK executed and any expense sustained plus reasonable profit.

18.5 If, through no act or fault of the CONTRACTOR, the WORK is suspended for a period of more than ninety (90) days by the OWNER or under an order of court or other public authority, or the ENGINEER fails to act on any request for payment within thirty (30) days after it is submitted, or the OWNER fails to pay the CONTRACTOR substantially the sum approved by the ENGINEER or awarded by arbitrators within thirty (30) days of this approval and presentation, then the CONTRACTOR may, after ten (10) days from delivery of a WRITTEN NOTICE to the OWNER and the ENGINEER, terminate the CONTRACT and recover from the OWNER payment for all WORK executed and all expenses sustained. In addition and in lieu of terminating the CONTRACT, if the ENGINEER has failed to act on a request for payment or if the OWNER has failed to make any payment as aforesaid, the CONTRACTOR may upon ten (10) days WRITTEN NOTICE to the OWNER and the ENGINEER

stop the WORK until he has been paid all amounts then due, in which event and upon resumption of the WORK, CHANGE ORDERS shall be issued for adjusting the CONTRACT PRICE or extending the CONTRACT TIME or both to compensate for the costs and delays attributable to the stoppage of the WORK.

18.6 If the performance of all or any portion of the WORK is suspended, delayed, or interrupted as a result of a failure of the OWNER or ENGINEER to act within the time specified in the CONTRACT DOCUMENTS, or if no time is specified, within a reasonable time, an adjustment in the CONTRACT PRICE or an extension of the CONTRACT TIME, or both, shall be made by CHANGE ORDER to compensate the CONTRACTOR for the costs and delays necessarily caused by the failure of the OWNER or ENGINEER.

## 19. PAYMENTS TO CONTRACTOR

19.1 At least ten (10) days before each progress payment falls due (but not more often than once a month), the CONTRACTOR will submit to the ENGINEER a partial payment estimate filled out and signed by the CONTRACTOR covering the WORK performed during the period covered by the partial payment estimate and supported by such data as the ENGINEER may reasonably require. If payment is requested on the basis of materials and equipment not incorporated in the WORK but delivered and suitably stored at or near the site, the partial payment estimate shall also be accompanied by such supporting data, satisfactory to the OWNER, as will establish the OWNER's title to the material and equipment and protect his interest therein, including applicable insurance. The ENGINEER will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the partial payment estimate. The ENGINEER will, within five (5) days after receipt of each corrected partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the OWNER, or return the partial payment estimate to the CONTRACTOR indicating in writing his reasons for refusing to approve payment. The OWNER will, within fifteen (15) working days of the presentation to him of an approved partial payment estimate, pay the CONTRACTOR a progress payment on the basis of the approved partial payment estimate. The OWNER shall retain ten (10) percent of the amount of each payment until final completion and acceptance of all WORK covered by the CONTRACT DOCUMENTS. However, after fifty (50) percent of the WORK has been completed, if the OWNER finds that satisfactory quality and progress is being made, the OWNER shall reduce Retainage to five (5) percent on the current and remaining estimates. When the WORK is substantially complete (operational or beneficial occupancy), the retained amount shall be further reduced below five (5) percent to only that amount related to the punchlist and necessary to assure completion. On completion and acceptance of a part of the WORK on which the price is stated separately in the CONTRACT DOCUMENTS, payment may be made in full, including retained percentages, less authorized deductions.

19.2 Prior to SUBSTANTIAL COMPLETION, the OWNER, with the approval of the ENGINEER and with the concurrence of the CONTRACTOR, may use any completed or substantially completed portions of the WORK. Such use shall not constitute an acceptance of such portions of the WORK.

19.3 The OWNER shall have the right to enter the premises for the purpose of doing WORK not covered by the CONTRACT DOCUMENTS. This provision shall not be construed as relieving the CONTRACTOR of the sole responsibility for the care and protection of the WORK, or the restoration of any damaged WORK except such as may be caused by agents or employees of the OWNER.

19.4 Upon completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

19.5 The CONTRACTOR will indemnify and save the OWNER or the OWNER'S agents harmless from all claims growing out of the lawful demands of SUBCONTRACTORS, laborers, workmen, mechanics, material-men, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the WORK. The CONTRACTOR shall, at the OWNER'S request, furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the CONTRACTOR fails to do so the OWNER may, after having notified the CONTRACTOR, either pay unpaid bills

or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the CONTRACTOR shall be resumed, in accordance with the terms of the CONTRACT DOCUMENTS, but in no event shall the provisions of this sentence be construed to impose any obligations upon the OWNER to either the CONTRACTOR, his Surety or any third party. In paying any unpaid bills of the CONTRACTOR, any payment so made by the OWNER shall be considered as a payment made under the CONTRACT DOCUMENTS by the OWNER to the CONTRACTOR and the OWNER shall not be liable to the CONTRACTOR for any such payments made in good faith.

19.6 If the OWNER fails to make payment thirty (30) days after approval by the ENGINEER, in addition to other remedies available to the CONTRACTOR, there may be added to each such payment interest at the maximum legal rate commencing on the first day after said payment is due and continuing until the payment is received by the CONTRACTOR.

## 20. ACCEPTANCE OF FINAL PAYMENT AS RELEASE

20.1 Upon final completion and acceptance of the WORK, the ENGINEER shall issue a certificate attached to the final payment request that the WORK has been accepted by him under the conditions of the CONTRACT DOCUMENTS. The entire balance found to be due the CONTRACTOR, including the retained percentages, but except such sums as may be lawfully retained by the OWNER, shall be paid to the CONTRACTOR within thirty (30) days of completion and acceptance of the WORK.

20.2 The acceptance by the CONTRACTOR of final payment shall be and shall operate as a release to the OWNER of all claims and all liability to the CONTRACTOR other than claims in stated amounts as may be specifically excepted by the CONTRACTOR for all things done or furnished in connection with this WORK and for every act and neglect of the OWNER and others relating to or arising out of this WORK. Any payment, however, final or otherwise, shall not release the CONTRACTOR or his sureties from any obligations under the CONTRACT DOCUMENTS or the Performance BOND or Payment BONDS.

## 21. INSURANCE

21.1 The CONTRACTOR shall purchase and maintain such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S execution of the WORK, whether such execution be by himself or by any SUBCONTRACTOR or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable.

21.1.1 Claims under workmen's compensation, disability benefit and other similar employee benefit acts

21.1.2 Claims for damages because of bodily injury, occupational sickness or disease, or death or his employees

21.1.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees

21.1.4 Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the CONTRACTOR, or (2) by any other person; and

21.1.5 Claims for damages because of injury to or destruction of tangible property, including loss of use resulting there from.

21.2 Certificates of Insurance acceptable to the OWNER shall be filed with the OWNER prior to commencement of the WORK. These Certificates shall contain a provision that coverage afforded under the policies will not be canceled unless at least fifteen (15) days prior WRITTEN NOTICE has been given to the OWNER.

21.3 INSURANCE REQUIREMENTS. Insurance obtained by the CONTRACTOR to cover the below-listed requirements shall be procured from an insurance company registered and licensed to do business in the State of

Vermont. All insurance coverage for property damage shall provide coverage for "Replacement" cost. Before the CONTRACT is signed and becomes effective, the CONTRACTOR shall file with the OWNER a certificate of insurance, in duplicate, executed by an insurance company or its licensed agent(s), on a form satisfactory to the OWNER, stating that with respect to the CONTRACT awarded, the CONTRACTOR carries insurance in accordance with the following requirements. Renewal certificates for keeping the required insurance in force for the duration of the CONTRACT shall also be filed as specified above. No warranty is made that the coverages and limits listed herein are adequate to cover and protect the interests of the CONTRACTOR and any SUBCONTRACTOR for the CONTRACTOR'S and any SUBCONTRACTOR'S operations. These are solely minimums that have been established to protect the interests of the OWNER. The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, insurances as hereinafter specified:

21.3.1 Workers Compensation Insurance. With respect to all operations performed the CONTRACTOR shall carry Workers Compensation Insurance in accordance with the laws of the State of Vermont, 21 V.S.A. Chapter 9. The CONTRACTOR shall also ensure that all SUBCONTRACTORS carry Workers Compensation Insurance in accordance with 21 V.S.A. Chapter 9 for all work performed by them.

CONTRACTOR shall carry Employer's Liability Insurance with Limits of Coverage not less than:

- \$1,000,000 Each employee for disease
- \$1,000,000 Each accident
- \$1,000,000 Disease policy limit

CONTRACTOR shall amend their policy to include a waiver of subrogation endorsement in favor of Saint-Gobain Parties, which shall be defined as: Saint-Gobain, its parent(s), and each of their respective direct or indirect, partners, members, affiliates, principals, directors, officers, stockholders, and employees ("Saint-Gobain Parties"). CONTRACTOR shall also include a waiver of subrogation endorsement in favor of the State of Vermont, Officers and Employees ("State of Vermont").

21.3.2 Commercial General Liability Insurance. With respect to all operations performed by the CONTRACTOR and SUBCONTRACTORS, the CONTRACTOR shall carry Commercial General Liability Insurance on an occurrence form providing all major divisions of coverage, including but not limited to:

- Premises - Operations
- Independent CONTRACTOR's Protective
- Products and Completed Operations
- Personal Injury Liability

Policy shall include endorsements ISO form CG20 10, CG 20 37 and CG 20 01, including Saint-Gobain Parties and State of Vermont as additional insureds. Saint-Gobain Parties and State of Vermont are to be afforded the same types of coverage as listed in declarations page of the named insured's policy. Policy shall include a waiver of subrogation endorsement in favor of Saint-Gobain Parties and State of Vermont. Policy shall include a cross-liability and severability of interest clauses. Policy shall contain an endorsement noting that CONTRACTOR'S insurance is primary and any other insurance carried by Saint-Gobain or the State of Vermont shall be noncontributory.

CONTRACTOR's General Liability and Property Damage Insurance will be obtained by the CONTRACTOR protecting him from all claims for personal injury, including death, and all claims for destruction of or damage to property arising out of or in connection with any operations under the CONTRACT DOCUMENTS, whether such operations be by himself or by any SUBCONTRACTOR under him, or anyone directly or indirectly employed by the CONTRACTOR or by a SUBCONTRACTOR under him. Contractual Liability applying to the CONTRACTOR'S obligations, unless this requirement is waived in writing by the OWNER, shall have Limits of Coverage not less than:

- \$1,000,000 Each Occurrence
- \$2,000,000 General Aggregate applying, in total to this project only
- \$1,000,000 Products/Completed Operations Aggregate
- \$ 250,000 Fire Damage Legal Liability



21.3.3 Automobile Liability Insurance. The CONTRACTOR shall carry Automobile Liability Insurance covering all motor vehicles, including owned, hired, borrowed, and non-owned vehicles, used in connection with the project. Limits of Coverage shall be not less than:

Bodily Injury: \$1,000,000 Each Person, \$1,000,000 Each Occurrence  
Property Damage: \$ 1,000,000 Each Occurrence, OR  
Combined Single Limit: \$2,000,000 Each Occurrence

Policy shall include an endorsement, including Saint-Gobain Parties and the State of Vermont as additional insureds. Saint-Gobain Parties and the State of Vermont are to be afforded the same types of coverage as listed in declarations page of the named insured's policy. Policy shall include a waiver of subrogation endorsement in favor of Saint-Gobain Parties and the State of Vermont. Policy shall include a cross-liability and severability of interest clauses. Policy shall contain an endorsement noting that CONTRACTOR'S insurance is primary and any other insurance carried by Saint-Gobain or the State of Vermont shall be noncontributory.

21.3.4 Excess/Umbrella Liability. CONTRACTOR shall carry Excess/Umbrella Liability insurance with a limit of not less than \$5,000,000 per occurrence, at least with respect to policies required in 21.3.1, 23.3.2 and 23.3.3; coverage shall provide excess limits and be at least follow form or broader.

21.3.5 Pollution Liability. CONTRACTOR shall carry a Pollution Liability policy for losses caused by pollution conditions that arise from the operations of the CONTRACTOR described under the terms of the CONTRACT. CONTRACTOR shall carry Pollution Liability Insurance with Limits of Coverage not less than:

\$3,000,000 Per pollution condition  
\$3,000,000 Aggregate written on occurrence form with no sunset clause

The pollution conditions include:

- (a) Bodily injury, sickness, and disease to include mental anguish or shock, sustained by any one person; including death
- (b) Property damage including physical damage to or destruction of tangible property including the resulting loss of use thereof, clean-up costs, and the loss of use of tangible property that has not been physically destroyed.
- (c) Defense including costs, charges, and expenses incurred in the investigation, adjustment of defense claims for such compensatory damages;
- (d) Transportation coverage including the loading and unloading of products, goods, and/or waste

21.3.6 General Insurance Conditions. The insurance specified under paragraphs 21.3.1, 21.3.2, 21.3.3, 21.3.4 and 21.3.5 above shall be maintained in force until acceptance of the project by the OWNER. Under paragraph 21.3.2 above, Products and Completed Operations Coverage shall be maintained in force for at least one year from the date of acceptance of the project. The contractual liability insurance requirements detailed in the Contract Documents are to indemnify, defend, and hold harmless the OWNER, and additional insureds, as applicable, and their officers, agents, representatives, and employees, with respect to any and all claims, causes of actions, losses, expenses, or damages that arise out of, relate to, or are in any manner connected with the CONTRACTOR'S work or the supervision of the CONTRACTOR'S work on this project. Each policy, except the Workers Compensation Policy, shall name the OWNER, St. Gobain Parties, and the State of Vermont, as additional insured for actions, losses, expenses or damages that arise out of, relate to, or are in any manner connected with the CONTRACTOR'S work or the supervision of the CONTRACTOR'S work on this project. Umbrella Excess Liability Policies may be used in conjunction with primary policies to comply with any of the limit requirements specified above. "Claims-made" coverage forms are expressly prohibited. The CONTRACTOR shall investigate and the CONTRACTOR and/or insurance company shall either adjust or defend all claims against the insured for damages covered, even if groundless. Each policy furnished shall contain a rider or non-cancellation clause reading in substance as follows:

Anything herein to the contrary notwithstanding, no cancellation, termination, or alteration of this policy by the company or the assured shall become effective unless and until notice of cancellation, termination, or alteration has been given by registered mail to the OWNER, at least 30 calendar days

before the effective cancellation, termination, or alteration date unless all work required to be performed under the terms of the CONTRACT is satisfactorily completed as evidenced by the formal, final acceptance of the project by the OWNER. There shall be no directed compensation allowed the CONTRACTOR on account of any premium or other charge necessary to take out and keep in effect such insurance or bond; the cost thereof shall be considered included in the general cost of the work.

21.3.7 The CONTRACTOR shall acquire and maintain, if applicable, Fire and Extended Coverage insurance upon the PROJECT to the full insurable value thereof for the benefit of the OWNER, the CONTRACTOR, and SUBCONTRACTORS as their interest may appear. This provision shall in no way release the CONTRACTOR or CONTRACTOR'S surety from obligations under the CONTRACT DOCUMENTS to fully complete the PROJECT.

21.4 The CONTRACTOR shall procure and maintain, at his own expense, during the CONTRACT TIME, in accordance with the provision of the laws of the state in which the WORK is performed, Workmen's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the PROJECT and in case any WORK is sublet, the CONTRACTOR shall require such SUBCONTRACTOR similarly to provide Workmen's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection afforded by the CONTRACTOR. In case any class of employees engaged in hazardous WORK under this CONTRACT at the site of the PROJECT is not protected under Workmen's Compensation statute, the CONTRACTOR shall provide, and shall cause, each SUBCONTRACTOR to provide, adequate and suitable insurance for the protection of his employees not otherwise protected.

21.5 The CONTRACTOR shall secure "All Risk" type Builder's Risk Insurance for WORK to be performed. Unless specifically authorized by the OWNER, the amount of such insurance shall not be less than the CONTRACT PRICE totaled in the BID. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, water and smoke during the CONTRACT TIME, and until the WORK is accepted by the OWNER. The policy shall name as the insured the CONTRACTOR, the ENGINEER, and the OWNER.

## 22. CONTRACT SECURITY

22.1 The CONTRACTOR shall within ten (10) days after the receipt of the NOTICE OF AWARD furnish the OWNER with a Performance BOND and a Payment BOND in penal sums equal to the amount of the CONTRACT PRICE, conditioned upon the performance by the CONTRACTOR of all undertakings, covenants, terms, conditions and agreements of the CONTRACT DOCUMENTS, and upon the prompt payment by the CONTRACTOR to all persons supplying labor and materials in the prosecution of the WORK provided by the CONTRACT DOCUMENTS. The form of such BONDS are subject to review and approval by St. Gobain. Such BONDS shall be executed by the CONTRACTOR and a corporate bonding company licensed to transact such business in the state in which the WORK is to be performed and named on the current list of "Surety Companies Acceptable on Federal Bonds" as published in the Treasury Department Circular Number 570. The expense of these BONDS shall be borne by the CONTRACTOR. If at any time a surety on any such BOND is declared bankrupt or loses its right to do business in the state in which the WORK is to be performed or is removed from the list of Surety Companies accepted on Federal BONDS, CONTRACTOR shall within ten (10) days after notice from the OWNER to do so, substitute an acceptable BOND (or BONDS) in such form and sum and signed by such other surety or sureties as may be satisfactory to the OWNER. The premiums on such BOND shall be paid by the CONTRACTOR. No further payments shall be deemed due nor shall be made until the new surety or sureties shall have furnished an acceptable BOND to the OWNER.

## 23. ASSIGNMENTS

23.1 Neither the CONTRACTOR nor the OWNER shall sell, transfer, assign or otherwise dispose of the CONTRACT or any portion thereof, or of his right, title or interest therein, or his obligations hereunder, without written consent of the other party.

## 24. INDEMNIFICATION

24.1 The CONTRACTOR will indemnify and hold harmless the OWNER and the ENGINEER and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out

of or resulting from the performance of the WORK, provided that any such claims, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the CONTRACTOR, and SUBCONTRACTOR, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

24.2 In any and all claims against the OWNER or the ENGINEER, or any of their agents or employees, by any employee of the CONTRACTOR, any SUBCONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the CONTRACTOR or any SUBCONTRACTOR under workmen's compensation acts, disability benefit acts or other employee benefits acts.

24.3 The obligation of the CONTRACTOR under this paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, DRAWINGS, opinions, reports, surveys, CHANGE ORDERS, design or SPECIFICATIONS.

## 25. SEPARATE CONTRACTS

25.1 The OWNER reserves the right to let other CONTRACTS in connection with this PROJECT. The CONTRACTOR shall afford other CONTRACTORS reasonable opportunity for the introduction and storage of their materials and the execution of their WORK, and shall properly connect and coordinate his WORK with theirs. If the proper execution or results of any part of the CONTRACTOR'S WORK depends upon the WORK of any other CONTRACTOR, the CONTRACTOR shall inspect and promptly report to the ENGINEER any defects in such WORK that render it unsuitable for such proper execution and results.

25.2 The OWNER may perform additional WORK related to the PROJECT by himself or he may let other CONTRACTS containing provisions similar to these. The CONTRACTOR will afford the other CONTRACTORS, who are parties to such CONTRACTS (for the OWNER, if he is performing the additional WORK himself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of WORK, and shall properly connect and coordinate his WORK with theirs.

25.3 If the performance of additional WORK by other CONTRACTORS or the OWNER is not noted in the CONTRACT DOCUMENTS prior to the execution of the CONTRACT, WRITTEN NOTICE thereof shall be given to the CONTRACTOR prior to starting any such additional WORK. If the CONTRACTOR believes that the performance of such additional WORK by the OWNER or others involves him in additional expense or entitles him to an extension of the CONTRACT TIME, he may make a claim therefore as provided in Section 14 and 15.

## 26. SUBCONTRACTING

26.1 The CONTRACTOR may utilize the services of specialty SUBCONTRACTORS on those parts of the WORK which under normal contracting practices, are performed by specialty SUBCONTRACTORS.

26.2 If the CONTRACTOR was not required to obtain OWNER approval of the SUBCONTRACTOR(s) prior to Award of the CONTRACT, the CONTRACTOR shall provide written notification to the OWNER within 10 working days of the CONTRACTOR's intent to employ SUBCONTRACTOR(s) on site. The notification shall list the name, address and telephone number of the SUBCONTRACTOR(s); estimated dollar amounts of SUBCONTRACT(s); estimated start and completion dates of the SUBCONTRACTOR(s) work.

26.3 The CONTRACTOR shall be fully responsible to the OWNER for the acts and omissions of his SUBCONTRACTORS and of persons whether directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

26.4 The CONTRACTOR shall cause appropriate provisions to be inserted in all subcontracts relative to the WORK to bind SUBCONTRACTORS to the CONTRACTOR by the terms of the CONTRACT DOCUMENTS insofar as applicable to the WORK of SUBCONTRACTORS and to give the CONTRACTOR the same power as regards terminating any subcontract that the OWNER may exercise over the CONTRACTOR under any provision of the CONTRACT DOCUMENTS.

26.5 Nothing contained in this CONTRACT shall create any contractual relation between any SUBCONTRACTOR and the OWNER.

## 27. ENGINEER'S AUTHORITY

27.1 The ENGINEER shall act as the OWNER'S representative during the construction period. He shall decide questions which may arise as to quality and acceptability of materials furnished and WORK performed. He shall interpret the intent of the CONTRACT DOCUMENTS in a fair and unbiased manner. The ENGINEER will make visits to the site and determine if the WORK is proceeding in accordance with the CONTRACT DOCUMENTS.

27.2 The CONTRACTOR will be held strictly to the intent of the CONTRACT DOCUMENTS in regard to the quality of materials, workmanship and execution of the WORK. Inspections may be made at the factory or fabrication plant of the source of material supply.

27.3 The ENGINEER will not be responsible for the construction means, controls, techniques, sequences, procedures, or construction safety.

27.4 The ENGINEER shall promptly make decisions in writing relative to interpretation of the CONTRACT DOCUMENTS.

## 28. LAND AND RIGHTS-OF-WAY

28.1 Prior to issuance of NOTICE TO PROCEED, the OWNER shall obtain all land and rights-of-way necessary for carrying out and for the completion of the WORK to be performed pursuant to the CONTRACT DOCUMENTS, unless otherwise mutually agreed.

28.2 The OWNER shall provide to the CONTRACTOR information which delineates and describes the lands owned and rights-of-way acquired.

28.3 The CONTRACTOR shall provide at his own expense and without liability to the OWNER any additional land and access thereto that the CONTRACTOR may desire for temporary construction facilities, or for storage of materials.

## 29. GUARANTY

29.1 The CONTRACTOR shall guarantee all materials and equipment furnished and WORK performed for a period of one, (1) year from the date of SUBSTANTIAL COMPLETION or FINAL COMPLETION OF THE PROJECT or specified part, as appropriate. The CONTRACTOR warrants and guarantees for a period of one (1) year from the date of SUBSTANTIAL COMPLETION (or FINAL COMPLETION OF THE PROJECT for items not completed at time of SUBSTANTIAL COMPLETION) or specified part, as appropriate, that the completed project is free from all defects due to faulty materials or workmanship and the CONTRACTOR shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the project resulting from such defects. The OWNER will give notice of observed defects with reasonable promptness. In the event that the CONTRACTOR should fail to make such repairs, adjustments, or other WORK that may be made necessary by such defects, the OWNER may do so and charge the CONTRACTOR the cost thereby incurred. The Performance BOND shall remain in full force and effect through the guarantee period.

## 30. TAXES

30.1 The CONTRACTOR will pay all sales, consumer, use and other similar taxes required by the law of the place where the WORK is performed.

**TOWN OF BENNINGTON**  
**WATER SYSTEM REMEDIAL EXPANSION PROJECT**  
**10 May 2019**

State Permits  
Attachment 1

- State of Vermont Stream Alteration Permit (will be issued in separate Addendum)
- State of Vermont Water Supply Permit (will be issued in separate Addendum)
- State of Vermont Construction General Permit (will be issued in separate Addendum)
- Erosion Prevention and Sediment Control Plan (EPSC) (will be issued in separate Addendum)
- Army Corps of Engineer's Category 2 General Permit (will be issued in separate Addendum)

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**SECTION 012600  
MEASUREMENT AND PAYMENT**

**PART 1 – GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. This section specifies administrative and procedural requirements for Unit and Lump Sum Prices stated in the Bid Schedule.
- B. A "Measurement and Payment Schedule" is included at the end of this Section. Specification Sections referenced in the Schedule contain requirements for materials and methods described under each Price.

**1.03 GENERAL PROVISIONS**

- A. Each unit price or lump sum stated in the Bid Schedule shall constitute full compensation for all materials, labor, tools, equipment and incidentals thereto, to perform the work in accordance with the Contract Documents.
- B. Consider all work required by the Contract Documents and/or normally required during the construction of the work herein specified, and not listed as a separate Item, as included and incidental to all items stated in the Bid Schedule. Such work will not be paid for as a separate Item.

