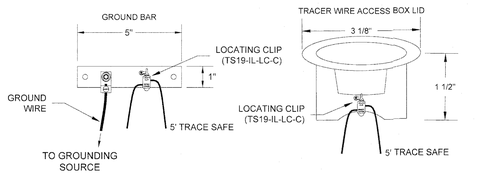
1. TRACER WIRES SHALL BE INSTALLED USING MANHOLES, TRACER WIRE ACCESS BOXES, VALVE BOXES OR VAULTS, WATER METERS AND FIRE HYDRANTS AS ACCESS POINTS.
2. FOR WATER AND SEWER INSTALLED BY OPEN TRENCHING, HORIZONTAL DIRECTIONAL DRILLING, OR PIPE BURSTING, TRACER WIRE SHALL BE NEPTCO TRACE-SAFE WATER BLOCKING TRACER WIRE OR APPROVED EQUAL.
3. SPLICES SHALL ONLY BE MADE WITH GEL FILLED CONNECTORS DESIGNED FOR WIRE WITH A WOVEN POLYESTER FIBER CORE SUCH AS NEPTCO TRACE-SAFE WATER BLOCKING CONNECTORS OR APPROVED EQUAL. SPLICES SHALL BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S INSTALLATION INSTRUCTIONS. CONTRACTOR WILL BE RESPONSIBLE FOR ENSURING CONTINUITY AT ALL SPLICE LOCATIONS.
4. WHERE HDPE PIPE IS INSTALLED WITHOUT STEEL CASING PIPE, SUCH AS A DIRECTIONALLY DRILLED CROSSINGS, AND CONNECTED TO DUCTILE IRON PIPE ON EACH END, TRACER WIRE SHALL BE INSTALLED ALONG FULL LENGTH OF HDPE PIPE WITH AN ACCESS POINT INSTALLED AT EACH HDPE/DUCTILE IRON TRANSITION. TRACER WIRE SHALL BE CONNECTED TO THE ACCESS POINT IN ACCORDANCE WITH THIS DETAIL. ANY TRANSITION FROM DUCTILE IRON MAIN TO NON-DUCTILE IRON MAIN SHALL HAVE AN ACCESS POINT TO BEGIN TRACER WIRE.
5. AS-BUILTS SHALL SHOW TRACER WIRE(S) LOCATION AND ACCESS POINT(S), ALONG WITH BUTT SPLICE LOCATIONS.
6. THE TRACER WIRE SHALL BE PLACED ALONG THE LOWER QUADRANT OF THE PIPE. THE WIRE SHALL NOT TOUCH THE PIPE, BUT SHALL BE A MAXIMUM OF 6" FROM THE PIPE. NON-METALLIC SPACERS MAY BE USED TO MAINTAIN A SET DISTANCE FROM THE UTILITY.
7. WIRE SHALL BE BROUGHT TO THE SURFACE EVERY **FIVE-HUNDRED (500) FEET** AND PLACED IN A WATER METER BOX OR A DRAINAGE & WATER SOLUTIONS, INC. (OR APPROVED EQUAL) ALL CAST IRON TRACER WIRE ACCESS BOX.
8. THE TRACER WILL BE TESTED BY THE PARTICIPATING UTILITY AS PART OF THE PROJECT'S FINAL ACCEPTANCE. CONTRACTOR WILL BE RESPONSIBLE FOR ENSURING ALL CONTINUITY OF TRACER WIRE.
9. THE GROUND WIRE SHALL BE #5 AWG COPPER WIRE AND SHALL BE OF ADEQUATE LENGTH TO EXTEND A MINIMUM OF (5) FIVE FEET BEYOND THE TOP OF THE STRUCTURE. THE END OF THE GROUND WIRED SHALL CONNECT TO THE GROUND BAR OR LID TERMINAL USING A BURNDY KA6U MECHANICAL TERMINAL LUG.
10. A GROUND ROD SHALL BE INSTALLED AT EACH LOCATION WHERE GROUND WIRE SURFACES AND CONNECTS TO GROUND BAR. GROUND ROD SHALL BE COPPER COATED WITH A MINIMUM DIAMETER OF 5/8" AND SHALL BE BURIED A MINIMUM OF FOUR (4) FEET INTO THE GROUND.
11. THE GROUND BAR SHALL BE STAINLESS STEEL AND SHALL BE ATTACHED USING SS ¼" X 1¼" SS HEX TAPCON. THE FOLLOWING SHALL BE INSTALLED IN (4) FOUR CENTER HOLES: 10-32SS NUTS, #10 SS WASHERS AND 10-32 X ¾ SS PHILLIPS. THE FOURTH HOLE SHALL HAVE A BURNDY KA6U MECHANICAL TERMINAL LUG FOR THE #6 AWG GROUND WIRE. THE ASSEMBLY CAN BE ACQUIRED AT RCS INDUSTRIAL SUPPLY, INC. (540-353-0583) - CLAMP RFC-11. THE ENDS OF THE TRACER WIRES SHALL BE PLACED IN THE GROUND BAR AS SHOWN BELOW.
12. IF USING TRACER WIRE ACCESS BOX AS ACCESS POINT, GROUND BAR WILL NOT BE REQUIRED. WIRES SHALL BE CONNECTED AS SHOWN BELOW. TRACER WIRE SHALL BE OF ADEQUATE LENGTH TO EXTEND FIVE (5) FEET ABOVE THE TOP OF ACCESS BOX.
13. TWO WRAPS OF TRACER WIRE SHALL BE WRAPPED SNUGGLY AROUND BASE OF HYDRANT. WIRE SHALL NOT BE LEFT IN A WAY THAT WOULD INTERFERE WITH MOWING AROUND HYDRANT.
14. WHEN USING ALL DUCTILE MAIN, TRACER WIRE FOR SERVICES SHALL BE 12 AWG COPPER TRACER WIRE. TRACER WIRE SHALL HAVE BARE WIRE CONTACT TO DUCTILE MAIN.

