

Revisions	No.	Description	Date	By
	1	For Local Submittal	2/15/19	AAD

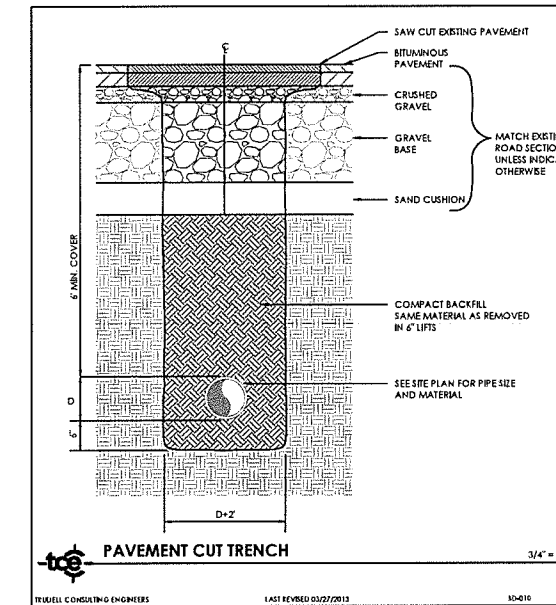
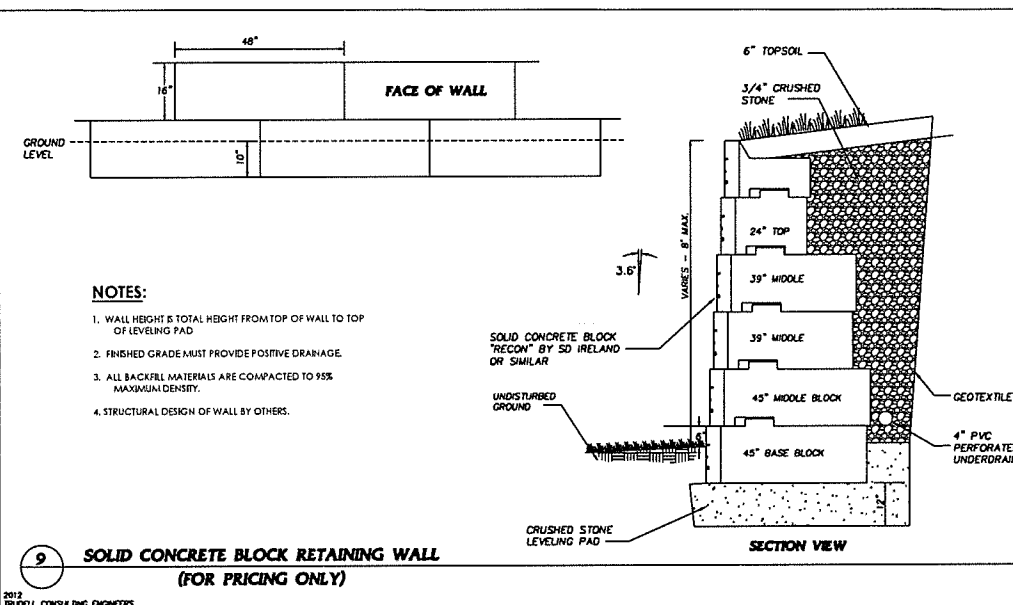
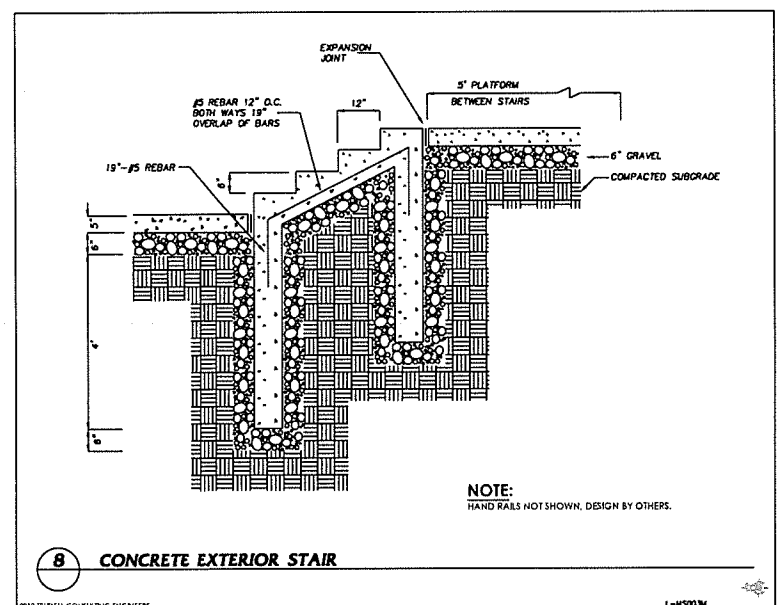
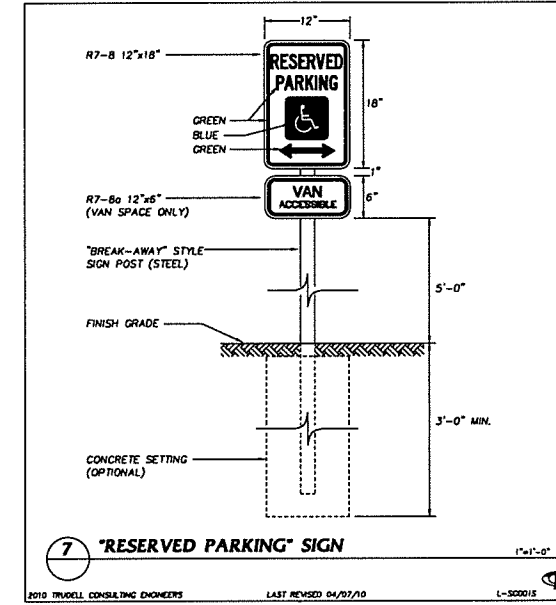
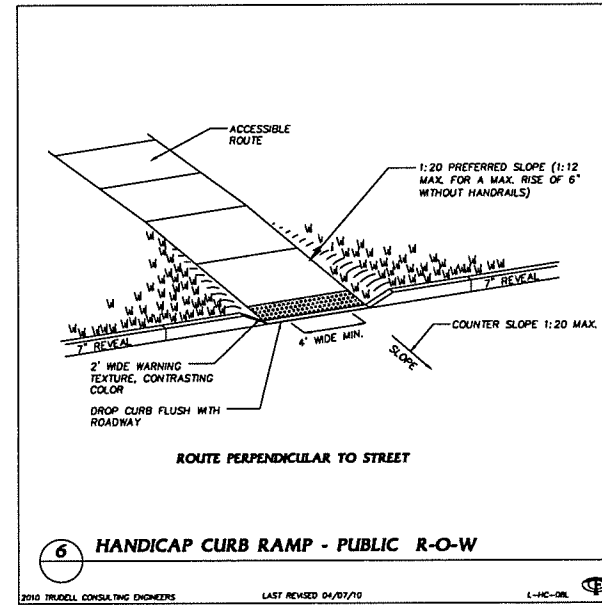
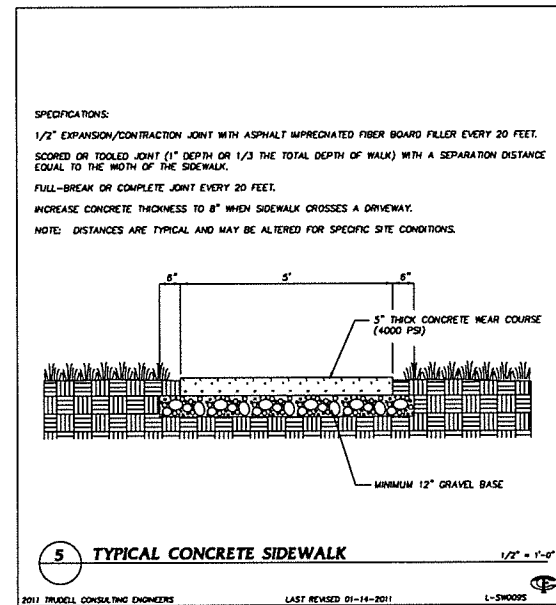