**1.04 ITEMS INVOLVING EARTHWORK**

- A. Items involving earthwork shall include full compensation for the following as required:
  - 1. Excavation of earth, sawcutting and removal of pavement, stripping, grubbing, clearing, tree removal, disposal of surplus, demolition of waste material
  - 2. Supply, placement, and compaction of bedding material, backfill, any other borrow material;
  - 3. Dewatering of surface and groundwater where encountered;
  - 4. Sheeting, bracing, and trench protection;
  - 5. Final cleanup and surface restoration unless specifically described in another Item.

**1.05 ITEMS INVOLVING ROCK REMOVAL**

- A. Items involving rock removal shall include, but are not limited to, the following:
  - 1. The cost of the pre-blast survey (if applicable);
  - 2. Rock removal within the specified pay limits;
  - 3. Transportation and disposal of rock;
  - 4. Refilling with appropriate backfill material.
- B. The Contractor and Engineer shall agree on the method of measurement prior to blasting or removal of material. The Engineer shall be present during rock removal operations and all quantities shall be agreed upon with the Contractor at that time.
- C. The Contractor shall only be reimbursed for removal of rock within the specified pay limits. The Contractor will be responsible for removing and replacing any material blasted beyond the specified pay limits with appropriate backfill material at no additional cost to the Owner.

**1.06 INCREASE, DECREASE OR ELIMINATION OF ITEMS**

- A. The quantity of units identified in the Contract Documents are not guaranteed. No additional compensation for anticipated profits shall be granted nor shall the Contract be deemed

invalid due to an increase, decrease or elimination of an item in the Bid Schedule by the Engineer.

#### **1.07 CONTRACTOR COORDINATION WITH WORK BY OTHERS**

- A. The watermain extension project includes multiple concurrent contracts that may be performed by separate contractors, and that will require contractor coordination. Water Main tie-ins between multiple contracts will occur at the following locations:
  - 1. Contract 5 - Contract 6:
    - a. Houghton Lane
- B. Contractor means & methods will determine which Contractor arrives first. Whichever Contractor arrives first shall provide the gate valves, pipe stub and a temporary cap and thrust block for connection by subsequent Contractor. Subsequent Contractor shall be responsible for all labor and materials required to make connection and for restoration immediately adjacent to the connection. Each Contractor shall be paid for the actual units of work installed. No additional payment will be made for any required coordination.

#### **1.08 EXCESS SPOILS AND UNSUITABLE EXCAVATED MATERIAL**

- A. All excavated native soil that is not re-used within the project limits shall be delivered to a collection site designated by the Engineer and secured by the Contractor with approval from the State of Vermont. The designated site shall be located at the Town of Benningtons former landfill on Houghton Lane, within the specified corrective action area. All costs associated with loading, hauling and discharge of excess spoils and unsuitable excavated material shall be incidental to other items of work.
- B. All costs associated with coordinating spoils loads from Contracts 5-7 shall be incidental to other items of work. Management, security, and restoring collection area shall be the responsibility of the Contract #6 Contractor.
- C. The Contract #6 Contractor shall construct, maintain, and restore the spoils site and all access roads to the designated spoils site to accommodate all construction spoils loads from Contracts 5-7 until the date of Final Completion listed in the Contract Documents. All coordination with other contracts and contractors including, but not limited to, designated dump areas, scheduling, access, and frequency of loads shall be the responsibility of the Contract #6 Contractor.
- D. The Contractor shall conduct operations at the spoils management site so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.
- E. The Contractors responsible for Contracts #5 and #7 shall coordinate with the Contract #6 Contractor all activities including, but not limited to, scheduling, access, and frequency of loads.
- F. The opening and managing of the designated off site activity area for spoils shall be operable and ready to receive excavated materials within 15 work days of the Notice to Proceed. Any claims from other Contracts associated with the delay of an operable spoils site shall be the responsibility of the Contract #6 Contractor.
- G. The Contractor shall conduct operations at the spoils management site so as to prevent unauthorized access from the public. The access gate to the site shall be secure at all times.

- H. The opening and managing of an off site activity area for spoils other than the designated spoils site shall require compliance with Section 015713 of the Contract Documents and will be the responsibility of the individual Contractors.

#### 1.09 MEASUREMENT OF QUANTITIES

- A. All work completed under the Contract will be measured by the Engineer according to U.S. Customary units, as required by the Contract Documents. The measurement and determination of the number of units will be made as specifically described in Part 3 of this Section.
- B. Area: Unless otherwise specified in the Contract, area computations will be made horizontally. Measurements for area computations will be the neat dimension shown on the Plans or authorized in writing by the Engineer.
- C. Volumes: Unless otherwise specified in the Contract, volume computations will be made using arithmetical formulae of in-place quantities after compaction to the specified density and in accordance with the limits shown in the Contract Documents or as authorized in writing by the Engineer.
- D. Length Measurement: All items measured by the linear foot will be measured parallel to the base or foundation upon which the item is placed, unless otherwise indicated in the Contract Documents.
- E. Lump Sum: The term "lump sum", when used as a unit of measurement for an item of payment, means complete payment for the work described in the Item Description.
- F. Each: The term "Each", when used as a unit of measurement for an item of payment, means the complete payment per item for the work described in the Item Description.

#### 1.10 SCOPE OF PAYMENT

- A. In general, the Contractor shall receive and accept the compensation provided in accordance with the General Conditions of the Contract Documents as full payment for:
  - 1. Furnishing all materials, labor, tools, equipment and performing all work contemplated and required under the Contract Documents;
  - 2. All loss or damage arising out of the work from actions of the elements, or from any unforeseen difficulties or obstructions which may arise or be encountered during the prosecution of the work until its acceptance by the Owner;
  - 3. All risks of every description connected with the prosecution of the work;
  - 4. All expenses incurred by or in consequence of the temporary suspension or discontinuance of the work for any infringement of patent, trademark, or copyright, and for the completing the work in an acceptable manner according to the Contract Documents.

### **PART 2 - PRODUCTS (NOT APPLICABLE).**

### **PART 3 - EXECUTION**

#### 3.01 UNIT PRICED ITEM DESCRIPTIONS

- A. Item No. 1 - Mobilization/Demobilization
  - 1. Mobilization and demobilization of all necessary equipment and materials; set up of the necessary storage areas, field offices, sanitary and other facilities required by Federal, State and local law or regulation; obtaining all required permits, insurance and bonds; and any costs associated with initiation of the Contract work.
  - 2. Unit of Measure: Lump Sum (The maximum amount of Mobilization/Demobilization shall not be greater than 6% of the Total Contract Price).
- B. Item No. 2 - Erosion and Sediment Controls

1. Planning, furnishing, installing, maintaining, removing, and disposing of erosion prevention and sediment control measures in accordance with the Contract Documents.
  2. Unit of Measure: Lump Sum.
- C. Item No. 3 – Traffic Control
1. Development and submittal of traffic control plan for approval by agencies having jurisdiction, purchase and installation of traffic control signs, traffic control management in compliance with applicable standards and permits.
  2. Unit of Measure: Lump Sum
- D. Item No. 4 - Trench Excavation of Rock
1. Removal of all solid rock in formation, or boulders measuring 1 cubic yard or more, excavated within 6 inches beneath invert elevation of pipe in trenches, and 24 inches wider than pipe diameter, or 42 inches wide, whichever is greater. This item includes the backfill of all voids where solid rock was removed with suitable material.
  2. Unit of Measure: Cubic Yard
- E. Item No. 5 - French Drain
1. Installation of French Drain as shown in the Contract Plans to daylight and as directed by the Engineer if excessive groundwater is encountered during the installation of water distribution lines.
  2. Unit of Measure: Linear Foot
- F. Item No. 6 - Removal and Replacement of Unsuitable Trench Material
1. Furnishing and installing of replacement trench backfill meeting the requirements of Specification 312323, only where excavated on-site materials are unsuitable for trench backfill and only as directed by the Engineer.
  2. Unit of Measure: Cubic Yard
- G. Item No. 7 - Gravel Road
1. Furnishing and installing gravel road material meeting the requirements of Specification 312323 as shown in the Contract Plans and as directed by the Engineer. General restoration of gravel driveways shall be incidental to waterline installation unless explicitly noted on the plans. Quantities will be based on neat line measurements in place.
  2. Unit of Measure: Cubic Yard
- H. Item No. 8 – 2.5” Caliper Tree Installation
1. Furnishing, installing in a prepared bed and watering of 2.5” caliper deciduous trees in accordance with the details shown in the Contract Documents.
  2. Unit of Measure: Each
- I. Item No. 9 - Bituminous Concrete Pavement - Patching
1. Costs shall include all labor, materials and equipment necessary to repair the asphalt pavement within the removal limits of the watermain installation trenches including, but not limited to, preparation of a mix design and material submittals for Engineer’s review, saw-cutting, removal and disposal of existing pavement, replacement of existing detectable warning panels and posts where removed for construction, preparation of subbase and installation of base course, tack coating, pavement installation and field quality control, protection of the installed pavement until the surface temperature has cooled sufficiently to prevent mechanical injury, and clean-up. Costs shall also include re-establishment of pavement markings disturbed by

construction. All work shall conform to the Contract Documents.

2. Unit of Measure: Ton
- J. Item No. 10 – Bituminous Concrete Pavement – Overlay
1. Costs shall include all labor, materials and equipment necessary to install 2,  $\frac{3}{4}$ "-inch compacted lifts of Type IV asphalt overlay including, but not limited to, cold-planing at terminations, sweeping, tack coating, pavement installation and field quality control, protection of the installed pavement until the surface temperature has cooled sufficiently to prevent mechanical injury, and clean-up. Costs shall also include re-establishment of pavement markings disturbed by construction. All work shall conform to the Contract Documents. Cold planing shall be assumed to be a  $\frac{3}{4}$ " average depth when joining to existing asphalt pavement at a 2-foot length including paved driveways. A rubber-tired roller must be used on the shim coat to knead the pavement in the existing road profile. Costs shall also include re-establishment of pavement markings disturbed by construction. Copies of all load slips must be handed to inspectors at the delivery of each load.
  2. Unit of Measure: Ton
- K. Item No. 11 – Corporation Stops
1. Furnishing and installing corporation stops in accordance with the Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 11.1 –  $\frac{3}{4}$ " Corporation Stops
    - b. Item No. 11.2 – 1" Corporation Stops
    - c. Item No. 11.3 – 1.5" Corporation Stops
    - d. Item No. 11.4 - 2" Corporation Stops
- L. Item No. 12 – Curb Stops
1. Furnishing and installing Curb Stops in accordance with Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 12.1 –  $\frac{3}{4}$ " Curb Stop
    - b. Item No. 12.2 – 1" Curb Stop
    - c. Item No. 12.3 - 1.5" Curb Stop
    - d. Item No. 12.4 - 2" Curb Stops
- M. Item No. 13 – Gate Valves
1. Furnishing and installing Gate Valves including, but not limited to, furnishing and installing anchorages and valve boxes in accordance with the Contract Documents.
  2. Unit of Measure: Each
    - a. Item No. 13.1 – 3" Gate Valve
    - b. Item No. 13.2 – 4" Gate Valve
    - c. Item No. 13.3 – 6" Gate Valve
    - d. Item No. 13.4 – 8" Gate Valve
- N. Item No. 14 – Ductile Iron MJ Fittings
1. Furnishing and installing ductile iron fittings including, but not limited to, mechanical joint thrust restraints, and manufacturer "blue" bolts in accordance with the Contract Documents.

2. Unit of Measure: Pound (lb). Weight of fitting shall be determined as published by the Ductile Iron Pipe Research Association. Mechanical joints, bolts, fasteners and gaskets shall be incidental.
- O. Item No. 15 – Pipe and Tube
1. Earthwork, sawcutting and removing existing pavement, furnishing and installing pipe or tube, pipe bedding, installation of Trace Wire for non-conductive water mains and service lines, cleaning, disinfection, pressure and bacteria testing in accordance with the Contract Documents. Coordination with other contractors for connection to new water mains installed under separate contracts shall be incidental to the unit price bid for the associated water main pipe. Copper tees, reducers and miscellaneous fittings for service line connections shall be incidental. 90% payment upon complete installation of pipe and service corporation and curb stops. 10% payment upon completion of required pressure and bacteria testing. All service lines shall be paid 90% upon complete installation of pipe through foundation and final 10% upon completion of yard restoration.
  2. Unit of Measure: Linear Foot
    - a. Item No. 15.1 - 4" Ductile Iron Pipe
    - b. Item No. 15.2 - 6" Ductile Iron Pipe
    - c. Item No. 15.3 - 8" Ductile Iron Pipe
    - d. Item No. 15.4 – 1" HDPE Tubing Pipe
    - e. Item No. 15.5 – 1.5" HDPE Tubing Pipe
    - f. Item No. 15.6 – 2" HDPE Tubing Pipe
    - g. Item No. 15.7 – 3" HDPE Tubing Pipe
    - h. Item No. 15.8 – 3/4" Copper Tube
    - i. Item No. 15.9 – 1" Copper Tube
    - j. Item No. 15.10 – 1.5" Copper Tube
    - k. Item No. 15.11 – 2" Copper Tube
- P. Item No. 16 – Sleeves
1. Trenchless installation of casing sleeves in accordance with the Contract Documents, including boring pits, carrier pipe, casing spacers, end seals and thrust blocks. If Agency approval is granted for open cut in lieu of trenchless installation, all excavation, bedding, backfill, carrier pipe, casing spacers and end seals shall be incidental.
  2. Unit of Measure: Linear Foot
    - a. Item No. 16.1 – 4" HDPE Sleeve
    - b. Item No. 16.2 – 6" HDPE Sleeve
    - c. Item No. 16.3 – 10" HDPE Sleeve
    - d. Item No. 16.4 – 18" HDPE Sleeve
    - e. Item No. 16.5 – 24" HDPE Sleeve
- Q. Item No. 17 – Trenchless Water Main
1. Trenchless installation of 10" HDPE water main carrier pipe installed within a specified HDPE casing pipe and all associated accessories and appurtenances, casing spacers and end seals, cleaning, disinfecting, pressure and bacteria testing and trenchless installation of casing sleeves in accordance with the Contract Documents. Unit price



shall include all labor, equipment and materials, boring pit construction, protection and clean-up.

2. Unit of Measure: Linear Foot (Horizontal Distance)
- R. Item No. 18 – Pressure Reducing Valve Vault – Site Preparation
1. Work required to prepare the site for installation of Pressure Reducing Valve Vaults (PRV's) including, but not limited to, site preparation, excavation, installation of 8-inch compacted gravel base for PRV vault, connection of exterior lines, coordination with PRV supplier on delivery and construction progress, electrical trenching and energizing of the PRV, incidental site work, installation of 1-1/2" pvc sump drain pipe to daylight, and backfill and restoration. PRV shall be supplied and offloaded by others. This item includes all coordination and associated lead times associated with the PRV and its supplier.
  2. Unit of Measure: Lump Sum
- S. Item No. 19 - Cast-in-Place Concrete Thrust Block
1. Furnishing and Installing cast-in-place concrete thrust blocks in accordance with the Contract Documents.
  2. Unit of Measure: Each
- T. Item No. 20 - Buried Rigid Insulation Board
1. Furnishing and installing minimum 2" thick buried rigid insulation board in accordance with the Contract Documents.
  2. Unit of Measure: Square Foot
- U. Item No. 21 – Connection to Existing Mains
1. All labor, equipment and materials required to make connections to existing water mains including test digs and field verification of existing mains.
  2. Unit of Measure: Lump Sum
- V. Item No. 22 – Connection to Existing Gate Valves
1. All labor, equipment and materials required to make connections to existing gate valves.
  2. Unit of Measure: Lump Sum
- W. Item No. 23 – Service Connections
1. All work required within the building envelope for the installation and connection of new water service lines including, but not limited to, demolition, disposal, construction, modification of existing water systems, installation of equipment and appurtenances, electrical and plumbing permits, record documents, O&M Manuals and owner training as outlined in the Contract Documents and within the specified pay limits. Existing line sizes indicated on individual service connection details are approximate. Contractor shall provide all required materials and fittings necessary for a complete system. Where required, meters shall be purchased from the Town of Bennington Water Department.
  2. Unit of Measure: Each
    - a. Item 23.1 – Building service
    - b. Item 23.2 – Slab on Grade Building Service
    - c. Item 23.3 – Mobile Home Building Service
    - d. Item 23.4 – Meter Installation

- e. Item 23.5 – Booster Pump Installation
- X. Item No. 24 – Fire Hydrant Assembly
  - 1. Furnishing, assembling and installing fire hydrant assemblies in accordance with Contract Documents including, but not limited to, hydrants and appurtenances, mechanical joint thrust restraint at the hydrant assembly joints, hydrant isolation gate valves, hydrant tee, hydrant branch pipe, hydrant markers, and concrete thrust blocking at the hydrant and hydrant tee.
  - 2. Unit of Measure: Each
- Y. Item No. 25 – Flush Hydrant Assembly
  - 1. Furnishing, assembling and installing flush hydrant assemblies in accordance with Contract Documents including, but not limited to, hydrants and appurtenances, hydrant isolation gate valve, mechanical joint thrust restraint at the hydrant assembly joints and concrete thrust blocking at the hydrant and isolation gate valve.
  - 2. Unit of Measure: Each
- Z. Item No. 26 – Lockable Well Caps and Water Sampling Stations
  - 1. Furnishing, assembling and installing lockable well caps and water sampling station assemblies where indicated on the plans or as directed by the Engineer in accordance with the Contract Documents. This item shall include, but is not limited to, the removal of the well pump and well line, and capping of abandoned service line at well casing and foundation.
  - 2. Unit of Measure: Each
    - a. Item 26.1 – Lockable well caps
    - b. Item 26.2 – Water Sampling Station
- AA. Item No. 27 – Closure of Abandoned Wells
  - 1. All work associated with decommissioning wells including State of Vermont well closure reports in accordance with the Contract Documents. This item shall include, but is not limited to, the removal of the well pump and well line, and capping of abandoned service line at well casing and foundation.
  - 2. Unit of Measure:
    - a. 27.1 – Drilled Well: Linear Foot
    - b. 27.2 – Dug Well: Each
- BB. Item No. 28- Utility Crossings
  - 1. Temporary disconnection, temporary service (if required) and reconnection of underground electrical or telecommunications utilities for the purpose of completing trench excavation as noted on the Drawings.
  - 2. Unit of Measure: Each
- CC. Item No. 29 - Sewer Crossing – Water Below
  - 1. Removal and replacing of an existing sewer line crossing above a water line in accordance with the Contract Documents.
  - 2. Unit of Measure: Each
- DD. Item No. 30 Culvert Installation
  - 1. All work associated with the removal and replacement of existing culverts as noted in the contract plans or directed by the Engineer including, but not limited to; earthwork, sawcutting and removing existing pavement, removal and disposal of existing storm

pipe, furnishing and installing new pipe, pipe bedding, removal and replacement of unsuitable trench material, and trench backfill.

2. Unit of Measure: Linear Foot
  - a. Item 30.1 - 18" CPEP Pipe
  - b. Item 30.2 - 24" CPEP Pipe
  - c. Item 30.3 - 36" CPEP Pipe
  - d. Item 30.4 - 48" CPEP Pipe
- EE. Item No. 31 Riprap Stone Installation
  1. All work associated with installing riprap stone at culvert ends and specified swales as noted in the contract plans or directed by the Engineer including, but not limited to: earthwork, grading, removal of existing material, and furnishing and installing new stone. Load tickets shall be provided at time of delivery.
  2. Unit of Measure: Ton
- FF. Item No. 32. Leakage Clamps
  1. Furnishing and installing ductile iron leakage clamps in accordance with the Contract Documents.
  2. Unit of Measure: Each
- GG. Item No. 33. Heat Tape installation
  1. Furnishing and installation of heat tape on service lines in accordance with the Contract Documents.
  2. Unit of Measure: Each
- HH. Item No. 34 – Large Diameter Tree Removal (18 inches or larger)
  1. All work associated with removing large diameter trees including, but not limited to, cutting and chipping, stump removal, earthwork and cleanup in accordance with the Contract Documents.
  2. Unit of Measure: Each
- II. Item No. 35 - Yard Hydrant Installation
  1. Furnishing, assembling and installing yard hydrant assembly in accordance with Contract Documents including, but not limited to, hydrant and appurtenances.
  2. Unit of Measure: Each
- JJ. Item No. 36 - Bollard Installation
  1. Furnishing, assembling and installing bollard assembly in accordance with Contract Documents.
  2. Unit of Measure: Each
- KK. Item No. 37 - Fluoroelastomer Gaskets
  1. Furnishing and installing fluoroelastomer gaskets in accordance with Contract Documents and as directed by the Engineer.
  2. Unit of Measure: Each
- LL. Item No. 38 - Meter Pit Installation
  1. Furnishing, assembling and installing meter pit assembly in accordance with Contract Documents including, but not limited to, site preparation, excavation, installation of 8-inch compacted gravel base for meter pit, connection of exterior lines, meter, valves and appurtenances.

2. Unit of Measure: Each

MM. Item No. 39 - Concrete Curb

1. All excavation, subbase installation and preparation, installation, and surrounding surface restoration for concrete curbing in accordance with the Contract Documents
2. Unit of Measure: Linear Foot

NN. Item No. 40 - Off-Site Activity Area Spoils Management (Contract #6 Only)

1. All work associated with coordinating and managing a preapproved spoils disposal location for Contracts 5, 6 and 7. Costs shall include all security, labor, materials, and equipment necessary to maintain spoils site and access for the duration of the Contract. Work shall include, but is not limited to, preparation of a Spoils Management plan for Engineer's review, acquisition of necessary permits, preparation of site for construction vehicle access, installation and maintenance of erosion control fencing, field quality control, site grading, and clean-up in accordance with the Contract Documents.
2. Unit of Measure: Lump Sum

OO. Item No. 41 - Excavating and Handling for Offsite Disposal of Contaminated Soil (Contract #5 Only)

1. All work associated with initial identification of potential petroleum-contaminated soil through visual (soil staining, slicks, or sheens) or olfactory (odor) methods, notifying the Site Health & Safety Officer regarding the potential soil contamination as soon as possible so that the existence of any contamination can be confirmed; Excavation, segregation, and handling of contaminated soils, placement, wrapping and maintenance of contaminated soils on 6 mil plastic sheeting, removal of contaminated soils from project site to a temporary stockpile to the satisfaction of State of Vermont Department of Environmental Conservation, Sites Management Section, loading of contaminated soils. The truck bed will be wrapped in 6 mil plastic sheeting to prevent contamination of the truck bed and seepage.
2. Unit of Measure: Cubic Yard

**END OF SECTION**

**SECTION 013000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittal procedures, schedules, lists and instructions for proper and prompt submittal and review of construction related documents.
- B. Coordination, field engineering, preconstruction meeting, progress meetings, and examination.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Requests for Interpretation (RFI) procedures.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PRECONSTRUCTION MEETING**

- A. A pre-construction meeting will be held prior to the start of construction.
- B. Engineer shall schedule the Pre-Construction Meeting after Notice of Award and shall be responsible for preparing an agenda, recording discussions and distributing meeting minutes.
  - 1. Minimum Agenda - Pre-construction Meeting:
    - a. Individual sign-in.
    - b. Owner's, Prime Contractor's, Major Sub-Contractor's, and Engineer's contact persons for project.
    - c. Procedures to be followed when working on site.
    - d. Submittals:
      - 1) Shop Drawings
      - 2) Samples
      - 3) Products
      - 4) Traffic Control Plan
      - 5) Erosion Control Plan
    - e. Material Deliveries:
      - 1) Owner-supplied equipment
      - 2) Contractor-supplied equipment
      - 3) Site laydown area
    - f. General Discussion and Critical Areas.
    - g. Sequence of Work and Procedures:
      - 1) Contractor's Schedule
      - 2) Start of on-site work
      - 3) Construction Staking
      - 4) Completion date specified
      - 5) Coordination with on-site Owner's representatives
      - 6) Owner's Work in conjunction with Contract

- h. Specific Procedures:
  - 1) Temporary Facilities
  - 2) Noise, General Safety & Site Security
  - 3) Traffic in site area
  - 4) Site access - (key procedures)
  - 5) Utility notifications & coordination
  - 6) Other special procedures

### 3.02 PROGRESS MEETINGS

- A. The Engineer shall schedule and conduct Construction Progress Meetings and shall be responsible for preparing an agenda, recording discussions and distributing the meeting minutes. These meetings will be held every week, or more frequently as needed.
  - 1. Minimum Agenda - Construction Progress Meeting:
    - a. Review, revise as necessary, and approve minutes of previous meeting(s).
    - b. Review progress of the work since last meeting, including status of submittals for approval.
    - c. Identify problems which will impede planned progress.
    - d. Develop corrective measures and procedures to regain planned schedule.
    - e. Complete other current business.
    - f. Three week Look-Ahead Schedule.
    - g. Schedule of the next meeting.
- B. Minimum Attendance Required:
  - 1. Contractor.
  - 2. Owner.
  - 3. Contractor's Superintendent.
  - 4. Major Subcontractors as requested.
  - 5. Engineer.
- C. The Engineer shall schedule and conduct special Construction Administration meetings including Pre-Installation meetings on critical systems and assemblies and other meetings as deemed necessary.