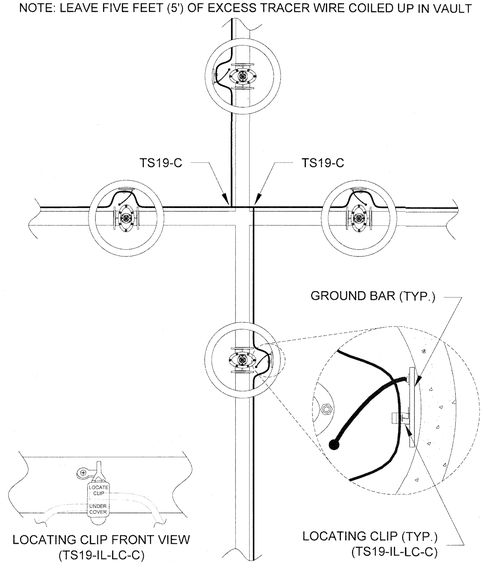


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

TRACER WIRE
FOR NON-METALLIC
PRESSURE PIPE

09/06/16 — **G-4**

BLUE = TRACE SAFE TRACER WIRE
BLACK = GROUND WIRE & GROUND BAR
TS19-IL-LC-C = TRACE SAFE LOCATING CLIP AT GROUND BAR
TS19-C = SERVICE LATERAL TRACE SAFE CONNECTOR
GROUND WIRE = #6 AWG COPPER WIRE
NOTE: LEAVE FIVE FEET (5') OF EXCESS TRACER WIRE COILED UP IN VAULT

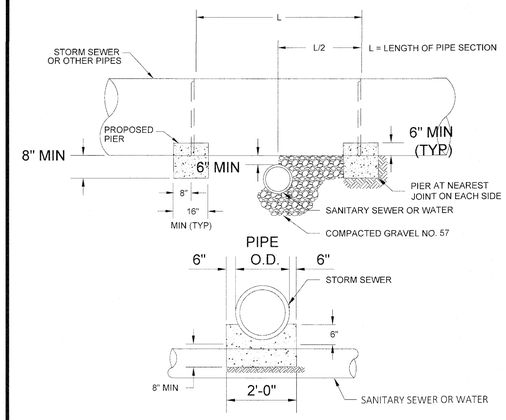


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

TRACER WIRE SAMPLE
TEE/CROSS INTERSECTION

09/06/16 — **G-4A**

1. PIER REQUIRED WHEN STORM DRAIN OR OTHER PIPES CROSSES OVER THE OTHER UTILITY WITH A VERTICAL CLEARANCE OF LESS THAN 18".
2. PIER TO BE BUILT ON UNDISTURBED EARTH.
3. CONCRETE TO BE READY MIX, CLASS A3.