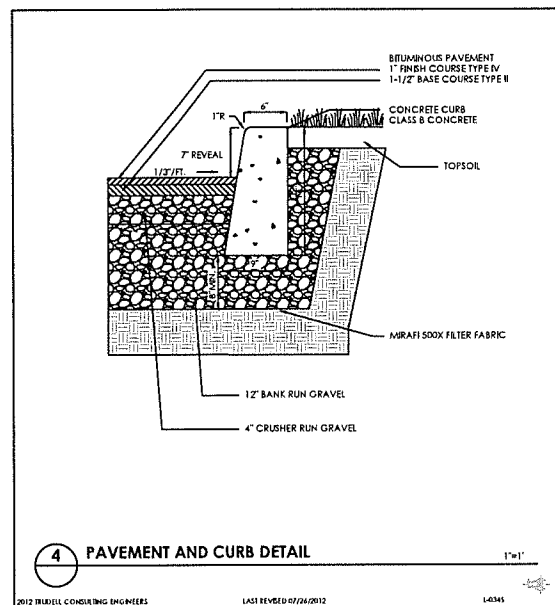
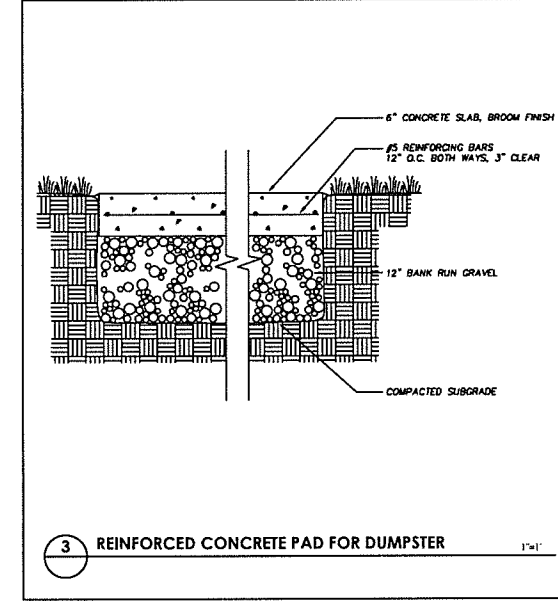
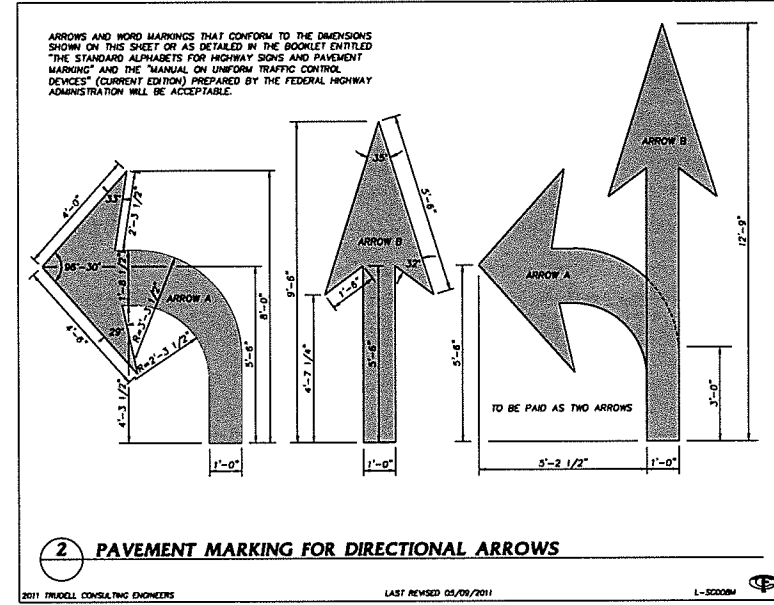
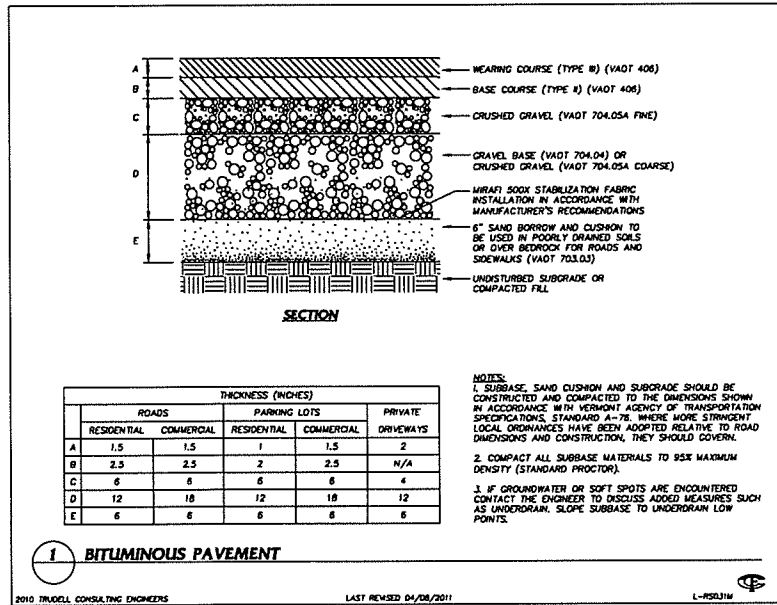
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Project Title: **Sisters and Brothers Investment Group**
 110 Riverside Ave.
 Burlington, Vermont