### 3.03 CONSTRUCTION PROGRESS SCHEDULE

- A. Submit preliminary schedule in duplicate within 15 days after effective date of the Agreement.
- B. Revise and resubmit as required within 5 days.
- C. Submit revised schedules with each Application for Payment, identifying changes since previous version.
- D. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities.
- E. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- F. Submit updated schedule with each Application for Payment.
- G. Indicate estimated percentage of completion for each item of work at each submission.



- H. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner and required by allowances.

#### **3.04 MANUFACTURER INSTALLATION INSTRUCTIONS**

- A. When required, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing to Engineer.
- B. Indicate special procedures, conditions requiring special attention, and special environmental criteria required for application or installation.

#### **3.05 MANUFACTURER CERTIFICATES**

- A. When specified in individual specification sections, submit certification by manufacturer to Engineer, in duplicate.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

#### **3.06 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.
  - 2. Shop drawings.
  - 3. Samples for selection.
  - 4. Samples for verification.
  - 5. Traffic Control Plan.
  - 6. Erosion Control Plan.
  - 7. Lighting Plan.
- B. Submit to Engineer for review for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.
  - 1. Shop Drawings and proposed products intended for incorporation in the Work, including fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:
    - a. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
    - b. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.
    - c. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.
    - d. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - e. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - f. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed Work.
    - g. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

- h. Provide space for Contractor and Engineer review stamps.
  - i. If directed to revise and resubmit, identify all changes made since previous submission.
  - j. Submittals not requested will not be recognized or processed.
  - k. Sheet Size: Except for templates, patterns and similar full- size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 24" x 36".
  - l. Submittal: Submit one electric copy and two hard copies for the Engineer's concurrent review.
  - m. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connection with construction.
  - n. Engineer shall not proceed with Shop Drawing review without prior review and approval by Contractor.
- C. Samples will be reviewed only for aesthetic, color, or finish selection.
- 1. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical to the material or product proposed. Samples include partial sections of manufactured or fabricated components, cuts or containers of materials, color range sets, and swatches showing color, texture and pattern.
    - a. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.
      - 1) Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.
    - b. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.
      - 1) Preliminary submittals will be reviewed and returned with the Engineer's mark indicating selection and other action.
  - 2. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.

### 3.07 REQUESTS FOR INFORMATION (RFI)

- A. Definition: A request seeking one of the following:
  - 1. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of the Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  - 1. Prepare a separate RFI for each specific item.
  - 2. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Review Time: Engineer will respond and return RFIs to Contractor within ten calendar days of receipt.
- D. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.

### **3.08 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.

### **3.09 SUBMITTAL REVIEW**

- A. Submittals for Review: Engineer will review each submittal, and acknowledge, or take other appropriate action.
- B. Submittals for Information: Engineer will acknowledge receipt and review. See below for actions to be taken.
- C. Engineer's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
  - 1. Notations may be made directly on submitted items and/or listed on appended Submittal Review cover sheet.
- D. Engineer's and consultants' actions on items submitted for review:
  - 1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Acknowledged", or language with same legal meaning.
    - b. "Acknowledged as noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
  - 2. Not Authorizing fabrication, delivery, and installation:
    - a. "Revise and Resubmit".
      - 1) Resubmit revised item, with review notations acknowledged and incorporated.
    - b. "Rejected".
      - 1) Submit item complying with requirements of Contract Documents.
- E. Engineer's and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  - 2. Items for which action was taken:
    - a. "Reviewed" - no further action is required from Contractor.

### **MEASUREMENT AND PAYMENT**

- 4.01 **ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

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**SECTION 014000**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Instructions and requirements for quality assurance and quality control of installation.
- B. Control of installation.

**1.02 REFERENCES**

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date for receiving bids, except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. The contractual relationship, duties, and responsibilities of the parties in the contract nor those of the Engineer will not be altered from the Contract Documents by mention or inference otherwise in any reference document.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Submit a certified written report of each inspection, test or similar service to the Engineer, in duplicate, within 48 hours after completion of results.
  - 1. Include:
    - a. Date issued.
    - b. Project title and number.
    - c. Name of inspector.
    - d. Date and time of sampling or inspection.
    - e. Identification of product and specifications section.
    - f. Location in the Project.
    - g. Type of test/inspection.
    - h. Date of test/inspection.
    - i. Results of test/inspection.
    - j. Conformance with Contract Documents.
    - k. When requested by Engineer, provide interpretation of results.
  - 2. Submit additional copies of each written report directly to the governing authority, when the authority so directs.

**1.04 TESTING AND INSPECTION AGENCIES AND SERVICES**

- A. Contractor shall engage and pay for services of an independent testing agency to perform compliance testing for submitted products and materials.
- B. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work and the Contractor is also required to engage an entity for the same or related element, Contractor shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.
- C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. Contractor Employed Agency:

1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

**PART 2 PRODUCTS - NOT USED**

1. Laboratory: Authorized to operate in the State in which the Project is located.
2. Testing Equipment: Calibrated at reasonable intervals either by NIST or using an NIST established Measurement Assurance Program, under a laboratory measurement quality assurance program.

**PART 3 EXECUTION**

**3.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, sub-contractors, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

**3.02 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

**3.03 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  1. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
  2. Perform inspections, sampling and testing of materials and construction specified with qualified personnel.
  3. Promptly notify Engineer and Contractor of observed irregularities or non-compliance of Work or products.
  4. Perform additional tests and inspections required by Engineer .
  5. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  2. Agency may not approve or accept any portion of the Work.



3. Agency may not assume any duties of Contractor .
  4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  4. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing/inspection services.

#### **3.04 ASSOCIATED SERVICES**

- A. Cooperate with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to:
1. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
  2. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.

#### **3.05 DEFECT ASSESSMENT**

1. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
2. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
3. Security and protection of samples and test equipment at the project site.

#### **3.06 COORDINATION AND SCHEDULING**

- A. Coordinate the sequence of activities to accommodate required services with a minimum of delay and avoid the necessity of removing and replacing construction to accommodate inspections and tests.
- B. Responsible for scheduling times for inspections, tests, taking samples and similar activities.

#### **3.07 RETESTING**

- A. The Contractor is responsible for retesting where results of required inspections, tests or similar services prove unsatisfactory and do not indicate compliance with Contract Document requirements, regardless of whether the original test was the Contractor's responsibility.
- B. Cost of retesting construction for Work revised or replaced by the Contractor is the Contractor's responsibility, where required tests were performed on original construction.
- C. Replace Work or portions of the Work not complying with specified requirements.

- D. In the event that additional testing is specifically requested by the Engineer in excess of the number of tests required by the individual specification sections:
  - 1. If the additional requested test fails, the Contractor shall be responsible for the cost of the test and any subsequent testing required until a passing test is recorded.
  - 2. If the additional requested test passes, the Owner shall be responsible for the cost of the test.

### **3.08 MANUFACTURERS' FIELD SERVICES**

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Engineer in advance of required observations. Observer subject to approval of Engineer and Owner.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to Manufacturer's written instructions.
- D. Submit report within 15 days of observation to Engineer for information.
- E. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- F. If, in the opinion of Owner, it is not practical to remove and replace the work, Owner may, at their discretion, direct an appropriate remedy or adjust payment.

### **PART 4 MEASUREMENT AND PAYMENT**

- 4.01 **ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

**SECTION 015000**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Guidelines, directions, and descriptions for temporary utilities, including electricity, lighting, heat, ventilation, telephone service, water and sanitary facilities.
- B. Temporary controls for barriers and protection of the work during construction.
- C. Construction Facilities: Progress cleaning.
- D. Temporary Controls: Barriers, enclosures and fencing.
- E. Security requirements.
- F. Waste removal facilities and services.
- G. Field offices.

**1.02 RELATED REQUIREMENTS**

- A. Section 015500 - Vehicular Access and Parking.

**1.03 REFERENCE STANDARDS**

- A. OSHA Publications:
  - 1. 3007 Ground Fault Protection on Construction Sites
  - 2. No. 3115 Underground Construction
  - 3. No. 3124 Stairs and Ladders
  - 4. No. 2226 Excavation and Trenching Operations
- B. International Fire Code (IFC), latest edition.
  - 1. Chapter 14 for construction with flammable materials present.

**1.04 TEMPORARY UTILITIES - SEE SECTION 015100**

- A. Electricity: If available and adequate, Owner's existing power service may be utilized during construction. Do not disrupt Owner's need for continual service.
  - 1. Owner's permanent convenience receptacles may be utilized during construction.
  - 2. Owner's permanent building lighting may be utilized during construction.
- B. Heat: Existing heating system, if available, may be utilized during construction. If not available provide temporary heat for construction and protection of facilities. Maintain space at 68 degrees F.
- C. Ventilation: Ventilate enclosed areas to assist cure of materials, dissipate humidity and prevent accumulation of dust, fumes, vapors or gases.
  - 1. Extend and supplement existing equipment with temporary fan units as required to maintain clean air for construction operations.
  - 2. Provide additional fans as needed.
  - 3. During winter heating season use conservation measures to reduce heat loss.
- D. Telephone Service: Provide and maintain telephone service, if required.
- E. Water Service: Existing water system (if available) may be utilized during construction. Utilize measures to conserve water. If not available, provide temporary supply for potable use, sanitation and construction.
- F. Sanitary Facilities: Existing restroom facility (if available) may be utilized during construction. If not available, provide temporary sanitary facilities for workers and

representatives.

- G. Safety Barriers: Provide safety barriers to prevent unauthorized entry into construction areas and allow for Owner's use of site if required.
- H. Field Office: If required, provide a clean, weather tight structure with necessary electrical and mechanical equipment and a drawing table and chair. Locate as directed by Owner or Engineer in the field.
- I. Internet: Provide and maintain high speed internet service to all work stations with wireless capabilities. 25 megabits per second minimum.
- J. Printer: One(1) - All in one color inkjet printer capable of printing, scanning and coping Ledger, Legal and Letter sizes. Standard interfaces shall include Hi-Speed USB 2.0, Wireless (802.11b/g/n), Ethernet. Minimum requirements include: 35 page automatic document feeder, printing 20 color copies per minute at 6000 x 1200 dpi resolution, scan resolution 2400 x 2400 dpi, flat bed document glass size Ledger (11" x 17") with standalone copy features, minimum of 250 sheet input capacity cassettes and 2 additional complete set of ink cartridges. All warranties, maintenance, servicing and sufficient appropriate ink/toner cartridges and paper for the duration of the Work.
  - 1. Supplies for the printer/scanner/copier shall include 8.5x11 inch paper, 11x17 inch paper, ink and toner throughout the duration of the project.
- K. Office Furnishings: Furniture will be delivered and placed as directed by the Engineer. Provide and maintain work stations to include the following:
  - 1. Desks: Flat top, double pedestal, with one box and one file drawer in each pedestal, 60-inches by 30-inches.
  - 2. Chairs: Ergonomic, adjustable heights, on rollers, with armrests.
  - 3. File Cabinet: Two drawer file cabinet.
  - 4. Conference Table and Chairs: One (1) table (3-feet by 10-feet minimum), scratch and stain resistant and 15 meeting-type chairs.
  - 5. One (1) each refrigerator, microwave, and coffee machine.
- L. Waste Disposal: One waste receptacle and recycling bin for each desk with weekly janitorial services.
- M. Miscellaneous Field Supplies:
  - 1. One (1) minimum/maximum digital thermometer, with batteries for the duration of the Work.
  - 2. One (1) rain gauge
  - 3. One (1) first aid kit conforming to the latest revision of ANSI/ISEA Z 308.1
  - 4. Toiletries as needed.
- N. Provide and pay for all electrical power, lighting, water, heating and cooling, ventilation and temporary utilities required for construction purposes.

#### 1.05 FIELD OFFICE AND STORAGE AREA

- A. If unused space is available on site, Contractor may use it for office and storage space. Space must be coordinated with and approved by Owner.
- B. Areas designated for storage must be secured by Contractor. Sensitive or hazardous materials shall not be brought on site without the written consent of Owner.

#### 1.06 SITE DRAINAGE

- A. Grade site to drain around temporary facilities.

- B. Provide erosion control and protection as needed.

#### 1.07 **BARRIERS**

- A. Sensitive and hazardous materials must be stored away from drainage areas and water ways.
- B. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- C. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- D. Provide protection for plants designated to remain. Replace damaged plants.
- E. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

#### 1.08 **FENCING**

- A. Provide 6 foot (1.8 m) high fence around construction site; equip with vehicular and pedestrian gates with locks.

#### 1.09 **SECURITY**

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

#### 1.10 **VEHICULAR ACCESS AND PARKING - SEE SECTION 01 5500**

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.

#### 1.11 **WASTE REMOVAL**

- A. Provide means of removing mud from vehicle wheels before entering streets.
- B. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.
- C. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- D. Provide containers with lids. Remove trash from site weekly.
- E. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

#### 1.12 **REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities and materials prior to final application for payment.
- B. Clean and repair damage caused by installation or use of temporary work.
- C. Restore existing facilities used during construction to original condition.
- D. Restore new permanent facilities used during construction to specified condition.

### **PART 2 PRODUCTS - NOT USED**

### **PART 3 EXECUTION - NOT USED**

**END OF SECTION**

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**SECTION 015500  
VEHICULAR ACCESS AND PARKING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Construction Traffic Control
- B. Access roads.
- C. Parking.
- D. Haul routes.
- E. Maintenance.
- F. Removal, repair.

**1.02 REFERENCES**

- A. Manual of Uniform Traffic Control Devices, (MUTCD), latest edition.
- B. Vermont Agency of Transportation (VTrans) - Standard Specifications for Construction, Division 100 and 600.

**1.03 SUBMITTALS**

- A. Submit a Traffic Control Plan for Engineer review and approval at the Pre-Construction Conference. If no Pre-Construction Conference is held, Traffic Control Plan shall be submitted prior to site mobilization.

**1.04 QUALIFICATIONS**

- A. Provide a qualified traffic maintenance person with the following minimum qualifications:
  - 1. Be familiar with the requirements and importance of maintaining safe and smooth traffic flows.
  - 2. Have previous experience working with maintenance and protection of traffic.
  - 3. Be competent to supervise personnel in traffic maintenance operations.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Use only traffic control devices manufactured from materials that are durable, lightweight, rigid and visible, but do not create a hazard when struck.
- B. All traffic control devices used shall comply with applicable provisions of the MUTCD, latest edition.

**2.02 ACCESSORIES**

- A. Barricades: Type III, clear, well maintained and properly marked or lighted for nighttime use.
- B. Signs: Utilize signs with messages appropriate to provide adequate construction control. Signs and sign mountings shall conform to the Vtrans Standard Specifications for Construction, current edition.
- C. Traffic Cones: The cones shall be orange in color, shall be a minimum of 28 inches in height with a broadened base, and fabricated from materials that withstand impact. For nighttime use, cones shall have a minimum 6 inch wide white flexible reflectorized band placed a minimum of 3 inches, but not more than 4 inches, from the top. An additional 4 inch white reflectorized band shall be placed a minimum of 2 inches below the 6 inch band. The cones shall be weighted at the base to prevent overturning by wind. The reflectorized band shall be fabricated from Type III C, Type IV or Wide Angle Prismatic flexible reflective sheeting.

- D. Lights, delineators and reflectors: Red, yellow or white in color with no less than 12 square inches of reflective area per unit.
- E. Delineator Drums: Drums shall be approximately 36 inches in height and minimum of 18 inches in diameter at the top. They shall be constructed of durable plastic with horizontal, circumferential, orange and white reflectorized stripes. The reflectorized striped shall be fabricated from Type III C, Type IV, or Wide Angle Prismatic flexible reflective sheeting. Delineator drums shall be weighted with sand placed at the bottom of the drum or constructed so that they cannot be blown over or displaced by wind or passing traffic, and do not create a hazard if accidentally struck.

## **PART 3 EXECUTION**

### **3.01 SCHEDULING AND COORDINATION**

- A. Prior to commencing work, develop and agree to a detailed schedule between the Engineer, Utility Companies, the Contractor and Subcontractor(s).
- B. Before any detour or temporary route is opened to traffic, all necessary Temporary Traffic Control (TTC) devices shall be in place.
- C. Schedule work to reopen a closed intersection in the most expedient manner. Any public road closures shall be approved by the governmental authority having jurisdiction.
- D. Provide access to all residential dwellings and businesses adjacent to this project.
- E. All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, TTC devices that are no longer appropriate shall be removed or covered.

### **3.02 PREPARATION**

- A. Provide, erect and place all required traffic control devices in the appropriate locations prior to beginning any construction activity.

### **3.03 ACCESS ROADS**

- A. Tracked vehicles not allowed on paved areas.
- B. Extend and relocate as work progress requires, provide detours as necessary for unimpeded traffic flow.
- C. Provide unimpeded access for emergency vehicles. Maintain 20 foot (6 m) width driveways with turning space between and around combustible materials.
- D. Contractor shall utilize only those roads designated as access roads by the governing authority having jurisdiction for access to the project site.

### **3.04 PARKING**

- A. Contractor shall install vehicle tracking pads to prevent material tracking onto adjacent roadways.
- B. Provide and maintain access to fire hydrants free of obstructions.
- C. Arrange for temporary parking areas to accommodate use of construction personnel.
- D. Construction may utilize those portions of the existing facilities designated by the Owner for access and parking.

### **3.05 HAUL ROUTES**

- A. Confine construction traffic to designated haul routes.
- B. Provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.

- C. Provide traffic control and access to all commercial vehicles including, but not limited to: Emergency vehicles, mail trucks, school buses and dairy trucks.

### **3.06 MAINTENANCE**

- A. Maintain traffic and parking areas in a sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
- B. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

### **3.07 REMOVAL, REPAIR**

- A. Repair existing facilities damaged by use, to original condition.
- B. Repair damage caused by installation.

## **PART 4 MEASUREMENT AND PAYMENT**

### **4.01 MEASUREMENT**

- A. Items as required within the plans and traffic control details.

### **END OF SECTION**

- A. If traffic control is bid as a Lump Sum on the bid form, the amount bid must include the appropriate number of units as defined in "A" above within the plans and traffic control details to properly complete the project.

### **5.02 PAYMENT**

- A. Include all costs associated with the requirements listed herein in the lump sum price bid for traffic control.
- B. If no bid item is provided, payment will be incidental to other related items of work.

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**SECTION 015713  
EROSION AND SEDIMENT CONTROL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Permanent erosion control.
- E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor .

**1.02 RELATED REQUIREMENTS**

- A. Section 311000 - Site Clearing: Limits on clearing; disposition of vegetative clearing debris.
- B. Section 312200 - Grading: Temporary and permanent grade changes for erosion control.
- C. Section 321123 - Aggregate Base Courses: Temporary and permanent roadways.
- D. Section 329219 - Seeding: Permanent turf for erosion control.
- E. Section 329300 - Plants: Permanent plantings for erosion control.

**1.03 REFERENCE STANDARDS**

- A. State of Vermont Agency of Natural Resources, Department of Environmental Conservation: Chapter 22 - Stormwater Permitting Rule.
- B. State of Vermont :Vermont Standards and Specifications for Erosion Prevention and Sediment Control", current edition.
- C. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus 2014.
- D. ASTM D4491 - Standard Test Methods for Water Permeability of Geotextiles by Permittivity. 1999a (Reapproved 2014).
- E. ASTM D4533 - Standard Test Method for Trapezoid Tearing Strength of Geotextiles 2011.
- F. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles 2015a.
- G. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile 2016.
- H. ASTM D4873 - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples 2002 (Reapproved 2009).

**1.04 PERFORMANCE REQUIREMENTS**

- A. Comply with all State of Vermont Erosion and Sedimentation control standards.
- B. Review, revise, and follow the Erosion and Sedimentation Prevention Plan and submit periodic inspection reports in accordance with the SWPPP requirements and state stormwater permits and regulations.
- C. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained.
  - 1. Obtain permits and pay for securities required by authority having jurisdiction.
  - 2. Contractor shall sign on as Co-Permittee and Permit Operator where required.

3. Owner will withhold payment to Contractor equivalent to all fines resulting from non-compliance with applicable regulations.
- D. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
  - E. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.
    1. Prevent runoff of sediment-laden water into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less..
  - F. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
    1. Control movement of sediment and soil from temporary stockpiles of soil.
    2. Prevent development of ruts due to equipment and vehicular traffic.
    3. If erosion occurs due to non-compliance with these requirements, restore eroded areas immediately at no cost to Owner, including removal and disposal of accumulated sediment in storm and sanitary sewer systems, open channels and stormwater treatment practices.
  - G. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
    1. Prevent windblown soil from leaving the project site.
    2. Prevent tracking of mud onto public roads outside site.
    3. Prevent mud and sediment from flowing onto sidewalks and pavements.
    4. If erosion occurs due to non-compliance with these requirements, restore eroded areas immediately at no cost to Owner .
  - H. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
    1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner ; remove deposited sediments; comply with requirements of authorities having jurisdiction.
    2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
  - I. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
    1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner ; remove deposited sediments; comply with requirements of authorities having jurisdiction.
  - J. Open Water: Prevent standing water that could become stagnant.
  - K. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

#### 1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
  1. Submit within 2 weeks after Notice to Proceed.



2. Include:
    - a. Site plan identifying proposed erosion and sedimentation controls compliant with Contract Documents and applicable permits.
    - b. Schedule of temporary preventive measures, in relation to ground disturbing activities.
  3. Obtain the approval of the Plan by authorities having jurisdiction.
  - 4.
  5. Obtain the approval of the Plan by Owner .
- C. Inspection Reports: Contractor shall perform inspections and maintain records in accordance with the General Permit 3-9020 conditions and requirements.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Mulch: Use one of the following:
1. Straw or hay.
  2. Wood waste, chips, or bark.
  3. Erosion control matting or netting.
- B. Grass Seed For Temporary Cover: Use seed mix identified on plans or select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- C. Fiber Rolls (Straw Wattles):
1. Wood, 2 by 2 inches (50 by 50 mm) in cross section.
  2. 9 inch, East Coast Erosion Control Sediment Retention Fiber Rolls, or approved equal.
- D. Silt Fence:
1. Where required by the local municipality having jurisdiction, where indicated on the plans, or where required at critical areas.
  2. Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible. Silt fence shall be backed with wire fence, minimum 14 gauge with 6" openings.
  3. Posts: hardwood, 2" by 2" in cross section.
- E. Erosion Control Blanket: Erosion Control Blanket and Turf Reinforcement Mat shall conform to VTrans Standard Specifications for Construction, current edition. Install on slopes 3:1 or steeper, in swales and stormwater conveyance channels, and where indicated on plans.
- F. Permanent Turf Reinforcement Mat
1. As per pan.
- G. Clean Stone: See Section 321123 for aggregate.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

### **3.02 PREPARATION**

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

- B. Maximum area of disturbance at any one time shall be as established in issued General Permit 3-9020.

### 3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed, temporary preventive measures are not required.
- B. Construction Entrances: Traffic-bearing aggregate surface.
  - 1. Width: As required; 20 feet (7 m), minimum.
  - 2. Length: 50 feet (16 m), minimum.
  - 3. Provide at each construction entrance from public right-of-way.
  - 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences, bales or approved alternative.
  - 1. Provide linear sediment barriers:
    - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
    - b. Along the top of the slope or top bank of drainage channels and swales that traverse disturbed areas.
    - c. Along the toe of cut slopes and fill slopes.
    - d. Across the entrances to culverts that receive runoff from disturbed areas.
- D. Storm Drain Drop Inlet Sediment Traps: Manufactured drop-in style filter bags or site-construction sediment filters shall be installed at each existing and newly installed storm sewer inlet to prevent sediment laden water from entering. Contractor shall maintain as needed and in accordance with Manufacturer's instructions.
- E. Soil Stockpiles: Protect using one of the following measures:
  - 1. Cover with polyethylene film, secured by placing soil on outer edges.
  - 2. Cover with mulch at least 4 inches (100 mm) thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches (150 mm) of straw or hay.
  - 3. Install perimeter silt fence at tow of stockpile.
- F. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
  - 1. Wood Waste: Use only on slopes 3:1 or flatter; no anchoring required.
- G. Temporary Seeding: Use where temporary vegetated cover is required.
- H. Permanent turf reinforcement mats or temporary erosion control: Install where required or where indicated on plans.