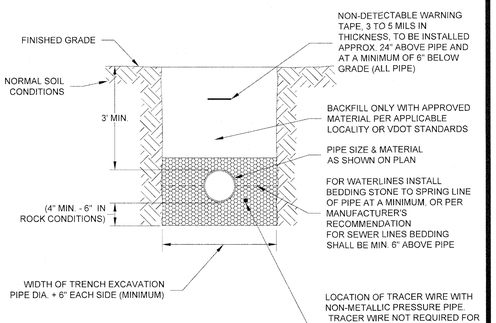


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

CONCRETE PIER

01/01/14 — **G-8**

1. BEDDING, HAUNCHING AND INITIAL BACKFILL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THIS DETAIL AND MANUFACTURER'S RECOMMENDATION.
2. ALL PVC PIPE SHALL BE BEDDED IN COMPACTED VDOT #57 OR #68 STONE, OR CRUSHER RUN.
3. IN AREAS SUBJECTED TO VEHICULAR TRAFFIC, BEDDING STONE AND FILL SHALL BE PLACED IN 6" LIFTS FROM BOTTOM OF TRENCH TO 1' ABOVE THE PIPE AND THE REMAINING SHALL BE PLACED IN 10" LIFTS AND SHALL BE COMPACTED TO AT LEAST 90% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D 698.
4. BEDDING REQUIREMENTS FOR DUCTILE IRON WATER LINE ARE DEPENDENT ON MANUFACTURER'S BEDDING CRITERIA.
5. ALL EXCAVATIONS SHALL COMPLY WITH OSHA TECHNICAL MANUAL, CHAPTER 2, TITLED "EXCAVATIONS: HAZARD RECOGNITION IN TRENCHING AND SHORING."
6. THE TRACER WIRE SHALL BE PLACED ALONG THE LOWER QUADRANT OF THE PIPE. THE WIRE SHALL NOT TOUCH THE PIPE, BUT SHALL BE A MAXIMUM OF 6" FROM THE PIPE. NON-METALLIC SPACERS MAY BE USED TO MAINTAIN A SET DISTANCE FROM THE UTILITY.

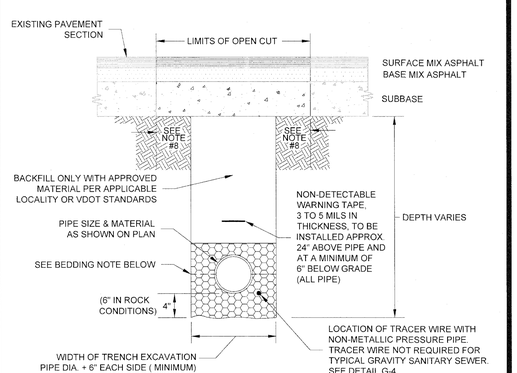


WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

BEDDING AND BACKFILL
OUTSIDE OF PAVED AREAS

08/01/15 — **G-11**

1. BEDDING, HAUNCHING AND INITIAL BACKFILL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THIS DETAIL AND MANUFACTURER'S RECOMMENDATION.
2. ALL PVC PIPE SHALL BE BEDDED IN COMPACTED VDOT #57 OR #68 STONE.
3. IN VDOT ROW, THE CONTRACTOR SHALL REPLACE THE PAVEMENT AS REQUIRED AND SPECIFIED BY VDOT. IN ROANOKE CITY, CONTRACTOR SHALL REPLACE PAVEMENT AS REQUIRED BY CITY OF ROANOKE RIGHT OF WAY EXCAVATION AND RESTORATION STANDARDS, LATEST EDITION.
4. ALL CONSTRUCTION WITHIN THE PUBLIC RIGHT-OF-WAY SHALL BE AS SPECIFIED BY VDOT OR APPLICABLE LOCALITY.
5. PRIOR TO CONSTRUCTION, CONTRACTOR IS RESPONSIBLE FOR SECURING ALL REQUIRED PERMITS FROM VDOT AND/OR APPLICABLE LOCALITY.
6. IN AREAS SUBJECTED TO VEHICULAR TRAFFIC, BEDDING STONE AND FILL SHALL BE PLACED IN 6" LIFTS AND SHALL BE COMPACTED TO AT LEAST 95% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D 698.
7. ALL SEWER LINE PIPE SHALL BE BEDDED IN COMPACTED GRANULAR MATERIAL. BEDDING REQUIREMENTS FOR DUCTILE SEWER LINE ARE DEPENDENT ON MANUFACTURER'S BEDDING CRITERIA.
8. BENCH CUT ON EACH SIDE OF PAVEMENT SHALL BE IN ACCORDANCE WITH VDOT OR APPLICABLE LOCALITY'S SPECIFICATIONS.
9. ALL EXCAVATIONS SHALL COMPLY WITH OSHA TECHNICAL MANUAL, CHAPTER 2, TITLED "EXCAVATIONS: HAZARD RECOGNITION IN TRENCHING AND SHORING."
10. THE TRACER WIRE SHALL BE PLACED ALONG THE LOWER QUADRANT OF THE PIPE. THE WIRE SHALL NOT TOUCH THE PIPE, BUT SHALL BE A MAXIMUM OF 6" FROM THE PIPE. NON-METALLIC SPACERS MAY BE USED TO MAINTAIN A SET DISTANCE FROM THE UTILITY.