Sheet Title: **Storm Details**

Date: 11/21/2012
 Scale: Shown
 Project Number: 2010083
 Drawn By: PJM
 Project Engineer: AAL
 Approved By: _____
 Field Book: _____



Revisions

No.	Description	Date	By
1	For Local Submittal	2/15/19	AAD
2	Pavement Cut Detail Revision	9/24/19	CMU

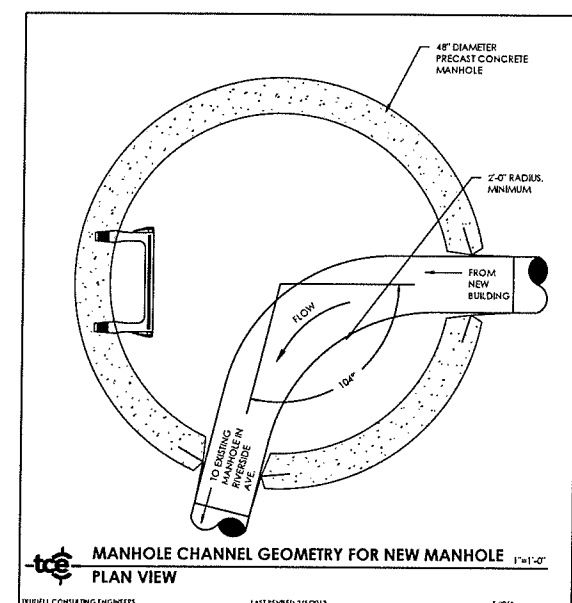
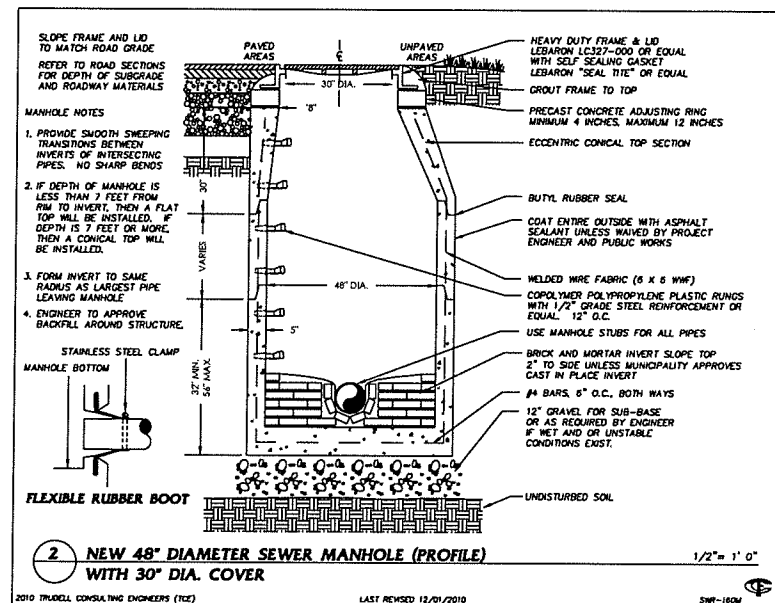
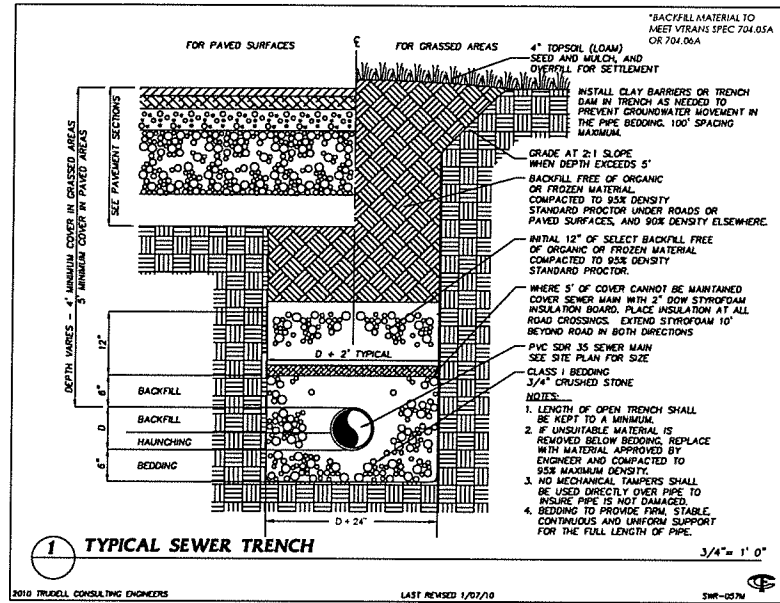
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Project Title
Sisters and Brothers Investment Group
110 Riverside Ave.
Burlington, Vermont

Sheet Title
Site Details

Date: 11/21/2012
Scale: Shown
Project Number: 2010083
Drawn By: PJM
Project Engineer: AAL
Approved By:
Field Book:



CONTRACTOR'S CERTIFICATION REQUIRED

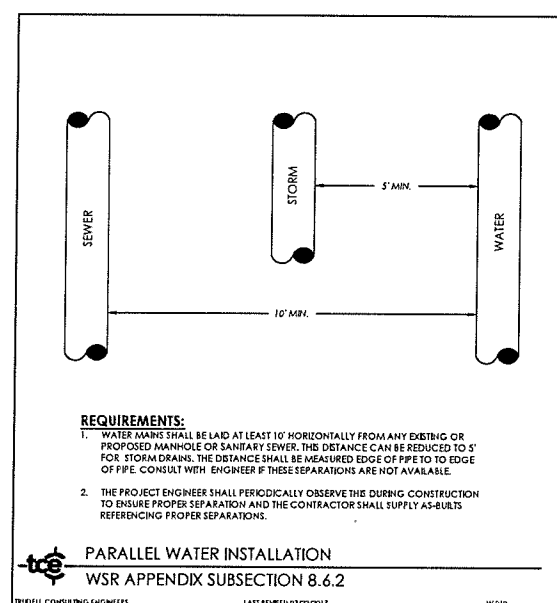
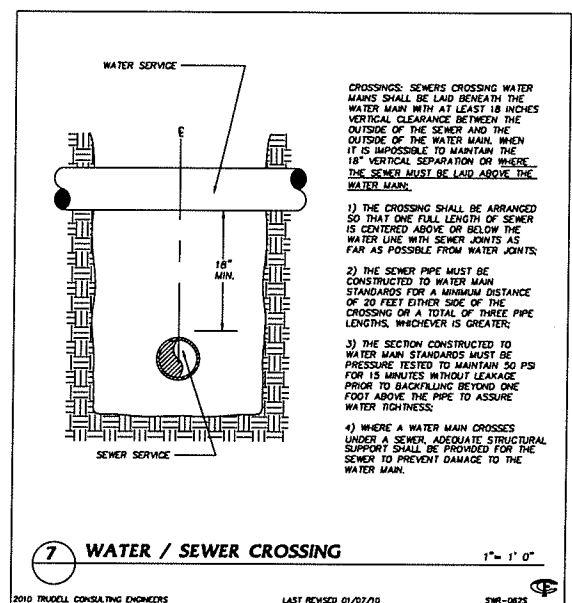
PRIOR TO THE DESIGN ENGINEER CERTIFYING THAT THE INSTALLATION HAS BEEN INSTALLED IN ACCORDANCE WITH THE PERMITTED DESIGN, THE CONTRACTOR SHALL PROVIDE A CERTIFICATION THAT THE WASTEWATER SYSTEM WAS INSTALLED AND TESTED IN ACCORDANCE WITH THE APPROVED DESIGN PLANS, STATE PERMITS REQUIREMENTS, THERE SHALL BE NO DEVIATIONS FROM THE APPROVED PLANS WITHOUT PRIOR APPROVALS. THE DESIGN ENGINEER SHALL BE NOTIFIED AND ALLOWED TO OBSERVE THE CRITICAL PHASES OF CONSTRUCTION INCLUDING ANY REQUIRED TESTS. LIKEWISE, THE DESIGN ENGINEER SHALL BE NOTIFIED OF ANY DEVIATIONS FROM THE APPROVED PLANS. SINCE THE DESIGN ENGINEER DOES NOT CUSTOMARILY OBSERVE ALL PHASES OF THE WORK, OR ALL TESTING, THEY MAY RELY ON THE CONTRACTOR'S CERTIFICATION AS THE BASIS FOR FINAL CERTIFICATION. THE CONTRACTOR SHALL THEREFORE SIGN AND RETURN A COPY OF THE FOLLOWING CERTIFICATION UPON COMPLETION OF THE WORK:

"I HEREBY CERTIFY THAT I HAVE INSTALLED, PROPERLY TESTED, AND SUCCESSFULLY PASSED THOSE TESTS, AND THE WASTEWATER SYSTEM(S) ARE BUILT IN ACCORDANCE WITH THE APPROVED DESIGN PLANS AND APPLICABLE PERMIT CONDITIONS."

CONTRACTOR NAME _____
 AUTHORIZED AGENTS NAME _____
 SIGNATURE _____ DATE _____

NOTE ANY DEVIATIONS FROM APPROVED PLANS HERE:

4 CONTRACTOR'S CERTIFICATION FOR WASTEWATER SYSTEMS
 2010 TRUDELL CONSULTING ENGINEERS LAST REVISED 01/27/10 SWR-062M



AIR TESTING SEWERS

*ALL TESTING SHALL BE PERFORMED IN THE PRESENCE OF THE TOWN ENGINEER OR PUBLIC WORKS DEPARTMENT AND TRUDELL CONSULTING ENGINEERS (TCE). CONTRACTOR SHALL PRE-TEST SUCCESSFULLY PRIOR TO CONTACTING ENGINEER. THE PRE-TEST IS TO ENSURE PASSING RESULTS PRIOR TO OFFICIAL TESTING OBSERVATION.

- TEST THE GRAVITY SEWER BY A PRESSURIZED AIR TEST BETWEEN CONSECUTIVE MANHOLES. PLUG ALL OPENINGS OF THE TEST SECTION AND CONNECT THE AIR CONTROL EQUIPMENT TO THE TAPPED END.
- SUPPLY AIR SLOWLY TO THE PIPE UNTIL REACHING A CONSTANT PRESSURE OF 4.0 PSI GREATER THAN THE AVERAGE PRESSURE OF ANY SURROUNDING GROUNDWATER. PRESSURE WILL NORMALLY DROP AS TEMPERATURE STABILIZES. SUPPLY THE AIR SO THAT THE PRESSURE REMAINS ABOVE 3.0 PSI FOR AT LEAST 5 MINUTES DURING TEMPERATURE STABILIZATION. USE A PRESSURE GAUGE HAVING A RANGE FROM 0 TO 5 PSI. THE GAUGE SHOULD HAVE MINIMUM DIVISIONS OF 0.1 PSI AND AN ACCURACY OF ± 0.04 PSI. REGULATE THE AIR PRESSURE TO PREVENT IT FROM EXCEEDING 5.0 PSI.
- AFTER STABILIZATION, ADJUST PRESSURE TO 3.5 PSI OR ABOVE AND SHUT OFF AIR SUPPLY. START THE STOP WATCH. THE TIME REQUIRED FOR THE TEST IS DEPENDENT ON PIPE DIAMETER PER TOTAL LENGTH OF PIPE BEING TESTED AND MUST BE AT LEAST:

NOMINAL PIPE DIA. IN INCHES	T (TIME) MIN/100 FT.	NOMINAL PIPE DIA. IN INCHES	T (TIME) MIN/100 FT.
3	0.2	21	3.0
4	0.3	24	3.4
6	0.5	30	4.2
8	0.7	36	5.0
12	1.1	48	7.5
18	1.6	60	10.0

- IF THE SECTION OF LINE TO BE TESTED INCLUDES MORE THAN ONE PIPE SIZE, CALCULATE THE TEST TIME FOR EACH SIZE AND ADD THE TEST TIMES TO EQUAL THE TOTAL SECTION TEST TIME.
- IF THERE IS GROUND WATER ABOVE THE SEWER LINE THE AIR TEST PRESSURE WILL BE INCREASED BY 0.5 PSI FOR EACH FOOT OF WATER ABOVE THE INVERT OF THE PIPE. DIFFERENCES DUE TO AIR TEMPERATURE AND BAROMETRIC PRESSURE WILL BE CONSIDERED NEGLIGIBLE.
- IF THE PRESSURE DROPS MORE THAN 1 PSI DURING THE TEST TIME, THE PIPE WILL HAVE FAILED AND ADEQUATE REPAIRS AND RETESTING WILL BE REQUIRED AT NO EXPENSE TO OWNER.
- IF IT IS NOT NECESSARY TO HOLD THE TEST FOR THE WHOLE PERIOD WHEN IT IS CLEARLY EVIDENT THAT THE RATE OF AIR LOSS IS LESS THAN THE ALLOWABLE.

