"EXHIBIT A"

WATERMAIN SPECIFICATIONS

A. DESCRIPTION

THIS WORK INCLUDES EXCAVATION, PLACING, BACKFILLING, DISINFECTION, AND TESTING WATER MAIN PIPE, HYDRANTS, FITTINGS, THRUST BLOCKS, VALVES, WELLS, AND SERVICE LEADS WHEN CALLED FOR ON THE PLANS.

B. MATERIALS

1. SEE NOTES AND MATERIALS AT RIGHT OF SHEET.
2. BACKFILL, CONCRETE, REINFORCEMENT, AND OTHER MATERIALS
   a. THE MATERIALS SHALL MEET THE REQUIREMENTS SPECIFIED IN THE CURRENT MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, DIVISION 8.
   b. BACKFILL SHALL BE MDOT CLASS II GRANULAR MATERIAL.

C. CONSTRUCTION

1. PIPE HANDLING

THE PIPE SHALL BE DISTRIBUTED AT THE SITE BY THE CONTRACTOR AS REQUIRED AND CARE SHALL BE EXERCISED TO PREVENT INJURY TO THE PIPE IN HANDLING. PROPER TOOLS AND IMPLEMENTS SATISFACTORY TO THE CITY ENGINEER FOR SAFE HANDLING THE PIPE AND OTHER MATERIALS SHALL BE PROVIDED BY THE CONTRACTOR. PIPE MUST BE PROTECTED FROM FALLING EITHER FROM TRUCK TO GROUND OR INTO THE TRENCH, AND WHEN DISTRIBUTED ALONG THE LINE OR STORED NEAR A ROAD, MUST BE KEPT CLEAR OF DANGER OF DAMAGE TO PASSING VEHICLES.

ALL MATERIALS WILL BE INSPECTED BEFORE PLACING IN THE TRENCH, AND IF DEFECTIVE, MARKED "REJECTED", AND REMOVED FROM THE SITE BY THE CONTRACTOR.

2. EXCAVATION

THE CONTRACTOR SHALL DO ALL THE EXCAVATION REQUIRED FOR THE CONSTRUCTION OF THE MAINS AND APPURTENANCES, INCLUDING CLEARING OF THE SITE OF THE WORK AND THE REMOVAL AND DISPOSAL OF ALL MATERIALS NECESSARY TO BE REMOVED IN THE CONSTRUCTION OF ALL WORK UNDER THIS CONTRACT.

EXCAVATED MATERIALS MAY BE TEMPORARILY STORED ALONG THE TRENCH, UNLESS OTHERWISE NOTED, IN A MANNER THAT WILL NOT CAUSE DAMAGE TO TREES, SHRUBS, FENCES, OR OTHER PROPERTY, NOR THAT WILL ENDANGER THE BANK OF THE TRENCH BY IMPOSING TOO GREAT A LOAD THEREON.

EXCAVATIONS SHALL BE ADEQUATELY BRACED AND/OR SHEETED TO PREVENT CAVING OR SQUEEZING OF THE SOIL, OR DISTURBING EXISTING UTILITIES OR PAVEMENT, AND SHALL BE COMPLETELY DEWATERED PRIOR TO CONSTRUCTION OF THE WATERMAINS OR OTHER STRUCTURES.

WHERE, THROUGH THE CONTRACTOR'S CONSTRUCTION PROCEDURE, OR BECAUSE OF POOR EXISTING GROUND CONDITIONS, IT IS IMPOSSIBLE TO MAINTAIN ALIGNMENT AND GRADE PROPERLY, OR PROVIDE SUITABLE SUPPORT FOR THE PIPE, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, EXCAVATE BELOW GRADE AND REPLACE WITH SUITABLE APPROVED MATERIAL IN ORDER TO INSURE THAT THE PIPE, WHEN LAID, WILL MAINTAIN CORRECT ALIGNMENT AND GRADE.

THE SUBGRADE SHALL BE ACCURATELY PREPARED TO LINE AND GRADE SO THAT THE PIPE, WHEN LAID, SHALL HAVE UNIFORM BEARING UPON THE APPROVED BACKFILL, THROUGHOUT ITS LENGTH.

PAVEMENT CUTTING, MAINTENANCE, AND REINSTATEMENT SHALL BE DONE IN A MANNER SATISFACTORY TO THE CITY OF POTTERVILLE.

a. TRENCH BOTTOM. THE BOTTOM OF TRENCH SHALL BE EXCAVATED NEATLY TO THE REQUIRED GRADE PRIOR TO FILLING WITH FOUR (4) INCHES, OR TO THE DEPTH REQUIRED BY THE DETAIL DRAWING FOR SPECIFIC TYPE OF PIPE USED, OF MDOT CLASS II GRANULAR MATERIAL THOROUGHLY COMPACTED BY TAMPING BEFORE THE PIPE IS LAID. BLOCKING UNDER PIPE IS STRICTLY PROHIBITED UNLESS SPECIFICALLY ORDERED IN WRITING BY THE CITY ENGINEER; AND, THEN ONLY FOR EACH SPECIFIC LENGTH OF PIPE IN QUESTION.

b. SHEETING, SHORING, AND BRACING. EXCAVATIONS SHALL BE SHEETED AND BRACED AS NECESSARY TO INSURE SUBSTANTIAL COMPLETION OF THE WORK AND/ OR TO INSURE THE SAFETY OF THE WORKMEN OR THE PUBLIC OR TO PROTECT ADJOINING STRUCTURES.

c. DISPOSAL OF EXCAVATED MATERIAL. WITH THE EXCEPTION OF AN AMOUNT OF EXCAVATED MATERIALS SUFFICIENT FOR BACKFILLING AND CONSTRUCTION OF FILLS AS CALLED FOR ON THE PLANS, ALL BROKEN CONCRETE, STONE, AND EXCESS EXCAVATED MATERIALS SHALL BE LEGALLY DISPOSED OF BY THE CONTRACTOR OFF-SITE. ON-SITE DISPOSAL MAY BE PERMITTED BY THE CITY ENGINEER.

d. PUMPING AND DRAINING. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN ADEQUATE PUMPING AND DRAINAGE FACILITIES FOR REMOVAL AND DISPOSAL OF WATER FROM TRENCHES, OR OTHER EXCAVATIONS. THE CONTRACTOR SHALL ALSO PROVIDE PUMPING AND DRAINAGE FACILITIES AND SHALL OPERATE SAME AS MAY BE NECESSARY UNTIL CONSTRUCTION IS COMPLETED.

WHERE THE WORK IS IN GROUND CONTAINING EXCESSIVE AMOUNT OF WATER, THE CONTRACTOR SHALL PROVIDE, INSTALL, MAINTAIN, AND OPERATE SUITABLE WELL POINTS, CONNECTING MANIFOLDS, AND RELIABLE PUMPING EQUIPMENT TO OPERATE SAME TO INSURE PROPER CONSTRUCTION OF THE WORK.

DRAINAGE OR DISCHARGE LINES SHALL BE CONNECTED TO ADJACENT PUBLIC STORMWATER DRAINS OR EXTENDED TO NEARBY WATERCOURSES WHEREVER POSSIBLE. IN AN EVENT, ALL PUMPING AND DRAINAGE SHALL BE DONE WITHOUT DAMAGE TO ANY HIGHWAY OR OTHER PROPERTY, PUBLIC OR PRIVATE, PROPERTY OWNERS. IF IT SHOULD BECOME NECESSARY TO LAY PIPE IN WATER, THE METHOD OF INSTALLATION MUST BE APPROVED BY THE CITY ENGINEER.

e. UTILITIES CROSSING. IN CROSSING OVER OR UNDER ANY MAIN OR LATERAL SEWER, SEWER CONNECTION, CATCH BASIN, WATERMAIN, SERVICE CONNECTION, GAS MAN, GAS CONNECTION, CONDUIT, OR ANY UNDERGROUND IMPROVEMENT, THE CONTRACTOR SHALL USE ALL POSSIBLE CARE IN PROTECTING THE SAME FROM INJURY, DAMAGE, OR THE FREE UNOBSTRUCTED CONTINUOUS USE OF THE SAME AS FAR AS POSSIBLE, AND THE CONTRACT WORK SHALL BE PERFORMED IN SUCH MANNER AS WILL EFFECT THE LEAST DAMAGE OR INTERFERENCE WITH SUCH IMPROVEMENTS OR THE FREE AND UNOBSTRUCTED USE OF THE SAME. THE CONTRACTOR WILL BE REQUIRED TO REPAIR, REPLACE, OR REBUILD ANY SUCH IMPROVEMENT INJURED OR DAMAGED BY HIM, AND SHALL BE RESPONSIBLE TO THE DEPARTMENT, COMPANIES, INDIVIDUALS, OR CORPORATION CONTROLLING SUCH IMPROVEMENTS.

3. LAYING PIPE

BEFORE LOWERING IN THE TRENCH, AND WHILE SUSPENDED, EACH PIPE AND FITTING SHALL BE INSPECTED FOR DEFECTS. DEFECTIVE, DAMAGED, OR UNSOUND PIPE SHALL IMMEDIATELY BE REMOVED FROM THE CONSTRUCTION SITE. THE INTERIOR OF EACH PIPE SHALL BE INSPECTED FOR CLEANNESS AND CLEARED OF ALL DIRT AND FOREIGN MATTER BEFORE BEING LOWERED INTO THE TRENCH.

UNLESS OTHERWISE DIRECTED, PIPE SHALL BE LAID WITH BELL ENDS FACING IN THE DIRECTION OF LAYING. AFTER A LENGTH OF PIPE IS PLACED IN THE TRENCH, THE SPIGOT SHALL BE CENTERED IN THE BELL OF THE ADJACENT PIPE, THE PIPE SHOVED INTO POSITION AND BROUGHT TO A TRUE ALIGNMENT AND THERE SECURED WITH SAND TAMPED UNDER AND ON EACH SIDE OF THE PIPE, EXCEPTING AT BELL HOLES. NO EARTH OR OTHER FOREIGN MATTER SHALL BE ALLOWED TO ENTER THE JOINT SPACE.

WHEN THE TEMPERATURE IS ABOVE 60 DEGREES F., THE SPIGOT OF EACH PIPE LAID SHALL BE BROUGHT TIGHTLY HOME IN THE BELL OF THE PRECEDING PIPE. WHEN THE TEMPERATURE IS BELOW 60 DEGREES F., THE PIPE SHALL BE LAID WITH THE SPIGOT END APPROXIMATELY 1/16 INCH FROM THE FACE OF THE BELL TO ALLOW FOR EXPANSION.

WHEREVER DEFLECTIONS AT JOINTS ARE REQUIRED BY CHANGES IN GRADE OR ALIGNMENT OR TO PLUMB VALVE STEMS, THE DEFLECTION AT ANY BELL AND SPIGOT JOINT SHALL NOT EXCEED THAT WHICH WILL CAUSE THE SPIGOT END OF PIPE TO BE AWAY FROM HOME IN THE BELL OF THE ADJACENT PIPE A DISTANCE OF 1/4 INCH AT THE POINT OF GREATEST OPENING. THE DEFLECTION AT ANY MECHANICAL JOINT SHALL NOT EXCEED THREE-QUARTERS OF THE MAXIMUM DEFLECTION RECOMMENDED BY THE MANUFACTURER OF THE JOINT USED.

WHERE NECESSARY TO CUT PIPE, CUTTING SHALL BE DONE WITH APPROVED TOOLS AND CUT ENDS OF PIPE SHALL BE SQUARE AND REGULAR. CUTTING SHALL BE DONE IN A MANNER TO AVOID DAMAGE TO LINING AND COATING.

TO PREVENT TRENCH WATER FROM ENTERING THE PIPE, JOINTS WHICH FOR ANY REASON MAY NOT BE COMPLETED AS THE PIPE IS LAID SHALL BE THOROUGHLY PACKED WITH APPROVED MATERIAL, IN A MANNER TO MAKE THEM WATERTIGHT. OPEN ENDS OF FITTINGS SHALL BE TIGHTLY CLOSED WITH APPROVED PLUGS AND WELL PACKED AS SHALL THE END OF THE LAST PIPE LAID WHENEVER WORK IS NOT IN PROGRESS.

TOOLS OR OTHER OBJECTS SHALL NOT BE STORED OR LEFT IN THE PIPE.

PIPE SHALL BE LAID AT DEPTHS TO PROVIDE COVER OF 5 FT. 6 INCH OVER THE TOP OF THE PIPE UNLESS OTHERWISE NOTED ON THE PLANS OR ELSEWHERE IN THESE SPECIFICATIONS.

4. TUNNELING OR BORING

WHEN TUNNELING IS REQUIRED BY THE WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES OR IS SPECIFIED ON THE PLANS, SAID TUNNELING SHALL BE IN ACCORDANCE WITH THE CURRENT WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES REQUIREMENTS FOR CONSTRUCTION WITHIN ROAD RIGHT OF WAY OR PARKS UNDER JURISDICTION OF THE BOARD (REVISED AUGUST 1, 2007).

WHEN TUNNELING BY JACKING OR BORING, ALL VOIDS SHALL BE FILLED BY MEANS OF PRESSURE GROUTING WITH A 1:3 CEMENT-SAND MORTAR. THIS WORK MUST BE ACCOMPLISHED WITHIN 24 HOURS AFTER THE CONDUIT CROSSING HAS BEEN COMPLETED. THE TUNNELING SHALL EXTEND A MINIMUM OF 10 FEET OUTSIDE THE EDGES OF THE COUNTY ROAD PAVEMENT. PRESSURE GROUTING WILL NOT BE REQUIRED FOR CASINGS FOUR (4) INCH IN DIAMETER OR SMALLER UNLESS THE VOIDS ARE ONE (1) INCH OR LARGER.

5. THRUST BLOCKS

CONCRETE THRUST BLOCKS SHALL BE PLACED AS DIRECTED BY THE CITY ENGINEER.

THRUST BLOCKS SHALL BE PLACED TO BEAR ON UNDISTURBED SOIL.

IN UNSTABLE SOIL CONDITIONS, THE THRUST BLOCKS ARE TO BE SUPPORTED BY REMOVAL OF THE UNSTABLE SOLS AND REPLACEMENT WITH BALLAST OF SUFFICIENT STABILITY TO RESIST THE THRUSTS. ALL THRUST BLOCKS SHALL BE APPROVED BY THE CITY ENGINEER BEFORE BACKFILLING.

6. BACKFILL

BACKFILL IS DEFINED AS THAT MATERIAL PLACED INTO THE TRENCH FROM THE TOP OF THE STANDARD PIPE BEDDING TO THE GROUND SURFACE. BACKFILL SHALL BE PLACED INTO THE TRENCH ACCORDING TO ONE OF THE FOLLOWING SPECIFIED MANNERS AS DETERMINED BY THE LOCATION OF THE TRENCH OR THE EDGE OF TRENCH NEAREST THE EXISTING PAVEMENT, ROADWAY, SIDEWALK, DRIVEWAY OR PARKING AREA.

WHEREVER COMPACTION IS REQUIRED, IT SHALL BE ACCOMPLISHED BY SUITABLE MECHANICAL COMPACTION EQUIPMENT APPROVED BY THE CITY ENGINEER. FROZEN BACKFILL MATERIALS ARE NOT PERMITTED UNDER ANY CIRCUMSTANCE WHATSOEVER.

a. UNDER OR ADJACENT TO PAVEMENT

TRENCH LOCATION	TRENCH LOCATION
1) UNDER EXISTING OR PROPOSED PAVEMENT 2) PARALLEL TO AND LESS THAN FIVE (5) FEET FROM EDGE PAVEMENT	BACKFILL SHALL BE FULL DEPTH MECHANICALLY COMPACTED MDOT CLASS II GRANULAR MATERIAL CONSTRUCTED IN SIX (6) INCH LAYERS, LOOSE MEASURE WITH EACH LAYER COMPACTED TO NOT LESS THAN 95 PERCENT OF MAXIMUM UNIT WEIGHT AT OPTIMUM MOISTURE CONTENT PER AASHTO-180 OR BY MDOT CONE DENSITY METHOD.
3) PARALLEL AND LESS THAN TEN (10) FEET AND MORE THAN FIVE (5) FEET FROM EDGE OF PAVEMENT	SELECTED EXCAVATED OR OTHER ACCEPTABLE BACKFILL MATERIALS SHALL BE PLACED, AFTER STANDARD BEDDING CALLED FOR ON PLAN HAS BEEN COMPLETED, INTO TRENCH IN SIX (6) INCH LAYERS, LOOSE MEASURE, WITH EACH LAYER COMPACTED TO NOT LESS THAN 90 PERCENT MAXIMUM UNIT WEIGHT. BACKFILL MATERIAL USED MUST PROVIDE COMPACTION MEETING REQUIREMENTS STATED ABOVE.

b. OPEN SPACE AREAS. ALL TRENCHES IN OPEN SPACES AREAS SHALL BE BACKFILLED BY PROPERLY BEDDING THE PIPE ACCORDING TO THE PIPE BEDDING DETAILS AND THEN SHALL BE BACKFILLED BY SPREADING BACKFILL MATERIAL OVER THE TRENCH AND MECHANICALLY COMPACTING TO 90 PERCENT OF MAXIMUM UNIT WEIGHT. CONTRACTOR SHALL REGRADE AS NECESSARY DURING THE LIFE OF THE CONTRACT AND AS DIRECTED BY THE CITY ENGINEER.

c. BACKFILL. BACKFILL SHALL NOT BE PLACED AGAINST ANY PORTION OF A STRUCTURE UNTIL THE STRUCTURE HAS PASSED INSPECTION AND HAS BEEN APPROVED BY THE CITY ENGINEER FOR BACKFILLING. ALL TRENCHES SHOULD BE BACKFILLED AS SOON AS INSPECTION IS COMPLETED IN ORDER TO AVOID UNNECESSARY RISK OR DAMAGE TO THE STRUCTURE AND ALSO TO REDUCE THE RISK OF ACCIDENTS INVOLVING THE PUBLIC.