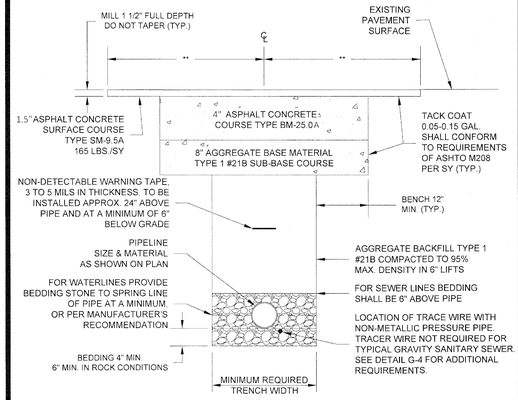
BEDDING: FOR WATERLINES, INSTALL BEDDING STONE TO SPRING LINE OF PIPE AT A MINIMUM, OR PER MANUFACTURER'S RECOMMENDATION. FOR SEWER LINES, BEDDING SHALL BE MINIMUM 6" ABOVE PIPE.

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

BEDDING AND BACKFILL
UNDER PAVEMENT AND IN RIGHT-OF-WAY

08/01/15 — **G-12**

1. ALL PAVEMENT MARKINGS DAMAGED OR DESTROYED BY TRENCH EXCAVATION ACTIVITY SHALL BE REPLACED BY THE PERMITEE PER VDOT SPECIFICATIONS.
2. ALL PVC PIPE SHALL BE BEDDED IN COMPACTED VDOT #57 OR #68 STONE.
3. THIS DETAIL FOR HIGHWAYS WITH EXISTING ASPHALT CONCRETE PAVEMENT SECTIONS.
4. THE EXTENT OF PAVEMENT RESTORATION FOR ALL OTHER PAVEMENT CUTS SHALL BE DETERMINED BY THE DISTRICT ADMINISTRATOR'S DESIGNEE.
5. ** WIDTH OF TRAVEL LANE MINIMUM FULL PAVEMENT WIDTH FOR OPEN CUT TRENCHING ALONG ROAD CENTERLINE OR 25' (MINIMUM) FOR PERPENDICULAR CROSSINGS.
6. THE TRACER WIRE SHALL BE PLACED ALONG THE LOWER QUADRANT OF THE PIPE. THE WIRE SHALL NOT TOUCH THE PIPE, BUT SHALL BE A MAXIMUM OF 6" FROM THE PIPE. NON-METALLIC SPACERS MAY BE USED TO MAINTAIN A SET DISTANCE FROM THE UTILITY.



***MODIFIED PAVEMENT THICKNESS PER VDOT RECOMMENDATIONS FOR SUBDIVISION ROADS*

WESTERN VIRGINIA REGIONAL - CONSTRUCTION DETAIL

VDOT LAND USE PERMIT
OPEN CUT PAVEMENT RESTORATION

05/14/2018 (REV.)*** — **G-13**

CHA
1341 Research Center Drive, Suite 2100
Blacksburg, VA 24060
540.552.5548 - www.chacompanies.com

WESTERN VIRGINIA WATER AUTHORITY

WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

COMMONWEALTH OF VIRGINIA
STEPHEN M. STEELE
Lic. No. 41449
05/25/18
PROFESSIONAL ENGINEER

IT IS A VIOLATION OF LAW FOR ANY PERSON, UNLESS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, ARCHITECT, OR LAND SURVEYOR PURSUANT TO SECTION 54.1-402 OF THE CODE OF VIRGINIA, TO ALTER IN ANY WAY ANY ITEM BEARING THE SEAL OF A PROFESSIONAL ENGINEER, ARCHITECT, OR LAND SURVEYOR. IF THIS ITEM IS ALTERED, THE ALTERING ENGINEER, ARCHITECT, OR LAND SURVEYOR SHALL STAMP THE DOCUMENT BEING ALTERED AND INCLUDE A NOTATION INCORPORATING THE WORDS "ALTERED BY" FOLLOWED BY HIS SIGNATURE AND THE DATE OF SUCH ALTERATION, AND A SPECIFIC DESCRIPTION OF THE ALTERATION.

WESTERN VIRGINIA WATER AUTHORITY
SUNNYBROOK DRIVE
WATER MAIN REPLACEMENT
ROANOKE COUNTY, VIRGINIA

No.	Submittal / Revision	Appvd. By	Date:
1	90% SUBMITTAL	SMS/MBH	5-18-18
2	CLIENT REVIEW	SMS/MBH	5-25-18

GENERAL DETAILS

Designed By:	Drawn By:	Checked By:
MBH	RAS	LES
Issue Date:	Project No:	Scale:
05/18/18	33834	AS SHOWN

Drawing No.:
C-501