### 3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface at Construction Entrances:
  - 1. Excavate minimum of 6 inches (150 mm).
- B. Permanent turf reinforcement mats or temporary erosion control: Install where required or where indicated on plans.
  - 1. Place geotextile fabric full width and length, with minimum 12 inch (300 mm) overlap at joints.
  - 2. Place and compact at least 6 inches (150 mm) of [2" - 3"] inch ([ ] mm) diameter stone.
- C. Silt Fences:

1. Store and handle fabric in accordance with ASTM D4873.
  2. Silt fence shall either be installed in a 4 inch deep by 6 inch wide trench on the upslope side of the fence, or be machine sliced in with a 4 inch fabric embedment. If utilizing trench method, trench shall be backfilled and compacted. Top of fabric shall be at a minimum 32 inch nominal height.
  3. Posts shall be installed at a maximum 4 foot spacing, with a minimum embedment of 24 inches.
  4. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches (460 mm), with J hooks.
  5. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches (300 mm) high with post spacing not more than 4 feet (1220 mm).
- D. Fiber Rolls:
1. Install in fiber roll sections with roll ends overlapping 4 feet or greater, with each end of row turned uphill.
- E. Erosion Control Blankets:
1. Install where indicated in plans or as needed per manufacturers recommendations.
- F. When hydraulic seeder is used, seedbed preparation is not required.
1. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.
- G. Permanent Turf reinforcement mats:
1. Install where indicated in plans per manufacturers recommendations.
- H. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
  2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
  3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at manufacturers specified rate.
  4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft (6 to 8 kg per 100 sq m).
  5. Incorporate fertilizer into soil before seeding.
  6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch (12 to 25 mm) deep.
  7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
  8. Repeat irrigation as required until grass is established.

### 3.05 MAINTENANCE

- A. Comply with General Permit 3-9020 inspection and reporting requirements.
- B. Repair deficiencies immediately.
- C. Silt Fences:
  1. Promptly replace fabric that deteriorates unless need for fence has passed.

2. Remove silt deposits that exceed one-third of the height of the fence.
  3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Fiber Rolls:
1. Promptly replace rolls that fall apart or otherwise deteriorate unless need has passed.
- E. Clean out temporary sediment control structures as required and relocate soil on site.
- F. Place sediment in appropriate locations on site; do not remove from site.
- G. Sweep debris and soil from work area daily in a manner that prevents dust from becoming airborne.

### 3.06 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Engineer .
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.
- D. Comply with all SWPPP requirements relative to protection removal.

### 3.07 OFF-SITE ACTIVITY AREAS

- A. Off-Site Activity (OSA) areas are those areas located outside of the Project's defined construction limits but within the projects Corrective Action Area II (CAAI) and associated Operational Unit A (OUA) that are necessary adjuncts used for supporting the construction activities, including access roads, waste, borrow, and staging areas. Compliance with Environmental and Pollution Control Regulations described in construction permits and the spoils management plan shall apply to all OSA areas.
- B. The projects corrective action area can be found at the State of Vermont Agency of Natural Resources Department of Environmental Conservation Website, found at the following link: <https://anrweb.vt.gov/PubDocs/DEC/PFOA/Maps/PFASOpenHouseMap.pdf>
- C. Opening Off Site Activity Areas:
  1. General: The Contractor shall demonstrate that the proposed OSA area is in accordance with all Project permits and that the following are met:
    - a. The final shape, slope, and contour of the land in and about the area will not be undesirable aesthetically or as it relates to drainage.
    - b. Is consistent with any duly adopted development plan, land use plan or land capability plan, whether site specific, local, or regional.
    - c. The entrance is at the most desirable angle or perspective from any nearby Town and State roads, residences, and other facilities.
    - d. The Contractor shall remove, stockpile, and preserve topsoil, sod, and other suitable material from the surface of the area prior to proceeding with other operations.
    - e. The Contractor has all erosion prevention and sediment control measures, as indicated in the Conforming Erosion Prevention and Sediment Control Plan, in place prior to use of the area. At a minimum, erosion prevention and sediment control measures published by ANR shall be used as best management practices for OSA areas.

2. The Contractor shall meet all Vermont Agency of Natural Resources (VT ANR) siting criteria listed below for each spoils management site.
    - a. Areas where water lines are being expanded within Corrective Action Area II (CAAIL) as identified in the Consent Order
    - b. On public land/in public right of way area, if possible
    - c. Areas with limited erosion potential
    - d. Greater than 100 feet from wetlands, river corridor, and Federal Emergency Management Agency (FEMA) floodplains
    - e. Outside of public water supply source protection areas; and
    - f. Distal from homes with private wells that will not be replaced with municipal water.
- D. Clearances:
1. Permits. The Contractor and/or the property owner shall be required to obtain or amend all necessary State, Federal, and local permits and clearances, prior to using an area for the Project. Any fees related to applications for such permits shall be the responsibility of the Contractor
- E. Maintaining Off-Site Activity Areas:
1. General: The Contractor shall conduct operations at OSA areas so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.
  2. Area Erosion Prevention and Sediment Control Measures. Installation and maintenance of erosion prevention and sediment control measures at OSA areas shall be consistent with the Conforming Erosion Prevention and Sediment Control Plan for the specific area. The On-Site Plan Coordinator (OSPC) shall review these areas as required in the Contract.
  3. Seasonal Shutdown. For areas that will be utilized for more than one Construction Season the Contractor shall grade to no more than 1:3 (V:H), seed and mulch disturbed fill areas prior to shutting down for the season.
- F. Closing Off-Site Activity Areas:
1. With the exception of those areas which will remain open for commercial use, the Contractor shall complete the following prior to the Completion and Acceptance of the Project:
    - a. Shape the entire area to leave banks in a neat and presentable condition, properly and thoroughly graded and drained.
    - b. Establish vegetation on all disturbed areas.
    - c. All stones, boulders, stumps, and debris shall be removed or satisfactorily disposed of.
- G. The Contractor shall conduct operations at the spoils management site so as to minimize air pollution. The Contractor shall keep in a condition acceptable to the Engineer the portions of an area where a pit or pits have been opened and shall maintain all access roads with sufficient dust control and proper drainage to prevent damage to adjacent properties. Area operations shall be restricted to normal working hours except with the express written approval of the Engineer and shall be in accordance with all permit conditions.

1. Slopes shall not be left steeper than 1:3 (V:H) for earthen fills. Slopes shall not be left steeper than 1:2 (V:H) for fill made up of stone or concrete. The tops of slopes and toes of slopes shall be neatly rounded.
2. Stockpiled sod, topsoil, and other stripped material shall be evenly spread over the surface of the area. The complete area shall be seeded and mulched in accordance with the Contract Documents.

**END OF SECTION**



**SECTION 016000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations and procedures.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 RELATED SECTIONS**

- A. Instructions to Bidders: Product options and substitution procedures.
- B. Section 01 3000 - Administrative Requirements: Submittal procedures.
- C. Section 014000 - Quality Requirements: Product quality monitoring.

**1.03 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements for submittal requirements and procedures.
- B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

**PART 2 PRODUCTS**

**2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner , or otherwise indicated as to remain the property of the Owner , become the property of the Contractor ; remove from site.

**2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by the Contract Documents.

**2.03 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

**PART 3 EXECUTION**

**3.01 SUBSTITUTION PROCEDURES**

- A. Instructions to Bidders specifies time restrictions for submitting requests for Substitutions during the bidding period and the documents required. Any products approved during the bidding period will be identified by Addendum.
- B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.
- D. A request for substitution constitutes a representation that the Contractor:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to coordinate installation and make changes to other Work that may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
  - 1. Submit three copies and one electronic copy of request for substitution for consideration. Limit each request to one proposed substitution.
  - 2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.
  - 3. The Engineer will notify Contractor in an addendum of decision to accept or reject request.

### 3.02 **TRANSPORTATION AND HANDLING**

- A. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- B. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- C. Transport and handle products in accordance with manufacturer's instructions.
- D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

### 3.03 **STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.

- F. Provide off-site storage and protection when site does not permit on-site storage or protection.
- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**PART 4 MEASUREMENT AND PAYMENT**

**4.01 ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

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**SECTION 017000  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Starting systems, demonstration, instructions, testing, adjusting, and balancing.
- B. Examination, preparation, and general installation procedures.
- C. Surveying for laying out the work.
- D. Cleaning and protection.
- E. Closeout procedures, final cleaning, punch list, adjusting, project record documents, warranties, spare parts, and maintenance materials.

**1.02 REFERENCES**

- A. Applicable and appropriate operations and maintenance manuals provided by manufacturer.
- B. Contract Documents

**1.03 PERFORMANCE REQUIREMENTS**

- A. Equipment and system must perform as stated in the applicable sections herein prior to final acceptance and payment.

**1.04 SUBMITTALS**

- A. Provide written guidance on schedules and time frame for coordination of various components.
- B. See Section 013000 - Administrative Requirements, for submittal procedures.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

**1.05 OPERATIONS AND MAINTENANCE DATA**

- A. Every individual component supplied for the project shall be identified in the operations and maintenance manual which shall be assembled as follows:
  - 1. Each O&M manual shall be divided into a minimum of two volumes.

**1.06 QUALITY ASSURANCE**

- A. All equipment must be properly labeled as directed by the Manufacturer or in the technical specifications.
- B. All components must be properly labeled and all operations and maintenance manuals must be present on site prior to startup.

**1.07 QUALIFICATIONS**

- A. When specified in individual technical sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to startup, and to supervise placing equipment or system in operation.
- B. Perform testing, adjusting, and balancing.
  - 1. Volume One shall contain at least the following:
    - a. Final tag list.
    - b. Detailed floor plan showing location of each tagged piece of equipment.
    - c. An overview of the plant, the process equipment, and the control system and how the plant's systems and subsystems interact and are controlled.

- d. Complete description prepared by the Process Equipment Supplier of each system and subsystem and component with cross reference to tag number.
  - e. Complete operating and maintenance instructions for each and every item of equipment (referencing tag number), setting forth in detail and step-by-step the procedure for starting, stopping, operating and maintaining the entire system as installed. A schedule of recommended maintenance intervals shall also be included.
  - f. Any special emergency operating instructions and a list of service organizations, including addresses and telephone numbers, capable of rendering emergency service to the various parts of the system.
  - g. Procedures for normal operation, trouble shooting, routine data analysis, water analysis, interpretation of data, etc.
  - h. A section on plant safety in general and for each system.
  - i. Appendices to Volume One shall include the following:
    - 1) P & I.D.'s and mechanical, electrical and instrumentation installation drawings on 11" x 17" size paper.
    - 2) Copy of final control system ladder logic.
    - 3) A complete valve tag list, including the name and function of the pipe in which the valve is mounted.
    - 4) All manufacturer's equipment guarantees and warranties.
2. Volume Two shall contain, at lease, the following:
- a. Manufacturer's manuals for each piece of equipment including individual components and subsystems of complete assemblies. The section of the manual on operation shall describe the function of each component and its relationship to the system of which it is a part. Where several models, options or styles are described, the manual shall identify the items actually provided.
  - b. Blue line prints or reviewed shop drawings or reviewed shop drawing and diagrams of all systems.
  - c. Certified equipment drawings or reviewed shop drawing data clearly marked for equipment furnished.
- C. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Engineer. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate.
- a. Complete parts list of all replaceable parts, their part numbers and the name and address of the nearest vendor.
2. Binding
- a. Manuals shall be bound in durable plastic or fiberboard covers. Each sheet shall be reinforced to prevent tearing from continued use and each manual shall have the following information clearly printed on its inside cover:
    - 1) Project name, name of owner and address (inside and outside cover).
    - 2) Name and address of Engineers.
    - 3) Name and addresses of Contractor and Subcontractors.
    - 4) Telephone numbers of Contractors, including night and emergency numbers.
    - 5) Major equipment vendor's names and telephone numbers.



3. Number of complete sets shall be 3, as outlined herein.

#### **1.08 PROJECT CONDITIONS**

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas as required by Contract Documents and permits. Prevent erosion and sedimentation.
- C. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

#### **1.09 WARRANTY**

- A. Provide duplicate notarized copies.
- B. Execute and assemble transferable warranty documents from Subcontractors, Suppliers, and Manufacturers.
- C. Provide Table of Contents and assemble in binder with durable cover.
- D. Submit prior to final Application for Payment.

### **PART 2 PRODUCTS NOT APPLICABLE**

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions that may cause damage.
- B. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- C. Verify wiring and support components for equipment are complete and tested.
- D. Execute start up under direct supervision of Contractor and in full accordance with manufacturer's instructions.

#### **3.02 PREPARATION**

- A. Execute final facility cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces.
- C. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate for the surface and material being cleaned.
- D. Clean operating equipment components and accessories such as filters.
- E. Clean debris from drainage systems.
- F. Clean site, sweep paved areas, rake clean landscaped surfaces, remove applicable erosion control measures.
- G. Remove waste and surplus materials, rubbish, and construction facilities from the site.
- H. Adjust operating products and equipment to ensure smooth and unhindered operation.

#### **3.03 SCHEDULING AND COORDINATION**

- A. Coordinate schedule for startup of various equipment and systems.
- B. Coordinate with Owner on how project is taken over and operated during transition.

#### **3.04 LAYING OUT THE WORK**

- A. Notify Engineer 48 hours prior to startup of each item.

### **3.05 FIELD QUALITY CONTROL**

- A. Demonstrate operation and maintenance of Products to Owner's personnel prior to date of final inspection.
- B. Demonstrate equipment and instruct in a classroom environment on site by qualified representatives who are knowledgeable about the equipment and its performance.
- C. Verify locations of survey control points prior to starting work.
- D. Demonstrate start up, operation, control, adjustment, troubleshooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- E. The amount of time required for instruction on each item of equipment and system is that specified in individual sections.

### **3.06 TOLERANCES**

- A. Verify that all specified tolerances are being met.
- B. Promptly notify Engineer of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Engineer the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Engineer .
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

### **3.07 PROGRESS CLEANING**

### **3.08 PROTECTION OF INSTALLED WORK**

- A. Protect all finished work until Owner accepts responsibility.

### **3.09 PROJECT RECORD DOCUMENTS**

- A. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during construction.
- B. Submit a written report stating that equipment or system has been properly installed and is functioning correctly.

### **3.10 SPARE PARTS AND MAINTENANCE MATERIALS**

- A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual technical specification sections.
- B. Deliver to location as directed by Engineer.

- C. Reports will be submitted to the Engineer indicating observations and results of tests and indicating compliance or noncompliance with the requirements of the Contract Documents.
- D. Provide to Engineer one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instructions for assembly, installation, and adjusting.
- E. Ensure entries are complete and accurate, enabling future reference by Owner.
- F. Store record documents separate from documents used for construction.
- G. Record information concurrent with construction progress.
- H. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- I. Record Documents and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finished first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract Drawings.
  - 6. Change orders where applicable.
- J. Submit Operations and Maintenance Manual bound in 8½ x 11 inch text pages, capacity expansion binders with durable covers.
  - 1. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project and subject matter of binder when multiple binders are required.
  - 2. Internally subdivide the binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
  - 3. Prepare a Table of Contents for each volume, with each product or system description identified.
  - 4. Submit 1 draft copy of completed volumes 15 days prior to final inspection. This copy will be reviewed and returned, with Engineer comments. Revise content of all document sets as required by Engineer prior to final submission.
  - 5. Submit 3 sets of revised final volumes, within 10 days after final inspection.

- K. Submit written certification that Contract Documents have been reviewed, Work has been inspected, and that Work is complete in accordance with Contract Documents and ready for Engineer's review.

**PART 4 MEASUREMENT AND PAYMENT**

- 4.01 **ALL WORK DESCRIBED HEREIN IS INCIDENTAL TO OTHER RELATED ITEMS OF WORK. NO MEASUREMENT OR ADDITIONAL PAYMENT WILL BE CONSIDERED.**

**END OF SECTION**

**SECTION 023000  
SUBSURFACE INVESTIGATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Geotechnical Evaluation of Sub-Surface Conditions.

**1.02 REFERENCES**

- A. Contract Documents

**1.03 SOIL INVESTIGATION**

- A. A Geotechnical Evaluation Report has been prepared by QC/QA Laboratories, Inc., hereinafter referred to as the Geotechnical Engineer. Electronic copies of the report are available and may be obtained by contacting the Engineer. The actual report, including boring logs, soils analysis and recommendations, is on file and may be inspected at the Engineer's office.
- B. This report was obtained only for the Owner's use in design and is not a part of the Contract Documents. The report and log of borings is available for the Contractor's information, but is not a warrant of subsurface conditions.
- C. The Contractor should visit the site and become acquainted with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but such subsurface investigation shall be performed only under time schedules and arrangements approved in advance by the Construction Manager and Engineer.
- D. The Geotechnical Engineer shall be retained by the Contractor to observe performance of work in connection with excavation, filling and grading. Re-adjust all work that does not meet technical or design requirements, but make no deviations from the Contract Documents without specific and written approval of the Geotechnical Engineer.
- E. The Geotechnical Engineer may be retained by the Owner to observe performance of work in connection with excavation, filling and grading. Re-adjust all work that does not meet technical or design requirements, but make no deviations from the Contract Documents without specific and written approval of the Project Engineer.

**PART 2 PRODUCTS**

**2.01 NOT USED**

**PART 3 EXECUTION**

**3.01 NOT USED**

**END OF SECTION**

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**SECTION 024100  
DEMOLITION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Building demolition.
- B. Abandonment and removal of existing utilities and utility structures.

**1.02 RELATED REQUIREMENTS**

- A. Section 312323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

**1.03 REFERENCE STANDARDS**

- A. State of Vermont Wastewater System and Potable Supply Rules, 2007.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
  - 1. Areas for temporary construction and field offices.
  - 2. Areas for temporary and permanent placement of removed materials.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
  - 2. Identify demolition firm and submit qualifications.
- D. Construction Waste Management Plan: Submit plan in accordance with Section 017419.
- E. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**PART 2 PRODUCTS -- NOT USED**

**PART 3 EXECUTION**

**3.01 SCOPE**

- A. Remove all buildings, appurtenant structures, waste and debris from the area designated on the Contract Plans.
- B. Remove underground tanks that contain or once contained petroleum products; fill and bury other types of tanks.
- C. Remove or abandon existing septic system and all associated appurtenances. Any waste stone or soil removed from the systems shall be disposed or in compliance with section 1-930 of the 2019 Wastewater System and Potable Water Supply Rules.
- D. Remove fences and gates.
- E. Remove other items indicated, for salvage, relocation, recycling and disposal.
- F. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 312200.

**3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.

2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  3. Provide, erect, and maintain temporary barriers and security devices.
  4. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  5. Do not close or obstruct roadways or sidewalks without permit.
  6. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
  7. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.
- B. Do not begin removal until receipt of notification to proceed from Owner .
- C. Protect existing structures and other elements that are not to be removed.
1. Provide bracing and shoring.
  2. Prevent movement or settlement of adjacent structures.
  3. Stop work immediately if adjacent structures appear to be in danger.
- D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- E. If hazardous materials are discovered during removal operations, stop work and notify Engineer and Owner ; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- F. Perform demolition in a manner that maximizes salvage and recycling of materials.
1. Comply with requirements of Section 017419 - Waste Management.
  2. Dismantle existing construction and separate materials.
  3. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

### 3.03 EXISTING UTILITIES

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner .
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner .
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

### 3.04 **DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

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**SECTION 311000  
SITE CLEARING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Clearing and protection of vegetation.
- B. Removal of existing debris.

**1.02 RELATED REQUIREMENTS**

- A. Section 015000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.
- C. Section 312200 - Grading: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Fill Material: As specified in Section 312200 - Grading

**PART 3 EXECUTION**

**3.01 SITE CLEARING**

- A. Comply with other requirements specified in Section 017000.
- B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

**3.02 EXISTING UTILITIES AND BUILT ELEMENTS**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Protect existing structures and other elements that are not to be removed.

**3.03 VEGETATION**

- A. Do not remove or damage vegetation beyond the limits indicated on drawings.
- B. Install substantial, highly visible fences at least 3 feet high (at least 1 m high) to prevent inadvertent damage to vegetation to remain:
  - 1. At vegetation removal limits.
  - 2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
  - 3. Around other vegetation to remain within vegetation removal limits.
  - 4. Where required for permit compliance.
- C. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.
- D. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
  - 1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.

2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
  3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches (450 mm).
  4. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.
- E. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner .

#### 3.04 **DEBRIS**

- A. Remove debris and trash from work limits as necessary to complete work.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**



**SECTION 311143  
HORIZONTAL DIRECTIONAL DRILLING**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. This Section includes provisions for the materials and installation of sleeve and carrier pipe via the method of horizontal directional drilling.

**1.03 SYSTEM PERFORMANCE REQUIREMENTS**

- A. Assembly to meet applicable AOT and AWWA standards.

**1.04 SUBMITTALS**

- A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.
- B. Provide product data, including thickness and size for the following:
  - 1. Steel, PVC or HDPE casing pipe.
  - 2. Carrier pipe.
  - 3. Casing spacers.
  - 4. End seals.
  - 5. HDPE headwall thrust restraint.
  - 6. High strength trace wire.
- C. Provide the name and qualification of proposed directional drilling subcontractor. The information shall include, at a minimum:
  - 1. The qualifications of the subcontractor and key personnel showing that all directional drilling operations will be performed by a competent drill contractor and crew with a minimum of (5) years of relevant experience, at least as complex and of similar size as this project.
  - 2. Identification of key person(s) and contact information proposed for this project.
  - 3. A list of completed projects with details of the types of pipe installations including Owner and Engineer contact names and telephone numbers.
- D. Provide a work plan and schedule of activities proposed to perform the work under this specification, including any proposed variation from the Drawings and Specifications. Information in this work plan shall include, but not be limited to, the following:
  - 1. Method for directional drilling indicating the following:
    - a. Plan showing the work zone equipment configuration at the end of the bore(s), staging areas, storage areas, and the location of slurry, cuttings and pit spoil handling areas.
    - b. Boring procedure, tooling for drilling, method for control slurry, design of entrance and exit pits and method to verify that installed utilities are acceptable.
    - c. Materials list including bentonite and bentonite additives proposed for use on the project along with product data sheets for all materials used on the site.
    - d. Steering and tracking equipment procedures and proposed locations of ground based coils or other equipment requiring surface or subsurface access.

2. Contingency Plans that address each of the following:
  - a. Inadvertent return, and/or spill of drilling fluids, hydraulic fluids, etc., including measures to contain and clean the affected area.
  - b. Clean up of surface seepage of drilling fluids and spoils.
  - c. Collapse of borehole.
  - d. Sealing of abandoned boreholes.
3. Drilling Fluids Management Plan should address the following:
  - a. Identify all proposed drilling muds and additives to be used and provide the Engineer with the appropriate MSDA sheets.
  - b. Calculated hole volumes and drilling fluids volumes.
  - c. Source and amount of water required for drilling mud and all necessary approvals and permits.
  - d. Method of slurry containment and cleanup of all drilling fluid overflows or spills.
  - e. Method of recycling drilling fluid and spoils.
  - f. Method of transporting and disposing of drilling fluids and spoils including proof of approvals for same.
  - g. Allowable pull-back forces and stresses for pipes.
4. Time required for complete pipe installation.

#### 1.05 **QUALITY ASSURANCE**

- A. Directional drilling subcontractor shall comply with requirements of the Town of Bennington Water Department, State of Vermont Agency of Natural Resources and State Agency of Transportation, and all associated permit requirements.
- B. The directional drilling subcontractor shall provide a full-time on-site representative thoroughly knowledgeable of the equipment, boring procedures, and available to address immediate concerns and emergency operations.
- C. The Contractor shall protect piping materials before, during and after installation. In the event of damage, the Contractor shall immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.
- D. Upon the direction of the Engineer, the Contractor shall remove, replace and/or rework all piping that does not meet the requirements of this section. The Contractor shall perform all remedial measures at no additional cost to the Owner.
- E. All work shall be subject to applicable testing requirements of other Specifications Sections.

#### 1.06 **PROJECT CONDITIONS**

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.
- B. Verify that piping may be installed in compliance with original design and referenced standards.
- C. Site Information: Reports on subsurface condition investigations made during the design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions (between soil borings). Owner assumes no responsibility for interpretations or conclusions drawn from this information. Contractor has the responsibility to make themselves aware of site conditions and perform any testing they deem necessary prior to bid.