IF A BULLDOZER OR OTHER MACHINE IS USED TO PLACE THE BACKFILL MATERIAL, NO MATERIAL SHALL BE PUSHED OR DROPPED INTO THE TRENCH, BUT SHALL BE PLACED ON THE SLOPING ENDS OF THE COMPLETED BACKFILL, AND ALLOWED TO ROLL IN PLACE TO THE BOTTOM OF THE TRENCH.

7. GATE WELLS AND VALVES

GATE WELLS SHALL BE CONSTRUCTED AS SHOWN ON THE WATERMAIN STANDARD DETAIL PLANS. COVERS SHALL BE SET TO FINISH GRADE.

GATE VALVES SHALL BE OF THE SIZE AND INSTALLED AT THE LOCATION AS SHOWN ON THE PLANS. THEY SHALL BE SET SQUARE WITH THE LINE OF THE MAIN, AND UNLESS OTHERWISE DIRECTED BY THE CITY ENGINEER, ALL GATE VALVES SHALL BE SET WITH STEMS PLUMB.

8. HYDRANTS

HYDRANTS SHALL BE LOCATED AS SHOWN ON THE PLANS, AND SHALL BE SET PLUMB. THE HYDRANT AND VALVE SHALL BE SET AS INDICATED ON THE STANDARD DETAIL DRAWING AND TO THE FINISH GRADE CALLED FOR ON THE PLANS.

9. CONNECTIONS

ALL CONNECTIONS TO EXISTING WATER MAINS SHALL BE MADE AT THE LOCATIONS AS SHOWN ON THE PLANS.

NO CONNECTIONS TO EXISTING WATER MAINS SHALL BE MADE UNTIL AFTER THE NEW MAIN HAS PASSED THE BACTERIOLOGICAL AND HYDROSTATIC TESTS AND THE CITY DPW AUTHORIZES SAME.

ONLY CITY OF POTTERVILLE PERSONNEL OR THE CONTRACTOR UNDER DIRECT CITY OF POTTERVILLE PERSONNEL'S SUPERVISION MAY OPERATE LINE VALVES.

ALL MATERIALS USED AT THE FINAL CONNECTION ARE TO BE CLEAN AND SANITIZED.

D. TESTING

1. WATER MAINS

a. HYDROSTATIC TESTS

THE CITY OF POTTERVILLE SHALL BE NOTIFIED AND BE PRESENT TO WITNESS THE HYDROSTATIC TEST.

TEMPORARY BLOW, CAPS, OR PLUGS SHALL BE PROVIDED AT THE ENDS OF THE NEW MAIN TO PERMIT TESTING.

WATER MAINS SHALL BE LEAKAGE AND PRESSURE TESTED IN ACCORDANCE WITH THE AWWA STANDARD C600 FOR DUCTILE IRON PIPE OR AWWA STANDARD C605 FOR PVC PIPE. PRIOR TO TESTING, MAINS SHALL BE APPROPRIATELY FLUSHED IN ACCORDANCE WITH C600 FOR DUCTILE IRON PIPE OR AWWA STANDARD C605 FOR PVC PIPE.

NO HYDROSTATIC TESTING MAY BE PERFORMED UNTIL TRENCH BACKFIELD COMPACTING HAS BEEN SUCCESSFULLY COMPLETED AND COMPACTING TEST REPORTS HAVE BEEN FURNISHED TO THE CITY ENGINEER.

b. CHLORINATING

AFTER SATISFACTORY HYDROSTATIC TEST IS OBTAINED, THE NEW MAIN SHALL BE CHLORINATED. CHLORINE SHALL BE APPLIED BY MEANS OF A SOLUTION THROUGH A CORPORATION STOP AT THE BEGINNING OF THE MAIN. A SLOW FLOW OF WATER SHALL BE LET INTO THE MAIN APPROXIMATELY AT THE POINT OF INJECTION OF THE CHLORINE SOLUTION AT A RATE SUCH THAT THE CHLORINE DOSAGE OF THE ENTERING WATER SHALL BE AT LEAST 25 PARTS PER MILLION (PPM). AN OPEN DISCHARGE SHALL BE MAINTAINED AT THE FAR END OF THE MAIN, AND THE INTRODUCTION OF CHLORINE SOLUTION AND WATER SHALL CONTINUE UNTIL THE WATER DISCHARGING AT THE FAR END SHALL BE OPENED AND SUFFICIENT WATER DRAWN OFF TO ASSURE THE FULL DOSAGE OF CHLORINE REACHES EACH OUTLET.

THE CHLORINE TREATED WATER SHALL REMAIN AT LEAST 24 HOURS, AND AT THE END OF THAT TIME THE CHLORINE RESIDUAL AT PIPE EXTREMITIES AND OTHER REPRESENTATIVE POINTS SHALL BE AT LEAST 10 PPM. IF THE CHLORINE RESIDUAL IS LESS THAN 10 PPM AT THE END OF THE RETENTION PERIOD, REPEAT UNTIL THE REQUIRED 10 PPM RESIDUAL IS OBTAINED.

FOLLOWING CHLORINATION, ALL TREATED WATER SHALL BE THOROUGHLY FLUSHED FROM THE MAIN UNTIL THE REPLACEMENT WATER THROUGHOUT ITS LENGTH SHALL, UPON TEST, BOTH CHEMICALLY AND BACTERIOLOGICALLY, BE PROVEN EQUAL TO THE WATER QUALITY IN THE SOURCE WATER SUPPLY SYSTEM AND SAFE.

THE CONTRACTOR MUST NOTIFY THE CITY ENGINEER TO SCHEDULE A BACTERIOLOGICAL SAMPLING AND TESTING. THE TESTING MUST BE SCHEDULED 48 HOURS IN ADVANCE. TWO CONSECUTIVE SAMPLES WILL BE TAKEN 24 HOURS APART.

SAMPLES WILL BE TAKEN FOR EVERY 1,000 FEET OF WATER MAIN AND DEAD-END LINES.

SHOULD THE INITIAL TREATMENT OF ALL OR ANY SECTION OF THE MAIN, IN THE OPINION OF THE CITY ENGINEER, PROVE INEFFECTIVE, THE CHLORINATION PROCEDURE SHALL BE REPEATED UNTIL CONFIRMED TESTS SHOW THAT WATER SAMPLED FROM THE NEW MAIN CONFORMS TO THE FOREGOING REQUIREMENT.

FINAL WATERMAIN CONNECTIONS TO THE PUBLIC SYSTEM WILL NOT BE ALLOWED UNTIL AUTHORIZATION IS PROVIDED BY THE CITY OF POTTERVILLE.

COST FOR SAMPLING AND TESTING WILL BE THE RESPONSIBILITY OF THE CONTRACTOR.

2. TESTING AND INSPECTION OF PIPE MATERIALS AND BACKFILL COMPACTION

a. MANUFACTURERS' TEST CERTIFICATES SHALL ACCOMPANY ALL PIPE SHIPMENTS AND SHALL BE PROVIDED TO THE CITY ENGINEER.

b. WHERE WATERMAIN IS CONSTRUCTED IN EASEMENT AND PAVED AREAS NOT IN PUBLIC RIGHTS OF WAY, THE TESTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY AND THE COST OF SERVICES PERFORMED SHALL BE PAID FOR BY THE CONTRACTOR. COMPACTION TESTING SHALL BE ONE TEST PER LAYER PER 50 FEET OF TRENCH.

FIRE PROTECTION

PRIVATE FIRE PROTECTION WATERMAIN NOTES FOR CONSTRUCTION & TESTING

A. PRIVATE FIRE PROTECTION WATERMAIN IS THAT WATERMAIN LYING OUTSIDE THE EASEMENT OR RIGHT OF WAY LIMITS AND IS NOT INCLUDED IN THE STATE PERMIT.

B. PRIVATE FIRE PROTECTION WATERMAIN IS A PRIVATE LINE FOR FIRE PROTECTION ONLY. NO DOMESTIC WATER SERVICE IS ALLOWED FROM THIS LINE, AND ALL MAINTENANCE IS THE PROPERTY OWNER'S RESPONSIBILITY.

C. PRIVATE FIRE PROTECTION WATERMAIN SHALL BE INSTALLED UNDER THE INSPECTION OF CITY ENGINEER.

D. PRIVATE FIRE PROTECTION WATERMAIN SHALL BE PRESSURE TESTED AND DISINFECTED ACCORDING TO THE REQUIREMENTS ON THE CITY OF POTTERVILLE.

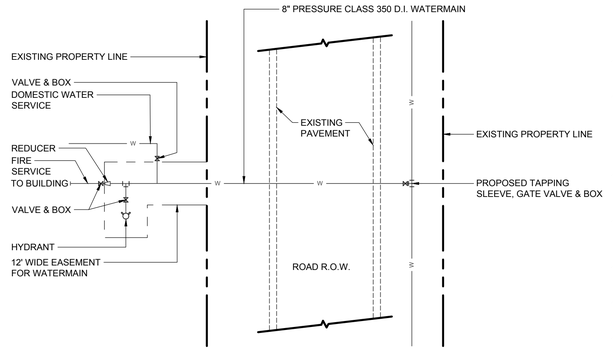
E. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING, AND PAYING FOR, TESTING FOR STANDARD PRESSURE TESTS TO 150 PSI, CHLORINE RESIDUAL, AND BACTERIOLOGICAL TESTING BY A QUALIFIED PRIVATE LABORATORY. TEST RESULTS SHALL BE REPORTED TO THE CITY ENGINEER.

F. PRIVATE FIRE PROTECTION WATERMAIN SHALL NOT BE CONNECTED TO THE EXISTING MAIN UNTIL SATISFACTORY TEST RESULTS HAVE BEEN OBTAINED AND REPORTED AND THE CITY DPW SUPERVISOR AUTHORIZES SAME.

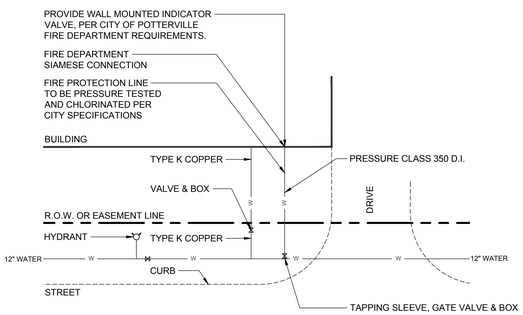
G. PRIVATE FIRE PROTECTION WATERMAIN SHALL BE PRESSURE CLASS 350 DUCTILE IRON PIPE.

H. BACKFLOW PREVENTION ASSEMBLY IS REQUIRED TO BE INSTALLED PRIOR TO HYDRANT USE FOR THE PROTECTION OF THE DRINKING WATER DISTRIBUTION SYSTEM.

I. AN APPROPRIATE BACKFLOW PREVENTION DEVICE IS REQUIRED WHERE THE FIRE PROTECTION CONNECTS TO THE PUBLIC WATER SUPPLY IN ACCORDANCE WITH THE CURRENT MICHIGAN PLUMBING CODE AND AS APPROVED BY THE CITY OF POTTERVILLE.



BUILDING FIRE SERVICE AND DOMESTIC WATER SUPPLY DETAIL



PRIVATE FIRE PROTECTION WATERMAIN

WATERMAIN NOTES AND MATERIALS

1. ALL WORKMANSHIP, MATERIALS, AND TESTING SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATION OF THE CITY OF POTTERVILLE.

2. ALLOWABLE TYPES OF WATER MAIN:

   a. PRESSURE CLASS 350 DUCTILE IRON IN ACCORDANCE WITH AWWA C150 AND AWWA C151 STANDARDS. ALL DUCTILE IRON PIPE SHALL MEET NSF/ANSI STANDARD 61 AND BE STAMPED ACCORDINGLY. ALL DUCTILE IRON PIPE SHALL BE CEMENT LINED IN ACCORDANCE WITH AWWA C104 STANDARD. CEMENT LINING SHALL BE STANDARD THICKNESS AND HAVE A BITUMINOUS SEAL COAT.

   b. DR 14 PVC IN ACCORDANCE WITH AWWA C900 STANDARDS. ALL PVC PIPE SHALL MEET NSF/ANSI STANDARDS 61 AND 14 AND BE STAMPED ACCORDINGLY.

3. PIPE FITTINGS SHALL BE MECHANICAL JOINT, PRESSURE CLASS 350, CONFORMING TO AWWA STANDARD C111 AND C153. WEDGE ACTION RETAINER GLANDS SHALL BE USED ON THE FOLLOWING FITTINGS: BENDS, BRANCH LEG-OFF TEES, AND FITTINGS & VALVES WITH LESS THAN 50 FEET OF WATER MAIN EXTENDING BEYOND FITTING OR VALVE. ALL FITTINGS SHALL BE CEMENT MORTAR LINED OF STANDARD THICKNESS AND BITUMINOUS SEAL COAT.

4. POLYETHYLENE ENCASEMENT WILL BE REQUIRED FOR ALL DUCTILE IRON WATERMAIN. THE CURRENT REQUIREMENTS OF AWWA C105 STANDARDS APPLY.

5. WATERMAIN AND HYDRANT GATE VALVES SHALL BE EJIW RESILIENT SEATED GATE VALVES OPENING TO THE LEFT, CONFORMING WITH AWWA C515. VALVE BOXES SHALL BE EJIW 8550 SERIES, SCREW TYPE. VALVE BOX COVERS SHALL BE EJIW 6800 SERIES BEARING THE LETTERING "WATER".

6. FIRE HYDRANTS SHALL BE EJIW WATERMASTER 5BR250 5-1/4" WITH BREAKAWAY FLANGE, CONFORMING WITH AWWA C502. ALL HYDRANTS SHALL BE SIX (6) FOOT BURY, SIX (6) INCH MECHANICAL JOINT SHOE, 1-1/2" PENTAGON OPERATING NUT (POINT TO FLAT) AND CAPNUTS OPEN LEFT, TWO (2) 2-1/2" HOSE NOZZLES, AND ONE (1) 5" STORZ FITTING PUMPER NOZZLE. ALL HYDRANTS SHALL BE YELLOW IN COLOR.

7. PROVIDE A MINIMUM OF 18 INCH VERTICAL CLEARANCE BETWEEN WATERMAIN AND STORM OR SANITARY SEWERS. THE CROSSING SHALL BE CENTERED OVER ONE WATER MAIN PIPE LENGTH SO THE JOINTS ARE AS FAR FROM THE SEWER PIPE AS POSSIBLE. WHERE WATERMAIN IS CONSTRUCTED PARALLEL TO A STORM OR SANITARY SEWER, THERE SHALL BE A 10-FOOT MINIMUM HORIZONTAL SEPARATION BETWEEN THE WATERMAIN AND THE STORM OR SANITARY SEWER.

8. WATERMAINS SHALL HAVE 5 FT. 6 INCH OF COVER FROM FINISH GRADE. GRADE STAKES AT MAXIMUM 100 FOOT INTERVALS ARE REQUIRED.

9. NO CONNECTIONS TO EXISTING WATERMAINS SHALL BE MADE UNTIL AFTER THE NEW MAIN HAS PASSED THE BACTERIOLOGICAL AND HYDROSTATIC TESTS AND THE CITY DPW SUPERVISOR AUTHORIZES SAME.

10. NEW MAINS MUST BE TESTED AT A PRESSURE OF 150 POUNDS PER SQUARE INCH FOR NOT LESS THAN TWO (2) HOURS, WITH LEAKAGE NOT TO EXCEED THE RATE AS SPECIFIED IN AWWA STANDARD C600 FOR DUCTILE IRON WATER MAIN AND AWWA C605 FOR PVC PIPE.