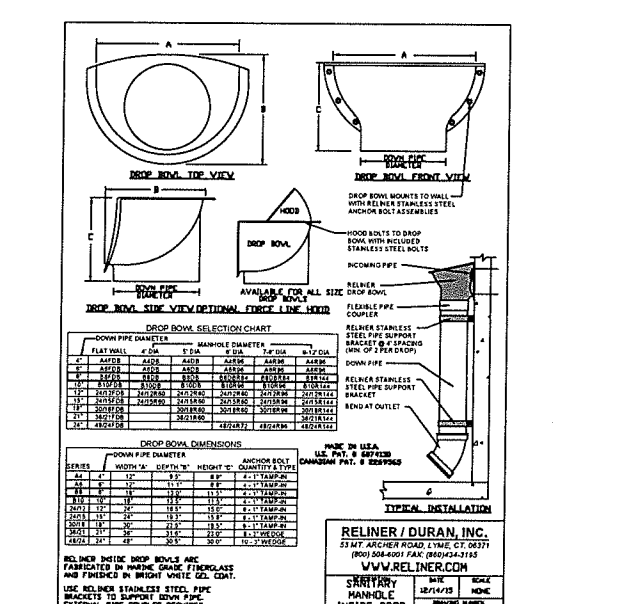
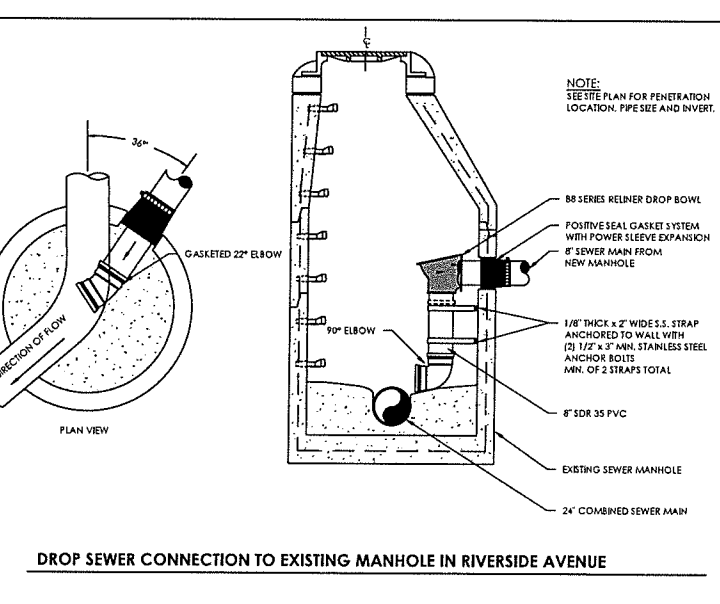
DEFLECTION TESTING SEWERS

- AFTER A FLEXIBLE PIPE SEWER, SUCH AS PVC, HAS BEEN BACKFILLED FOR 30 DAYS, A PIPE DEFLECTION TEST SHALL BE PERFORMED.
- THE TEST SHALL BE CONDUCTED USING A RIGID BALL OR MANDREL HAVING A DIAMETER EQUAL TO 92.5% OF THE PIPE DIAMETER. THE DEVICE WILL BE PULLED THROUGH THE SEWER BY A ROPE USING THE MEANS OF MECHANICAL EQUIPMENT. THE MAXIMUM ALLOWABLE VERTICAL DEFLECTION SHALL BE 7.5%.
- IF THE BALL OR MANDREL CANNOT BE SUCCESSFULLY PULLED THROUGH THE SEWER PIPE, THOSE SECTIONS OF PIPE NOT MEETING THE DEFLECTION REQUIREMENTS SHALL BE EXCAVATED AND THE EMBEDMENT AND BACKFILL REPLACED. IF, IN THE OPINION OF THE ENGINEER, THE PIPE HAS BEEN DAMAGED, IT SHALL BE REMOVED AND REPLACED.

TESTING GRAVITY SEWERS (ENVIRONMENTAL PROTECTION RULES)
 CH 1 EFFECTIVE 9/29/07 SECTION 1-A-03(K)(2)
 2010 TRUDELL CONSULTING ENGINEERS LAST REVISED 04/02/2017 SWR-062M