### **PART 2 - PRODUCTS**

## 2.01 DRILLING FLUIDS

- A. Provide drilling fluids specifically suited for horizontal directional drilling and the site-specific soil/project conditions. Do not use any chemicals or polymer surfactants in the drilling fluid without written consent from the Engineer.
- B. Drilling fluids intended to provide support for pipe in a conduit or sleeve shall be selected to cure in such a manner to provide permanent protection and support of the pipe.
- C. All drilling fluids shall be approved by agencies having jurisdiction prior to use.

## 2.02 WATER

- A. The Owner will allow the Contractor to take water from the Owner's water system at Owner stipulated locations, if necessary. The Contractor shall provide all required tools, equipment and trucking necessary to transport water to the work site.

## 2.03 CASING SPACERS AND END SEALS

- A. Casing Spacers shall be SSI Stainless Steel Casing Spacer as manufactured by Advance Products and Systems, Inc., (APS) or approved equal.
- B. End seals shall be one piece pull-on rubber end seal, Model AC or IL-S316 "Innerlynx" with stainless steel hardware, as manufactured by Advance Products and Systems, Inc., (APS) or approved equal.

## 2.04 PIPING

- A. Casing pipe shall be DR 17 HDPE - 4710, Carbon Steel ASTM A139 Gr. B, AWWA C900/C905 fusible PVC, or approved equal.
- B. Carrier pipe shall be as noted on plans.
- C. HDPE headwall thrust restraint shall be axial thrust restraint as manufactured by Plasson or approved equal.
- D. Trace wire shall be Copperhead SoloShot extra high strength #12 AWG high carbon 1055 grade steel with blue colored insulation or approved equal.

## PART 3 - EXECUTION

### 3.01 GENERAL

- A. All pipes shall be cut, fabricated, and installed in strict conformance with the pipe manufacturer's recommendations.
- B. All pipes shall be installed to lines and grades as shown on the subcontractors drilling plan. Provide horizontal and vertical record locations at 20 ft intervals or less as directed by the Engineer.

### 3.02 DRILLING OPERATIONS

- A. The Contractor shall notify the Engineer (2) business days in advance of starting directional drilling work.
- B. The exact method and techniques for completing the directionally drilled installation shall be determined by the directional drilling subcontractor. The Contractor shall prepare a plan to be submitted for the Engineer review which describes the noise reduction program, solids control plan, and drilling procedure. All drilling operations shall be performed by supervisors and personnel experienced in direction drilling. All required labor, equipment, materials and support services shall be provided by the Contractor. Installation shall at all times comply with the subcontractors directional drilling plan.
- C. The position of the drill string shall be monitored by the directional drilling subcontractor with the downhole survey instruments. The directional drilling subcontractor shall compute the position in the X,Y, and Z axis relative to ground surface from downhole survey data, a

minimum of once per length of each drilling pipe approximately 20 foot interval. Deviations from the acceptable tolerances described in the Specifications shall be documented and immediately brought to the attention of the Engineer for review and/or approval/rejection. The profile and alignment defined on the drawings for the bores define the required grade. The Contractor shall maintain and provide to the Engineer, upon request, the data generated by the downhole survey tools in a form suitable for independent calculation of the pilot hole profile.

- D. Between the entry and exit point, the directional drilling subcontractor shall provide and use a separate steering system employing a ground survey grit system such as "TRU-TRACKER", or equal, wherever possible.
- E. During the entire operation, waste and leftover drilling fluids from the pits and cuttings shall be dewatered and disposed of in accordance with all permits and regulatory agencies requirements. Remaining water shall be cleaned by Contractor to meet permit requirements.
- F. The Owner retains the right to sample or monitor waste drilling mud, cuttings and water.

### 3.03 HANDLING DRILLING FLUIDS AND CUTTINGS

- A. During the drilling, reaming, or pullback operations the directional drilling subcontractor shall make adequate provisions for handling the drilling fluids, and cuttings at the entry and exit pits. These fluids must not be discharged into any waterway or stormwater system. When provisions for storage of the fluids or cuttings on site are exceeded, these materials shall be hauled away to a suitable legal disposal site. The directional drilling operation shall be conducted in such a manner that drilling fluids are not forced through the sub-bottom into any waterway. After completion of the directional drilling work, the entry and exit pit locations shall be restored to original conditions. The Contractor shall comply with all permit provisions.
- B. Pits constructed at the entry or exit point area shall be constructed to completely contain the drill fluid and prevent escape to any waterway. The directional drilling subcontractor shall utilize drilling tools and procedures which will minimize the discharge of any drill fluids. The Contractor shall comply with all mitigation measures indicated in the required permits and elsewhere in the Specifications.
- C. To the extent practical, a closed loop drilling fluid system shall be maintained.
- D. Drilling fluid disposal quantities shall be minimized by utilizing a drilling fluid cleaning system which allows returned fluids to be used.
- E. As a part of the installation plan specified herein before, the Contractor shall submit a drilling fluid plan which details types of drilling fluids, cleaning and recycling equipment, estimated flow rates, and procedures for minimizing drilling fluid escape.

### 3.04 TOLERANCES

- A. Pipe installed by the directional drilling method must be located as shown on the Drawings, both horizontally and in profile unless otherwise approved.
- B. When requested, the Contractor shall provide explanations of this position monitoring and steering equipment and data. The directional drilling subcontractor shall employ experienced personnel to operate the directional drilling equipment and, in particular, the position monitoring steering equipment. No information pertaining to the position or inclination of the pilot bores shall be withheld from the Engineer.
- C. The exit point shall fall within a rectangle 5 feet wide and 10 feet long centered on the planned exit point.

### 3.05 ENVIRONMENTAL PROVISIONS

- A. The directional drilling operation is to be completed in a manner to prevent the discharge of water, drilling mud and cuttings to the adjacent stream, groundwater, or land areas involved during the construction process. Equipment and procedures shall maximize the reuse of drilling mud to minimize waste. All excavated pits used in the drilling operation shall be lined by the Contractor with heavy duty plastic sheeting with sealed joints to prevent the migration of drilling fluids.
- B. The Contractor and directional drilling subcontractor shall visit the site and must be aware of all structures and site limitations at the directional drilling crossing and provide the Engineer with a drilling plan outlining procedures to prevent drilling fluid from adversely affecting the surrounding area.
- C. The general work areas on the entry and exit ends of the drilling shall be enclosed by a berm to contain planned spills or discharge.
- D. Waste cuttings and drilling mud shall be processed through a solid control plant comprised at sumps, pumps, tanks, desalter/desander, centrifuges, material handlers, and/or handlers all in a quantity sufficient to perform the cleaning/separating operation without interference with the drilling program. The cutting and excess drilling fluids shall be dewatered and dried to the extent necessary for disposal in off site landfills. Water from the dewatering process shall be treated by the Contractor to meet permit requirements and disposed of per the authority requirements. The cuttings and water for disposal are subject to being sampled and tested. The construction site and adjacent areas will be checked frequently for signs of unplanned leaks or seeps, as required by the authority.
- E. Equipment and materials for cleanup and contingencies shall be provided in sufficient quantities by the Contractor and maintained by all sites for use in the event of inadvertent leaks, seeps or spills.

### 3.06 **SITE RESTORATION**

- A. At the conclusion of all drilling operations, remove any excavation support systems that may have been installed for the entrance and exit pits. If withdrawal would damage or disturb the roadway subgrade or ground surface, leave supports in place and cut off three feet below finished grade.
- B. All abandoned pilot and boreholes shall be grouted closed with grout or bentonite within 48 hours of abandonment. No additional compensation will be provided for grouting abandoned boreholes.

### 3.07 **BORE PATH REPORT**

- A. The Contractor shall furnish a Bore Path Report to the Engineer within seven days of the completion of each bore path. Include in the following report:
  - 1. Location of the project.
  - 2. Name of the person collecting data, including title, position and company name.
  - 3. Identification of the detection method used.
  - 4. Elevations and offset locations of critical changes in bore path.
  - 5. Copy of drilling fluids testing logs.

### 3.08 **RECORD PLANS**

- A. The Contractor shall provide the Engineer with a complete set of Record Plans showing all bores (successful and failed) within 30 calendar days of completing the work. Ensure that the plans are dimensionally correct copies of the Contract Plans and include plan and profile, boring location and subsurface conditions as directed by the Engineer. The plans must show appropriate elevations at 20 foot intervals and be referenced to the design plan datum. Specific plan content requirements include, but are not limited to the following:

1. The horizontal center of the pipe.
2. Bore path profile.
3. Bore notes on each plan stating the final bore path diameter, pipe diameter, drilling fluid composition, and composition of any other material used to fill the annular void between the bore path and the pipe.

**END OF SECTION**



**SECTION 312200  
GRADING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Removal of topsoil.
- B. Rough grading the site for site structures.
- C. Finish grading.

**1.02 RELATED REQUIREMENTS**

- A. Section 311000 - Site Clearing.
- B. Section 312316 - Excavation.
- C. Section 312316.13 - Trenching: Trenching and backfilling for utilities.
- D. Section 312316.26 - Rock Removal.
- E. Section 312323 - Fill: Filling and compaction.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Topsoil: See Section 312323.
- B. Other Fill Materials: See Section 312323.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the Work are as indicated.
- B. Verify the absence of standing or ponding water.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect from damage above- and below-grade utilities to remain.
- D. Notify utility company to remove and relocate utilities.
- E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.
- F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs, from damage by grading equipment and vehicular traffic.

**3.03 ROUGH GRADING**

- A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.
- B. Do not remove topsoil when wet.
- C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.
- D. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

- G. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

#### 3.04 SOIL REMOVAL

- A. Stockpile topsoil to be re-used on site; remove remainder from site.
- B. Stockpile subsoil to be re-used on site; remove remainder from site.
- C. Stockpiles: Use areas designated on site; protect from erosion.
- D. All removed material shall be transported to a Contractor secured site within the corrective action area. No material shall leave the corrective action area.

#### 3.05 FINISH GRADING

- A. Before Finish Grading:
  - 1. Verify building and trench backfilling have been inspected.
  - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch (13 mm) in size. Remove soil contaminated with petroleum products.
- C. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 3 inches (75 mm).
- D. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.
- E. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

#### 3.06 REPAIR AND RESTORATION

- A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

#### 3.07 FIELD QUALITY CONTROL

- A. See Section 312323 for compaction density testing.

**END OF SECTION**

**SECTION 312316  
EXCAVATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures and utilities within the building.
- B. Trenching for utilities outside the building to utility main connections.
- C. Temporary excavation support and protection systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring. General requirements for dewatering of excavations and water control.
- C. Section 311000 - Site Clearing: Vegetation and existing debris removal.
- D. Section 312200 - Grading: Soil removal from surface of site.
- E. Section 312200 - Grading: Grading.
- F. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.
- G. Section 312316.26 - Rock Removal: Removal of rock during excavating.
- H. Section 312323 - Fill: Fill materials, backfilling, and compacting.
- I. Section 313700 - Riprap.
- J. Section 334100 - Subdrainage: Filter aggregate and filter fabric for foundation drainage systems.

**1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards current edition.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Bedding and Fill to Correct Over-Excavation:
  - 1. See Section 312323 for bedding and corrective fill materials at general excavations.
  - 2. See Section 312316.13 for bedding and corrective fill materials at utility trenches.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that survey bench mark and intended elevations for the work are as indicated.
- B. Survey existing adjacent structures and improvements and establish exact elevations at fixed points to act as benchmarks.
  - 1. Resurvey benchmarks during installation of excavation support and protection systems and notify Owner if any changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. See Section 311000 for clearing, grubbing, and removal of existing debris.

- C. See Section 312200 for topsoil removal.
- D. Locate, identify, and protect utilities that remain and protect from damage.
- E. Notify utility company to remove and relocate utilities.
- F. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic.
- G. Protect plants, lawns, rock outcroppings and other features to remain.
- H. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Engineer.
- I. Contractor shall schedule meeting with Homeowner and Engineer to coordinate service line route prior to commencing any work on private property.

### 3.03 **TEMPORARY EXCAVATION SUPPORT AND PROTECTION**

- A. Excavation Safety: Comply with OSHA's Excavation Standard, 29 CFR 1926, Subpart P.
  - 1. Depending upon excavation depth, time that excavation is open, soil classification, configuration and slope of excavation sidewalls, design and provide an excavation support and protection system that meets the requirements of 29 CFR 1926, Subpart P:

### 3.04 **EXCAVATING**

- A. Excavate to accommodate new structures and construction operations.
  - 1. Excavate to the specified elevations.
  - 2. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
- B. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Provide temporary means and methods, as required, to remove all water from excavations until directed by Engineer. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

**END OF SECTION**

## **SECTION 312316.13 TRENCHING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Backfilling and compacting for utilities outside the building to utility main connections.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Site grading.
- B. Section 312316 - Excavation: Building and foundation excavating.
- C. Section 312316.26 - Rock Removal: Removal of rock during excavating.

#### **1.03 REFERENCE STANDARDS**

- A. AASHTO T 180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18 in.) Drop 2018.
- B. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method 2007.
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2011.
- G. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017.

### **PART 2 PRODUCTS**

#### **2.01 FILL MATERIALS**

#### **2.02 SOURCE QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that survey bench marks and intended elevations for the work are as indicated.

#### **3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum locations.
- B. Locate, identify, and protect utilities that remain and protect from damage.
- C. Notify utility company to remove and relocate utilities.
- D. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving and curbs from excavating equipment and vehicular traffic. If disturbed or lost, the Contractor shall immediately have them replaced by a Licensed Surveyor, at no additional

cost to the Owner.

- E. Protect plants, lawns, rock outcroppings and other features to remain.
- F. Grade top perimeter of trenching area to prevent surface water from draining into trench. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by the Engineer.
- G. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations. The Contractor shall be responsible for any repairs or remedial work necessary, at no additional cost to the Owner.
- H. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- I. Provide erosion control measures to meet State Permit and as out lined in the Erosion Control Specification Section.

### 3.03 TRENCHING

- A. Notify Engineer of unexpected subsurface conditions and discontinue affected Work in area until notified to resume work.
- B. Slope banks of excavations deeper than 4 feet (1.2 meters) to angle of repose or less until shored.
- C. Do not interfere with 45 degree bearing splay of foundations.
- D. Cut trenches wide enough to allow inspection of installed utilities.
- E. Hand trim excavations. Remove loose matter.
- F. Remove large stones and other hard matter that could damage piping or impede consistent backfilling or compaction.
- G. Remove lumped subsoil, boulders, and rock.
- H. Remove excavated material that is unsuitable for re-use from site.
- I. Stockpile excavated material to be re-used in area designated on site.
- J. Remove excess excavated material from site.
- K. Provide temporary means and methods, as required, to remove all water from trenching. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

### 3.04 PREPARATION FOR UTILITY PLACEMENT

- A. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- B. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- C. Until ready to backfill, maintain excavations and prevent loose soil from falling into excavation.
- D. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, and 12 inches each side, unless otherwise indicated.
- E. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading



- F. Where encountering rock or another unyielding bearing surface, carry trench excavation 6 inches below invert elevation to receive bedding course.

### 3.05 BACKFILLING

- A. Notify Engineer when excavations have reached required Subgrade.
- B. When Engineer determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Backfill to contours and elevations indicated using unfrozen materials.
- D. Employ a placement method that does not disturb or damage other work.
- E. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- F. Maintain optimum moisture content of fill materials to attain required compaction density.
- G. Slope grade away from building minimum 2 inches in 10 feet (50 mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
  - 1. Use general fill, flush to required elevation, compacted to minimum 95 percent of maximum dry density.
- I. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade and similar construction: 95 percent of maximum dry density.
  - 2. At other locations: 85 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Install warning tape directly above utilities, 18 inches above utility.
- L. Backfill excavations promptly, but not before completing the following:
  - 1. Acceptance of construction below finish grade.
  - 2. Removal of temporary shoring and bracing, and sheeting.
  - 3. Removal of all trash and debris from excavation.
  - 4. Any existing underground utilities encountered during trenching shall be inspected and surveyed for as built before backfilling.
- M. Backfill excavations at the end of each working day.

### 3.06 TOLERANCES

- A. Top Surface of General Backfilling: Plus or minus 1 inch (h) from required elevations.
- B. Top Surface of Backfilling Under Paved Areas: Plus or minus [0.5] inch ([ ] mm) from required elevations.

### 3.07 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167 or ASTM D6938.
- C. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D1557 ("modified Proctor") or ASTM D698 ("standard Proctor").
- D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

E. Frequency of Tests:

1. Trench Backfill: At minimum 200 LF intervals, density tests shall be performed at top of pipe bedding and each successive lift.

**END OF SECTION**

**SECTION 312316.26  
ROCK REMOVAL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Removal of identified rock during excavation.

**1.02 DEFINITIONS**

- A. Site Rock: Solid mineral material with a volume in excess of 1 cubic yard ([ ] cubic meter) or solid material that cannot be removed with a 3/4 cubic yard (0.57 cubic meter) capacity power shovel without drilling.

**1.03 REFERENCE STANDARDS**

- A. NFPA 495 - Explosive Materials Code 2018.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate the proposed method of blasting, delay pattern, explosive types, type of blasting mat or cover, and intended rock removal method.
- C. Pre and Post Blast Surveys.

**1.05 QUALITY ASSURANCE**

- A. Seismic Survey Firm: Company specializing in seismic surveys with five years documented experience.
- B. Explosives Firm: Company specializing in explosives for disintegration of rock, with five years documented experience.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Explosives: Type recommended by explosive firm following seismic survey and required by authorities having jurisdiction.
- B. Delay Device: Type recommended by explosives firm.
- C. Blast Mat Materials: Type recommended by explosives firm.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify site conditions and note subsurface irregularities affecting work of this section.

**3.02 PREPARATION**

- A. Identify required lines, levels, contours, and datum.

**3.03 ROCK REMOVAL**

- A. Excavate and remove rock by either mechanical or explosive methods.
- B. Mechanical Methods: Drill holes and utilize expansive tools to fracture rock.
- C. If rock is uncovered requiring the explosives method for rock disintegration, execute as follows:
  - 1. Maintain at least two continuous recording seismographs on site during explosive detonation which shall be reviewed by an Engineer qualified to assess accelerations produced by explosive shockwaves.
  - 2. Disintegrate rock and remove from excavation.

- D. Use of Explosives: Obtain permits from authorities having jurisdiction before explosives are brought to site or drilling is started.
  - 1. Comply with NFPA 495 and applicable state and local codes.
  - 2. Prior to blasting, obtain a seismographic survey to determine maximum charges that can be used at each location in area of excavation without damaging adjacent properties or other work.
  - 3. Prior to executing seismographic survey, advise owners of adjacent buildings and structures in writing; explain planned survey and blasting operations.
  - 4. Prior to blasting, document conditions of buildings near locations of intended blasting and photograph existing conditions identifying existing irregularities.
  - 5. Schedule work to avoid working hours of occupied buildings nearby.
  - 6. Unless otherwise noted, conduct drilling operations Monday through Friday; 7:00 am to 5:00 pm. Explosive detonations shall be limited to 9:00 am to 4:00 pm Monday through Friday.
  - 7. After blasting, document conditions of buildings near locations of blasting and photograph conditions identifying any changes to the pre-existing conditions.
- E. Form level bearing at bottom of excavations.
- F. Remove shaled layers to provide sound and unshattered base for footings.
- G. In utility trenches, excavate to 6 inches (150 mm) below invert elevation of pipe and 24 inches (600 mm) wider than pipe diameter. Or 42 inches wide, whichever is greater.
- H. Remove excavated materials from site.
- I. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 312323. No payment will be made to correct unauthorized rock removal.
- J. Maintain and provide to Engineer daily records of hole location, total depth, depth to rock, explosive load, weight per delay per hole, and the type of subsurface materials and any unusual event during an explosive detonation.

#### 3.04 FIELD QUALITY CONTROL

- A. Independent agency field inspection will be provided under provisions of Section 014000 - Quality Requirements.

**END OF SECTION**

**SECTION 312323**  
**FILL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Filling, backfilling, and compacting for building volume below grade.
- B. Backfilling and compacting for utilities outside the building to utility main connections.

**1.02 RELATED REQUIREMENTS**

- A. Section 015713 - Erosion and Sediment Control: Slope protection and erosion control.
- B. Section 033000 - Cast-in-Place Concrete.
- C. Section 312200 - Grading: Removal and handling of soil to be re-used.
- D. Section 312200 - Grading: Site grading.
- E. Section 312316 - Excavation: Removal and handling of soil to be re-used.
- F. Section 312316.13 - Trenching: Excavating for utility trenches outside the building to utility main connections.
- G. Section 312316.26 - Rock Removal: Removal of rock during excavating.
- H. Section 313700 - Riprap.

**1.03 REFERENCE STANDARDS**

- A. AASHTO M 147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses 2017.
- B. ASTM C136/C136M - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates 2014.
- C. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft<sup>3</sup> (600 kN-m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- D. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft<sup>3</sup> (2,700 kN m/m<sup>3</sup>)) 2012, with Editorial Revision (2015).
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method 2015.
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System) 2011.
- G. ASTM D6938 - Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth) 2017.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Soil Samples: 10 pounds (4.5 kg) sample of each type of fill; submit in air-tight containers to testing laboratory.
- C. Materials Sources: Submit name of imported materials source.
- D. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used, including manufactured fill.
- E. Compaction Density Test Reports.
- F. Testing Agency Qualification Statement.

**1.05 QUALITY ASSURANCE**

- A. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. When necessary, store materials on site in advance of need.
- B. When fill materials need to be stored on site, locate stockpiles where indicated.
  - 1. Separate differing materials with dividers or stockpile separately to prevent intermixing.
  - 2. Prevent contamination.
  - 3. Protect stockpiles from erosion and deterioration of materials.

**PART 2 PRODUCTS**

**2.01 FILL MATERIALS**

- A. General Fill: Subsoil excavated on-site.
  - 1. Graded.
  - 2. Free of lumps larger than 3 inches (75 mm), rocks larger than 6 inches ([ ] mm), and debris.
- B. Structural Fill: Subsoil excavated on-site.
  - 1. Structural Fill shall consist of on-site sand and/or gravel soils, or an imported, well graded crusher run stone or bank-run sand and gravel, which is free of clay, organics and friable or deleterious particles. Imported Structural Fill should also conform to the following gradation requirements.
    - 2 inch sieve: 100 percent passing
    - 1/4 inch sieve: 25 to 85 percent passing
    - #40 sieve: 5 to 50 percent passing
    - #200 sieve: 0 to 8 percent passing
- C. Crushed Gravel for Subbase: Coarse aggregate, conforming to State of Vermont Highway Department standard.
  - 1. Coarse - 704.05A:
    - 4 inch sieve: 95 to 100 percent passing
    - #4 sieve: 25 to 50 percent passing
    - #100 sieve: 0 to 12 percent passing
    - #200 sieve: 0 to 6 percent passing
  - Fine - 704.05B:
    - 2-inch sieve: 100 percent passing
    - 1-1/2 inch sieve: 90 to 100 percent passing
    - #4 sieve: 30 to 60 percent passing
    - #100 sieve: 0 to 12 percent passing
    - #200 sieve: 0 to 6 percent passing
- D. Drainage Aggregate: Shall consist of clean, hard, crushed washed stone or washed crushed gravel meeting the material and gradation requirements of the VTrans Standard Specifications Section 704.16A, or approved equivalent:
  - 1. 3/4" Crushed Stone



- 1 inch sieve: 100 percent passing
  - 3/4 sieve: 90 to 100 percent passing
  - 3/8 sieve: 20 to 55 percent passing
  - #4 sieve: 0 to 10 percent passing
  - #8 sieve: 0 to 5 percent passing
- E. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
1. Graded in accordance with ASTM C136/C136M; within the following limits:
    - #4 sieve: 100 percent passing
    - #100 sieve: 0-20 percent passing
    - #200 sieve: 0-8 percent passing
- F. Bedding Material: Sand or granular materials with 100 percent passing a 1/2 inch sieve, 20 percent passing the #4 and not more than 8 percent passing a No. 200 sieve.
- G. Topsoil: Obtain from project site or from areas having similar soil characteristics found at the project site.
1. Whenever possible, stockpile and reapply topsoil to disturbed areas.
  2. When insufficient topsoil on site exists, provide new topsoil with the following characteristics:
    - a. 4 to 6 percent by weight of fine-textured, stable organic material.
    - b. Contains not less than 20 percent fine textured material (passing the No 200 sieve) and not more than 15% clay.
    - c. Be relatively free of stones over 1-1/2 inch diameter, trash, noxious weeds such as nutsedge and quackgrass.
    - d. Compost and other amendment materials shall have a C:N ratio below 25:1. Compost shall meet the Vermont Solid Waste Management definition.
    - e. Does not contain soluble salts greater than 500 ppm.
  3. Free of roots, rocks larger than 1/2 inch (12 mm), subsoil, debris, large weeds and foreign matter.
- H. Stone for Stone Fill: Stone for stone fill shall be approved, hard, blasted, angular rock other than serpentine rock containing the fibrous variety chrysotile (asbestos). The least dimension of the stone shall be greater than 33 percent of the longest dimension. The stone fill shall be reasonably well graded from smallest to the maximum size stone specified so as to form a compact mass when in place
1. Type I. The longest dimension of the stone shall vary from 1-12 inches, and at least 50% of the volume of the stone in place shall have a minimum dimension of 4 inches.
  2. Type II . The longest dimension of the stone shall vary from 2 to 36 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 12 inches.
  3. Type III. The longest dimension of the stone shall vary from 3 to 48 inches, and at least 50% of the volume of the stone in-place shall have a minimum dimension of 16 inches.
  4. Type IV. The longest dimension of the stone shall vary from 3 to 60 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 20 inches.

