

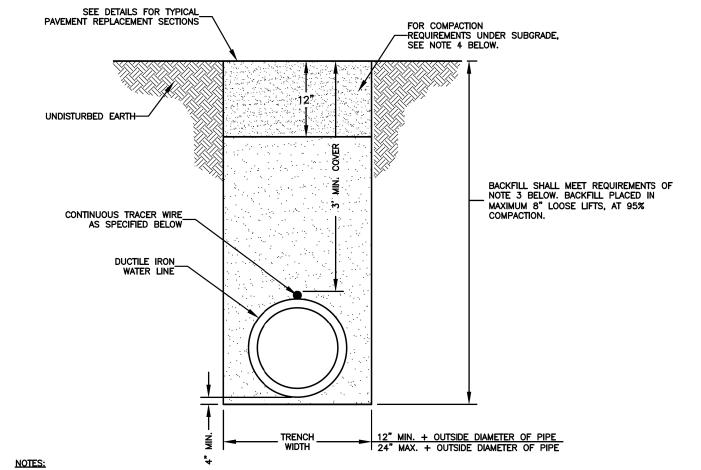
NOTES:

TRENCHES EXCAVATED OUTSIDE EXISTING ROAD AND RAILWAY RIGHTS-OF-WAY SHALL BE BE BACKFILLED WITH COMMON BACKFILL MATERIAL CONSISTING OF EXCAVATED MATERIALS EXCEPT HIGHLY ORGANIC SILTS AND CLAYS AND TAMPED THOROUGHLY. FILL SHALL BE DEPOSITED IN SUCCESSIVE, UNIFORM, APPROXIMATELY HORIZONTAL LAYERS. MATERIAL SHALL BE FREE OF ROOTS, STONES, AND DEBRIS. ALL MATERIAL SHALL HAVE AN IN-PLACE DENSITY OF AT LEAST 85% OF MAXIMUM DRY DENSITY (STANDARD PROCTOR) OR AS APPROVED BY THE ENGINEER. COMMON BACKFILL SHALL NOT CONTAIN STONE BLOCKS, BROKEN CONCRETE, MASONRY RUBBLE, OR OTHER SIMILAR MATERIALS. IT SHALL HAVE PHYSICAL PROPERTIES SUCH THAT IT CAN BE READILY SPREAD AND COMPACTED DURING FILLING. SNOW, ICE, AND FROZEN SOIL WILL NOT BE PERMITTED.

WHERE EXCAVATED MATERIAL, AFTER REMOVAL OF ROCKS, STUMPS, PLANT MATERIAL, AND OTHER EXTRANEOUS MATERIAL AND PROPER DEWATERING, DRYING, PROTECTION, AND STORAGE OF THE EXCAVATION BY THE CONTRACTOR, CANNOT BE PREPARED TO MEET THE REQUIREMENTS FOR COMMON BACKFILL, DUE TO THE NATURE OF THE MATERIAL (E.G., EXCESSIVE ROCK, MUCK, ORGANICS, CLAY, SILT, OR OTHER MATERIAL), AND AS DETERMINED BY THE ENGINEER, THE UNACCEPTABLE EXCAVATION SHALL BE REMOVED FROM THE SITE AND DISPOSED OF BY THE CONTRACTOR AND REPLACED BY IMPORTED BACKFILL MEETING THE REQUIREMENTS OF STRUCTURAL BACKFILL. IMPORTED STRUCTURAL BACKFILL SHALL BE FREE OF ORGANICS, ROOTS OR OTHER DELETERIOUS MATERIALS AND SHALL NOT CONTAIN MORE THAN FIVE PERCENT (BY WEIGHT) ORGANIC MATERIAL, HAVE A PLASTICITY INDEX (PI) GREATER THAN 25, OR HAVE A MAXIMUM DRY DENSITY LESS THAN 90 POUNDS PER CUBIC FOOT. IMPORTED STRUCTURAL FILL SHOULD CONSIST OF MATERIAL CLASSIFIED AS ML, CL, SC, OR SM, OR BETTER PER ASTM D-2487 AND BE CAPABLE OF BEING COMPACTED TO 85% STANDARD PROCTOR.