- *ALL TESTING SHALL BE PERFORMED IN THE PRESENCE OF THE TOWN ENGINEER OR PUBLIC WORKS DEPARTMENT AND TRUDELL CONSULTING ENGINEERS (TCE). CONTRACTOR SHALL PRE-TEST SUCCESSFULLY PRIOR TO CONTACTING ENGINEER. THE PRE-TEST IS TO ENSURE PASSING RESULTS PRIOR TO OFFICIAL TESTING OBSERVATION.
- EACH STRUCTURE SHALL BE TESTED BY MEANS OF A WATER TEST OR VACUUM TEST PRIOR TO THE BACKFILLING OF THE STRUCTURE. IN ANY CASE THERE SHALL BE NO VISIBLE LEAKAGE INTO THE BASE OR WALLS OF A COMPLETED STRUCTURE.
- AFTER THE STRUCTURE HAS BEEN ASSEMBLED IN PLACE, ALL LIFTING HOLES AND EXTERIOR JOINTS SHALL BE FILLED AND PAINTED WITH AN APPROVED NON-SHRINKING MORTAR IN MANHOLES. THE TEST SHALL BE MADE PRIOR TO PLACING THE INVERT AND INVERT. IF THE GROUNDWATER TABLE HAS BEEN ALLOWED TO RISE ABOVE THE BOTTOM OF THE STRUCTURE, THE ENGINEER MAY DIRECT IT TO BE LOWERED FOR THE DURATION OF THE TEST. ALL PIPES AND OTHER OPENINGS INTO THE STRUCTURE SHALL BE SUITABLY PLUGGED AND THE FLUGS BRACED TO PREVENT DEFLACEMENT.
- IF THE CONTRACTOR ELECTS TO BACKFILL PRIOR TO WATER TESTING, FOR ANY REASON, IT SHALL BE AT HIS OWN RISK AND IT SHALL BE INCUMBERT UPON THE CONTRACTOR TO DETERMINE THE REASON FOR ANY FAILURE OF THE TEST. NO ADJUSTMENT IN THE LEAKAGE ALLOWANCE WILL BE MADE FOR UNKNOWN CAUSES SUCH AS LEAKAGE OF FLUGS, ABSORPTION, ETC. I.E. IT WILL BE ASSUMED THAT ALL LOSS OF WATER DURING THE TEST IS A RESULT OF LEAKS THROUGH THE JOINTS OR THROUGH THE CONCRETE. FURTHERMORE, THE CONTRACTOR SHALL TAKE ANY STEPS NECESSARY TO ASSURE THE ENGINEER THAT THE WATER TABLE IS BELOW THE BOTTOM OF THE STRUCTURE THROUGHOUT THE TEST.
- IF THE GROUNDWATER TABLE IS ABOVE THE HIGHEST JOINT IN THE STRUCTURE, AND IF THERE IS NO LEAKAGE INTO THE STRUCTURE AS DETERMINED BY THE ENGINEER, SUCH A TEST CAN BE USED TO EVALUATE THE WATER TIGHTNESS OF THE STRUCTURE. HOWEVER, IF THE ENGINEER IS NOT SATISFIED, THE CONTRACTOR SHALL LOWER THE WATER TABLE AND CARRY OUT THE TEST AS DESCRIBED HEREIN BEFORE.
- MANHOLE WATER TEST:** THE STRUCTURE SHALL BE FILLED WITH WATER TO THE TOP OF THE RISERS, PAST ALL SEAMS. THE TANKS SHALL SIT FOR A PERIOD OF ONE HOUR TO ALLOW FOR ABSORPTION. AFTER ONE HOUR, THE STRUCTURE SHALL BE REFILLED TO THE TOP ABOVE ALL SEAMS. THE TANK SHALL BE TESTED FOR A MINIMUM OF 6 HOURS. AT THE END OF THE 6-HOUR TEST PERIOD, MEASURING THE VOLUME OF WATER ADDED. THE VOLUME OF WATER ADDED SHALL BE CONVERTED TO A 24-HOUR RATE AND THE LEAKAGE DETERMINED ON THE BASIS OF DEPTH. THE LEAKAGE FOR EACH MANHOLE SHALL NOT EXCEED ONE GALLON PER VERTICAL FOOT FOR A 24 HOUR PERIOD AND THERE SHALL BE NO VISIBLE LEAKAGE. REPAIRS BY APPROVED METHODS MAY BE MADE, AS DIRECTED BY THE ENGINEER, TO BRING THE LEAKAGE WITHIN ALLOWABLE RATE OF ONE GALLON PER FOOT PER DAY. SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO UNCOVER THE MANHOLES AS NECESSARY, AND TO DISASSEMBLE, RECONSTRUCT OR REPLACE IT AS DIRECTED BY THE ENGINEER. THE MANHOLES SHALL THEN BE RETESTED.
- TANK WATER TEST:** THE STRUCTURE SHALL BE FILLED WITH WATER TO THE TOP OF THE RISERS, PAST ALL SEAMS. THE TANKS SHALL SIT FOR A PERIOD OF 24 HOURS TO ALLOW FOR ABSORPTION. PLASTIC, STEEL, AND FIBERGLASS TANKS DO NOT NEED A 24-HOUR ABSORPTION PERIOD AND MAY BE TESTED IMMEDIATELY. AFTER 24 HOURS, REFLILL THE TANK. IF AFTER ONE HOUR THERE IS NO MEASURABLE DROP IN FLUID LEVEL THE TANK SHALL BE CONSIDERED WATER TIGHT.
- MANHOLE VACUUM TEST:** THE CONTRACTOR SHALL FURNISH THE MANHOLE CONE SEAL, VACUUM PUMP, ALL NECESSARY GAUGES, HOSES, AND EQUIPMENT TO PERFORM THE TEST.
 8.1. MANHOLES THAT HAVE BEEN BACKFILLED SHALL BE EXCAVATED TO EXPOSE THE ENTIRE EXTERIOR OR THE WATER TEST SHALL BE USED.
 8.2. A PLATE WITH AN INFLATABLE RUBBER RING THE SIZE OF THE TOP OF THE MANHOLE SHALL BE INSTALLED BY INFLATING THE RING WITH AIR TO A PRESSURE ADEQUATE TO PREVENT LEAKAGE OF AIR BETWEEN THE RUBBER RING AND THE MANHOLE WALL.
 8.3. PUMP THE AIR OUT OF THE MANHOLE THROUGH AN OPENING IN THE TEST PLATE UNTIL A VACUUM IS CREATED INSIDE THE MANHOLE EQUAL TO 10 INCHES OF MERCURY USING AN APPROVED VACUUM GAUGE. THEN STOP THE REMOVAL OF AIR AND BEGIN THE TEST.
 8.4. THE VACUUM DROP SHALL NOT EXCEED 1 INCH OF MERCURY OVER A 2 MINUTE PERIOD FOR MANHOLES 10'-15' DEEP. OVER 2.5 MINUTES FOR MANHOLES 10'-15' DEEP. AND OVER 3 MINUTES FOR MANHOLES DEEPER THAN 15'. IF MORE THAN A 1 INCH DROP OCCURS WITHIN 2 MINUTES, THE MANHOLE HAS FAILED THE TEST, AND IT SHALL BE REPAIRED OR RECONSTRUCTED AND THEN RETESTED UNTIL IT PASSES AT NO EXPENSE TO OWNER.
- TANK VACUUM TEST:**
 9.1. USING A VACUUM TEST, SEAL THE EMPTY TANK AND RISERS AND APPLY A VACUUM TO 2 INCHES (50 MM) OF MERCURY. THE TANK IS CONSIDERED WATER TIGHT IF 90% OF THE VACUUM IS HELD FOR 2 MINUTES.
- BACKFILL AROUND THE STRUCTURE UPON SATISFACTORY TEST RESULTS.

TESTING MANHOLES, TANKS, AND STRUCTURES
 2010 TRUDELL CONSULTING ENGINEERS LAST REVISED 03/27/2011 SWR-062M



tce ENGINEERING SURVEY PLANNING ENVIRONMENTAL
 111 PEARSON ROAD, BURLINGTON, VERMONT 05401
 802.874.4331 WWW.TCEVTC.COM

Revisions

No.	Description	Date	By
1	For Local Submittal	2/15/19	AAD
2	Sewer Connection Revision	9/25/19	CAU
3	Manhole Drop Bowl Detail	11/6/19	CAU