    NO PIPE INSTALLATION WILL BE ACCEPTED IF THE LEAKAGE IS GREATER THAN THAT DETERMINED BY THE FOLLOWING FORMULA:

    $L = SD\,(P)^{1/2} / 148{,}000$

    WHERE:
    L = ALLOWABLE LEAKAGE, GALLONS PER HOUR
    S = LENGTH OF PIPE TESTED, FEET
    D = NOMINAL DIAMETER OF THE PIPE, INCHES
    P = AVERAGE TEST PRESSURE DURING LEAKAGE TEST, POUNDS PER SQUARE INCH (GAUGE)

11. HYDROSTATIC PRESSURE TESTS SHALL BE WITNESSED BY THE CITY ENGINEER. CONTRACTOR SHALL PROVIDE 48 HOURS NOTICE TO THE CITY ENGINEER.

12. NEW OR REPAIRED WATERMAINS SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA STANDARD C651 BEFORE THEY ARE PLACED IN SERVICE. MAINS MUST BE FLUSHED BEFORE DISINFECTION. BEFORE PLACING MAINS IN SERVICE, 2 CONSECUTIVE SAMPLES SHALL INDICATE THE ABSENCE OF COLIFORM (R325.11110 OF ADMINISTRATIVE RULES PROMUL-GATED UNDER MICHIGAN SAFE DRINKING WATER ACT, ACT 399 OF 1976, AS AMENDED).

13. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND/OR OBTAIN ANY NECESSARY INFORMATION REGARDING THE PRESENCE OF UNDERGROUND UTILITIES ON THE PROJECT.

14. CONTRACTOR SHALL CALL MISS DIG AT (800) 482-7171 AT LEAST THREE (3) WORKING DAYS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE DONE TO ANY EXISTING UTILITY DURING CONSTRUCTION.

15. ONLY CITY OF POTTERVILLE PERSONNEL OR THE CONTRACTOR UNDER CITY OF POTTERVILLE'S DIRECT SUPERVISION MAY OPERATE EXISTING LINE VALVES.

16. CONTRACTOR SHALL NOTIFY THE CITY OF POTTERVILLE FIVE (5) WORKING DAYS PRIOR TO START OF CONSTRUCTION OR TESTING OF WATERMAINS.

17. TRACE WIRE SHALL BE INSTALLED ALONG ALL PVC WATER MAIN. TRACE WIRE SHALL HAVE HDPE INSULATION INTENDED FOR DIRECT BURY, COLOR COATED PER APWA STANDARD FOR THE SPECIFIC UTILITY BEING MARKED. TRACE WIRE INSTALLED ALONG WATER MAIN VIA OPEN TRENCH SHALL BE #10 AWG COPPER CLAD STEEL, HIGH STRENGTH WITH MINIMUM 450 LB. BREAK LOAD, WITH MINIMUM 30 MIL HDPE INSULATION THICKNESS. TRACE WIRE INSTALLED ALONG WATER MAIN VIA DIRECTIONAL DRILLING/BORING SHALL BE #10 AWG COPPER CLAD STEEL, EXTRA HIGH STRENGTH WITH MINIMUM 1,150 LB. BREAK LOAD, WITH MINIMUM 30 MIL HDPE INSULATION THICKNESS.

    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 SINGLE 4-WAY CONNECTOR.

    TRACE WIRE SYSTEMS MUST BE INSTALLED AS A SINGLE CONTINUOUS WIRE, EXCEPT WHERE USING APPROVED CONNECTORS. NO LOOPING OR COILING OF WIRE WILL BE PERMITTED. TRACE WIRE SHALL BE INSTALLED AT THE BOTTOM HALF OF THE PIPE AND SECURED (TAPED/TIED) AT 5' INTERVALS. 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 WILL NOT BE PERMITTED.

    TRACE WIRE SHALL BE TERMINATED AT ALL HYDRANTS UTILIZING AN APPROVED ABOVE-GROUND TRACE WIRE ACCESS BOX, PROPERLY AFFIXED TO THE HYDRANT GRADE FLANGE. AFFIXING WITH TAPE OR PLASTIC TIES WILL NOT BE PERMITTED. TRACE WIRE SHALL BE PROPERLY GROUNDED AT ALL DEAD ENDS AND STUBS. MAINLINE TRACE WIRE SHALL NOT BE CONNECTED TO EXISTING CONDUCTIVE PIPES AND SHALL BE TREATED AS A DEAD END. 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 0.5LB) SPECIFICALLY MANUFACTURED FOR THIS PURPOSE AND BURIED AT THE SAME ELEVATION AS THE UTILITY.

    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 BY THE ENGINEER.

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PROJECT NAME:
MASTER UTILITY SPECIFICATIONS

CITY OF POTTERVILLE
319 N. NELSON STREET
POTTERVILLE, MI 48876

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REVISIONS

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DATE: JANUARY, 2025
SCALE: NONE

STANDARD WATER MAIN SPECIFICATIONS

JOB No. 234032
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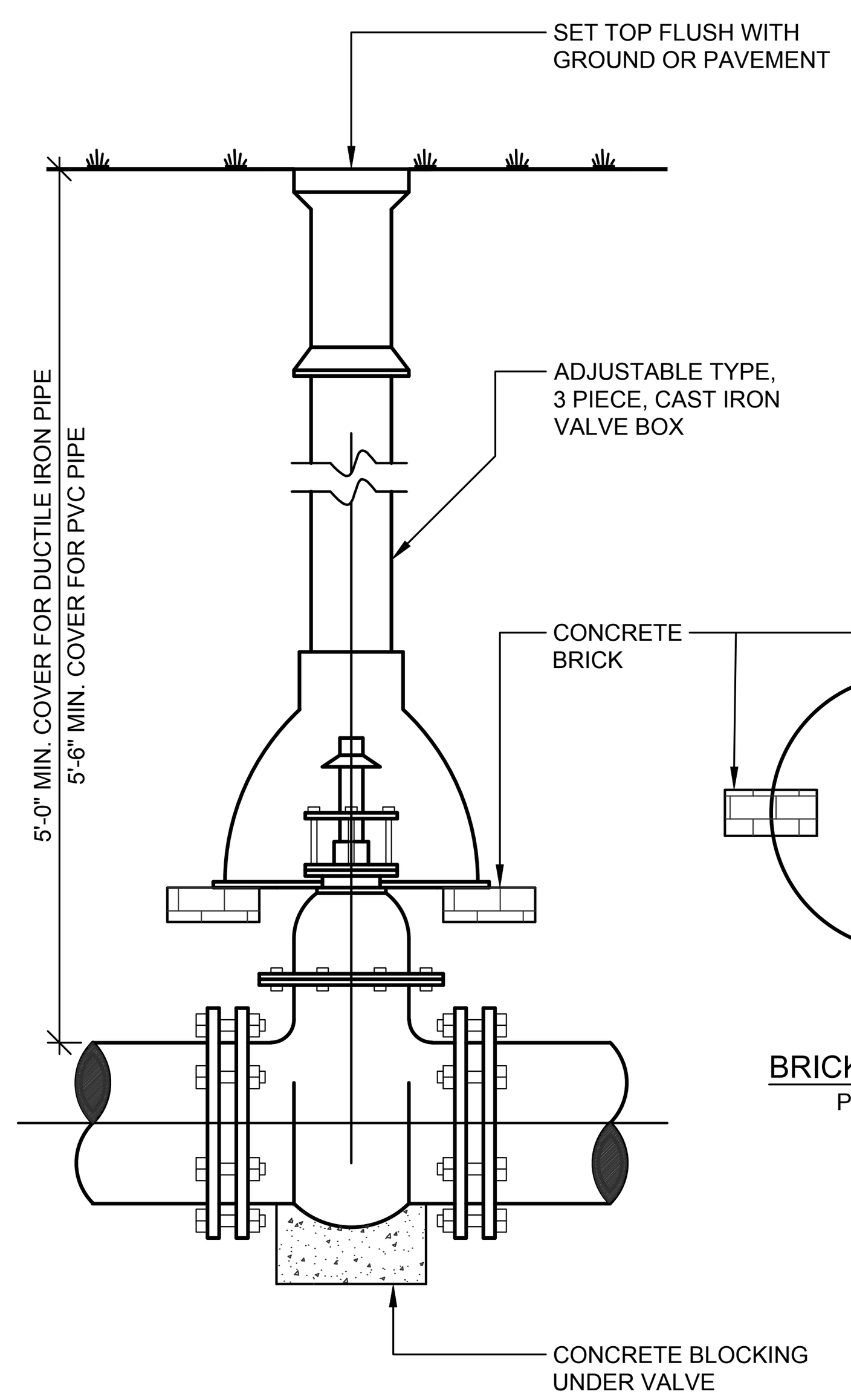
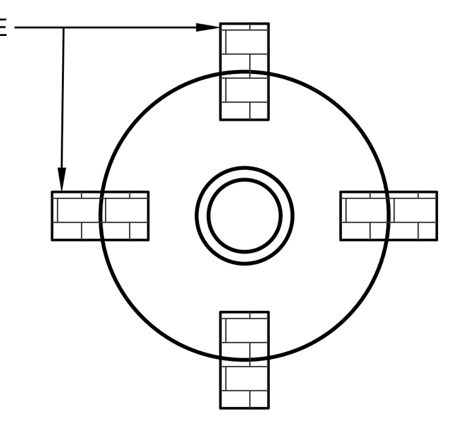
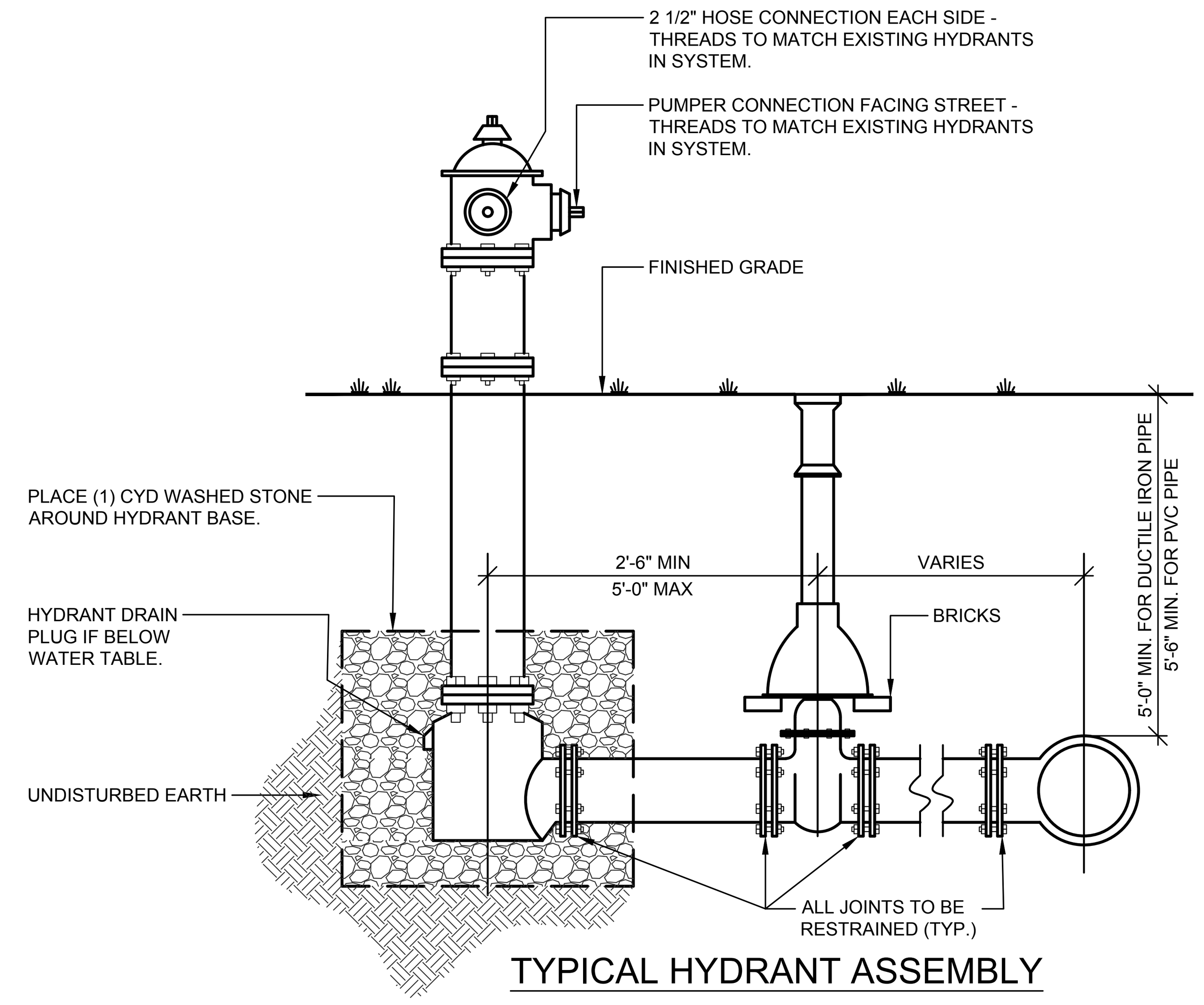
OF 6