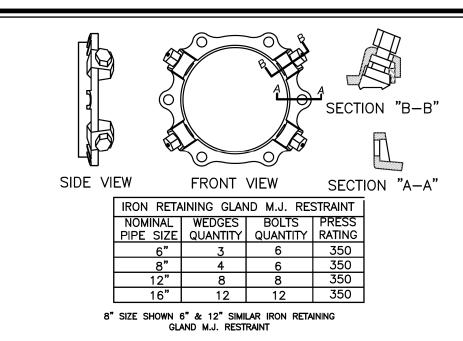
THE WATER LINE SHALL HAVE A MINIMUM OF 3' OF COVER AT FINISHED GRADE. TRACER WIRE WILL BE A 19 GAUGE, TIN COATED, COPPER CONDUCTOR WITH POLYETHYLENE INSULATION. CORE MATERIAL COMPRISED OF HIGH-TENACITY, WOVEN POLYESTER WITH WATER BLOCKING YARNS ENCAPSULATED IN 30 MIL. BLUE HDPE JACKET PROVIDING CORROSION RESISTANCE, FLEXIBILITY, IMPACT STRENGTH AND 1800 LBS. TENSILE STRENGTH. TRACER WIRE WILL NOT CONDUCT AN ELECTRICAL CURRENT WHEN STRUCK BY LIGHTNING AND IS DESIGNED FOR DIRECT BURY AND DIRECTIONAL BORING APPLICATIONS. WHEN SPLICES AND LATERAL CONNECTIONS ARE MADE, ONLY GEL FILLED CONNECTORS DESIGNED FOR WIRE WITH WOVEN POLYESTER FIBER CORE ARE TO BE USED. TRACER WIRE AND CONNECTORS SHALL BE TRACE—SAFE® WATER BLOCKING TRACER WIRE AND RELATED CONNECTORS, MANUFACTURED BY NEPTCO, INC., OR EQUIVALENT APPROVED BY ENGINEER, AND PRODUCED IN THE UNITED STATES OF AMERICA.

TRACER WIRE SHALL BE EXTENDED ALONG ALL WATER LINES, FITTINGS, VALVES, SERVICES, AND HYDRANTS. LOCATING CLIPS SHALL BE PROVIDED AT ALL MALVES, HYDRANT VALVES AND METER BOXES. THE CONTRACTOR SHALL DUCT TAPE TRACER WIRE ON CROWN OF WATER LINE EVERY FIVE FEET.

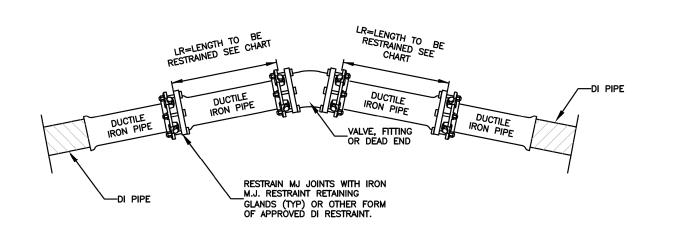


- THIS TRENCH BACKFILL DETAIL APPLIES TO AREAS UNDER PAVEMENT, CURB, GUTTER, SIDEWALK OR AREAS WHERE THE TRENCH IS WITHIN FIVE (5) FEET OF THE EDGE OF PAVEMENT.
- COMPACTION OF THE BACKFILL SHALL BE ACHIEVED THROUGH THE USE OF AN APPROVED VIBRATORY PLATE TAMPER OR ROLLER. THE CONTRACTOR IS RESPONSIBLE FOR MEETING ALL COMPACTION REQUIREMENTS.
- COMPACTION TESTING OF THE BACKFILL SHALL BE PROVIDED, DIRECTED AND COORDINATED BY THE OWNER. INTERVALS OF TESTING SHALL BE AT THE TOTAL DISCRETION OF THE OWNER AND MAY BE CHANGED AT ANY TIME. IF A TEST DOES NOT PASS, THE CONTRACTOR SHALL REMOVE THE DEFECTIVE BACKFILL, REDO THE WORK AND THE AREA WILL BE RETESTED. THE CONTRACTOR SHALL BE AWARE OF THE LEVEL OF COMPACTION REQUIRED. IF THE WORK IS SUSPECT TO BE DEFECTIVE BY THE OWNER, THE WORK SHALL BE RETESTED.
- THE WATER CONTENT OF THE BACKFILL MATERIAL SHALL ALSO BE TESTED AND RECORDED FOR EACH TEST COMPLETED. THE CONTRACTOR WILL BE ALLOWED TO ADD WATER TO THE BACKFILL MATERIAL IN ORDER TO OBTAIN THE OPTIMUM WATER CONTENT. HOWEVER, THE CONTRACTOR WILL NOT BE ALLOWED TO UTILIZE THE ADDITION OF WATER AS A MEANS OF COMPACTION. FURTHERMORE, SHOULD THE BACKFILL MATERIAL BE FOUND TO HAVE WATER CONTENT RATIOS WHICH IN THE OPINION OF THE ENGINEER OR THE OWNER PREVENTS THE APPROPRIATE COMPACTION OF THE TRENCH, THE CONTRACTOR SHALL REMOVE ALL DEFECTIVE MATERIAL AND UNDERTAKE THE NECESSARY CORRECTIVE WORK.
- 4. THE TOP TWELVE INCHES OF THE FINAL BACKFILL SHALL BE COMPACTED TO 98% STANDARD PROCTOR,
- 5. THE WATER LINE SHALL HAVE A MINIMUM OF 3' OF COVER AT FINISHED GRADE.
- TRACER WIRE WILL BE A 19 GAUGE, TIN COATED, COPPER CONDUCTOR WITH POLYETHYLENE INSULATION. CORE MATERIAL COMPRISED OF HIGH-TENACITY, WOVEN POLYESTER WITH WATER BLOCKING YARNS ENCAPSULATED IN 30 MIL. BLUE HDPE JACKET PROVIDING CORROSION RESISTANCE, FLEXIBILITY, IMPACT STRENGTH AND 1800 LBS. TENSILE STRENGTH. TRACER WIRE WILL NOT CONDUCT AN ELECTRICAL CURRENT WHEN STRUCK BY LIGHTNING AND IS DESIGNED FOR DIRECT BURY AND DIRECTIONAL BORING APPLICATIONS. WHEN SPLICES AND LATERAL CONNECTIONS ARE MADE, ONLY GEL FILLED CONNECTORS DESIGNED FOR WIRE WITH WOVEN POLYESTER FIBER CORE ARE TO BE USED. TRACER WIRE AND CONNECTORS SHALL BE TRACE—SAFE® WATER BLOCKING TRACER WIRE AND RELATED CONNECTORS, MANUFACTURED BY NEPTCO, INC., OR EQUIVALENT APPROVED BY ENGINEER, AND PRODUCED IN THE UNITED STATES OF AMERICA.