5. Type X. The longest dimension of the stone shall be at least 120 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 24 inches. The least dimension of the stone shall be greater than 33 percent of the longest dimension.

## 2.02 ACCESSORIES

- A. Turf Reinforcement: Biodegradable, East Coast Erosion Control Blanket ECC-2B, or Engineer approved equal.
- B. Geotextile fabrics shall conform to VTrans Standard Specifications Section 720, or approved equivalent, or as indicated on the plans.

## 2.03 SOURCE QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.
- B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.
- C. If tests indicate materials do not meet specified requirements, change material and retest.
- D. Provide materials of each type from same source throughout the Work.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that survey bench marks and intended elevations for the Work are as indicated.
- B. Identify required lines, levels, contours, and datum locations.
- C. Verify areas to be filled are not compromised with surface or ground water.

### 3.02 PREPARATION

- A. Proofroll subgrade to identify soft spots.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.
- C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.
- D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

### 3.03 FILLING

- A. Fill to contours and elevations indicated using unfrozen materials.
- B. Fill up to subgrade elevations unless otherwise indicated.
- C. Employ a placement method that does not disturb or damage other work.
- D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.
- E. Maintain optimum moisture content of fill materials to attain required compaction density.
- F. Place and compact material in equal continuous layers not exceeding 6 inches compacted depth.
- G. Slope grade away from building minimum 6 inches in 10 feet ([ ] mm in 3 m), unless noted otherwise. Make gradual grade changes. Blend slope into level areas.
- H. Correct areas that are over-excavated.
  1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 95 percent of maximum dry density.
  2. Other areas: Use general fill, flush to required elevation, compacted to minimum 85 percent of maximum dry density.

- I. Compaction Density Unless Otherwise Specified or Indicated:
  - 1. Under paving, slabs-on-grade and similar construction: 95 percent of maximum dry density.
  - 2. At other locations: 85 percent of maximum dry density.
- J. Reshape and re-compact fills subjected to vehicular traffic.
- K. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Engineer. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

### 3.04 FILL AT SPECIFIC LOCATIONS

- A. Use general fill unless otherwise specified or indicated.
- B. Over Subdrainage Piping at Foundation Perimeter and Under Slabs:
  - 1. Drainage aggregate and geotextile fabric.
  - 2. Cover drainage fill with general fill.
  - 3. Compact to 95 percent of maximum dry density.
- C. Buried Utility Piping, Conduits and Duct Bank in Trenches:
  - 1. Bedding: Use Fill Type Bedding.
  - 2. Cover with general fill.
  - 3. Fill up to subgrade elevation.
  - 4. Compact in maximum 6 inch ([ ] mm) lifts to 95 percent of maximum dry density.
- D. At Lawn Areas:
  - 1. Use general fill.
  - 2. Fill up to 4 inches ([ ] mm) below finish grade elevations.
  - 3. Fill up to subgrade elevations.
  - 4. Compact to 85 percent of maximum dry density.
  - 5. See Section 312200 for topsoil placement.
- E. At Planting Areas Other Than Lawns:
  - 1. Use general fill.
  - 2. Fill up to 12 inches (300 mm) below finish grade elevations.
  - 3. Fill up to subgrade elevations.
  - 4. Compact to 85 percent of maximum dry density.
  - 5. See Section 312200 for topsoil placement.
- F. At French Drains:
  - 1. Use Fill Type Drainage Aggregate.
  - 2. Compact to 95 percent of maximum dry density.

### 3.05 TOLERANCES

- A. Top Surface of General Filling: Plus or minus 1 inch (25 mm) from required elevations.
- B. Top Surface of Subgrade Under Paved Areas: Plus or minus 1 inch (25 mm) from required elevations.
- C. Top Surface Under Paved Areas: Plus or minus 1/2 inch from required elevations.

### 3.06 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.
- B. Soil Fill Materials:
  - 1. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor").
  - 2. If tests indicate work does not meet specified requirements, remove work, replace and retest.
  - 3. Frequency of Tests:
    - a. Trench Backfill: At 200 LF intervals, density tests shall be performed at top of pipe bedding, mid-depth of general backfill, and top of general backfill.
    - b. Paved Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 5,000 sq. ft. (186 sq. m) or less of paved area but in no case less than three tests.
    - c. As directed by Engineer.

### 3.07 CLEANING

- A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

**END OF SECTION**

**SECTION 321216  
ASPHALT PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aggregate base course.
- B. Bituminous concrete paving.

**1.02 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Preparation of site for paving and base.
- B. Section 312323 - Fill: Compacted subgrade for paving.
- C. Section 321723.13 - Painted Pavement Markings

**1.03 REFERENCE STANDARDS**

- A. Vermont Agency of Transportation (VTrans) - Standard Specifications for Construction; 2018.
- B. AI MS-2 - Asphalt Mix Design Methods 2015.
- C. ASTM D946 - Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction 2009a.

**1.04 QUALITY ASSURANCE**

- A. Perform Work in accordance with VTrans Standard Specifications.
- B. Provide Engineer with Manufacturers written certification that each load of asphalt cement (A.C.) meets the requirements of the specification.
- C. Provide asphalt mix design no less than 15 days prior to beginning construction.
- D. Mixing Plant: Conform to VTrans Standard Specifications.
- E. Obtain materials from same source throughout.

**1.05 FIELD CONDITIONS**

- A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F ([ ] degrees C), or surface is wet or frozen.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Performance-Graded Asphalt Binder: Conform to Section 406 of the VTrans Standard Specifications for Bituminous Concrete Pavement (Marshall).
- B. Aggregate for mix: Conform to Section 406.03A of the VTrans Standard Specifications.
- C. Tack Coat: Homogeneous, medium curing, liquid asphalt.
  - 1. Emulsified asphalt meeting requirements of either ASTM D977, Grade SS-1H, or ASTM D2397, Grade CSS-1H.
- D. Geotextile Fabric: Geotextile for Roadbed Separator shall conform to Section 720 of the VTrans Standard Specifications.

**2.02 ASPHALT PAVING MIXES AND MIX DESIGN**

- A. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.
- B. Submit proposed mix design of each class of mix for review prior to beginning of work. Unless otherwise noted, mix designs shall be Marshall Type 2, Type 3 or Type 4.

**2.03 SOURCE QUALITY CONTROL**

- A. Test mix design and samples in accordance with State of Vermont Highway standards.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that compacted subgrade and/or aggregate base is dry and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct prior to beginning paving operations.
- C. Verify utility castings are properly adjusted to grade prior to beginning paving operations.

#### **3.02 PREPARATION - TACK COAT**

- A. Provide clean saw cut edges prior to paving.
- B. All surfaces shall be cleaned and sprayed with an RS-1, CRS-1, RS-1h or CRS-1h emulsified asphalt prior to placing any bituminous mixture.
- C. Apply tack coat in accordance with manufacturer's instructions.
- D. Apply tack coat in accordance with Section 406.12 and at the application rates stated Table 406.12A of the VTrans Standard Specifications.
- E. Apply tack coat to contact surfaces of curbs, gutters, adjacent pavement joints, and between subsequent asphalt lifts.
- F. Maintain proper distributor spray bar height and spray nozzle angle. Maintain proper distributor speed during application.
- G. Coat surfaces of manhole frames with environmentally safe product to prevent bond with asphalt pavement. Do not tack coat these surfaces.

#### **3.03 PLACING ASPHALT PAVEMENT**

- A. Place asphalt base course within 8 hours of applying primer or tack coat.
- B. Place base and wearing courses to compacted thickness specified in plans.
- C. Maintain a mix laydown temperature of no less than 230 degrees F when ambient temperature is 60 degrees F or higher. When ambient temperature is below 60 degrees F, Engineer will determine laydown temperature.
- D. Spread and finish all mixtures with a self-propelled, bituminous paver, to the required section, leaving the mixture uniformly dense, smooth, and free from irregularities. In locations where it is impractical to use self-propelled bituminous pavers, or other types of lay-down equipment, a road grader or maintainer may be used if approved by the Engineer.
- E. Control the speed of paver to place the mixture uniformly and continuously without tearing or gouging. Do not exceed the Manufacturer's recommendation, and coordinate the paver speed with the output of the plant to provide for a smooth, continuous operation, minimizing starting and stopping.
- F. Level, fill or rake all transverse and longitudinal joints, high or low areas, and surface irregularities, prior to compaction. Immediately remove material dropped on previously compacted lanes.
- G. Sweep and tack previously placed layer or surface before spreading the next layer.
- H. Tack all joints and coordinate vertical construction joints in successive courses so the joints do not fall on the same vertical plane.
- I. Place pavement uniformly against the surface or edge of curb, gutters, manholes or similar structures, and at such an elevation so that the pavement is ¼-inch higher than the edge of the structure after the pavement has been compacted.



- J. Correct any low or high defective areas immediately. Correction can be accomplished by patching or cutting out the surface and replacing with fresh, hot, bituminous mixture, or by milling the surface.
- K. The sequence of rolling operations as well as the type and number of rollers must be commensurate with production, and adequate to obtain the specified density before the mat temperature falls below 185 degrees F.
- L. Thoroughly compact with hand or other mechanical tampers approved by the Engineer any areas not accessible to standard asphalt rollers.
- M. Remove and replace any mixture that becomes loose, broken, or becomes mixed with dirt, shows any excess deficiency of bitumen, or is defective in any manner.
- N. Do not place hot mix on a frozen subgrade, or when weather conditions prevent the proper handling or finishing of the asphalt pavement. Presence of frost particles in or on the subgrade or base course is considered a frozen subgrade.
- O. Compact asphalt pavement sloughs with rollers capable of providing a smooth, finished, compacted slough that is free of tire marks and unevenness or drop-off.
- P. Failing tests from field samples will be considered sufficient evidence to reject a full day's work.
- Q. Adjust any casting that is not 1/4-inch below the top of the finished surface. Adjust casting upward if greater than 1/4-inch below the top of the finished surface.
- R. Asphalt pavement shall be compacted to 95 percent of the Theoretical Maximum Density (Rice Method). Density of field samples shall be tested with a nuclear density gage at specified frequency.
- S. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks.

#### 3.04 **PLACING ASPHALT PAVEMENT - OVERLAY**

- A. Cold-plane at terminations.
- B. Prepare surface for pavement installation by sweeping and tack coating pavement.
- C. Installed specified overlay as noted in the Contract Plans.
- D. A rubber-tired roller must be used on the shim coat to knead the pavement in the existing road profile.

#### 3.05 **TOLERANCES**

- A. Flatness: Maximum variation of 1/4 inch (6 mm) measured with 10 foot (3 m) straight edge.
- B. Compacted Thickness: Within 1/4 inch (6 mm) of specified or indicated thickness.
- C. Variation from True Elevation: Within [1/4] inch ([ ] mm).
- D. Adjacent surface match: New finished surface must be 1/4-inch above any adjacent surface.

#### 3.06 **FIELD QUALITY CONTROL**

- A. See Section 014000 - Quality Requirements, for general requirements for quality control.
- B. The density of the compacted asphalt pavement shall be tested with a nuclear density gauge at a frequency of one (1) test per 1,500 square yards per lift of asphalt pavement, or a minimum of one (1) test per lift of pavement per day.
- C. Provide field inspection and testing. Take samples and perform tests in accordance with AI MS-2.
- D. Asphalt paving mixture shall be field sampled and tested for conformance with the mix design at intervals of one (1) test per 1,000 tons of asphalt pavement produced, or a

minimum of one (1) test per lift of pavement per day.

- E. The density of the compacted asphalt pavement shall be tested with a nuclear density gauge at a frequency of one (1) test per 1,500 square yards per lift of asphalt pavement, or a minimum of one (1) test per lift of pavement per day.
- F. Contractor shall pay for all additional tests and inspection required due to failing work and/or tests, and for any repairs and/or replacement necessitated by failing work.
- G. Copies of all load slips must be handed to inspectors at the delivery of each load.

### 3.07 PROTECTION

- A. Immediately after placement, protect pavement from mechanical injury until surface temperature is less than 140 degrees F (60 degrees C).
- B. Do not allow traffic on the completed surfacing until the mat has been compacted and has cooled sufficiently to prevent damage.
- C. Damage to the asphalt pavement due to inadequate protection shall be repaired by the Contractor to the satisfaction of the Engineer at no cost to the Owner.

**END OF SECTION**

**SECTION 321313  
CONCRETE PAVING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete sidewalks, stair steps, integral curbs, gutters, median barriers, parking areas and roads.
- B. Detectable Warning Panels for ADA curb ramps.
- C. Concrete Formwork.

**1.02 RELATED REQUIREMENTS**

- A. Concrete Reinforcement.
- B. Joint sealing for concrete expansion joints.
- C. Section 312200 - Grading: Preparation of site for paving and base and preparation of subsoil at pavement perimeter for planting.
- D. Section 312323 - Fill: Compacted subbase for paving.

**1.03 REFERENCE STANDARDS**

- A. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).
- B. ACI 301 - Specifications for Structural Concrete 2016.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- D. ACI 305R - Guide to Hot Weather Concreting 2010.
- E. ACI 306R - Guide to Cold Weather Concreting 2016.
- F. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2018.
- G. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.
- H. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2016, with Editorial Revision (2016).
- I. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens 2018.
- J. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2018.
- K. ASTM C150/C150M - Standard Specification for Portland Cement 2018.
- L. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method 2016.
- M. ASTM C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete 2010a (Reapproved 2016).
- N. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete 2011.
- O. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete 2017.
- P. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete 2015.
- Q. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2014.

- R. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.
- S. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction 2018.
- T. ASTM D8139 - Standard Specification for Semi-Rigid, Closed-Cell Polypropylene Foam, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction 2017.

#### 1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on joint filler, admixtures, curing compound and detectable warning panels.
- C. Provide a concrete mix design prepared by an independent testing laboratory. Design mixes in accordance with ACI 301.
- D. Prior to pouring concrete in hot weather, submit a written hot weather concreting plan to the Engineer for approval.
- E. Prior to pouring concrete in cold weather, submit a written cold weather concreting plan to the Engineer for approval.

### PART 2 PRODUCTS

#### 2.01 PAVING ASSEMBLIES

- A. All site concrete shall be, at a minimum, 4,000 psi at 28 days, unless specified elsewhere. Thickness, section and reinforcement as indicated on plans.

#### 2.02 FORM MATERIALS

- A. Form Materials: Conform to ACI 301 and ACI 347.
  - 1. Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
- B. Joint Filler: Preformed; non-extruding bituminous type (ASTM D1751) or sponge rubber or cork (ASTM D1752).
  - 1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
  - 2. Thickness: 1/2 inch (12 mm).

#### 2.03 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) (420 MPa) yield strength; deformed billet steel bars; unfinished.
- B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.
- C. Dowels: ASTM A615/A615M, Grade 60 - 60,000 psi (420 MPa) yield strength; smooth steel bars; unfinished.

#### 2.04 CONCRETE MATERIALS

- A. Obtain cementitious materials from same source throughout.
- B. Cement: ASTM C150/C150M, Type II/IIA Portland cement, gray color.
- C. Fine and Coarse Mix Aggregates: ASTM C33/C33M.
- D. Fly Ash: ASTM C618, Class C or F.
- E. Water: Clean and potable, and not detrimental to concrete.
- F. Air-Entraining Admixtures: ASTM C260/C260M.

- G. Chemical Admixtures: ASTM C494/C494M, Type A - Water Reducing, Type C - Accelerating and Type G - Water Reducing, High Range and Retarding.
  - 1. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

#### 2.05 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1, Class A.
- B. Slab Isolation Joint Filler: 1/2 inch (13 mm) thick, height equal to slab thickness, with removable top section that will form 1/2 inch (13 mm) deep sealant pocket after removal.
- C. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
- D. Detectable Warning Panels
  - 1. Detectable Warning Panels shall consist of square or rectangular panels with a surface of truncated domes, aligned in a square or radial grid pattern. Panels shall extend the full width of all curb ramp landings, and a minimum of 24 inches in the predominant direction of travel. Panels shall be wet-set; surface applied panels will not be allowed.

#### 2.06 CONCRETE MIX DESIGN

- A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.
- B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
  - 1. For trial mixtures method, employ independent testing agency acceptable to Engineer for preparing and reporting proposed mix designs.
- C. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended by manufacturer.
- D. Concrete Properties:
  - 1. Compressive strength, when tested in accordance with ASTM C39/C39M at {CH#15030} days; {CH#15031}.
  - 2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
  - 3. Total Air Content: 4 to 7 percent, determined in accordance with ASTM C173/C173M.
  - 4. Maximum Slump: 4 inches (100 mm).

#### 2.07 MIXING

- A. Transit Mixers: Comply with ASTM C94/C94M.
- B. Concrete Supplier shall provide a load ticket for each delivery of concrete

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.
- B. Verify gradients and elevations of base are correct.

#### 3.02 SUBBASE

- A. See Section 321123 for construction of base course for work of this Section.

#### 3.03 PREPARATION

- A. Moisten base to minimize absorption of water from fresh concrete.
- B. Coat surfaces of manhole and casting frames to prevent bond with concrete pavement.

- C. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

#### 3.04 FORMING

- A. Place and secure forms to correct location, dimension, profile, and gradient.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

#### 3.05 REINFORCEMENT

- A. Place reinforcement as indicated.

#### 3.06 COLD AND HOT WEATHER CONCRETING

- A. Follow recommendations of ACI 305R when concreting during hot weather.
- B. Follow recommendations of ACI 306R when concreting during cold weather.
- C. Do not place concrete when base surface temperature is less than 40 degrees F (4 degrees C), or surface is wet or frozen.

#### 3.07 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304R.
- B. In accordance with ACI specifications, concrete that has not been discharged within 90 minutes from when cementitious materials were first added to water, and/or after drum revolutions have exceeded 300 from when cementitious materials were first added to water, shall be rejected and shall not be incorporated into the work. No payment shall be made for concrete that has been rejected for non-conformance with aforementioned requirements.
- C. Do not place concrete when base surface is saturated or ponding water.
- D. In dry conditions, moisten base course prior to concrete placement. Use appropriate procedures to accomplish moistened base without creating areas of ponding water.
- E. Ensure reinforcement, inserts, embedded parts, formed joints and formed joints are not disturbed during concrete placement.
- F. Install Detectable Warning Panels at curb ramps or where indicated on plans in accordance with Manufacturers recommendations. Ensure full bearing on substrate.
- G. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

#### 3.08 JOINTS

- A. Align curb, gutter, and sidewalk joints.
- B. Place [1/2] inch ([ ] mm) wide expansion joints at 25 foot ([ ] m) intervals and to separate paving from vertical surfaces, footings, foundation and building walls, existing concrete and other components.
  1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch (13 mm) of finished surface.
  2. Secure to resist movement by wet concrete.
  3. All locations requiring expansion joints may not be indicated on plans. Contractor shall ensure that adequate expansion joints are provided at appropriate locations to ensure damage to site improvements does not occur due to expansion and contraction of concrete members.
  4. All expansion joints shall be sealed.
- C. Provide control joints.



1. Joint spacing shall be per plans. Where not explicitly indicated, a minimum spacing of 5 feet shall be used.
2. Between sidewalks and curbs.
3. Between curbs and pavement.
4. Control joints may be tooled or saw cut. Tooled joints shall provide 1/4 inch radius and be cut 1/3 into depth of slab during finishing.

### 3.09 FINISHING

- A. Area Paving: Light broom, texture perpendicular to pavement direction.
- B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius ( 6 mm radius).
- C. Curbs and Gutters: Light broom, texture parallel to pavement direction.
- D. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

### 3.10 TOLERANCES

- A. Maximum Variation of Surface Flatness: 1/4 inch (6 mm) in 10 ft (3 m).
- B. Maximum Variation From True Position: 1/4 inch (6 mm).

### 3.11 FIELD QUALITY CONTROL

- A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
  1. Provide free access to concrete operations at project site and cooperate with appointed firm.
  2. Contractor shall pay for and provide proposed mix design, to be submitted to Engineer for review prior to commencement of concrete operations.
  3. Tests of concrete and concrete materials may be performed at any time to ensure conformance with specified requirements.
  4. Contractor shall pay for all additional tests and inspection required due to failing work and/or tests.
- B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples from the first load of each days pour and for every 50 cu yd ( [ ] cu m) or less of each class of concrete placed thereafter.
  1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.
  2. The cylinders comprising one set will be made from the same sample of concrete and shall be tested at the following schedule: one (1) cylinder tested at seven (7) days and one (1) at twenty-eight (28) days. The third cylinder shall be held by the testing agency until the Owner or Engineer orders it tested or disposed of. If an additional cylinder is cast for cold weather concreting, it shall be tested at twenty-eight (28) days.
  3. Additional cylinders cast at the Contractor's request to facilitate early opening to traffic shall be paid for by the Contractor.
- C. Slump Testing: Slump tests shall be performed in accordance with ASTM C143 for each sample taken. The maximum allowable slump of the concrete mix shall be 4 inches.
- D. Air Entrainment: Air content in accordance with ASTM C231 shall also be tested and recorded for each sample of concrete used in making test cylinders. The air content shall fall within the range of 4 percent to 7 percent.

- E. Test Results: The testing agency shall report test results in writing to the Engineer within 24 hours of test.
- F. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

**3.12 DEFECTIVE CONCRETE**

**3.13 PROTECTION**

- A. Defective concrete is defined as follows:
  - 1. Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
  - 2. Concrete failing to meet specifications for compressive strength, air entrainment, consistency (slump) and/or composition.
  - 3. Concrete that is excessively honey-combed or contains embedded debris.
  - 4. Concrete that is spalling, experiencing surface delamination, and/or any other form of premature degradation.
- B. Any concrete meeting at least one of the above criteria or that does not comply with the requirements of this Section 32 1313 or any other requirements of the contract documents shall be replaced by the Contractor to the satisfaction of the Engineer at no cost to the Owner. Replaced concrete shall be tested at the same schedule as other concrete and such testing shall be incidental.
- C. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.
- D. Do not permit vehicular traffic over pavement for 7 days minimum or until concrete has reached 75 percent of 28-day compressive strength, as established by cylinder testing data, and until all joints have been sealed.

**END OF SECTION**

**SECTION 321723.13  
PAINTED PAVEMENT MARKINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Parking lot markings, including parking bays, crosswalks, arrows, handicapped symbols and curb markings.
- B. Roadway lane markings.

**1.02 RELATED REQUIREMENTS**

- A. Section 321216 - Asphalt Paving.

**1.03 REFERENCE STANDARDS**

- A. FS TT-P-1952 - Paint, Traffic Black, and Airfield Marking, Waterborne 2015f.
- B. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.
- C. FHWA MUTCD - Manual on Uniform Traffic Control Devices for Streets and Highways; U.S. Department of Transportation, Federal Highway Administration Current Edition.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
- C. Certificates: Submit for each batch of paint and glass beads stating compliance with specified requirements.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver paint in containers of at least 5 gallons (18 L) accompanied by batch certificate.
- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

**1.06 FIELD CONDITIONS**

- A. Do not install products under environmental conditions outside manufacturer's absolute limits.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Materials as required by VTrans Specifications for Construction, latest edition.
- B. Line and Zone Marking Paint: color(s) as indicated.
  - 1. Roadway Markings: As required by authorities having jurisdiction.
  - 2. Parking Lots: Yellow.
  - 3. Handicapped Symbols: Blue.
  - 4. Crosswalks and Turn Arrows: White.
- C. Temporary Marking Tape: Preformed, reflective, pressure sensitive adhesive tape in color(s) required; Contractor is responsible for selection of material of sufficient durability as

to perform satisfactorily during period for which its use is required.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Do not begin installation until substrates have been properly prepared.