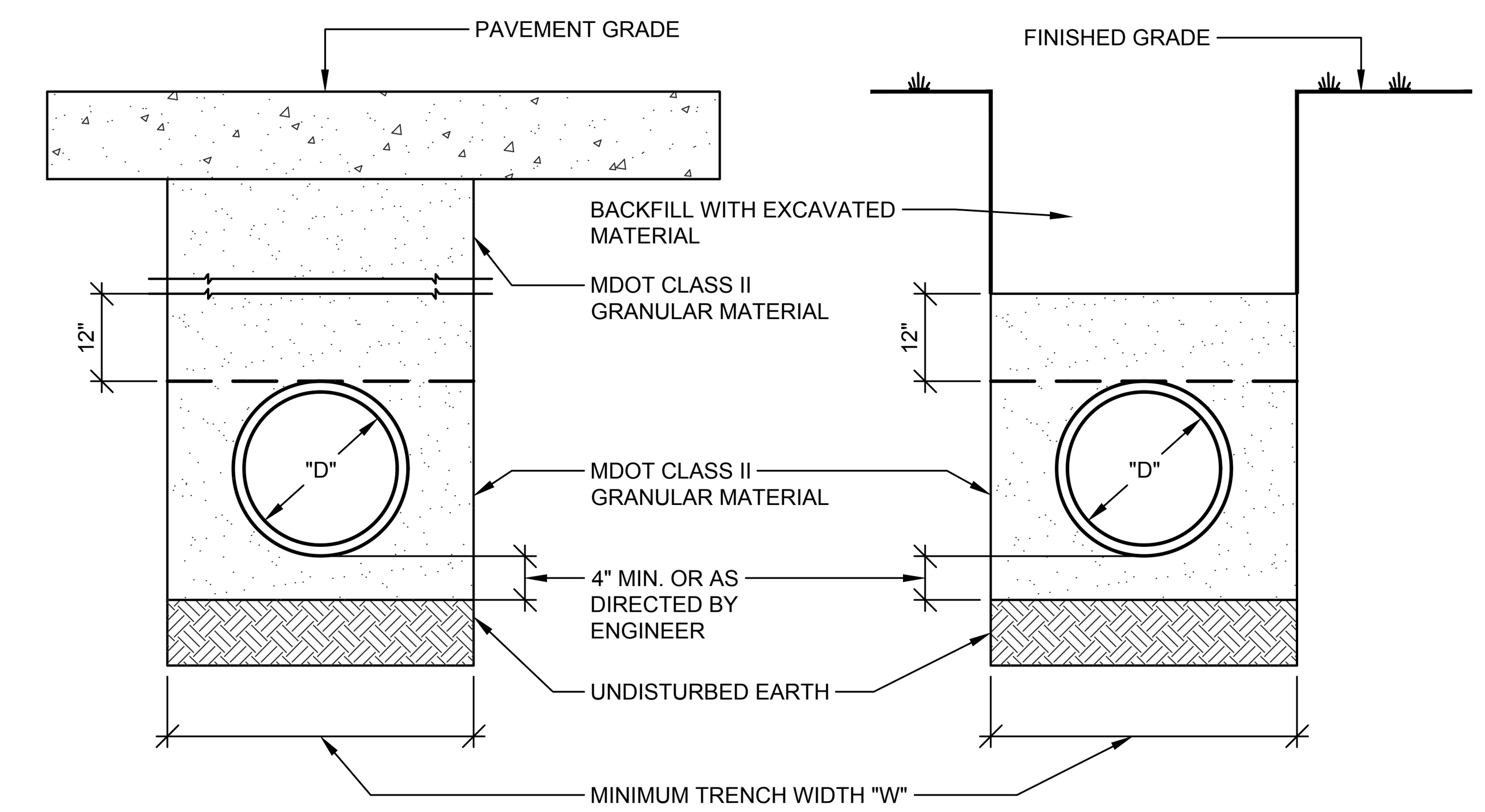


BRICK LOCATION
PLAN VIEW

TYPICAL GATE VALVE & VALVE BOX



TYPICAL HYDRANT ASSEMBLY

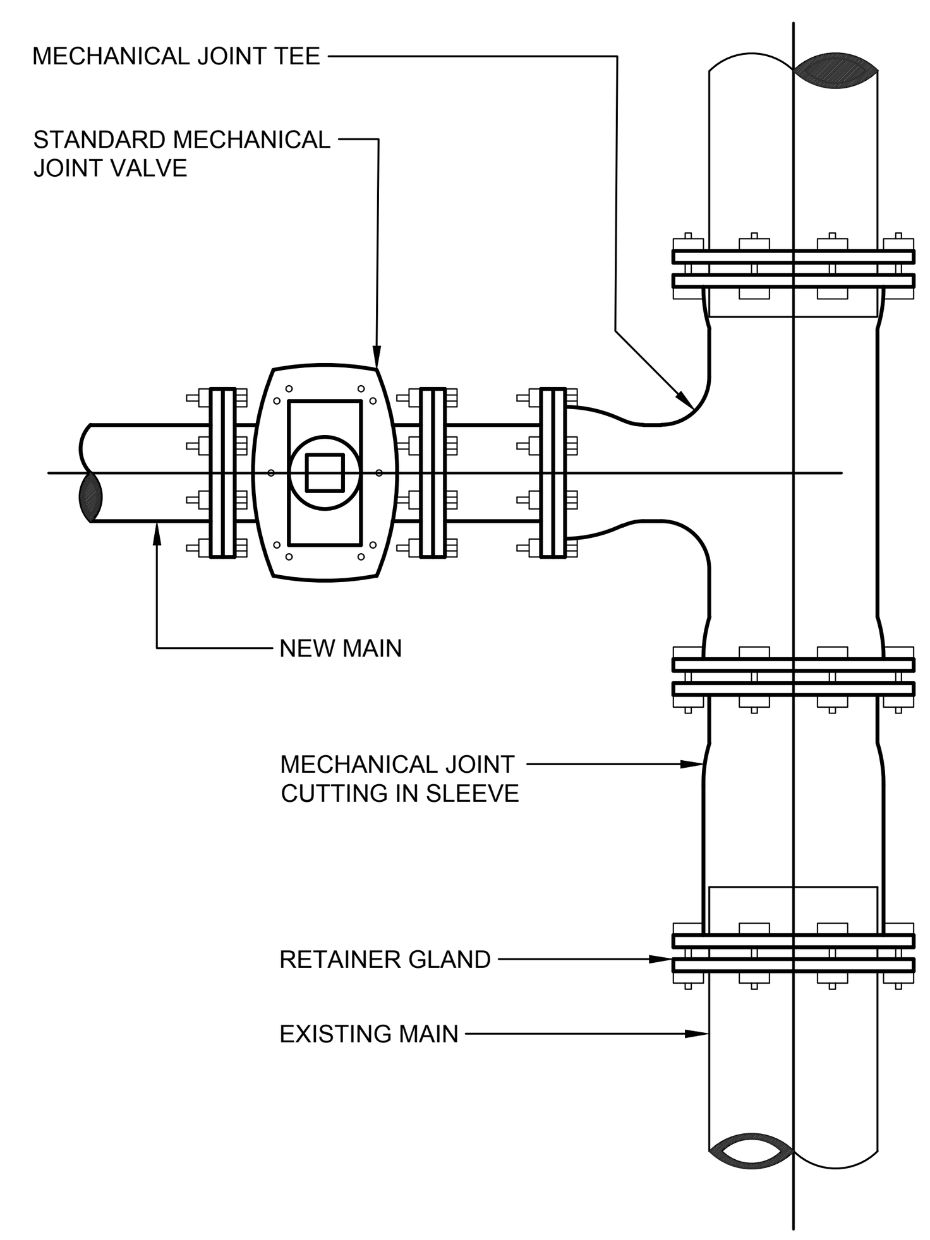


TRENCH DETAIL UNDER PAVEMENT

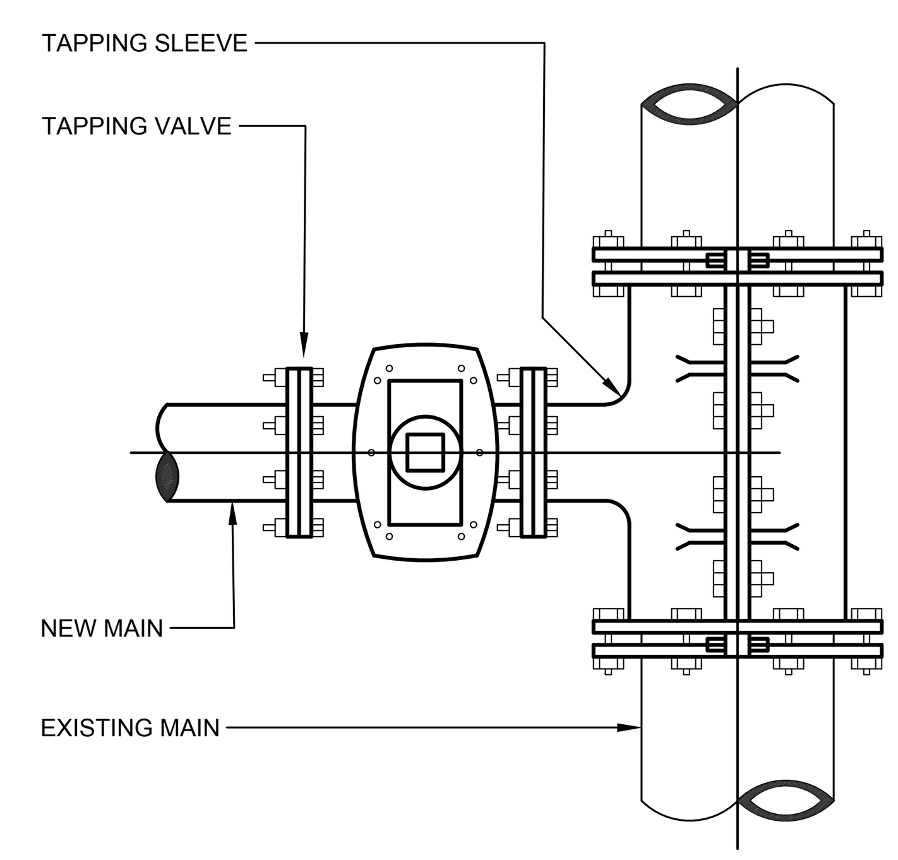
TRENCH DETAIL

TRENCH DIMENSIONS	
DIA "D"	MIN. WIDTH "W" (FEET)
LESS THAN 18"	3.0
21"	3.5
24"	4.0
30"	5.0
36"	6.0
42"	7.0
48"	8.0
54"	9.5
60"	10.0
66"	10.5
72"	11.0

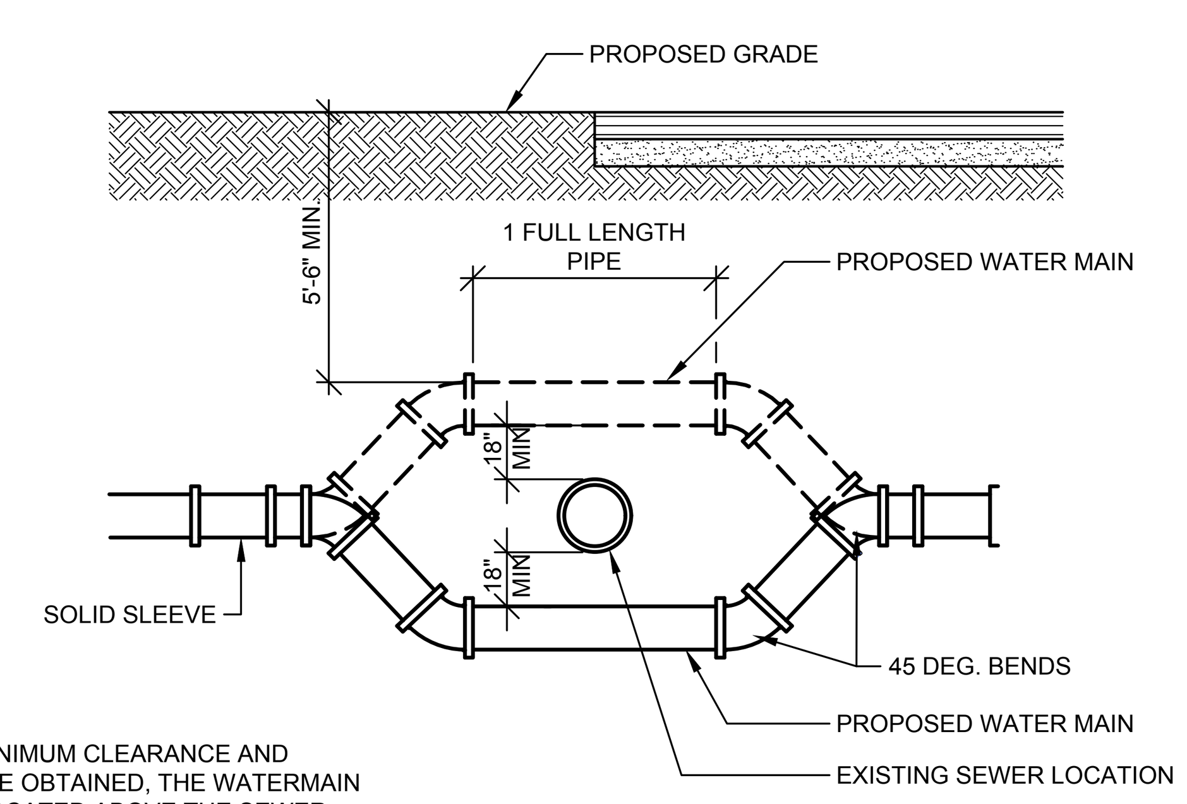
NOTE: IN ALL CASES BELL HOLES SHALL BE PROVIDED SO THAT BELL SUPPORTS NO WEIGHT.



DRY TAP METHOD
CONNECTING NEW MAIN TO EXISTING MAIN

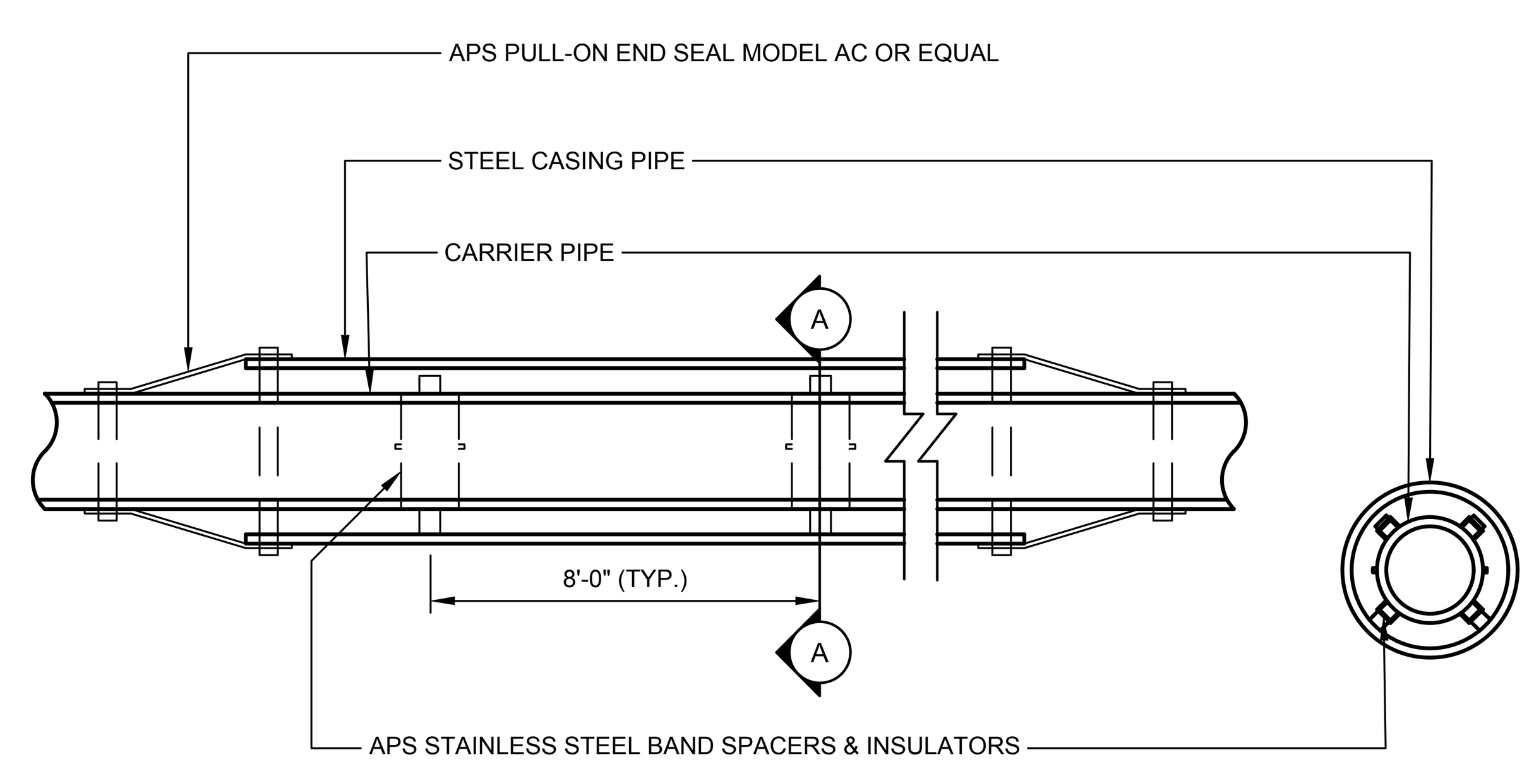


WET TAP METHOD
(UNDER PRESSURE)
CONNECTING NEW MAIN TO EXISTING MAIN



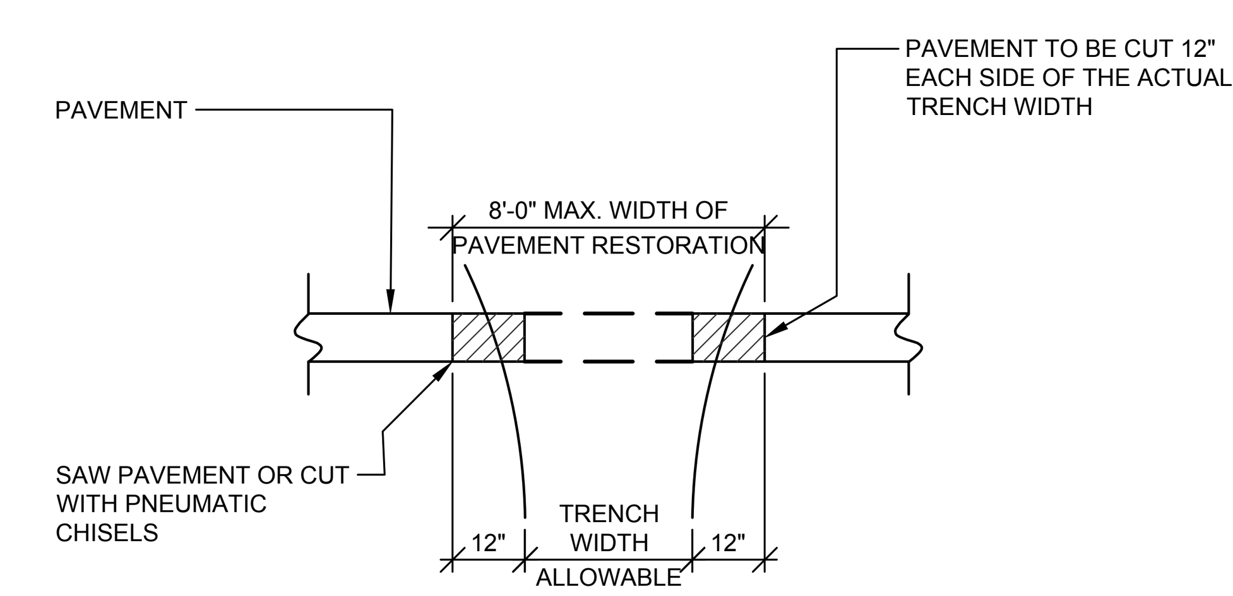
NOTE:
WHEN THE MINIMUM CLEARANCE AND COVER CAN BE OBTAINED, THE WATERMAIN IS TO BE RELOCATED ABOVE THE SEWER. RESTRAINED JOINTS ARE REQUIRED.