TRACER WIRE SHALL BE EXTENDED ALONG ALL WATER LINES, FITTINGS, VALVES, SERVICES, AND HYDRANTS. LOCATING CLIPS SHALL BE PROVIDED AT ALL VALVES, HYDRANT VALVES AND METER BOXES. THE CONTRACTOR SHALL DUCT TAPE TRACER WIRE ON CROWN OF WATER LINE EVERY FIVE FEET.



LR (MIN. LENGTH OF RESTRAINT EACH DIRECTION OF THRUST IN LINEAR FEET) Based on 200 psig pressure, Safety Factor of 2.0:1, BARE DI PIPE AND ML Soil, 3.5' cover Chart does not apply to pipes wrapped in polyethylene wrap						
PIPE SIZE	VALVES DEAD ENDS TEES	90° ELBOWS	45° ELBOW & CROSSES	22-1/2° ELBOWS	REDUCER	
6"	55'	31'	13'	7'	8"X2"	67'
8"	72'	40'	17'	8'	8"X6"	30'
12"	102'	57'	24'	12'	12"X8"	54'
16"	130'	72'	30'	15'	12"X8" 16"X8"	54' 95'



| DATE: 01/12/2019 SCALE: NOT TO SCALE

> City of Hendersonville Engineering Department 305 Williams Street Hendersonville, NC 28792 (828) 697-3000 (office) www.cityofhendersonville.org

WD DWG. NO. 2

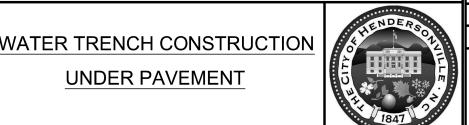
WATER TRENCH CONSTRUCTION **OUTSIDE PAVEMENT**



DATE: 06/10/2019 WD DWG. NO. 3 SCALE: NOT TO SCALE City of Hendersonville Engineering Department 305 Williams Street

www.cityofhendersonville.org 6/10/2019 3:13:41 PM, mpomraning

UNDER PAVEMENT Hendersonville, NC 28792 (828) 697-3000 (office)



DATE: 07/07/2019 WD DWG. NO. 4-1 SCALE: NOT TO SCALE City of Hendersonville Engineering Department

305 Williams Street Hendersonville, NC 28792 (828) 697-3000 (office) www.cityofhendersonville.org **DUCTILE IRON PIPE** RESTRAINT DETAIL SHEET 1 OF 2