#### **3.02 PREPARATION**

- A. Allow new pavement surfaces to cure.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. If obliteration of existing markings using paint is acceptable in lieu of removal as determined by authorities having jurisdiction; apply the black paint in as many coats as necessary to completely obliterate the existing markings.
- D. Clean surfaces thoroughly prior to installation.
  - 1. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
  - 2. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement, by scraping, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.
- E. Where oil or grease are present, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application; after cleaning, seal oil-soaked areas with cut shellac to prevent bleeding through the new paint.
- F. Establish survey control points to determine locations and dimensions of markings; provide templates to control paint application by type and color at necessary intervals.
- G. Temporary Pavement Markings: When required or directed by Engineer , apply temporary markings of the color(s), width(s) and length(s) as indicated or directed.
  - 1. After temporary marking has served its purpose, remove temporary marking by carefully controlled sandblasting, approved grinding equipment, or other approved method so that surface to which the marking was applied will not be damaged.
  - 2. At Contractor 's option, temporary marking tape may used in lieu of temporary painted marking; remove unsatisfactory tape and replace with painted markings at no additional cost to Owner .

#### **3.03 INSTALLATION**

- A. As required by MUTCD and VTrans Specifications for Construction, latest edition.

#### **3.04 DRYING, PROTECTION, AND REPLACEMENT**

- A. Protect newly painted markings so that paint is not picked up by tires, smeared, or tracked.
- B. Provide barricades, warning signs, and flags as necessary to prevent traffic crossing newly painted markings.
- C. Allow paint to dry at least the minimum time specified by the applicable paint standard and not less than that recommended by the manufacturer.
- D. Remove and replace markings that are applied at less than minimum material rates; deviate from true alignment; exceed length and width tolerances; or show light spots, smears, or other deficiencies or irregularities.
- E. Remove markings in manner to avoid damage to the surface to which the marking was applied, using carefully controlled sand blasting, approved grinding equipment, or other approved method.

F. Replace removed markings at no additional cost to Owner .

**END OF SECTION**

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**SECTION 329219  
SEEDING**

**PART 1 GENERAL**

**1.01 RELATED REQUIREMENTS**

- A. Section 312200 - Grading: Topsoil material.
- B. Section 312200 - Grading: Preparation of subsoil and placement of topsoil in preparation for the work of this section.
- C. Section 312323 - Fill: Topsoil material.

**1.02 DEFINITIONS**

- A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Topsoil samples.
- C. Certificate: Certify seed mixture approval by authority having jurisdiction.

**PART 2 PRODUCTS**

**2.01 REGULATORY REQUIREMENTS**

- A. Comply with regulatory agencies for fertilizer and herbicide composition.
- B. Provide certificate of compliance from authority having jurisdiction indicating approval of seed mixture.

**2.02 SEED MIXTURE**

- A. Seed Mixture Meadow or areas requiring little mowing:
  - 1. Kentucky Blue Grass: 10 percent.
  - 2. Creeping Red Fescue Grass: 35 percent.
  - 3. VNS Turf-Type Tall Fescue: 25 percent.
  - 4. Annual Ryegrass: 15 percent.
  - 5. Perennial Ryegrass: 12 percent.
  - 6. Clover: 0 to 3 percent.
- B. Seed Mixture Lawn and other maintained areas:
  - 1. Creeping Red Fescue Grass: 50 percent.
  - 2. Kentucky Blue Grass: 30 percent.
  - 3. Perennial Ryegrass: 20 percent.

**PART 3 EXECUTION**

**3.01 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches (50 mm) of topsoil.

- E. Lightly water to aid the dissipation of fertilizer.

### 3.02 SEEDING

- A. Meadow or areas requiring little mowing: Apply seed at a rate of 80 lbs per acre evenly in two intersecting directions. Rake in lightly.
- B. Lawn and other maintained areas: Apply seed at a rate of 100 lbs per acre evenly in two intersecting directions. Rake in lightly.
- C. Do not seed areas in excess of that which can be mulched on same day.
- D. Lightly compact seeded areas.
- E. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- F. Immediately following seeding and compacting, apply mulch. Maintain clear of shrubs and trees.
- G. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches (100 mm) of soil.
- H. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches (100 by 100 mm).

**END OF SECTION**

**SECTION 329300  
PLANTS**

**PART 2 PRODUCTS**

**1.01 PLANTS**

- A. Plants: Species and size identified in plant schedule, grown in climatic conditions similar to those in locality of the work.

**END OF SECTION**

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**SECTION 330110.58**  
**DISINFECTION OF WATER UTILITY PIPING SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Disinfection of site domestic water lines and site fire water lines specified in Section 331416.

**1.02 RELATED REQUIREMENTS**

- A. Section 331416 - Water Utility Distribution Piping.

**1.03 REFERENCE STANDARDS**

- A. AWWA B300 - Hypochlorites 2010, Addendum 2011.
- B. AWWA B301 - Liquid Chlorine 2010.
- C. AWWA B302 - Ammonium Sulfate 2016.
- D. AWWA B303 - Sodium Chlorite 2010.
- E. AWWA C651 - Disinfecting Water Mains 2014.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Bacteriological report:
  - 1. Date issued, project name, and testing laboratory name, address, and telephone number.
  - 2. Time and date of water sample collection.
  - 3. Name of person collecting samples.
  - 4. Test locations.
  - 5. Initial and 24 hour disinfectant residuals in ppm for each outlet tested.
  - 6. Initial and 24 hour Coliform bacteria test results for each outlet tested.
  - 7. Certification that water conforms, or fails to conform, to bacterial standards of the Vermont Water Supply Rule.

**1.05 QUALITY ASSURANCE**

- A. Testing Firm: Company specializing in testing potable water systems, certified by governing authorities of the State in which the Project is located.
- B. Submit bacteriologist's signature and authority associated with testing.

**PART 2 PRODUCTS**

**2.01 DISINFECTION CHEMICALS**

- A. Chemicals: AWWA B300 Hypochlorite, AWWA B301 Liquid Chlorine, AWWA B302 Ammonium Sulfate and AWWA B303 Sodium Chlorite.

**PART 3 EXECUTION**

**3.01 DISINFECTION**

- A. Use method prescribed by the applicable state or local codes, or health authority or water purveyor having jurisdiction, or in the absence of any of these follow AWWA C651.
- B. Provide and attach equipment required to perform the work.
- C. Inject treatment disinfectant into piping system.
- D. Maintain disinfectant in system for 24 hours.

- E. Flush, circulate, and clean until required cleanliness is achieved; use municipal domestic water.
- F. If any of the noted testing must be re-certified by Project Engineer due to system failures, all extra Engineering fees will be paid by the Contractor at no additional cost to the Owner.
- G. Replace permanent system devices removed for disinfection.

**3.02 FIELD QUALITY CONTROL**

- A. Test samples in accordance with AWWA C651.

**END OF SECTION**



**SECTION 330513  
MANHOLES AND STRUCTURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Modular precast concrete manhole sections with tongue-and-groove joints with masonry transition to lid frame, covers, anchorage, and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete.

**1.03 REFERENCE STANDARDS**

- A. ASTM C478 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections 2015a.
- B. ASTM C478M - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections (Metric) 2015a.
- C. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals 2018.
- D. ASTM C923M - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals (Metric) 2018.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Manhole Sections: Reinforced precast concrete in accordance with ASTM C478 (ASTM C478M), with resilient connectors complying with ASTM C923 (ASTM C923M).
- B. Mortar and Grout: Type S.

**2.02 CONFIGURATION**

- A. As per Contract Documents.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify items provided by other sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location, and ready for roughing into Work.
- C. Verify excavation for manholes is correct.

**3.02 MANHOLES**

- A. Place stone base pad, level.
- B. Place manhole sections plumb and level, trim to correct elevations.
- C. Position and fit for pipe.
- D. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
- E. Coordinate with other sections of work to provide correct size, shape, and location.

**3.03 MASONRY WORK**

- A. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- B. Lay masonry units in running bond. Course one unit and one mortar joint to equal 8 inches (200 mm).
- C. Form concave mortar joints.

- D. Lay masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

**END OF SECTION**

**SECTION 331113  
POTABLE WATER SUPPLY WELL ABANDONMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Well Abandonment

**1.02 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Include data indicating material type and installation method complying with State of Vermont Water Supply Division Regulations.
- C. Well abandonment forms as required by the State of Vermont for each well abandoned.

**1.03 DEFINITIONS**

- A. Well: Any hole drilled, driven, bored, excavated, or created by similar method into the earth to locate, monitor, extract, or recharge groundwater where the water table or potentiometric surface is artificially lowered through pumping.
- B. Shallow Water Source: A developed structure to collect groundwater, generally less than 20 feet deep. This includes springs, dug wells, jetted wells, drilled wells, and well points, and other water intake structures which may or may not be under the jurisdiction of the Vermont Well Driller's Rules and Construction Standards.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. As approved by the State of Vermont Water Supply Rule.

**PART 3 EXECUTION**

**3.01 FILLING**

- A. Groundwater sources which are no longer in use or planned for use shall be sealed by such methods as necessary to restore the controlling geologic conditions which existed prior to construction and shall conform to the requirements of the Vermont Water Supply Rule and reiterated below.
- B. Drilled Wells to be abandoned shall:
  - 1. Be sealed to prevent undesirable exchange of water from one aquifer to another.
  - 2. Have fill materials other than cement grout or concrete approved in advance by the Water Supply Division.
  - 3. When filled with cement grout or concrete, these materials shall be applied to the well hole through a pipe, tremie, or bailer, and filled to surface grade. Wells shall be re-filled to surface grade if consolidation of grout occurs.
  - 4. Be disinfected and free from foreign materials.
  - 5. Be disconnected and plugged from the home to prevent any backflow of grout into the home.
  - 6. Topsoil and seed disturbed areas.
- C. Shallow Wells to be abandoned shall:
  - 1. Be disinfected and free from foreign materials.
  - 2. Be disconnected and plugged from the home to prevent any backflow of grout into the home.

3. Remove top lid and casing section 2 feet below grade.
  4. Fill and compact with clean, drainable fill.
  5. Topsoil and seed disturbed areas.
- D. Well abandonment shall be performed only by a Vermont licensed water well driller or monitoring well driller for her or his respective class and in conformance with all Water Supply Division regulations.

**END OF SECTION**

**SECTION 331416**  
**WATER UTILITY DISTRIBUTION PIPING AND APPURTENANCES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water pipe for site conveyance lines.
- B. Pipe valves and Fire Hydrants.
- C. Hydrostatic pressure testing.
- D. Trace Wire

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Concrete for thrust restraints.
- B. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
- C. Section 330110.58 - Disinfection of Water Utility Piping Systems: Disinfection of site service utility water piping.
- D. Section 330513 - Manholes and Structures.
- E. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this section.

**1.03 REFERENCE STANDARDS**

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2012.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2018.
- C. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength 2014 (Editorial 2017).
- D. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2015.
- E. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2016.
- F. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).
- G. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40 2017.
- H. ASTM D3035 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter 2015.
- I. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes using Flexible Elastomeric Seals 1998 (Reapproved 2011).
- J. ASTM F1960 - Standard Specification for Cold Expansion Fittings with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) Polyethylene of Raised Temperature (PE-RT) Tubing 2018a.
- K. ASTM F2080 - Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe 2018.
- L. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2011 (Amended 2012).
- M. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems 2010.
- N. AWWA C111/A21.11 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings 2017.

- O. AWWA C115/A21.15 - Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges 2011.
- P. AWWA C502 - Dry-Barrel Fire Hydrants 2014.
- Q. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service 2015.
- R. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances 2017.
- S. AWWA C800 - Underground Service Line Valves and Fittings 2014.
- T. AWWA C901 - Polyethylene (PE) Pressure Pipe and Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service 2017.
- U. AWWA C904 - Cross-Linked Polyethylene (PEX) Pressure Tubing, 1/2 In. (13 mm) Through 3 In. (76 mm), for Water Service 2016.
- V. UL 246 - Hydrants for Fire-Protection Service Current Edition, Including All Revisions.

#### 1.04 **SYSTEM PERFORMANCE REQUIREMENTS**

- A. Minimum Working Pressure Ratings: Except where otherwise indicated, the following are minimum pressure requirements for water system piping:
  1. Underground Piping: 200 psig
  2. Underground Piping: Downstream of Fire Department Connections: 200 psig

#### 1.05 **SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, concrete thrust block mix design, and accessories.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- D. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.
- E. Operation and Maintenance Data: Upon approval of submittals, furnish Engineer with 3 copies of Manufacturer's drawings and instructions for use in Operation and Maintenance Manual.
- F. Test Reports specified in this specification section.
- G. Name and relevant experience of firm completing water main tapings.

#### 1.06 **QUALITY ASSURANCE**

- A. Perform Work in accordance with municipality requirements and State of Vermont Natural Resources.
- B. Comply with standards of authorities having jurisdiction for potable water piping and plumbing systems. Include materials, installation, testing, and disinfection.
- C. Product Options: Water systems specialties and accessories are based on specific types, manufacturers, and models indicated. Components by other manufacturers but having equal performance characteristics may be considered, provided deviations in dimensions, operation, and other characteristics do not change design concept or intended performance as judged by Project Engineer and Town Water Department. The burden of proof of equality of products is on Contractor.

#### 1.07 **DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store valves in shipping containers with labeling in place.



- B. Deliver free of damage and store in protected area with labeling in place.
- C. Report any damage, including light surface scratches, to Engineer prior to installation. Repair or replace any coating or component damage as required by Manufacturer and as directed by Engineer.
- D. Protect valves from weather. Store valves indoors and maintain temperature higher than ambient dew point temperature. Support valves off ground or pavement in watertight enclosures when outdoor storage is necessary.
- E. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use handwheels or stems as lifting or rigging points.
- F. Deliver pipes and tubes with factory applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
- G. Protect stored pipes and tubes from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.

## **PART 2 PRODUCTS**

- A. Protect flanges, fittings, and piping specialties from moisture and dirt.
- B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.
- C. All handling and storage procedures to meet or exceed the requirements of AWWA, M41.

### **2.02 PROJECT CONDITIONS**

- A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility locating service for area where Project is located.
- B. Verify that water system piping may be installed in compliance with original design and referenced standards.
- C. Site Information: Reports on subsurface condition investigations made during the design of the Project are available for informational purposes only; data in reports are not intended as representations or warranties of accuracy or continuity of conditions (between soil borings). Owner assumes no responsibility for interpretations or conclusions drawn from this information. Contractor has the responsibility to make themselves aware of site conditions and perform any testing they deem necessary prior to bid.

### **2.03 SEQUENCING AND SCHEDULING**

- A. Coordinate connection to water main with the Town Water Department and Project Engineer at least 48 hours prior to work.
- B. The Contractor shall notify and obtain permission from the Fire Department having jurisdiction at least 24 hours prior to the shutting down service to any hydrant, and shall notify the Fire Department when service is restored.
- C. Coordinate with pipe materials, sizes, entry locations, and pressure requirements of building fire protection systems piping.
- D. Coordinate with pipe materials, sizes, entry locations, and pressure requirements of building water distribution systems piping.
- E. Coordinate with other utility work and utility companies which may be effected.

### **2.04 GENERAL**

- A. All products or materials that may come into contact with water intended for use in a public water system shall meet the National Sanitary Foundation International (NSF)/American National Standards Institute (ANSI) Standard 61.

## 2.05 WATER PIPE

- A. Ductile Iron Pipe: AWWA C151/A21.51: Ductile iron pipe shall meet the requirements of ANSI/AWWA C151/A51.51, or the latest revision thereof. The thickness class of Ductile Iron pipe shall be C52. All Ductile Iron Pipe shall be cement mortar lined and contain an exterior bituminous seal conforming with AWWA/ANSI C104/A21.4. All water main fittings shall be ductile iron.
  - 1. Fittings: Ductile iron, standard thickness. Ductile Iron fittings shall be manufactured by Sigma, Tyler Union, or approved equal, and shall have a working pressure of 350 pounds per square inch meeting AWWA C153. All Ductile Iron fittings shall be cement mortar lined and contain an exterior bituminous seal conforming with AWWA/ANSI C104/A21.4. All fittings shall be mechanically restrained and have thrust blocking. Thrust blocking shall be of adequate size to prevent movement of pipe and appurtenances when under pressure.
  - 2. Joints: AWWA C111/A21.11, Styrene butadiene rubber (SBR) or vulcanized SBR gasket with rods.
    - a. Fluorocarbon elastomer gaskets if petroleum hydrocarbon and/or chlorinated solvent contaminated soils are encountered.
      - 1) Champion Fluoroelastomer (FKM) or approved equal.
  - 3. Jackets: AWWA C105/A21.5 polyethylene jacket For use when corrosive soils are encountered.
  - 4. Pipe Joints shall be Restrained Mechanical Joint (MJ) type with "Mega-Lug Series 1100" mechanical joint restraint glands as manufactured by EBAA Ton Sales, Inc., "Uni-Flange Series 1400 Wedge Action" mechanical joint restraint glands as manufactured by Ford Meter Box Co. or approved equal, with T-bolt and rubber gaskets.
  - 5. Pipe joints shall be "Field Lock" Gasket System restrained push-on bell and spigot joint type, as manufactured by U.S. Pipe & Foundry Co. or approved equal where indicated in the specifications or project drawings.
  - 6. Pipe shall be 18' or 20' lengths.
  - 7. Mechanical Joint Bolt Requirements: Bolts for mechanical joint fittings, valves, and hydrants shall be Fluorocarbon Bolts and Nuts meeting AWWA C111 and ANSI/ASME B1.1.
  - 8. Pipe Couplers: HYMAX Long Body Coupling, or approved equal.
  - 9. Leakage Clamps: Ford FBC-E Style or Engineer approved equivalent
    - a. Leakage clamps are to be installed at locations where water main is within 50 feet of leach fields and 25 feet of septic tanks.
  - 10. Pipe is to be installed with a minimum of (2) each bronze conductive wedges at every joint.
- B. Copper Tubing: ASTM B88, Type K, Seamless, Annealed Temper, furnished in coils:
  - 1. Fittings: ASME B16.18, cast copper, or ASME B16.22, wrought copper.
  - 2. Joints: Mueller 110 compression connection or approved equal.
- C. Polyethylene Pipe: AWWA C901:

1. Fittings: AWWA C901, molded or fabricated.
  2. Joints: Compression.
  3. Water Service Lines: HDPE water service lines shall be CTS DR11 conforming to ASTM D2737 with minimum working pressure of 200 psi.
  4. HDPE Sleeves: HDPE Sleeve Pipe: Shall be DR17 IPS.
  5. HDPE Mains: HDPE Main Pipe: Shall be DR9 IPS with minimum working pressure of 200 psi.
  6. Each pipe length shall be clearly marked with manufacturer's name or trademark, nominal pipe size, material designation, pressure class, dimensional ratio, quality control code, and AWWA/ASTM designation.
- D. Pipe and Tube Fittings:
1. Refer to Part 3 Article "Piping Applications" for identification of systems where pipe and tube fitting materials specified below are used.
  2. Ductile Iron and Cast Iron Pipe Fittings: AWWA C110, ductile iron or cast iron, 250 psig minimum pressure rating; or AWWA C153, ductile iron compact fittings, 350 psig pressure rating.
- E. Service Connection:
- a. Lining: AWWA C104, cement mortar.
  - b. Gaskets: AWWA C111, rubber.
  2. Ductile Iron Pipe, Grooved End Fittings: ASTM A 47 malleable iron or ASTM A 536 ductile iron, AWWA pipe size, grooved end fittings having cement lining or Food and Drug Administration (FDA) approved interior coating, designed to accept AWWA C606 couplings, for AWWA size grooved end piping joints.
  3. Ductile Iron and Gray Iron Flanged Fittings: AWWA C110, 250 psig minimum pressure rating, with AWWA C104 cement mortar lining.
  4. Bronze Corporation Stops and Valves, ball valve type:
  5. Ductile Iron, Flexible Expansion Joints: Compound fitting with combination of flanged and mechanical joint ends conforming to AWWA C110 or AWWA C153. Units have 2 gasketed ball joint sections and 1 or more gasketed sleeve sections, rated for 250 psig minimum working pressure and with FDA approved epoxy interior coating, for offset and expansion indicated.
  6. Ductile Iron Deflection Fittings: Compound coupling fitting with sleeve and flexing sections, gaskets, and restrained joint ends conforming to AWWA C110 or AWWA C153. Units rated for 250 psig minimum working pressure, and with cement lining or FDA approved epoxy interior coating, for up to 20 degrees deflection.
  7. Restrained Joint Ductile Iron Pipe: U.S. Pipe and Foundry Co. TR Flex or Engineer Approved Equal.
    - a. Ford Meter Box Co., Inc. FB 1000-X-Q-NL
  8. Ductile Iron Expansion Joints: 3 piece assembly consisting of telescoping sleeve with gaskets and restrained type, ductile iron bell and spigot end sections conforming to AWWA C110 or AWWA C153. Units rated for 250 psig minimum working pressure, and with cement lining or FDA approved epoxy interior coating, for expansion indicated.
  9. Copper Tube Fittings: ASME B16.22, wrought copper, solder joint pressure type.

F. Anchorages:

1. Clamps, Straps, and Washers: ASTM A 506, steel.
2. Rods: ASTM A 575, steel.
  - a. Regardless of manufacturer all corporations shall be No-Lead and in compliance with NSF-61 and Town Ordinance.
3. Rod Couplings: ASTM A 197, malleable iron.
4. Bolts: ASTM A 307, steel. Fluorocarbon Bolts and Nuts meeting AWWA C111 and ANSI/ASME B1.1.
5. Cast Iron Washers: ASTM A 126, gray iron.
6. Concrete Thrust Blocks: Portland cement concrete mix, 3000 psi.
  - a. Cement: ASTM C 150, Type I.
  - b. Fine Aggregate: ASTM C 33, sand.
  - c. Coarse Aggregate: ASTM C 33, crushed gravel.
  - d. Water: Potable.

G. Pipe Insulation:

1. Buried Insulation Board: Dow Styrofoam Highload 40 meeting ASTM C578 or Engineer approved equal with the following specifications:
  - a. 5.0 R-Value min - Thermal Resistance per inch, ASTM C518, C177, @ 75 degrees mean temp
  - b. 40 psi min Compressive Strength, ASTM D1621
  - c. 0.3 max % by volume, water absorption, ASTM C272
  - d. 1.0 perms water vapor permeance, ASTM E96
  - e. 165 degrees F maximum use temperature
  - f.  $3.5 \times 10^{-5}$  Coefficient of Linear Thermal Expansion
  - g. 60 psi, min Flexural Strength, ASTM C203
  - h. Type VI Complies with ASTM C578
2. Bronze Curb Stops, Valves, and Fittings:
  - a. Curb stops shall be open left, full flow, ball valve type as manufactured by Ford, Mueller, or approved equal with tracer wire nut connection and Quick Joint Coupling.
  - b. Ford Meter Box Co., Inc. B41-xxx-TW-Q-NL
  - c. Ford Meter Box Co., Inc. C84-xx-Q-NL
  - d. Curb stops shall be equipped with a sliding adjustable, cast iron curb box with two-hole cover marked "water". The box shall be arch-type so as to enclose the curb stop and rest on a concrete base and not transfer force to the service or curb stop. Boxes for curb stops larger than 1" shall have a heavy foot piece. Box length shall be adequate to allow a minimum of 4" of overlap of sections with top extended to final grade.
  - e. A 30" stainless steel stationary operating rod shall be affixed to the key of the curb stop with stainless steel cotter pin.
  - f. All curb stops shall be No-Lead.

3. Quick Joint Tee
  - a. Ford Meter Box Co., Inc. T444-xxx-Q-NL.
4. Interior Plumbing
  - a. Backflow Preventors: To meet Town Water Department Specifications.
    - 1) Watts Regulator Co. Dual Check Valve.
  - b. Residential Water Meters 1" to 1.5": To meet Town Water Department Specifications
    - 1) Neptune Water Div., Schlumberger Industries, Inc. T-10 Integrated E-Coder R900i.
  - c. Residential Water Meters 2" to 3": To meet Town Water Department Specifications.
    - 1) Neptune Water Div., Schlumberger Industries, Inc. TRU/FLO Compound Meter Integrated E-Coder R900i with strainer.
  - d. Booster Pumps
    - 1) DuraMAC – Residential Booster
    - 2) Booster pumps shall be rated to provide a minimum of 35 psi additional pressure to the system.
    - 3) Booster Pumps shall be installed with an approved testable double check valve and low pressure cut off switch calibrated to cut off when the incoming service pressure falls below 12 psi.
  - e. Expansion Tanks: Amtrol THERM-X-TROL In Line Model or approved equal.