Use of these Drawings

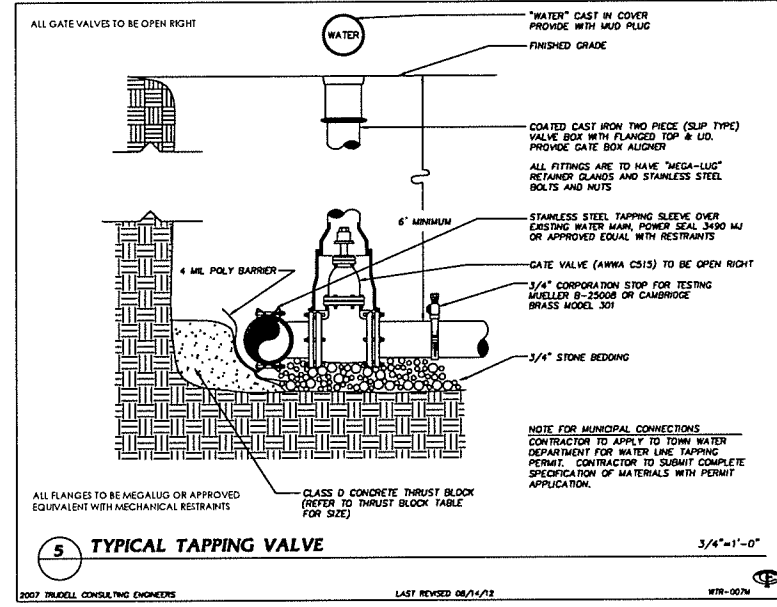
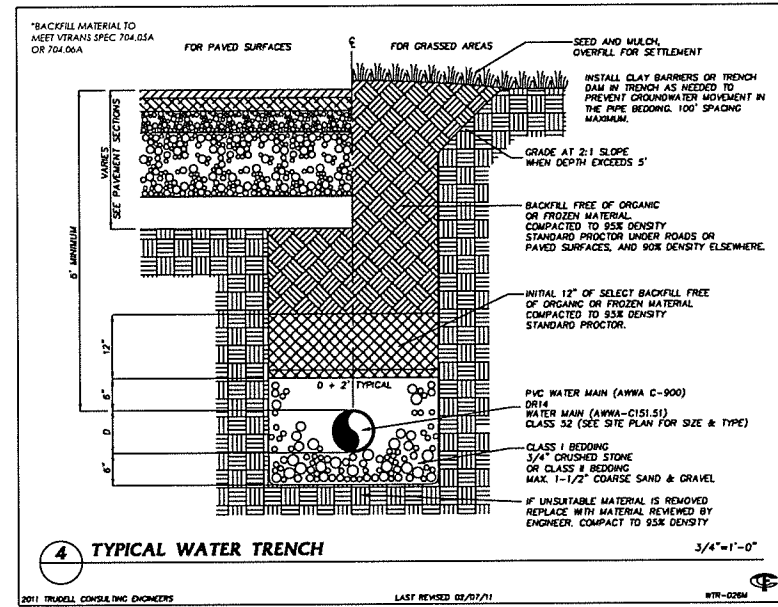
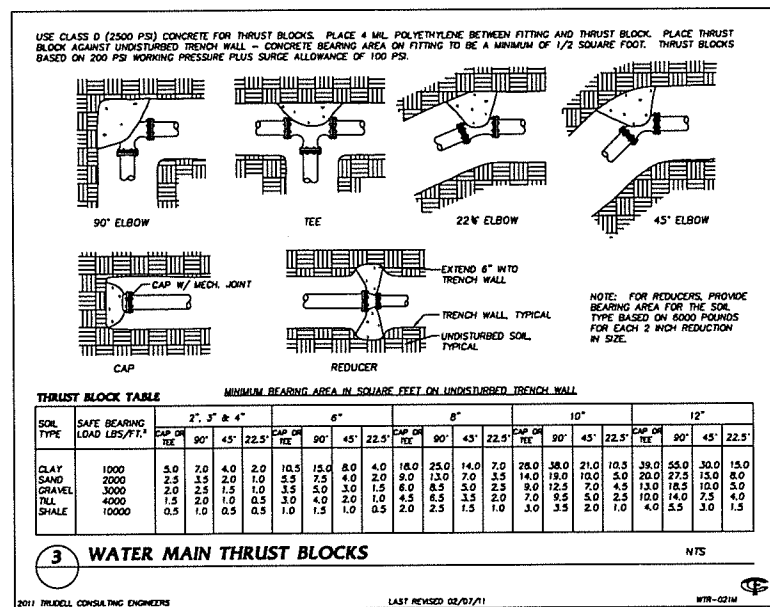
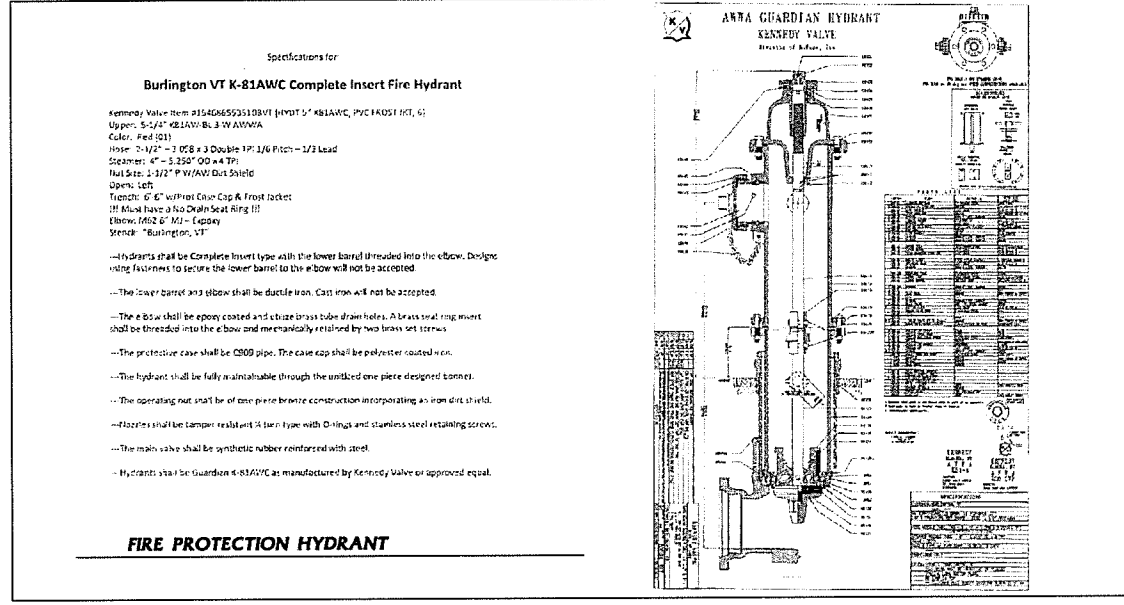
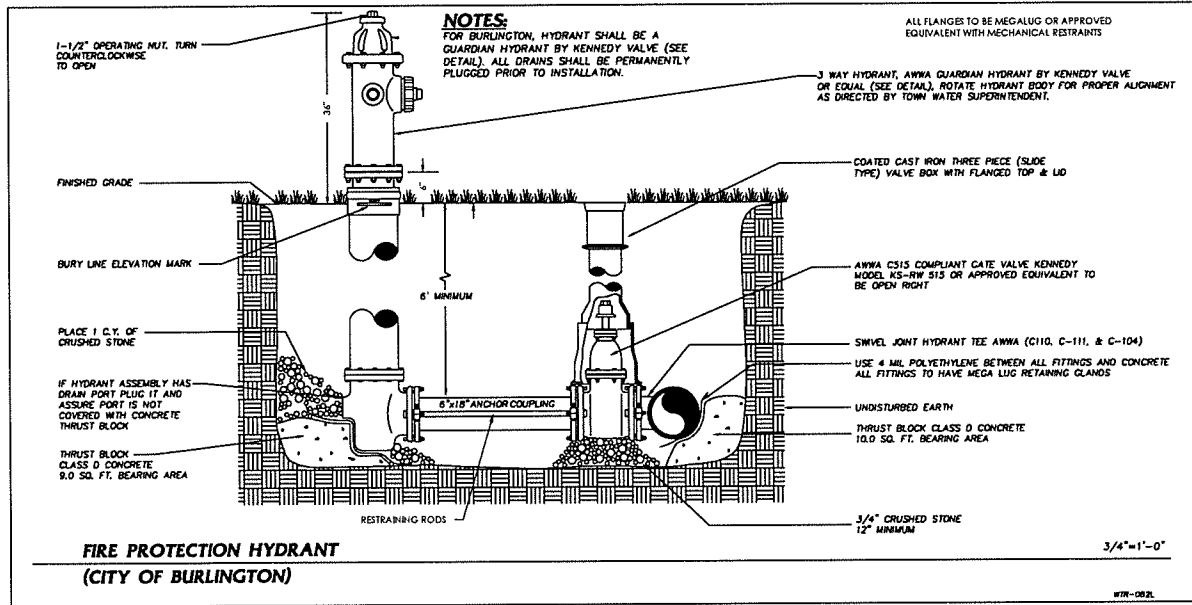
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STATE OF VERMONT
 No. 1020
 CIVIL
 PROFESSIONAL ENGINEER