INSUFFICIENT CLEARANCE
WATER MAIN CROSSING SEWER



CASING CARRIER PIPE DETAIL
SIZE CASING AND CARRIER PIPES PER PLAN AND SPECIFICATIONS

SECTION A-A



TYPICAL DETAIL PAVEMENT
CUTTING & RESTORATION

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PROJECT NAME:
MASTER UTILITY SPECIFICATIONS

CITY OF POTTERVILLE
319 N. NELSON STREET
POTTERVILLE, MI 48876

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DATE: JANUARY, 2025
SCALE: NONE

STANDARD WATER MAIN DETAILS

JOB No. 234032
C002

WATER SERVICE PERMITS AND NOTICES

A. BEFORE INSTALLATION OF ANY WATER SERVICE BETWEEN THE CURB STOP OR GATE VALVE AND THE PROPOSED STRUCTURE, THE CONTRACTOR SHALL OBTAIN A PLUMBING PERMIT FROM THE EATON COUNTY DEPARTMENT OF CONSTRUCTION CODES & PLANNING AND ZONING.

B. BEFORE ANY WORK MAY BE STARTED, THERE MUST BE A WATER AGREEMENT PAID IN FULL ON FILE WITH THE CITY OF POTTERVILLE.

C. AN INSPECTION OF THE INSTALLATION OF THE TAP, SERVICE LINE IN THE RIGHT-OF-WAY OR EASEMENT, AND CURB STOP AND GATE VALVE BY THE CITY OF POTTERVILLE DEPARTMENT OF PUBLIC WORKS IS REQUIRED. TWO (2) WORKING DAYS NOTICE SHALL BE PROVIDED PRIOR TO BEGINNING ANY CONSTRUCTION.

WATER SERVICE APPROVED MATERIALS LIST

A. SERVICE CONNECTIONS
   1. 4 INCH OR LARGER
      a. DUCTILE TEE
      b. TAPPING SLEEVE
   2. SMALLER THAN 4 INCH
      a. FORD BRASS CORPORATION STOP OR APPROVED EQUAL

B. SERVICE LINE
   1. 4 INCH OR LARGER
      a. PRESSURE CLASS 350 DUCTILE IRON
   2. SMALLER THAN 4 INCH
      a. COPPER - TYPE "K"

C. SADDLE
   1. FORD STAINLESS STEEL OR APPROVED EQUAL

D. CURB STOP
   1. 4 INCH OR LARGER
      a. EJIW RESILIENT SEATED GATE VALVE OPENING TO THE LEFT
   2. SMALLER THAN 4 INCH
      a. FORD BRASS BALL VALVE CURB STOP - MINNEAPOLIS PATTERN OR APPROVED EQUAL

E. VALVE / CURB BOX
   1. 4 INCH OR LARGER
      a. EJIW 8550 SERIES OR APPROVED EQUAL - NO PLASTIC
   2. SMALLER THAN 4 INCH
      a. MINNEAPOLIS PATTERN
      b. BUFFALO BOXES WILL NOT BE PERMITTED

F. VALVE BOX COVER
   1. 4 INCH OR LARGER
      a. EJIW 6800 SERIES BEARING THE LETTERING "WATER"

WATER SERVICE INSTALLATION

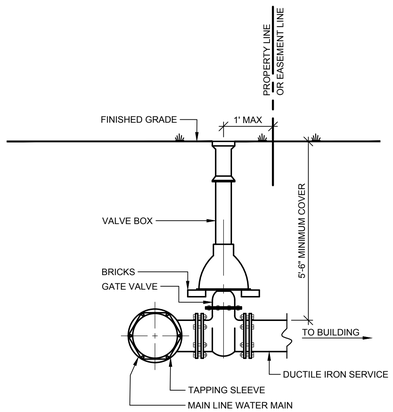
A. TAPS SHALL BE MADE AFTER THE WATERMAIN HAS SUCCESSFULLY PASSED A BACTERIA AND PRESSURE TEST AND THE CONNECTION TO THE CITY OF POTTERVILLE SYSTEM IS COMPLETED. THE TAP SHALL BE MADE AT A RIGHT ANGLE TO THE WATERMAIN. THE TAP SHALL BE MADE ON THE UPPER HALF OF THE MAIN AT A 45 DEGREE ANGLE FROM THE VERTICAL PLACE ON THE SIDE OF THE MAIN TO WHICH SERVICE IS TO BE EXTENDED.

B. A CURB STOP VALVE SHALL BE INSERTED ON THE SERVICE AT ONE (1) FOOT INSIDE THE ROAD RIGHT-OF-WAY OR EASEMENT LINE. A CURB BOX SHALL BE INSTALLED VERTICALLY OVER THE VALVE SO THAT, AFTER THE SERVICE IS BACKFILLED TO FINAL GRADE, A KEY MAY BE PLACED ON THE VALVE AND IT MAY BE OPERATED EASILY.

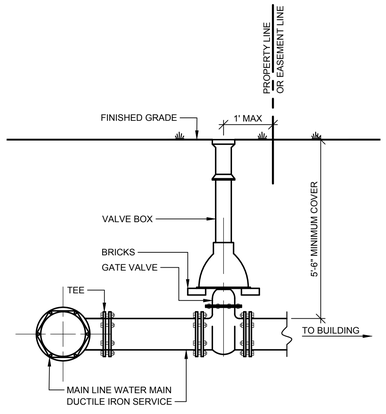
C. IN ORDER TO INSURE THAT NO ROCKS WILL BE PLACED OVER THE PIPE, THE FIRST FOOT OF COVER THE PIPE SHALL BE PLACED BY HAND. THE REMAINDER OF THE TRENCH SHALL BE BACKFILLED IN A MANNER SUITABLE TO THE CITY. NO DEBRIS OR BOULDERS OVER TWO (2) INCHES SHALL BE INCLUDED IN ANY OF THE BACKFILL MATERIAL.

D. ANY PORTION OF THE SERVICE THAT WILL BE BENEATH PAVEMENT SHALL BE MECHANICALLY COMPACTED TO THE SUBGRADE ELEVATION. TRENCHES OUTSIDE OF PAVED AREAS SHALL BE COMPACTED IN A MANNER TO AVOID SETTLEMENT.

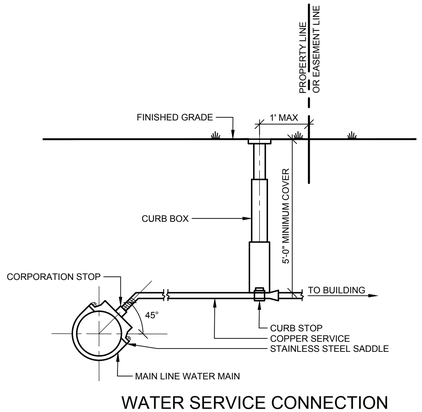
E. ALL SERVICES SHALL BE A MINIMUM OF FIVE (5) FEET BELOW FINAL GRADE.



TAPPING SLEEVE CONNECTION
4 INCH OR LARGER WATER SERVICE



TEE CONNECTION
4 INCH OR LARGER WATER SERVICE



WATER SERVICE CONNECTION
SMALLER THAN 4 INCH

SANITARY SEWER SERVICE PERMITS AND NOTICES

A. BEFORE INSTALLATION OF ANY SANITARY SEWER SERVICE TO THE PROPOSED STRUCTURE, THE CONTRACTOR SHALL OBTAIN A PLUMBING PERMIT FROM THE EATON COUNTY DEPARTMENT OF CONSTRUCTION CODES & PLANNING AND ZONING.

B. BEFORE AN WORK MAY BE STARTED THERE MUST BE A SANITARY SEWER AGREEMENT PAID IN FULL ON FILE WITHIN THE CITY OF POTTERVILLE.

C. AN INSPECTION OF THE INSTALLATION OF THE TAP AND SERVICE LINE IN THE RIGHT-OF-WAY OR EASEMEN, BY THE CITY OF POTTERVILLE DEPARTMENT OF PUBLIC WORKS IS REQUIRED. TWO (2) WORKING DAYS NOTICE SHALL BE PROVIDED PRIOR TO BEGINNING ANY CONSTRUCTION.

SANITARY SEWER SERVICE APPROVED MATERIALS

A. POLYVINYL CHLORIDE (PVC) SEWER SERVICE PIPE SHALL BE SIX (6) INCH DIAMETER AND CONFORM TO THE REQUIREMENTS OF ASTM D3034 AND MUST HAVE A STANDARD DIMENSION RATION (SDR) OF 26.

B. PVC FITTING MUST BE FULL FITTINGS CONFORMING TO ASTM D3034 FOR PIPE WALL THICKNESS OF SDR 26.

C. CLEAN OUT COVERS SHALL BE EJIW 6800 SERIES BEARING THE LETTERING "SEWER".

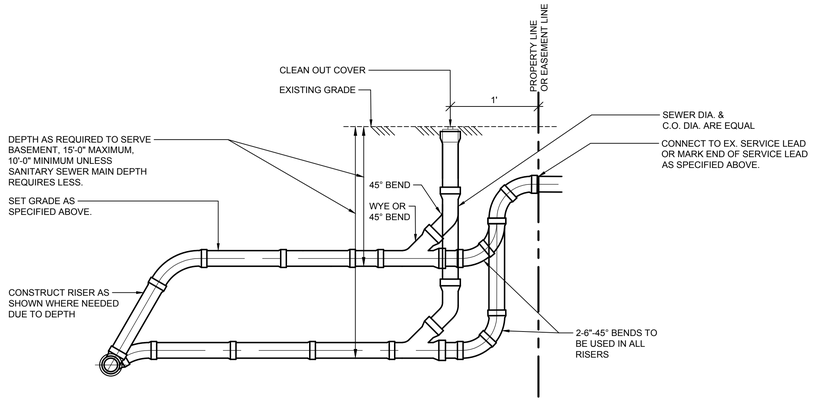
SANITARY SEWER SERVICE INSTALLATION

A. SANITARY SEWER SERVICE INSTALLATION SHALL BE IN ACCORDANCE WITH SECTION 825 OF THE CURRENT MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) STANDARD SPECIFICATIONS FOR CONSTRUCTION.

B. EACH WYE OR END OF SERVICE LEAD SHALL BE MARKED BY SETTING A 1 INCH X 2 INCH X 6 FT. CYPRESS, ASH, OR CEDAR STAKE VERTICALLY ABOVE THE END OF THE LEAD.

C. BACKFILL AT ALL RISERS SHALL BE CAREFULLY PLACED AND TAMPED SUFFICIENTLY TO INSURE AGAINST DAMAGE FROM BACKFILL SETTLEMENT.

D. THE MINIMUM GRADE ON THE SEWER SERVICE SHALL BE 2 PERCENT (1/4 INCH/FOOT). WHERE MINIMUM DEPTHS CANNOT BE OBTAINED AND WHEN APPROVED BY THE ENGINEER, THE MINIMUM GRADE MAY BE REDUCED TO 1 PERCENT (1/8 INCH/FOOT).



SERVICE CONNECTIONS - TYPICAL CONSTRUCTION

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PROJECT NAME:
MASTER UTILITY SPECIFICATIONS

CITY OF POTTERVILLE
319 N. NELSON STREET
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DATE: JANUARY, 2025
SCALE: NONE

STANDARD WATER AND SEWER SERVICE DETAILS

JOB No. 234032
C003
OF 6

SANITARY SEWER SPECIFICATIONS

A. DESCRIPTION

THIS WORK INCLUDES CONSTRUCTION LINES OF SANITARY SEWER PIPE OF THE REQUIRED TYPE AND DIAMETERS, MANHOLES AND OTHER STRUCTURES, EXCAVATION, BACKFILL AND TESTING.

B. MATERIALS

1. ALL WORKMANSHIP, MATERIALS AND TESTING SHALL BE IN ACCORDANCE WITH CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF POTTERVILLE.

2. ALLOWABLE TYPES OF SEWER PIPE AND JOINTS ARE:

   SEE NOTES AND MATERIALS AT RIGHT OF SHEET

C. CONSTRUCTION

1. HANDLING PIPE

   THE PIPE SHALL BE DISTRIBUTED AT THE SITE AND PROTECTED FROM FALLING FROM TRUCK TO GROUND OR INTO THE TRENCH, AND KEPT CLEAR OF PASSING VEHICLES.

   ALL MATERIALS WILL BE INSPECTED BEFORE PLACING IN THE TRENCH, AND IF DEFECTIVE, MARKED ''REJECTED", AND SHALL BE REMOVED FORM THE SITE BY THE CONTRACTOR.

2. EXCAVATION

   ALL EXCAVATION SHALL BE OPEN-CUT MADE IN SUCH A MANNER AND TO SUCH A DEPTH, LENGTH AND WIDTH AS WILL PROVIDE AMPLE ROOM FOR BUILDING AND STRUCTURES AND FOR BRACING, SHEETING AND SUPPORTING THE SIDES OF THE EXCAVATION FOR PUMPING AND DRAINAGE OF GROUND WATER AND SEWAGE WHICH MAY BE ENCOUNTERED, AND FOR THE REMOVAL OF ALL MATERIALS EXCAVATED.

   ALL WORK SHALL BE DONE TO TRUE LINE AND GRADE AS ESTABLISHED ON THE PLANS AND IN ACCORDANCE WITH GRADE STAKES SET BY THE ENGINEER.

   a. TRENCH. EXCAVATION SHALL BE OF SUFFICIENT WIDTHS AND DEPTHS TO PROVIDE ADEQUATE ROOM FOR CONSTRUCTION AND INSTALLATION OF THE WORK TO LINES, GRADES, AND DIMENSIONS CALLED FOR ON THE PLANS, EXCEPT THE WIDTH OF A TRENCH FROM THE INVERT TO A HEIGHT 12 INCHES ABOVE THE TOP OF THE SEWER BARREL, SHALL NOT BE GREATER THAN ONE (1) FOOT PLUS THE OUTSIDE DIAMETER OF THE SEWER BARREL FOR SEWER 12 INCHES TO 36 INCHES IN DIAMETER AND TWO (2) FEET PLUS THE OUTSIDE DIAMETER FOR SEWERS 42 INCHES IN DIAMETER AND LARGER, EXCEPT FOR SEWERS FOUR (4) INCHES TO 12 INCHES INCLUSIVE, THE WIDTH OF THE TRENCH MAY BE 30 INCHES. IF THE MAXIMUM TRENCH WIDTH, AS SPECIFIED ABOVE, IS EXCEEDED, UNLESS OTHERWISE SHOWN ON THE DRAWINGS, THE CONTRACTOR SHALL INSTALL, AT HIS OWN EXPENSE, SUCH OTHER BEDDING, AS IS APPROVED BY THE CITY ENGINEER, TO SUPPORT THE ADDED LOAD OF THE BACKFILL. WHERE, THROUGH THE CONTRACTOR'S CONSTRUCTION PROCEDURES OR BECAUSE OF POOR EXISTING GROUND CONDITIONS, IT IS IMPOSSIBLE TO MAINTAIN ALIGNMENT AND GRADE PROPERLY, THE CONTRACTOR SHALL, AT HIS OWN EXPENSE, EXCAVATE BELOW GRADE AND REFILL THE TRENCH TO THE PROPER GRADE WITH A COMPACTED 1-1/2 INCH MAXIMUM SIZE AGGREGATE, SUCH AGGREGATE TO CONSIST OF ANGULAR SHAPED, CRUSHED STONE OR BLAST FURNACE SLAG CONTAINING SUFFICIENT SMALLER SIZE AGGREGATE TO PROVIDE PROPER ''KEYING" OF THE MATERIAL TOGETHER IN ORDER TO INSURE THAT THE PIPE, WHEN LAID, WILL MAINTAIN CORRECT ALIGNMENT AND GRADE.

   b. SHEETING AND BRACING. WHERE THE CONDITION OF THE GROUND REQUIRES THE SIDES OF THE TRENCH SHALL BE SECURELY HELD BY BRACING AND SHEETING WHICH MAY BE REMOVED IN UNITS WHEN THE LEVEL OF THE BACKFILL HAS REACHED A POINT WHERE IT IS SAFE TO PULL THE SHEETING.