## 2.06 VALVES

- A. Valves: Manufacturer's name, pressure rating, and year in which manufactured cast on valve body.
- B. Gate Valves 3 Inches (75 mm) and Over:
  1. Manufacturers:
    - a. Kennedy Valve Div., McWane Inc..
    - b. Mueller Co, Grinnell Corp.
    - c. Waterouse Co.
  2. AWWA C509, iron body, bronze trim, non-rising stem with square nut, single wedge, resilient seat, flanged ends, control rod, post indicator, valve key, and extension box.
  3. Minimum working pressure of 250 psi. Inlet flange shall be Class 125 conforming to ANSI Specification B 16.1 and outlet connection shall be as specified on Contract Drawings for the type of pipe specified.
  4. Gate Valves shall be open right and an operating rod extension shall be provided where the valve depth exceeds 6 feet.
  5. Gate valves shall have stainless steel (304) nuts and bolts.
- C. Valve Boxes
  1. Buried valves shall have adjustable, flanged, 5.25" diameter, cast iron valve box with flush cover marked "water". The box shall enclose the valve operating nut and stuffing box. Box length shall be adequate to allow a minimum 4" overlap of sections with top extended to final grade.

2. Valve boxes shall be installed to prevent section stops from transferring loads from surface traffic to the valve. Stops shall be a minimum of 4 inches from bottom section.

#### 2.07 HYDRANTS

- A. Hydrants: AWWA C502, UL 246, dry barrel type. Hydrants to have minimum burial of 6', maintain a minimum 15" between bottom of the streamer cap and finish grade, all bolts to be stainless steel (304), and shall be factory painted red conforming to NFPA Standards (contractor to field touch up paint as necessary). Hydrants to open right and contractor to verify fitting requirements with local Water and Fire Departments
  1. Manufacturers:
    - a. Kennedy GUARDIAN.
- B. Hydrant Extensions: Fabricate in multiples of 6 inches (150 mm) with rod and coupling to increase barrel length.
- C. Hose and Streamer Connection: Match sizes with utility company, two hose nozzles , one pumper nozzle.
- D. Hydrant Drains to be plugged in areas of high ground water as defined by the Town Water Department.
- E. Hydrant Markers: All hydrants shall be equipped with a hydrant marker. The hydrant marker shall be approved by the municipality having jurisdiction.

#### 2.08 FLUSHING HYDRANTS

- A. Hydrants to open right and contractor to verify fitting requirements with local Water and Fire Departments.
  1. Manufacturers
    - a. Kupferle ECLIPSE #2 Post type or Engineer Approved Equal
- B. Hydrants to have minimum burial of 6', maintain a minimum 15" between bottom of the streamer cap and finish grade, all bolts to be stainless steel (304), and shall be factory painted red conforming to NFPA Standards (contractor to field touch up paint as necessary).
- C. Hydrant Drains to be plugged in areas of high ground water as defined by the Town Water Department.
- D. Hydrant Markers: All hydrants shall be equipped with a hydrant marker. The hydrant marker shall be approved by the municipality having jurisdiction.

#### 2.09 BEDDING AND COVER MATERIALS

- A. Bedding: As specified in Section 312316.13.
- B. Cover: As specified in Section 312316.13.

#### 2.10 ACCESSORIES

- A. Concrete for Thrust Restraints: Concrete type specified in Section 033000.
- B. Trace Wire: All non-metallic water main and service lines shall be equipped with blue Trace Wire designed specifically for detecting buried utilities and shall be certified for direct burial applications. Tracer wire shall be a minimum #12 AWG copper clad and connected to a magnesium grounding rod.
  1. Connectors: All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector or two 3-way connectors with a short jumper wire.

- a. Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
    - b. Non locking friction fit, twist on or taped connectors are prohibited.
  - 2. Termination/Access: All trace wire termination points must utilize an approved trace wire access box (above ground access box or grade level/in-ground access box as applicable), specifically manufactured for this purpose.
    - a. All grade level/in-ground access boxes shall be appropriately identified with "water" cast into the cap and shall be color coded.
    - b. A minimum of 2 feet of excess/slack wire is required in all trace wire access boxes after meeting final elevation.
- C. Water Sampling Stations
- a. All trace wire access boxes must include a manually interruptible conductive/connective link between the terminal(s) for the trace wire connection and the terminal for the grounding anode wire connection.
    - b. Grounding anode wire shall be connected to the identified (or bottom) terminal on all access boxes.
    - c. In lieu of trace wire access boxes, trace wire may be terminated at gate valve boxes at the end of lines. If this is done, tracer wire shall be wrapped around the exterior of the valve box to a point 6 inches below grade, and a hole will be drilled in the side of the valve box. The trace wire shall be looped a minimum of 2 feet inside the valve box.
  - 2. Spacing: At intervals not less than 500 linear feet, trace wire shall be extended from the mainline with an approved connector, ran to a curb box, and extended to grade. All curb boxes with connected trace wire shall be delineated using a minimum 48-inch polyethylene marker post, color coded per APWA standard for the specific utility being marked.
  - 3. Grounding. Trace wire must be properly grounded at all dead ends/stubs. Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod with a minimum of 20 feet of #14 red HDPE insulated copper clad steel wire connected to anode (minimum 0.5 lb.) specifically manufactured for this purpose, and buried at the same elevation as the utility.
    - a. When grounding the trace wire at dead ends/stubs, the grounding anode shall be installed in a direction 180 degrees opposite of the trace wire, at the maximum possible distance.
    - b. When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire or the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and in-line with the trace wire. Do not coil excess wire from grounding anode. In this installation method, the grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a mainline to lateral lug connector.
  - 4. Kupferle ECLIPSE #88-XC "Extreme Cold" with a lockable cast-aluminum enclosure.
    - a. Where the anode wire will be connected to a trace wire access box, a minimum of 2 feet of excess/slack wire is required after meeting final elevation.



- D. Tapping Sleeve: Ductile Iron Watermain: To be split sleeve design, constructed with two solid half sleeves bolted together. Sleeves shall be constructed of Stainless Steel Type 304 (ASTM A240), and shall have a minimum working pressure of 250 psi.
  - 1. Stainless steel, Model #3490MJ Manufactured by Powerseal Pipeline Products Corporation, or approved equal, with mechanical joint gate valve.
- E. Tapping Tee: HDPE Watermain: Service line connections from new HDPE watermain shall be accomplished with molded electrofusion tapping tees or transition saddles with a minimum working pressure of 200 psi, installed in accordance with the manufacturers recommendations. Direct connections shall not be allowed.
- F. Yard Hydrants: Sanitary Type: Nonfreeze, post type, with nondraining chamber for storing water trapped downstream of inlet valve. Hydrants have 1 inch (25 mm) inlet, integral or field installed vacuum breaker with outlet conforming to ASME B1.20.7, 3/4 11.5NH threads for garden hose, brass or bronze casing, and other parts in contact with water, and are handle or key operated.
  - 1. Body of hydrant is of length required for installation of storage chamber below frost line. Furnish 2 keys for each key operated hydrant.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that building service connection and municipal utility water main size, location, and invert are as indicated.

#### **3.02 PREPARATION**

- A. Cut pipe ends square, ream pipe and tube ends to full pipe diameter, remove burrs.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare pipe connections to equipment with flanges or unions.

#### **3.03 TRENCHING**

- A. See the sections on excavation and fill for additional requirements.
- B. Hand trim excavation for accurate placement of pipe to elevations indicated.
- C. Form and place concrete for pipe thrust restraints at each change of pipe direction. Place concrete to permit full access to pipe and pipe accessories. Provide required square feet thrust restraint bearing on subsoil.
- D. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

#### **3.04 PIPING APPLICATIONS**

- A. Refer to Part 2 of this Section for detailed specifications for pipe and fittings products listed below. Use pipe, tube, fittings, and joining methods according to the following applications. Piping in pits and inside building may be joined with flanges or couplings, instead of joints indicated, for grooved end AWWA size piping.

#### **3.05 JOINT CONSTRUCTION**

- A. Ductile Iron Piping Gasketed Joints: Construct joints according to AWWA C600.
- B. Flanged Joints: Align flanges and install gaskets. Assemble joints by sequencing bolt tightening. Use lubricant on bolt threads.

#### **3.06 INSTALLATION - PIPE**

- A. Threaded Joints: Thread pipes with tapered pipe threads according to ASME B1.20.1, apply tape or joint compound, and apply wrench to valve ends into which pipes are being threaded.
- B. Ductile Iron, Grooved End Pipe and Fitting Joints: Cut groove pipes. Assemble joints with grooved couplings, gaskets, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

### 3.07 PIPING SYSTEMS COMMON REQUIREMENTS

- A. General Locations and Arrangements: Drawings indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated except where deviations to layout are approved on coordination drawings.
- B. Install piping at indicated slope.
- C. Maintain separation of water main from sewer piping in accordance with State of Vermont code.
- D. Install components having pressure rating equal to or greater than system operating pressure.
- E. Install piping free of sags and bends.
- F. Locate groups of pipes parallel to each other, spaced to permit valve servicing.
- G. Establish elevations of buried piping to ensure not less than [5.5] feet ([\_\_\_\_\_] m) of cover.
- H. Install pipe to indicated elevation to within tolerance of 5/8 inches (16 mm).
- I. Install ductile iron piping and fittings to AWWA C600.
- J. Route pipe in straight line unless otherwise indicated on the plans. Deflections shall not exceed 2 degrees.
- K. Install pipe to allow for expansion and contraction without stressing pipe or joints.
- L. Install tapping sleeve and tapping valve according to manufacturer's installation instructions.
- M. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
- N. Install access fittings to permit disinfection of water system performed under Section 330110.58.
- O. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water service piping.
- P. Install service clamps and corporation stops in size, quantity, and arrangement required by utility company standards and according to manufacturer's installation instructions.
- Q. Install service clamps on pipe to be tapped. Position outlet for corporation stop.
- R. Install corporation stops into service clamps. Install valve with stem pointing up and with cast iron valve box.
- S. Install curb stop in service piping with head pointing up and with cast iron service box.
- T. Install manifold for multiple taps in water main.
- U. Use drilling machine compatible with service clamp and corporate stop. Drill hole in main. Remove drilling machine and connect water service piping.
- V. Comply with requirements of NFPA 24 for materials and installation.

- W. Install copper tube and wrought copper fittings according to CDA No. 404/0 "Copper Tube Handbook."
- X. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or a combination of both.
- Y. Welding, installation, and fittings of HDPE pipe shall be performed In Accordance With AWWA Standard C906-07 for Polyethylene (PE) Pressure Pipe and Fittings, 4-inch through 63-inch, and AWWA Standard M55 PE Pipe – Design and Installation.
- Z. Install TR Flex Restrained Joint Ductile Iron Pipe where pipe is installed at an aerial crossing or in a sleeved condition
- AA. Slope water pipe and position drains at low points.
- BB. Install marking tape 18 inches above top of pipe.
- CC. Trace Wire
  - 1. Electrical Conductivity Testing: All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the CONTRACTOR, ENGINEER and CITY prior to acceptance. Continuity testing in lieu of actual line tracing shall not be accepted.
  - 2. Trace wire systems must be installed as a single continuous wire, except where using approved connectors. No looping or coiling of wire is allowed.
  - 3. Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with approved connectors. Taping and/or spray coating shall not be allowed.
  - 4. Trace wire shall be installed at the 3 o'clock or 9 o'clock position and secured (taped/tied) at 5' intervals.
  - 5. Trace wire must be properly grounded as specified.
  - 6. At all mainline dead-ends, trace wire shall go to ground using an approved connection to a drive-in magnesium grounding anode rod, buried at the same depth as the trace wire.
  - 7. Mainline trace wire shall not be connected to existing conductive pipes. Treat as a mainline dead-end, ground using an approved waterproof connection to a grounding anode buried at the same depth as the trace wire.
  - 8. All service lateral trace wires shall be a single wire, connected to the mainline trace wire using a mainline to lateral lug connector, installed without cutting/splicing the mainline trace wire.
  - 9. In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using approved splice connectors, and shall be properly grounded at the splice location as specified.
  - 10. A mainline trace wire must be installed, with all service lateral trace wires properly connected to the mainline trace wire, to ensure full tracing/locating capabilities from a single connection point.
  - 11. Lay mainline trace wire continuously, by-passing around the outside of valves and fittings on the North or East side.
  - 12. The following products and methods shall be expressly prohibited:
    - a. Uninsulated trace wire.
    - b. Trace wire insulations other than HDPE.

- c. Trace wires not domestically manufactured.
- d. Non-locking, friction fit, twist on or taped connections.
- e. Brass or copper ground rods.
- f. Wire connections utilizing taping or spray-on waterproofing.
- g. Looped wire or continuous wire installations with multiple side-by-side wires or wires in close proximity.
- h. Trace wire wrapped around corresponding utility.
- i. Brass fittings with trace wire connection lugs.
- j. Wire terminations within the roadway.
- k. Trace wire connections to existing conductive utilities.

### 3.08 INSTALLATION - ANCHORAGES

- A. Anchorages: Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:

- 1. Gasketed Joint, Ductile Iron Piping: According to AWWA C600.

### 3.09 INSTALLATION - VALVES AND HYDRANTS

- 1. Fire Service Piping: According to NFPA 24.
- B. Apply full coat of asphalt or other acceptable corrosion retarding material to surfaces of installed ferrous anchorage devices.
- C. Set valves on solid bearing concrete block or approved equal. Install valve with stem pointing up and with cast iron valve box.
- D. Install gate valve onto tapping sleeve. Comply with AWWA C600.
- E. Center and plumb valve box over valve. Set box cover flush with finished grade.
- F. Set hydrants plumb; locate pumper nozzle perpendicular to and facing roadway.
- G. Set hydrants to grade, with nozzles at least 15 inches ([ ] mm) above ground.
- H. Locate control valve minimum 36 inches ([ ] mm) away from hydrant.
- I. Provide a drainage pit 36 inches (900 mm) square by 12 inches ([ ] mm) deep filled with [3/4] inches ([ ] mm) crushed stone. Encase elbow of hydrant in gravel to 6 inches (150 mm) above drain opening. Do not connect drain opening to sewer.
- J. Bronze Corporation Stops and Curb Stops: Comply with manufacturer's installation instructions. Install buried curb stops with head pointed up and with cast iron curb box.

### 3.10 INSTALLATION - CONNECTION TO EXISTING MAIN

- A. Prior to making any connection to an existing water main, the Contractor shall obtain permission and coordinate on the connection schedule with the municipality having jurisdiction.

### 3.11 INSTALLATION - SERVICE CONNECTIONS

- A. Foundation wall penetration shall be three times the diameter of the service line.
- B. Provide sleeve in foundation wall for service main as per plan details. Calk enlarged sleeve watertight.
- C. Anchor service main to interior surface of foundation wall.
- D. Seal service line penetration watertight with link seal.

- E. Modify Internal building plumbing as directed on the Project Drawings. Internal building modifications shall be completed by a Vermont Licensed Plumber in accordance with applicable State and Local plumbing codes.
- F. Contractor shall apply for and purchase all State plumbing and electrical permits.
- G. Install restrained joints for buried piping within 5 feet (1.5 m) of building. Use restrained joint pipe and fittings, thrust blocks, anchors, tie rods and clamps, and other supports at vertical and horizontal offsets.

### 3.12 INSTALLATION - YARD HYDRANT

- A. Install sanitary type yard hydrants in pavement or with concrete anchor as indicated.
- B. Install post type yard hydrants in pavement or with concrete anchor, and make provision for drainage into drywell as indicated.

### 3.13 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Piping Tests: Conduct piping tests after thrust blocks have hardened sufficiently. All tests shall comply with State of Vermont Water Supply Rules. Fill pipeline 24 hours prior to testing and apply test pressure to stabilize system. Use only potable water. Prior to beginning any tests, watermain shall be flushed at a minimum of 3.0 ft/sec to remove particulates. All connections to existing water supply system necessary to obtain flush and test water shall contain adequate cross-connection control devices.
  - 1. Hydrostatic Tests:
    - a. Test at not less than 1 1/2 times working pressure for 2 hours. Minimum test pressure of 200 psi.
    - b. Testing must be witnessed and report filed by a Vermont Licensed Professional Engineer.
    - c. Maximum pipe length to be run per test is not to exceed 1,200 LF unless approved by Project Engineer.
    - d. Contractor shall provide all necessary valves, gauges, pumps, temporary connections, etc. to run the test as part of base bid. Equipment, at a minimum, must consist of a volumetrically calibrated water tank with cover, oil filled pressure gage graduated in feet of water or psi, flexible hoses, leak free valves and gas driven pump with capability to develop 200 psi of discharge pressure.
    - e. Any damage done to the piping will be repaired by the Contractor at no additional cost to the owner.
    - f. The pressure and leakage test shall include all new components of the water system including, but not limited to, valves, fittings, hydrants, and branch lines
  - 2. Polyethylene Hydrostatic Tests:
    - a. During the test procedure, Contractor will not allow test pressure to drop below 5 psi of said test pressure, if it does system shall be pumped up to maintain pressure and water volume recorded.
    - b. No pipe installation shall be accepted if the leakage is greater than that determined by the following
      - 1)  $L = (S \times D \times P^{1/2}) / (148,000)$
      - 2) L = the allowable leakage, in gallons per hour.
      - 3) S = the length of pipe being tested, in feet.

- 4) D = the nominal diameter of the pipe, in inches.
  - 5) P = the average test pressure, in psig.
  - c. All testing be in accordance with State of Vermont Agency of Natural Resources Regulations and AWWA C600, latest revisions.
  - d. Test in accordance with ASTM F2164 – 13, Standard Practice for Field Leak Testing of Polyethylene (PE) and Crosslinked Polyethylene (PEX) Pressure Piping Systems Using Hydrostatic Pressure.
- C. Trace Wire Electrical Conductivity Testing: All new trace wire installations shall be located using typical low frequency (512Hz) line tracing equipment, witnessed by the CONTRACTOR, ENGINEER and CITY prior to acceptance. Continuity testing in lieu of actual line tracing shall not be accepted.
1. Conductivity testing shall be performed within one week of pressure testing completion.

### 3.14 CLEANING

- A. Clean and disinfect water distribution piping as follows:
1. Purge/flush new water distribution piping systems and parts of existing systems that have been altered, extended, or repaired to pressure testing and chlorination. Flushing to be in accordance with AWWA C600. If line is being connected to a fire suppression system it needs to meet NFPA24 and 30 and associated NFPA test certifications for flushing and pressure test be completed by Contractor.
  2. After satisfactory pressure test results, system shall be chlorinated in accordance with Vermont Agency of Natural Resources Regulations, AWWA C600 and ANSI/AWWA C651, latest revisions. The chlorination is to be left standing a minimum of 24 hours and a minimum of 2 bacteria tests are to be passed, tests to be taken at least 24 hours apart. The Testing Lab must be Certified by the State of Vermont Department of Health and approved by Project Engineer.
  3. After satisfactory test results, system will be flushed again. The super chlorinated water must be disposed of/treated in accordance with State and Local Regulations. Any special discharge permits/fees are the responsibility of the Contractor.
  4. If any of the noted testing must be re-certified by Project Engineer due to system failures all extra Engineering fees will be paid by the Contractor at no additional cost to the Owner.
- B. Tie-in connections to existing mains shall be sterilized either by immersing in a chlorine solution of 500 ppm for one-half hour or by swabbing with a five percent hypochlorite solution.

**END OF SECTION**

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**SECTION 333113**  
**SANITARY SEWERAGE GRAVITY PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Sanitary sewerage drainage piping, fittings, and accessories.
- B. Connection of building sanitary drainage system to municipal sewers.

**1.02 RELATED REQUIREMENTS**

- A. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.

**1.03 REFERENCE STANDARDS**

- A. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120 2015, with Editorial Revision (2018).
- B. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications 2014.
- C. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2011.

**PART 2 PRODUCTS**

**2.01 SEWER PIPE MATERIALS**

- A. Provide products that comply with applicable code(s).
- B. Plastic Pipe: ASTM D1785, Schedule 40, Poly(Vinyl Chloride) (PVC) material; inside nominal diameter of 4 inches (s), bell and spigot style solvent sealed joint end.
- C. Fittings: Same material as pipe molded or formed to suit pipe size and end design, in required tee, bends, elbows, cleanouts, reducers, traps and other configurations required.
- D. Couplings: All couplings shall be Max Adaptor AISI 304 Series Stainless Steel or approved equivalent.

**2.02 PIPE ACCESSORIES**

- A. Trace Wire: All non-metallic sewer lines shall be equipped with green Trace Wire designed specifically for detecting buried utilities and shall be certified for direct burial applications. Tracer wire shall be a minimum #12 AWG copper clad imprinted with "Sewer Service" in large letters.
- B. Connectors: All mainline trace wires must be interconnected in intersections, at mainline tees and mainline crosses. At tees, the three wires shall be joined using a single 3-way lockable connector. At crosses, the four wires shall be joined using a 4-way connector or two 3-way connectors with a short jumper wire.
- C. Direct bury wire connectors shall include 3-way lockable connectors and mainline to lateral lug connectors specifically manufactured for use in underground trace wire installation. Connectors shall be dielectric silicon filled to seal out moisture and corrosion, and shall be installed in a manner so as to prevent any uninsulated wire exposure.
- D. Non locking friction fit, twist on or taped connectors are prohibited.
- E. Marking tape: Install marking tape 2 feet above top of pipe.

**2.03 BEDDING AND COVER MATERIALS**

- A. Pipe Bedding Material: As specified in Section 312323.
- B. Pipe Cover Material: As specified in Section 312323.

**PART 3 EXECUTION**

### 3.01 GENERAL

- A. Perform work in accordance with applicable code(s).

### 3.02 TRENCHING

- A. See Section 312316.13 for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

### 3.03 INSTALLATION - PIPE

- A. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
  - 1. Plastic Pipe: Also comply with ASTM D2321.
- B. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).
- C. Connect to building sanitary sewer outlet and municipal sewer system , through installed sleeves.

**END OF SECTION**

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**SECTION 334211  
STORMWATER GRAVITY PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Storm drainage piping, fittings, and accessories.
- B. Connection of drainage system to municipal sewers.
- C. Bedding, backfilling and slope protections at pipe end.

**1.02 RELATED REQUIREMENTS**

- A. Section 312316 - Excavation: Excavating of trenches.
- B. Section 312323 - Fill: Bedding and backfilling.
- C. Section 330513 - Manholes and Structures.

**1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating pipe, pipe accessories.

**PART 2 PRODUCTS**

**2.01 PIPE MATERIAL**

- A. Corrugated polyethylene pipe, smooth walled, ADS-N12 or approved equal.
- B. Regulatory Requirements: Conform to applicable code for materials and installation of the work of this section.

**2.02 BEDDING AND COVER MATERIALS**

- A. Bedding: As specified in Section 312323.
- B. Cover: As specified in Section 312323.

**2.03 ACCESSORIES**

- A. Fill at Pipe Inverts: Riprap as specified in Section 313700.

**PART 3 EXECUTION**

**3.01 TRENCHING**

- A. See Section 312316 - Excavation and Section 312323 - Fill for additional requirements.
- B. Backfill around sides and to top of pipe with cover fill, tamp in place and compact, then complete backfilling.

**3.02 INSTALLATION - PIPE**

- A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.
- B. Install pipe, fittings, and accessories in accordance with manufacturer's instructions. Seal watertight.
- C. Lift or roll pipe into position. Do not drop or drag pipe over prepared bedding.
- D. Lay pipe to slope gradients noted on layout drawings; with maximum variation from true slope of 1/8 inch (3 mm) in 10 feet (3 m).
- E. Connect to building storm drainage system, foundation drainage system, and utility/municipal sewer system.
- F. Maximum variation from intended elevation of culvert invert: 1/2 inch.
- G. Maximum offset of pipe from true alignment: 1 inch.

### 3.03 PIPE INVERTS

- A. Place rip rap at pipe inverts, at embankment slopes.
- B. Installed thickness: 12 inches average.

### 3.04 INSTALLATION - CATCH BASINS

- A. Form bottom of excavation clean and smooth to correct elevation.
- B. Form and place cast-in-place concrete base pad, with provision for sanitary sewer pipe end sections.
- C. Establish elevations and pipe inverts for inlets and outlets as indicated.
- D. Mount lid and frame level in grout, secured to top cone section to elevation indicated.

### 3.05 PROTECTION

- A. Protect pipe and bedding cover from damage or displacement until backfilling operation is in progress.

## PART 4 MEASUREMENT AND PAYMENT

### 4.01 MEASUREMENT

- A. If specific items are listed on bid, Engineer will make measurement in accordance with each specific bid item. For lump sum (LS) bid items, measurements will not be made.

### 4.02 PAYMENT

- A. Payments for specific bid items shall be at the unit price bid and shall include all costs for labor, equipment and materials.

**END OF SECTION**