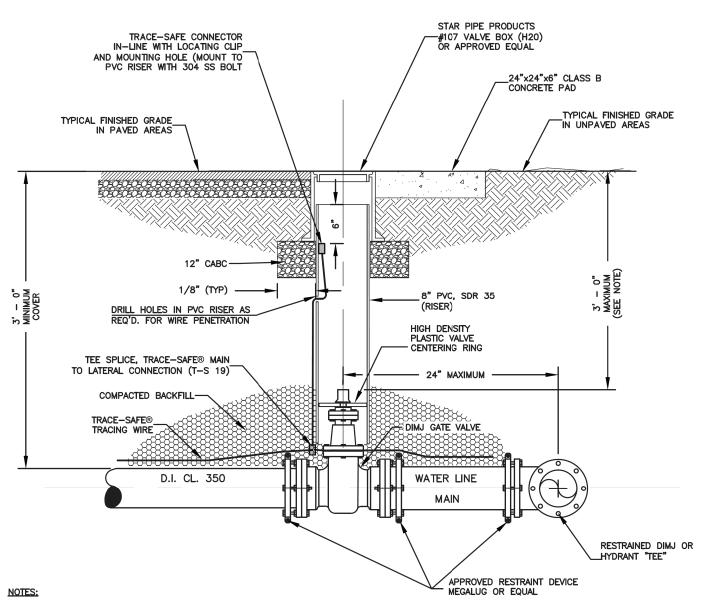


RESTRAIN M.J. JOINTS W/ APPROVED RESTRAIN M.J. TEE WITH -APPROVED RESTRAINT (TYPICAL) POINT OF C900 OR DI PIPE POINT OF DI PIPE UNRESTRAINED AT JOINT OR DI PIPE (TYP) LR TEE ALL DI PIPE BETWEEN FITTING AND DIRECTIONS. LR VALVE LR VALVE M.J. GATE VALVE WITH -approved restrain M.J. GATE VALVE WITH APPROVED RESTRAINT— -DUCTILE IRON PIPE (TYP) WITH APPROVED RESTRAINT DI PIPE TRANSITION TO -C900 OR D.I. PIPE UNRESTRAINED AT JOINT ---C900 OR D.I. PIPE RESTRAINED JOINT DETAIL FOR TYPICAL TEE INTERSECTION 4 WAY INTERSECTION SIMILARLY RESTRAINED

NOTES:

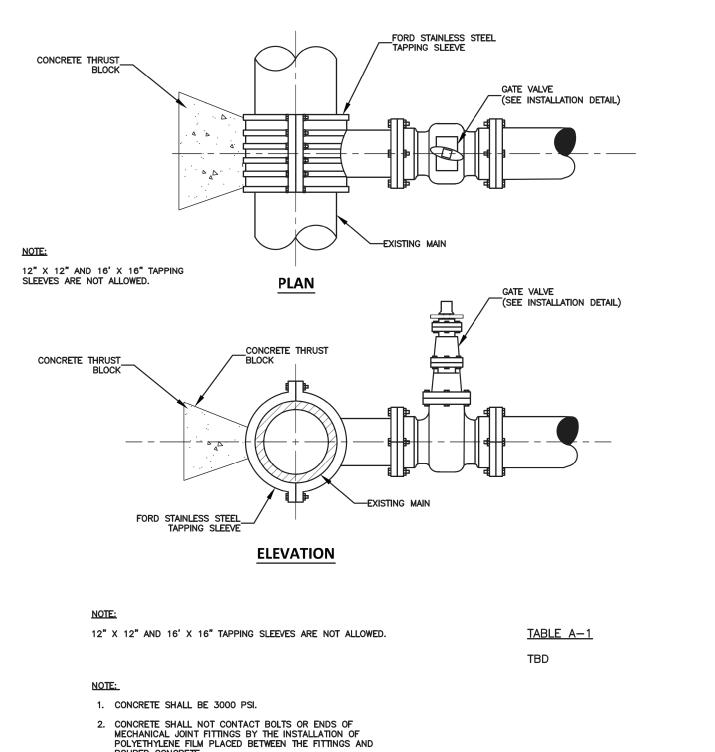
- THRUST RESTRAINT SHALL BE INSTALLED ON DUCTILE IRON WATER DISTRIBUTION LINES 6" THRU 12" DIAMETER IN THE MANNER SHOWN.
- IRON RETAINING GLAND M.J. RESTRAINT OR OTHER FORMS OF IRON RESTRAINT SHALL NOT BE USED ON PVC PIPE.
- PIPE GREATER THAN 12 INCH DIAMETER SHALL REQUIRE RESTRAINED JOINT PIPE FOR THE
- 4. COMPACT FITTINGS ARE ACCEPTABLE FOR USE WITH IRON RETAINING GLAND M.J. RESTRAINT AND OTHER FORMS OF DI RESTRAINT.
- 5. THE MINIMUM LENGTH OF RESTRAINT INDICATED SHALL REQUIRE ALL JOINTS WITHIN THE LR DISTANCE TO BE RESTRAINED.
- 6. RESTRAINT SYSTEM SHALL BE INSPECTED AND APPROVED PRIOR TO BACKFILLING.
- 7. RESTRAINT SYSTEMS MAY VARY BASED UPON THE ENGINEERS' DESIGN AS SHOWN ON THE PLAN AND PROFILE
- 8. GRIPPER RING AND FIELD LOK GASKETS ARE AN ACCEPTABLE METHOD OF RESTRAINT ON DUCTILE IRON PIPE
- 9. TRACER WIRE NOT SHOWN FOR CLARITY.
 WIRE SHALL BE INSTALLED PER OTHER DETAILS.