      SHEETING, BRACING AND SHORING SHALL NOT BE LEFT IN PLACE AFTER THE COMPLETION OF THE WORK.

   c. GROUNDWATER AND SEWAGE. THE CONTRACTOR SHALL REMOVE BY WELL POINTS, PUMPING, BAILING OR OTHER ACCEPTABLE METHOD, ANY WATER THAT MAY ACCUMULATE OR BE FOUND IN THE TRENCHES OR PRECAUTIONS TO KEEP THE TRENCHES AND OTHER EXCAVATIONS ENTIRELY CLEAR OF WATER DURING CONSTRUCTION OF SEWERS AND STRUCTURES. WHERE EXISTING SEWERS OR DRAINS ARE ENCOUNTERED IN THIS WORK, ADEQUATE PROVISION SHALL BE MADE FOR DIVERTING THE FLOW IN SUCH EXISTING SEWERS SO THAT THE EXCAVATION SHALL BE KEPT DRY DURING THE PROGRESS OF THE CONSTRUCTION WORK. NEWLY LAID CONCRETE SHALL BE ADEQUATELY PROTECTED FROM INJURY RESULTING FROM GROUNDWATER OR SEWAGE OR FROM THE HANDLING OF WATER OR SEWERAGE. NO DRAINAGE DITCHES SHALL BE PLACED WITHIN THE AREA TO BE OCCUPIED BY ANY STRUCTURE EXCEPT AS PERMITTED BY THE CITY ENGINEER.

   d. UTILITIES CROSSINGS. IN CROSSING OVER OR UNDER ANY MAIN OR LATERAL SEWER, SEWER CONNECTION, CATCH BASIN, WATERMAIN, SERVICE CONNECTION, GAS MAIN, GAS CONNECTION, CONDUIT, OR ANY UNDERGROUND IMPROVEMENT, THE CONTRACTOR SHALL USE ALL POSSIBLE CARE IN PROTECTING THE SAME FROM INJURY, DAMAGE OR THE FREE UNOBSTRUCTED CONTINUOUS USE OF THE SAME AS FAR AS POSSIBLE, AND THE CONTRACT WORK SHALL BE PERFORMED IN SUCH A MANNER AS WILL EFFECT THE LEAST DAMAGE OR INTERFERENCE WITH SUCH IMPROVEMENTS OR THE FREE AND UNOBSTRUCTED USE OF THE SAME.

      THE CONTRACTOR WILL BE REQUIRED, TO REPAIR, REPLACE OR REBUILD ANY SUCH IMPROVEMENT INJURED OR DAMAGED BY HIM, AND SHALL BE RESPONSIBLE TO THE DEPARTMENT, COMPANIES, INDIVIDUALS, OR CORPORATIONS CONTROLLING SUCH IMPROVEMENTS.

3. EXCAVATED MATERIALS

   EXCAVATED MATERIAL MAY BE USED IN BACKFILLING AROUND SEWERS AND OTHER STRUCTURES, PROVIDED IT IS SUITED FOR SUCH A PURPOSE. ALL MATERIAL IN EXCESS OF THE QUANTITY REQUIRED FOR BACKFILLING, OR THAT WHICH IS UNSUITED FOR BACKFILLING, SHALL BE HAULED AWAY BY THE CONTRACTOR AND DISPOSED OF LEGALLY OR BY DUMPING IN PLACES ON THE SITE DESIGNATED BY THE CITY ENGINEER. THE CONTRACTOR SHALL PROVIDE ALL LABOR FOR SPREADING SUCH MATERIAL AT THE PLACE OF DUMPING AND SHALL LEAVE THE AREA IN A FINISHED CONDITION SATISFACTORY TO THE CITY ENGINEER.

4. CUTTING PVC PIPE

   CUTTING OF PIPE LENGTHS, WHERE REQUIRED, SHALL BE PERFORMED BY THE USE OF TOOLS OR EQUIPMENT THAT WILL PROVIDE A NEAT, PERPENDICULAR CUT WITHOUT DAMAGE TO THE PLASTIC OR THE FILLER MATERIAL. BOWING OR WARPING OF PVC PIPE CAN OCCUR WITH TEMPERATURE FLUCTUATIONS. THE CONTRACTOR SHALL STORE AND PROTECT THE PIPE TO MINIMIZE BOWING. NOMINAL 12 FT. 6 INCH PIPE LENGTHS HAVING DEVIATIONS FROM STRAIGHT GREATER THAN 1 INCH SHALL NOT BE USED.

5. BEDDING, LAYING AND JOINING PIPE

   a. GENERAL. ALL PIPE SHALL BE LAID TO THE LINE AND GRADE CALLED FOR ON THE PLAN. EACH PIPE, AS LAID, SHALL BE CHECKED BY THE CONTRACTOR WITH LINE AND GRADE POLE TO INSURE THAT HIS RESULT IS OBTAINED. THE FINISHED WORK SHALL BE STRAIGHT AND SHALL BE SIGHTED THROUGH BETWEEN MANHOLES.

      EACH PIPE SHALL BE INSPECTED FOR DEFECTS PRIOR TO BEING LOWERED INTO THE TRENCH; AND INSIDE OF PIPE AND OUTSIDE OF SPIGOT SHALL BE CLEANED OF ANY DIRT OR FOREIGN MATTER.CONSTRUCTION SHALL BEGIN AT THE OUTLET (LOWEST) END AND SHALL PROCEED UPGRADE WITH SPIGOT ENDS POINTING IN THE DIRECTION OF FLOW UNLESS OTHERWISE APPROVED BY THE CITY OF POTTERVILLE.

   b. RIGID PIPE MATERIALS. THE PIPE SHALL BE LAID ON THE STANDARD BEDDING CONSISTING OF THE SAND CUSHION, WHICH SHALL EXTEND TO A SUBGRADE FOUR (4) INCHES BELOW THE BOTTOM OF THE PIPE. THE PIPES SHALL BE CENTERED IN THE BELLS AND PUSHED TIGHT TOGETHER TO FORM A SMOOTH AND CONTINUOUS INVERT. AFTER LAYING OF PIPE, CARE SHALL BE TAKEN SO AS NOT TO DISTURB ITS LINE OR GRADE. SHOULD LINE OR GRADE BECOME DISTURBED, THE PIPE SHALL BE RELAID PROPERLY BY THE CONTRACTOR.

      THE REMAINDER OF THE STANDARD PIPE BEDDING, FREE FROM STONES AND LUMPS SHALL BE PLACED WITH CARE, IN SIX (6) INCH LAYERS TO AN ELEVATION PROVIDING 12 INCHES OF COVER OVER THE PIPE. EACH LAYER SHALL BE THOROUGHLY COMPACTED BY POWER TAMPING.

   c. POLYVINYL CHLORIDE (PVC) PIPE. THE PIPE SHALL CONFORM TO ASTM D3034 AND JOINTS TO ASTM D3212. BEDDING FOR PVC PIPE SHALL BE IN ACCORDANCE WITH THE LATEST APPLICABLE D SPECIFICATION, EXCEPT, (1) ONLY MDOT CLASS II GRANULAR MATERIAL MAY BE USED, (2) EMBEDMENT SHALL EXTEND TO MINIMUM 12 INCHES ABOVE TOP OF PIPE, AND (3) FLOODING OR PUDDLING SHALL NOT BE USED.

      WHERE UNSTABLE BOTTOMS ARE ENCOUNTERED, THE CONTRACTOR SHALL PROVIDE A FOUNDATION CONSISTING OF AN APPROVED GRADED AND PROCESSED ANGULAR STONE OR GRAVEL.

      CARE SHALL BE TAKEN DURING BEDDING COMPACTION TO AVOID DISTORTING THE SHAPE OF THE PIPE OR DAMAGING ITS EXTERIOR WALL.

6. BACKFILL

   BACKFILL IS DEFINED AS THAT MATERIAL PLACED INTO THE TRENCH FROM THE TOP OF THE PIPE BEDDING TO THE GROUND SURFACE. BACKFILL SHALL BE PLACED INTO THE TRENCH ACCORDING TO ONE OF THE FOLLOWING SPECIFIED MANNERS AS DETERMINED BY THE LOCATION OF THE TRENCH OR THE EDGE OF TRENCH NEAREST THE EXISTING PAVEMENT, ROADWAY, SIDEWALK, DRIVEWAY OR PARKING AREA.

   WHEREVER COMPACTION IS REQUIRED, IT SHALL BE ACCOMPLISHED BY SUITABLE MECHANICAL COMPACTION EQUIPMENT APPROVED BY THE CITY ENGINEER. FROZEN BACKFILL MATERIALS ARE NOT PERMITTED UNDER ANY CIRCUMSTANCE WHATSOEVER.

   a. UNDER OR ADJACENT TO PAVEMENT

TRENCH LOCATION	TRENCH LOCATION
1) UNDER EXISTING OR PROPOSED PAVEMENT 2) PARALLEL TO AND LESS THAN FIVE (5) FEET FROM EDGE PAVEMENT	BACKFILL SHALL BE FULL DEPTH MECHANICALLY COMPACTED MDOT CLASS II GRANULAR MATERIAL CONSTRUCTED IN SIX (6) INCH LAYERS, LOOSE MEASURE WITH EACH LAYER COMPACTED TO NOT LESS THAN 95 PERCENT OF MAXIMUM UNIT WEIGHT AT OPTIMUM MOISTURE CONTENT PER AASHTO-180 OR BY MDOT CONE DENSITY METHOD.
3) PARALLEL AND LESS THAN TEN (10) FEET AND MORE THAN FIVE (5) FEET FROM EDGE OF PAVEMENT	SELECTED EXCAVATED OR OTHER ACCEPTABLE BACKFILL MATERIALS SHALL BE PLACED, AFTER STANDARD BEDDING CALLED FOR ON PLAN HAS BEEN COMPLETED, INTO TRENCH IN SIX (6) INCH LAYERS, LOOSE MEASURE, WITH EACH LAYER COMPACTED TO NOT LESS THAN 90 PERCENT MAXIMUM UNIT WEIGHT. BACKFILL MATERIAL USED MUST PROVIDE COMPACTION MEETING REQUIREMENTS OF THE LOCAL UNIT OF GOVERNMENT.

   b. OPEN SPACE AREAS. ALL TRENCHES IN OPEN SPACE AREAS SHALL BE BACKFILLED BY PROPERLY BEDDING THE PIPE ACCORDING TO THE PIPE BEDDING DETAILS AND THEN SPREADING BACKFILL MATERIAL OVER THE PIPE AND MECHANICALLY COMPACTING TO 90 PERCENT OF MAXIMUM UNIT WEIGHT. CONTRACTOR SHALL REGRADE AS NECESSARY DURING THE LIFE OF THE CONTRACT AND AS DIRECTED BY THE CITY ENGINEER.

   c. BACKFILL. BACKFILL SHALL NOT BE PLACED AGAINST ANY PORTION OF A STRUCTURE UNTIL THE STRUCTURE HAS PASSED INSPECTION AND HAS BEEN APPROVED BY THE CITY ENGINEER FOR BACKFILLING. ALL TRENCHES SHOULD BE BACKFILLED AS SOON AS INSPECTION IS COMPLETED IN ORDER TO AVOID UNNECESSARY RISK OR DAMAGE TO THE STRUCTURE AND ALSO TO REDUCE THE RISK OF ACCIDENTS INVOLVING THE PUBLIC.

      IF A BULLDOZER OR OTHER MACHINE IS USED TO PLACE THE BACKFILL MATERIAL, NO MATERIAL SHALL BE PUSHED OR DROPPED INTO THE TRENCH, BUT SHALL BE PLACED ON THE SLOPING ENDS OF THE COMPLETED BACKFILL, AND ALLOWED TO ROLL IN PLACE TO THE BOTTOM OF THE TRENCH.

7. CONNECTIONS TO EXISTING STRUCTURES

   WHERE THE PLANS CALL FOR CONNECTIONS TO EXISTING MANHOLES OR SEWER LATERALS, THE CONTRACTOR SHALL EXERCISE DUE CARE TO INSURE THAT THE STRUCTURE AS A WHOLE IS NOT DAMAGED.

8. MANHOLES

   MANHOLES SHALL BE CONSTRUCTED OF THE TYPE AND IN ACCORDANCE WITH THE DETAILS INCLUDED WITH THIS DOCUMENT, AND AT ALL LOCATIONS SHOWN ON THE PLANS, OR AS LAID OUT IN THE FIELD BY THE CITY ENGINEER. COVERS SHALL BE SET AT THE REQUIRED FINAL ELEVATION SO THAT NO SUBSEQUENT ADJUSTMENT SHALL BE NECESSARY.

   CONNECTIONS TO MANHOLES SHALL BE PROPERLY SUPPORTED AND BRACED WHERE NOT RESTING ON ORIGINAL GROUND SO THAT ANY SETTLEMENT WILL NOT DISTURB THE CONNECTION.

   EXCAVATION SHALL BE CARRIED TO THE DEPTH REQUIRED TO PERMIT THE CONSTRUCTION OF THE REQUIRED BASE AND BOTTOM OF EXCAVATION SHALL BE TRIMMED TO A UNIFORM HORIZONTAL BED. THE EXCAVATION SHALL BE SUFFICIENTLY WIDE TO ALLOW FOR SHORING, BRACING, OR FORM WORK, SHOULD ANY OR ALL BE NECESSARY.

   SET BOLTED WATERTIGHT FRAMES AND COVERS TO THE REQUIRED FINISHED ELEVATIONS AS SHOWN ON THE PLANS.

   WHEN COMPLETED, MANHOLES SHALL BE CLEARED OF SCAFFOLDS AND CLEANED OF SURPLUS MORTAR OR OTHER FOREIGN MATERIALS.

9. WYES, RISERS AND SERVICE CONNECTIONS

   WYE BRANCHES WITH TYPE OF JOINT MATCHING SIX (6) INCH LEAD PROPOSED TO BE USED, OR STUBS FITTED WITH SUITABLE STOPPERS OF THE SAME TYPE OF MATERIAL AND JOINT AS THE MAIN SEWER, SHALL BE SET AS CALLED FOR ON THE PLANS.

   RISER SHALL CONNECT TO WYE BRANCHES CONSTRUCTED AS PART OF SEWER PROPER AND SHALL INCLUDE A 45 DEGREE BEND AND STRAIGHT PIPE LAID TO THE HEIGHTS SPECIFIED AT THE RIGHT OF WAY LINE OR EASEMENT LINE.

   HOUSE CONNECTION SEWER BEDDING FOR PVC PIPE SHALL BE EQUAL TO THAT OF MAIN SEWER BEDDING. HOUSE CONNECTIONS SHALL BE MADE IN PLANT FABRICATED 45 DEGREES OR 60 DEGREES WYE FITTINGS. FITTINGS AND RISERS SHALL NOT BE BEDDED IN CONCRETE.

   FOR PVC PIPE, EACH WYE OR END OF SERVICE LEAD SHALL HAVE A FACTORY APPROVED PLUG .

   EACH WYE OR END OF SERVICE LEAD SHALL BE MARKED BY SETTING A 1 INCH X 2 INCH X 6 FT. CYPRESS, ASH OR CEDAR STAKE VERTICALLY ABOVE THE END OF THE LEAD.

   BACKFILL AT ALL RISERS SHALL BE CAREFULLY PLACED AND TAMPED SUFFICIENTLY TO INSURE AGAINST DAMAGE FROM BACKFILL SETTLEMENT.

10. STUBS

    WHERE CALLED FOR, STUBS SHALL BE ONE FULL PIPE LENGTH, OR AT LEAST SIX (6) FEET LONG, BULKHEADED WITH MASONRY OR FACTORY APPROVED PLUGS OR CAPS.

11. TESTING AND INSPECTION OF PIPE MATERIALS AND BACKFILL COMPACTION

    a. MANUFACTURER'S TEST CERTIFICATES SHALL ACCOMPANY ALL PIPE SHIPMENTS AND SHALL BE PROVIDED TO THE CITY ENGINEER.

    b. WHERE SEWER IS CONSTRUCTED IN EASEMENTS AND PAVED AREAS NOT IN PUBLIC RIGHTS OF WAY, THE BACKFILL TESTING SHALL BE PERFORMED BY AN INDEPENDENT TESTING LABORATORY AND THE COST OF SERVICES PERFORMED SHALL BE PAID FOR BY THE CONTRACTOR. COMPACTION TESTING SHALL BE ONE TEST PER LAYER OF BACKFILL PER 50 FEET OF TRENCH.

12. TESTING FOR INFILTRATION AND TELEVISION INSPECTION

    a. TELEVISION INSPECTION. ALL SANITARY SEWERS SHALL BE TELEVISION INSPECTED WITH TEST RESULTS APPROVED BY THE CITY PRIOR TO PLACING THE SEWER INTO SERVICE. ALL COURSES NOT TRUE TO LINE OR GRADE SHALL BE DUG UP AND RELAID. TELEVISION INSPECTION FOR ALL SANITARY SEWERS EIGHT (8)INCHES IN DIAMETER UP TO AND INCLUDING 27 INCHES IN DIAMETER SHALL BE PROVIDED BY THE CONTRACTOR. A VIDEO OF ALL LINES TELEVISED SHALL BE PROVIDED TO THE CITY AT THE COMPLETION OF THE INSPECTION.

    b. INFILTRATION/EXFILTRATION TESTING

       1) INFILTRATION/EXFILTRATION TESTING SHALL BE IN ACCORDANCE WITH SECTION 825 OF THE CURRENT MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) STANDARD SPECIFICATIONS FOR CONSTRUCTION.

13. DEFLECTION TESTING FOR PVC PIPE

    DEFLECTION MEASUREMENTS SHALL BE MADE UPON COMPLETION OF THE PROJECT PROVIDING THE PIPE HAS BEEN INSTALLED FOR NOT LESS THAN 30 DAYS AND NOT MORE THAN 12 MONTHS PRIOR TO TESTING. DEFLECTION TESTING SHALL BE PERFORMED ON ALL FLEXIBLE PIPE.