Project Title: **Sisters and Brothers Investment Group**
 110 Riverside Ave.
 Burlington, Vermont

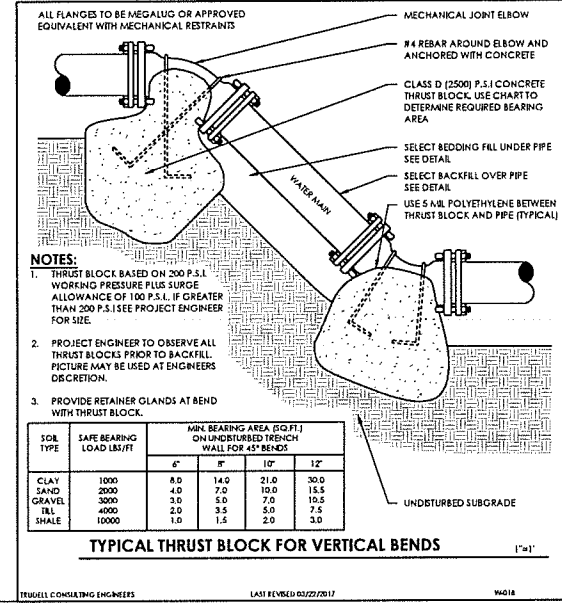
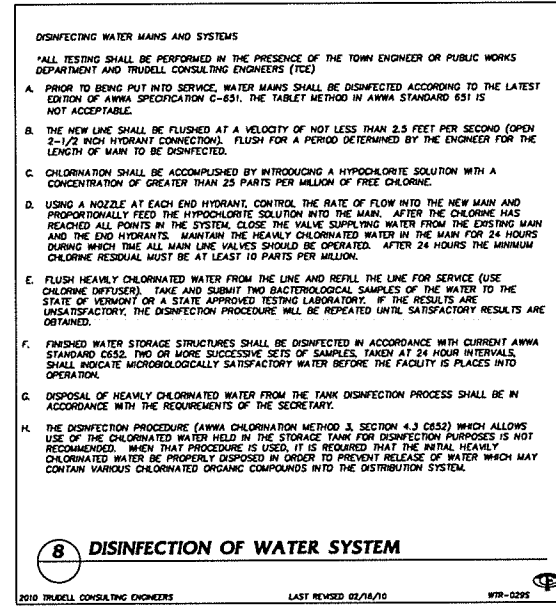
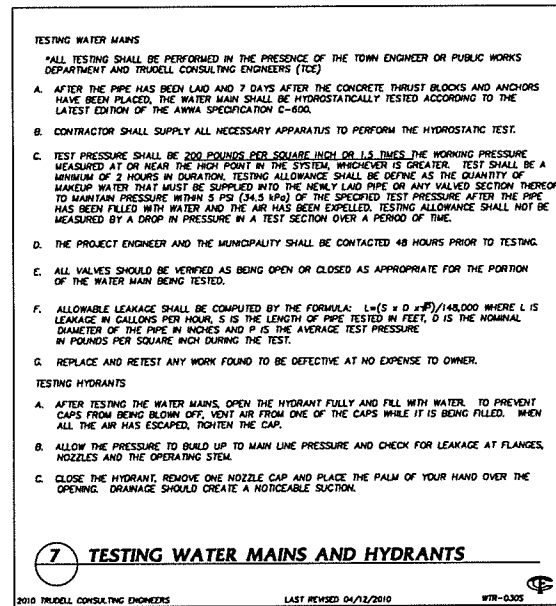
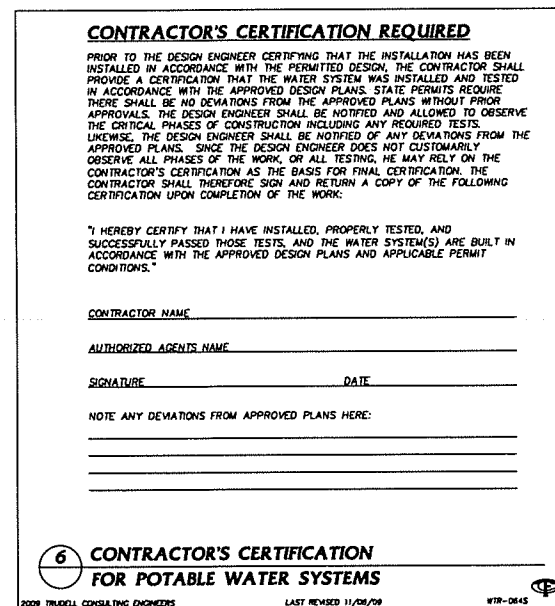
Sheet Title: **Sewer Details**

Date: 11/21/2012
 Scale: Shown
 Project Number: 2010063
 Drawn By: PJM
 Project Engineer: AAL
 Approved By: _____
 Field Book: _____



Revisions	No.	Description	Date	By
	1	For Local Submittal	2/15/11	AAD
	2	Hydrant	07/29/11	CAU
	3	Revisions per City Comments	09/03/11	CAU
	4	Revisions per City Comments	11/06/11	CAU

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Sisters and Brothers Investment Group
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Burlington, Vermont

Sheet Title: _____

Date: 11/21/2012

Scale: Shown

Project Number: 2010083

Drawn By: PJM

Project Engineer: AAL

Approved By: _____

Field Book: _____

C8-03