10. M.J. SHALL BE PRODUCED IN USA.



1. TOP OF COVER SHALL BE STAMPED "WATER"

- 2. VALVE PAD REQUIREMENTS SHALL NOT BE APPLICABLE FOR PAVED SURFACES.
- 3. PAVEMENT REPAIR SHALL MATCH EXISTING ROAD PAVING SECTION. SEE NCDOT ASPHALT REPAIR DETAIL # 654.01.
- 4. WHEN OPERATING NUT DEPTH EXCEEDS 3'-0" BELOW FINISHED GRADE, PROVIDE EXTENSION STEM WITH STANDARD 2" SQUARE OPERATING NUT. TOP OF NUT SHALL BE WITHIN 5" TO 9" OF FINISHED GRADE.
- TRACER WIRE WILL BE A 19 GAUGE, TIN COATED, COPPER CONDUCTOR WITH POLYETHYLENE INSULATION. CORE MATERIAL COMPRISED OF HIGH—TENACITY, WOVEN POLYESTER WITH WATER BLOCKING YARNS ENCAPSULATED IN 30 MIL. BLUE HDPE JACKET PROVIDING CORROSION RESISTANCE, FLEXIBILITY, IMPACT STRENGTH AND 1800 LBS. TENSILE STRENGTH. TRACER WIRE WILL NOT CONDUCT AN ELECTRICAL CURRENT WHEN STRUCK BY LIGHTNING AND IS DESIGNED FOR DIRECT BURY AND DIRECTIONAL BORING APPLICATIONS. WHEN SPLICES AND LATERAL CONNECTIONS ARE MADE, ONLY GEL FILLED CONNECTORS DESIGNED FOR WIRE WITH WOVEN POLYESTER FIBER CORE ARE TO BE USED. TRACER WIRE AND CONNECTORS SHALL BE TRACE—SAFE® WATER BLOCKING TRACER WIRE AND RELATED CONNECTORS, MANUFACTURED BY NEPTCO, INC., OR APPROVED EQUIVALENT, AND PRODUCED IN THE UNITED STATES OF AMERICA

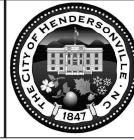


SEE TABLE A-1 FOR AREA OF CONCRETE REQUIRED FOR MAIN SIZED 6-INCH THROUGH 16-INCH.

DATE: 01/12/2019 WD DWG. NO. 6

City of Hendersonville Engineering Department 305 Williams Street Hendersonville, NC 28792 (828) 697-3000 (office)

STANDARD TAPPING SLEEVE AND VALVE ASSEMBLY



PROJECT REFERENCE NO.

DCR

JDN

PHONE: (919)707-6690 UTILITY CONSTRUCTION

DOCUMENT NOT CONSIDERED FINAL UNTIL ALL SIGNATURES ARE COMPLETED

UTILITY CONSTRUCTION

U-5887

DESIGNED BY: DCR

APPROVED BY: JDN

NORTH CAROLINA

DEPARTMENT OF TRANSPORTATION

UTILITIES ENGINEERING SEC.

FAX: (919)250-4151

DRAWN BY:

CHECKED BY:

HENDERSON

COUNTY

SHEET NO.

UC-3B

PLANS ONLY

Consulting Engineers Asheville, ■ North Carolina 828 - 253 - 2796

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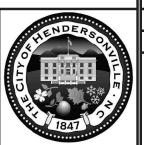
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423 • 467 • 8401

☐ Knoxville. TN

DATE: 01/12/2019 WD DWG. NO. 4-2 SCALE: NOT TO SCALE

DUCTILE IRON PIPE City of Hendersonville Engineering Department RESTRAINT DETAIL 305 Williams Street Hendersonville, NC 28792 SHEET 2 OF 2 (828) 697-3000 (office) www.cityofhendersonville.org



DATE: 01/12/2019 WD DWG. NO. 5 SCALE: NOT TO SCALE

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VALVE INSTALLATION DETAIL



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