    INSTRUCTIONS FOR MANDREL DEFLECTION TESTING ARE AS FOLLOWS:

    a. COMPLETELY FLUSH THE LINE MAKING SURE THE PIPE IS CLEAN OF ANY MUD OR TRASH THAT WOULD HINDER THE PASSAGE OF THE MANDREL.

    b. DURING THE FINAL FLUSHING OF THE LINE, ATTACH A FLOATING BLOCK OR BALL TO THE END OF THE MANDREL PULL ROPE AND FLOAT THE ROPE THROUGH THE LINE. (A NYLON SKI ROPE IS RECOMMENDED). DEFLECTION MUST BE LIMITED TO A MAXIMUM OF 5% AND THE MANDREL USED FOR TESTING MUST NOT BE LESS THAN 95% OF THE INSIDE DIAMETER OF THE PIPE BEING TESTED.

    c. AFTER THE ROPE IS THREADED THROUGH THE LINE, CONNECT THE PULL ROPE TO THE MANDREL AND PLACE THE MANDREL IN THE ENTRANCE OF THE PIPE.

    d. CONNECT A SECOND ROPE TO THE BACK OF THE MANDREL. THIS WILL ENABLE YOU TO RETRIEVE THE MANDREL IF EXCESS DEFLECTION IS ENCOUNTERED.

    e. REMOVE ALL THE SLACK IN THE PULL ROPE BY GENTLY PULLING THE ROPE AT THE FAR MANHOLE. AFTER THE SLACK HAS BEEN REMOVED, PLACE A TAPE MARKER ON THE ROPE CLOSE TO THE PIPE WHERE THE MANDREL WILL EXIT. IF MANDREL ENCOUNTERS EXCESSIVE DEFLECTION, THE MARKER WILL PROVIDE A MEANS OF MEASURING THE TRAVEL DISTANCE OF THE MANDREL SO THAT THE DEFLECTED AREA CAN BE LOCATED.

    f. DRAW MANDREL THROUGH THE SEWER LINE. NO MECHANICAL ASSISTANCE MAY BE USED WHEN DRAWING THE MANDREL THROUGH THE SEWER LINE.

    g. AN INCREASING RESISTANCE TO PULL IS AN INDICATION OF EXCESSIVE DEFLECTION. THE MAXIMUM ALLOWABLE DEFLECTION SHALL NOT EXCEED 5% OF THE PIPE'S INTERNAL DIAMETER. IF THIS OCCURS, MEASURE BEGINNING MARKER ON ROPE TO THE MANHOLE. LOCATE SECTION AND REPLACE BEDDING OR PIPE IF VISUAL EXAMINATION REVEALS DAMAGE.

    h. RETEST AS REQUIRED.

SANITARY SEWER SPECIFICATIONS

1. ALL WORKMANSHIP, MATERIALS AND TESTING SHALL BE IN ACCORDANCE WITH CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF POTTERVILLE.

2. ALLOWABLE TYPES OF SEWER PIPE AND JOINTS ARE:

   a. REINFORCED CONCRETE SEWER PIPE SHALL CONFORM TO SECTIONS 402 AND 909 OF THE CURRENT MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) STANDARD SPECIFICATIONS FOR CONSTRUCTION.

   b. POLYVINYL CHLORIDE (PVC) SEWER PIPE SHALL CONFORM TO THE REQUIREMENTS OF ASTM D3034 AND MUST HAVE A STANDARD DIMENSION RATIO (SDR) OF 26. PROVIDE JOINTS WITH AN ELASTOMERIC GASKET PUSH-ON TYPE CONFORMING TO ASTM D3212. PVC FITTINGS MUST BE FULL FITTINGS CONFORMING TO ASTM D3034 FOR PIPE WALL THICKNESS OF SDR 26.

3. TESTING OF SANITARY SEWERS AND EXISTING STUBS BY INFILTRATION/EXFILTRATION OR AIR TESTING IS REQUIRED. INFILTRATION FOR ANY SECTION OF SEWERS BETWEEN MANHOLES SHALL NOT EXCEED 100 GAL./INCH DIA./MILE/24 HOURS.

4. ALL SANITARY SEWERS SHALL BE TELEVISION INSPECTED WITH TEST RESULTS APPROVED BY CITY OF POTTERVILLE PRIOR TO PLACING THE SEWER INTO SERVICE. ALL COURSES NOT TRUE TO LINE OR GRADE SHALL BE DUG UP AND RELAID. TELEVISION INSPECTION FOR ALL SANITARY SEWERS EIGHT (8) INCHES IN DIAMETER TO AND INCLUDING 27 INCHES IN DIAMETER SHALL BE PROVIDED BY THE CONTRACTOR.

5. NO FOOTING DRAINS SHALL BE CONNECTED TO THE BUILDING SEWER.

6. THE DIFFERENTIAL IN EXCAVATION ELEVATION AROUND EXISTING MANHOLES SHALL NOT EXCEED SIX (6) FEET.

7. TO TAP AN EXISTING MANHOLE OR SEWER PIPE, THE CONTRACTOR SHALL UTILIZE CORING THE MANHOLE OR PIPE USING KOR-N-SEAL BOOT, RES-SEAL, LINK-SEAL, PRESS WEDGE II OR OTHER APPROVED EQUAL. ALL TAPS TO THE MANHOLE MUST BE MADE BELOW THE TRANSITION SECTION.

8. NO CONNECTION RECEIVING STORM WATER, SURFACE WATER, OR GROUND WATER SHALL BE MADE TO SANITARY SEWERS.

9. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND/OR OBTAIN ANY INFORMATION NECESSARY REGARDING THE PRESENCE OF UNDERGROUND UTILITIES ON THE PROJECT.

10. CONTRACTOR SHALL CALL MISS DIG AT (800) 482-7171 AT LEAST THREE(3) WORKING DAYS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE DONE TO ANY EXISTING UTILITY DURING CONSTRUCTION.

11. CONTRACTOR SHALL NOTIFY THE CITY OF POTTERVILLE FIVE (2) WORKING DAYS PRIOR TO THE START OF CONSTRUCTION OR TESTING.

WIGHTMAN

1670 LINCOLN RD.
ALLEGAN, MI. 49010
269.673.8465

www.gowightman.com

PROJECT NAME:

MASTER UTILITY SPECIFICATIONS

CITY OF POTTERVILLE
319 N. NELSON STREET
POTTERVILLE, MI 48876

00 1/30/2025 DRAFT SAL

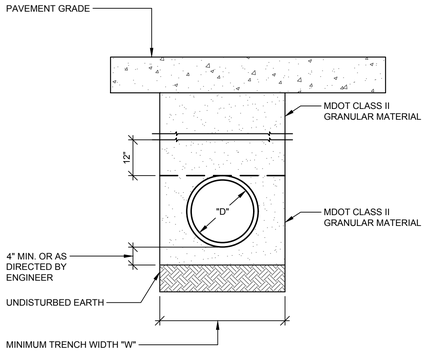
REVISIONS

P:\Kalamazoo\234032 City of Potterville - General Engineering\Master Utility Spec\B) Drawings\B50 AutoCAD\C004.dwg C004 1/30/2025 3:40:41 PM

DATE: JANUARY, 2025
SCALE: NONE

STANDARD SANITARY SEWER SPECIFICATIONS

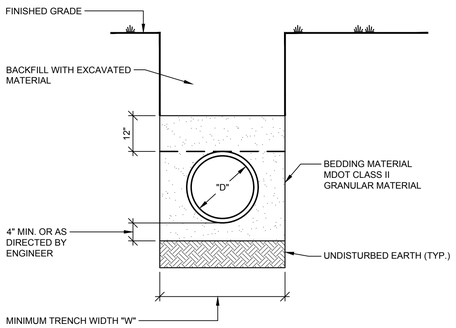
JOB No. 234032



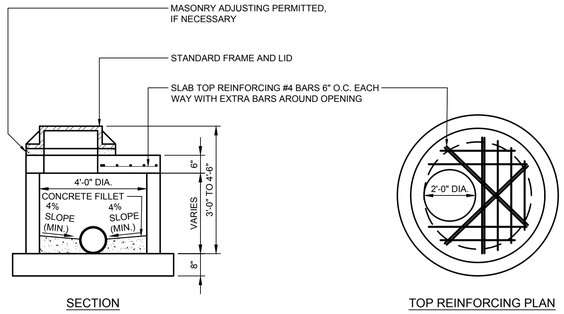
TRENCH DETAIL UNDER PAVEMENT

TRENCH DIMENSIONS	
DIA "D"	MIN. WIDTH "W" (FEET)
LESS THAN 18"	3.0
21"	3.5
24"	4.0
30"	5.0
36"	6.0
42"	7.0
48"	8.0
54"	9.5
60"	10.0
66"	10.5
72"	11.0

NOTE: IN ALL CASES BELL HOLES SHALL BE PROVIDED SO THAT BELL SUPPORTS NO WEIGHT.



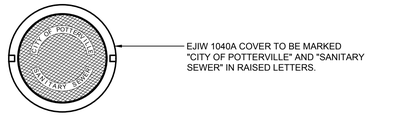
TRENCH DETAIL



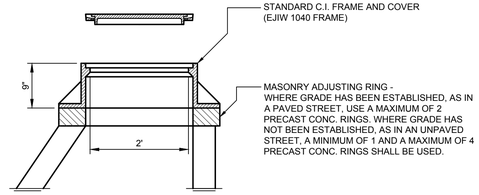
SECTION

TOP REINFORCING PLAN

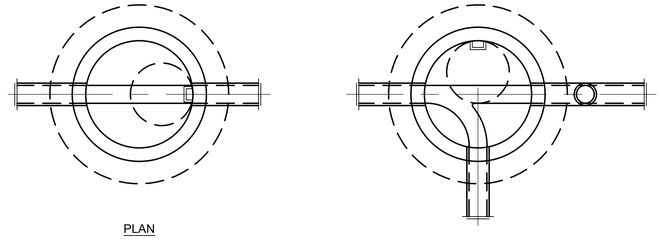
STANDARD MANHOLE 3'-0" TO 4'-6" DEPTH



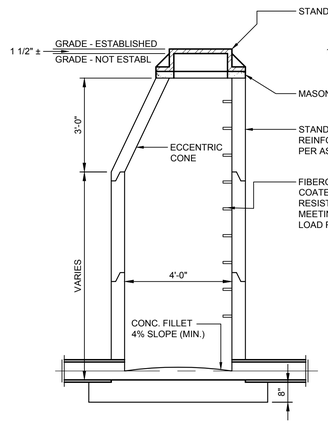
COVER



TYPICAL DETAIL FOR MANHOLE TOP FINISHING



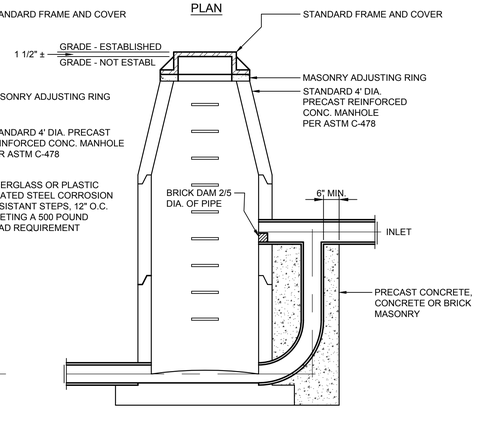
PLAN



SECTION

STANDARD PRECAST MANHOLE

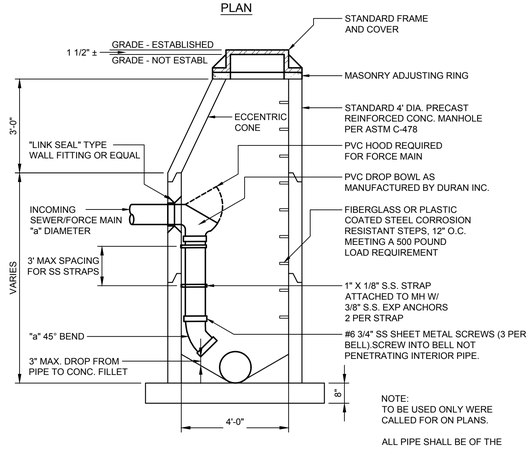
PLAN



SECTION

STANDARD DROP MANHOLE

PLAN



NOTE:
TO BE USED ONLY WERE CALLED FOR ON PLANS.

ALL PIPE SHALL BE OF THE SAME TYPE USED FOR THE INCOMING FORCE MAIN/SEWER.

SECTION

INTERNAL DROP CONNECTION

WIGHTMAN
1670 LINCOLN RD.
ALLEGAN, MI. 49010
269.673.8465
www.gowightman.com

PROJECT NAME:

MASTER UTILITY SPECIFICATIONS

CITY OF POTTERVILLE
319 N. NELSON STREET
POTTERVILLE, MI 48876

00 1/30/2025 SAL
DRAFT

REVISIONS

DATE: JANUARY, 2025

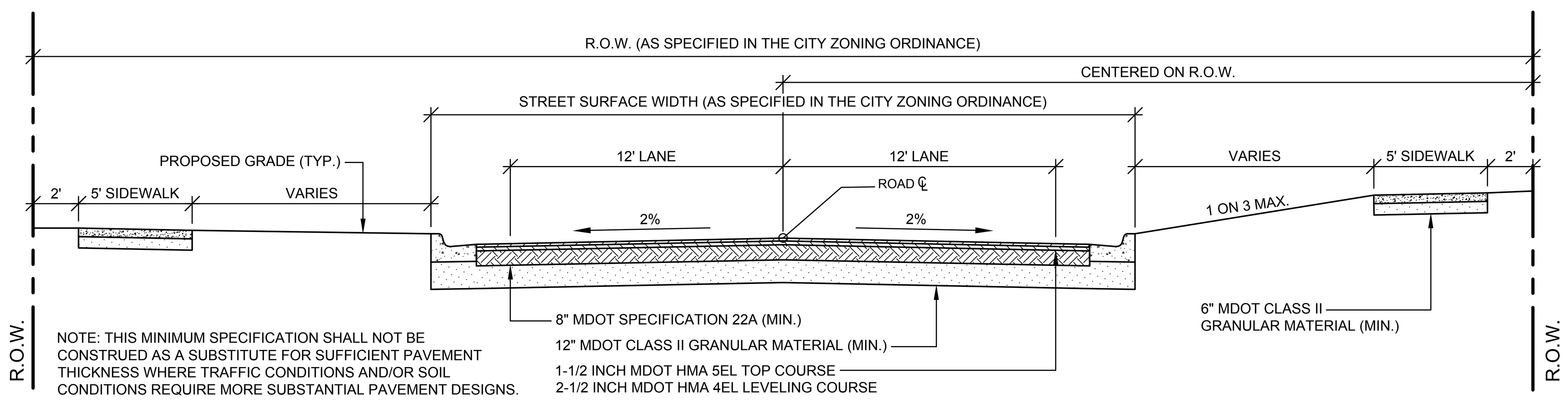
SCALE: NONE

STANDARD SANITARY SEWER DETAILS

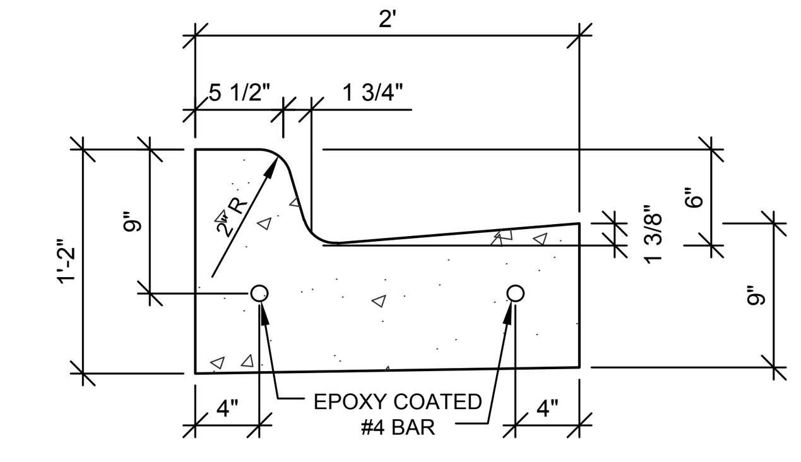
JOB No. 234032

C005

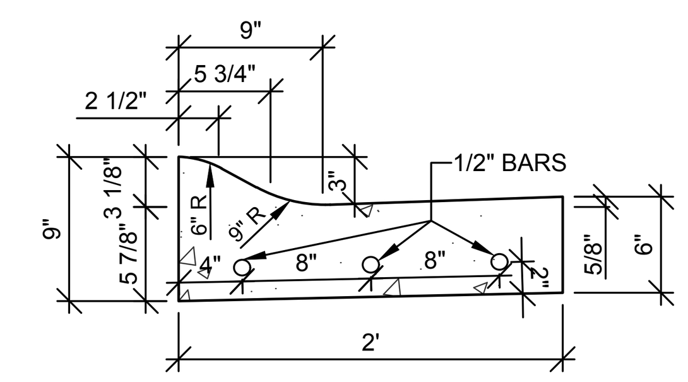
OF 6



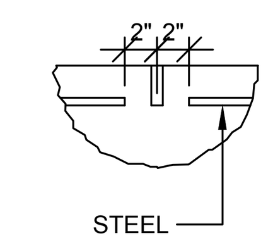
STANDARD ROADWAY SECTION



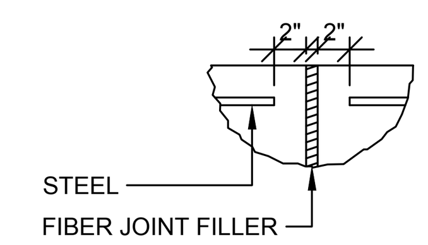
CONCRETE CURB & GUTTER - DETAIL F4



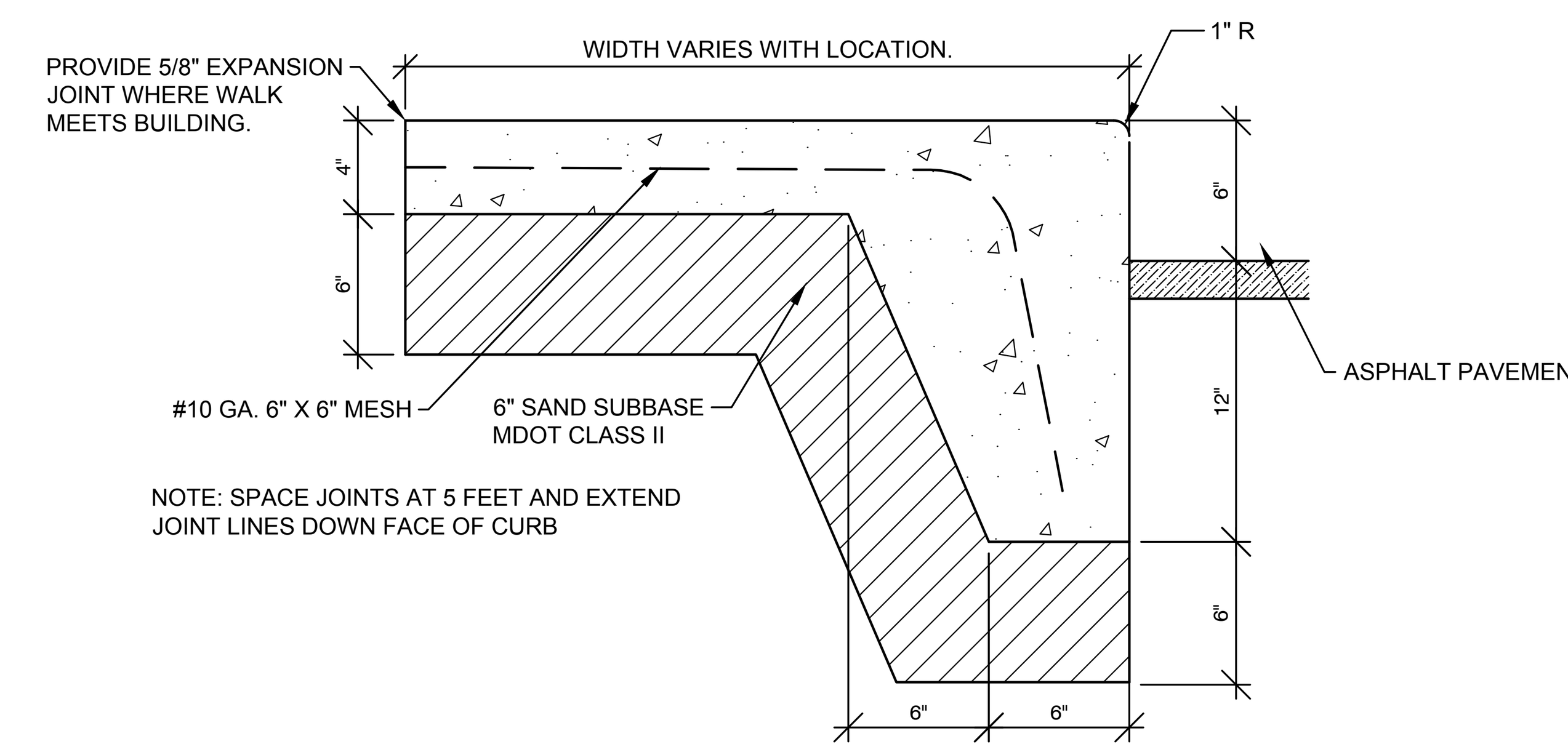
MOUNTABLE CONCRETE CURB & GUTTER



CONTROL JOINT
BREAK STEEL



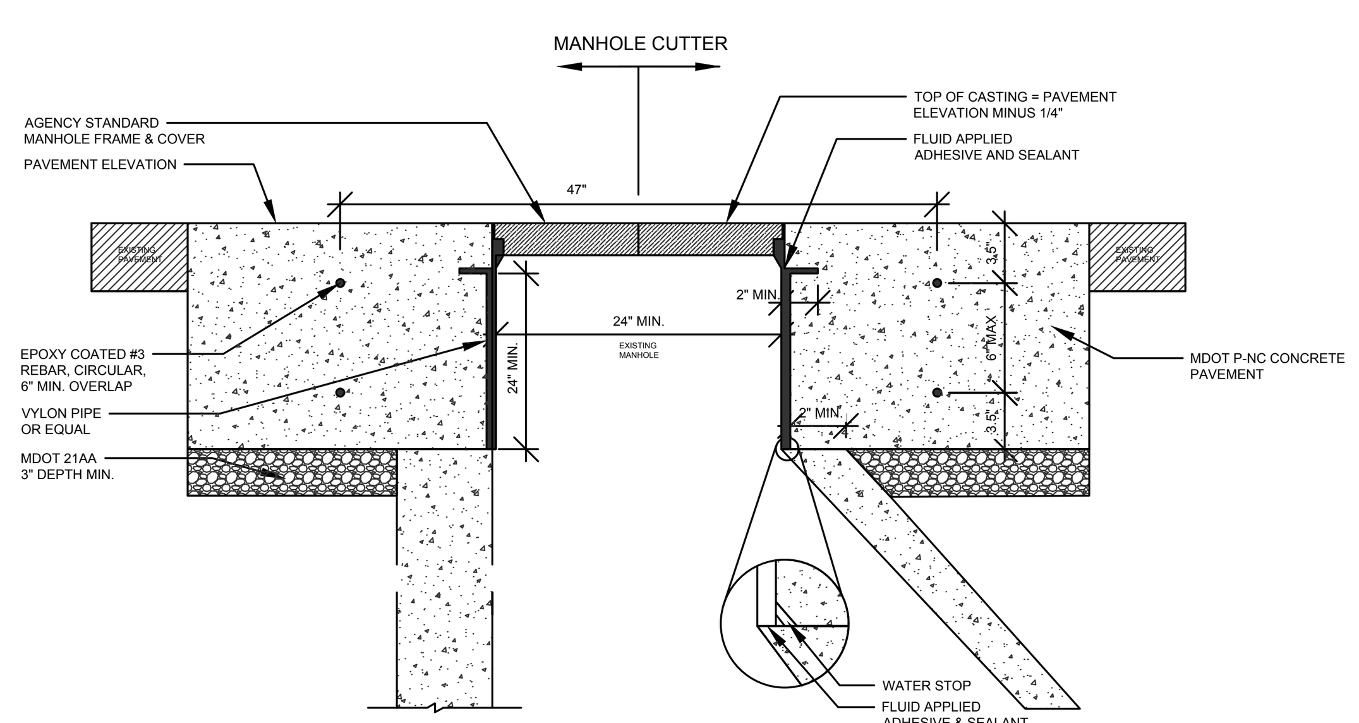
EXPANSION JOINT
BREAK STEEL



CURB & GUTTER - THICKENED EDGE SIDEWALK

JOINTS IN CURB OR CURB AND GUTTER NOT TIES TO CONCRETE PAVEMENT:

1. PLACE 1" FIBER JOINT FILLER AT SPRING POINTS OF STREET RETURNS.
2. PLACE 1" FIBER JOINTS AT APPROXIMATELY 400 FOOT INTERVALS WHEN SPRING POINTS OF INTERESTING STREETS ARE MORE THEN 400 FEET APART.
3. PLACE AN EXPANSION JOINT 10' TO 50' EACH SIDE OF EACH CATCH BASIN.
4. PLACE CONTROL JOINTS AT APPROXIMATELY 50 FOOT INTERVALS.



STRUCTURE ADJUSTMENT DETAIL
(CORE METHOD)
NOT TO SCALE

STRUCTURE ADJUSTMENT NOTES

ALL MANHOLES LOCATED WITHIN PAVEMENT SURFACE SHALL HAVE THE FRAME & COVER ADJUSTED TO FINISHED GRADE AS SHOWN IN THE STRUCTURE ADJUSTMENT DETAIL.

1. THE CENTER OF MANHOLE COVERS SHALL BE WITNESSED AND INVENTORIED UTILIZING GLOBAL POSITIONING SYSTEM (GPS) EQUIPMENT. GPS WITNESSING OF MANHOLES SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
2. THE OPENINGS IN THE TOP OF THE STRUCTURES SHALL BE COVERED WITH STEEL PLATES UNTIL PAVING OPERATIONS HAVE BEEN COMPLETED. STEEL PLATES SHALL HAVE A HOLE FOR CENTERING THE CIRCULAR SAW AND BE APPROVED BY THE ENGINEER BEFORE PLACEMENT AND USE.
3. IN AREAS WHERE THE HMA IS TO BE COLD MILLED, ALL OF THE MANHOLE COVERS SHALL BE REMOVED, AND HOLES IN THE PAVEMENT SHALL BE TEMPORARILY FILLED WITH HMA PRIOR TO ROAD BEING COLD MILLED.
4. THE CONTRACTOR SHALL MAINTAIN AND PROTECT THE AREAS AROUND THE MANHOLES (DRAINAGE STRUCTURES) AND THE INSIDE OF THE MANHOLES (DRAINAGE STRUCTURES) FROM MILLINGS AND OTHER DEBRIS DURING CONSTRUCTION. THE VENDOR SHALL BE RESPONSIBLE FOR REMOVING ALL DEBRIS FROM MANHOLES AND THE DOWNSTREAM SEWER LINE AS NECESSARY, INCLUDING THE CUT HOLE PRIOR TO PLACING CONCRETE.
5. AFTER FINAL HMA PAVING IS COMPLETE, THE STRUCTURES SHALL BE LOCATED UTILIZING THE GPS COORDINATES THAT WERE RECORDED PRIOR TO PAVING.
6. USING THE GPS LOCATED POINTS, THE C SHALL CUT A 54-INCH TO 60-INCH DIAMETER HOLE CENTERED ON THE STRUCTURE. CUTS SHALL BE MADE WITH A CIRCULAR CORE BIT, THE USE OF PNEUMATIC HAMMERS IS PROHIBITED EXCEPT FOR REMOVING THE PAVEMENT WITHIN THE PRECUT AREA. BOX CUTS MAY BE PERMITTED AT THE DISCRETION OF THE ENGINEER IN SPECIAL CIRCUMSTANCES WHEN STRUCTURES HAVE OVERSIZED MANHOLE COVERS, ARE CLUSTERED TOGETHER OR WHEN STRUCTURES ARE CLOSE TO CURBS. SAW CUTS THAT EXTEND BEYOND THE LIMITS OF THE PAVEMENT BEING REMOVED SHALL BE MINIMIZED AND SHALL BE SEALED WITH HOT POURED RUBBER ASPHALT.
7. MANHOLE COVERS SHALL BE SET TO THE REQUIRED GRADE WITH VYLON PIPE AS SHOWN IN THE DETAIL ON THE PLANS. THE USE OF CONCRETE ADJUSTING RINGS IN MORTAR MAY BE ACCEPTABLE AT THE ENGINEER'S DISCRETION BUT SHALL NOT BE USED WITH THE VYLON PIPE. THE USE OF BRICK OR WOODEN WEDGES TO HOLD THE CASTINGS IN PLACE WILL NOT BE PERMITTED. CONCRETE RINGS ARE TO ONLY BE USED WHEN THE HEIGHT OF THE VYLON PIPE IS MINIMAL AND A SINGLE CONCRETE RING MIGHT BE USED.
8. PLACE THE CONCRETE MIXTURE (GRADE P-NC) SURROUNDING THE ADJUSTING RINGS AND THE MANHOLE COVERS AND VIBRATE AT A 12 INCH SPACING TO CONSOLIDATE THE CONCRETE. MOVE THE VIBRATORS TO PREVENT FORMING LOCALIZED AREAS OF GROUT. DO NOT DRAG THE VIBRATOR THROUGH THE CONCRETE AND DO NOT USE THEM FOR FLOWING OR SPREADING CONCRETE.
9. STRIKE OFF THE CONCRETE SURFACE, FLOAT AND PROVIDE A BROOM TEXTURE TO BE EVEN WITH THE SURROUNDING PAVEMENT AND MANHOLE COVER.
10. PROTECT THE MANHOLE COVER AND SURROUNDING PAVEMENT FROM CONCRETE SPLATTER AND CLEAN AS NECESSARY TO REMOVE ALL MATERIAL AND STAINS ON THE MANHOLE COVER OR PAVEMENT.
11. APPLY CURING COMPOUND TO THE CONCRETE SURFACE IMMEDIATELY AFTER TEXTURING.
12. PROTECT THE CONCRETE FOR A MINIMUM OF 72 HOURS PRIOR TO ALLOWING TRAFFIC OR CONSTRUCTION EQUIPMENT TO DRIVE OVER THE MANHOLE COVERS OR SURROUNDING CONCRETE.

PLAN NOTES

1. ALL WORKMANSHIP, MATERIALS, AND TESTING SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF POTTERVILLE AND MICHIGAN DEPARTMENT OF TRANSPORTATION WHERE REFERENCED.
2. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO VERIFY AND/OR OBTAIN ANY INFORMATION NECESSARY REGARDING THE PRESENCE OF UNDERGROUND UTILITIES ON THE PROJECT.
3. CONTRACTOR SHALL CALL MISS DIG AT (800) 482-7171 AT LEAST THREE (3) WORKING DAYS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE DONE TO ANY EXISTING UTILITY DURING CONSTRUCTION.
4. CONTRACTOR SHALL NOTIFY THE CITY OF POTTERVILLE FIVE (5) WORKING DAYS PRIOR TO START OF CONSTRUCTION OR TESTING.
5. TESTING AND INSPECTION OF MATERIALS AND CONSTRUCTION IS REQUIRED AT THE EXPENSE OF THE CONTRACTOR.

SIDEWALKS

A. WHERE REQUIRED BY THE PLANNING COMMISSION AND/OR ZONING ORDINANCE, PUBLIC WALKS ARE TO BE INSTALLED AS PART OF THE SITE DEVELOPMENT AND ALONG THE FRONTAGE OF THE PROPERTY.
B. SIDEWALKS SHALL BE FIVE (5) FEET IN WIDTH.
C. SIDEWALKS SHALL EXTEND THROUGH ALL DRIVEWAYS WITHOUT STEPS, CURBS, OR OTHER OBSTACLES.
D. SIDEWALKS SHALL USE MDOT CONCRETE MIXTURE GRADE 3500, PLACED SIX (6) INCH THICK AT RESIDENTIAL DRIVES, EIGHT (8) INCH THICK AT COMMERCIAL DRIVES, AND FOUR (4) INCH THICK ELSEWHERE.
E. CAST IRON DETECTABLE WARNING SURFACE SHALL BE PROVIDED ON WALKING SURFACES IN ACCORDANCE WITH THE CURRENT AMERICANS WITH DISABILITY ACT ACCESSIBILITY GUIDELINES (ADAAG). DETECTABLE WARNING SURFACES SHALL BE COLONIAL RED IN COLOR.

STORM SEWER SYSTEM

A. A STRUCTURE WITH MULTIPLE PIPE CONNECTION, WITH AT LEAST ONE OF WHICH BEING A 12 INCH, MUST BE A MINIMUM OF A FOUR (4) FOOT STRUCTURE.
B. STORM SEWERS MUST HAVE A MINIMUM OF THREE (3) FEET OF COVER.
C. A TWO (2) FOOT SUMP IS REQUIRED, AT A MINIMUM, AT ALL CURB INLETS.

STORM SEWER NOTES AND MATERIALS

A. STORM SEWER SHALL BE IN ACCORDANCE WITH SECTION 402 OF THE CURRENT MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) STANDARD SPECIFICATION FOR CONSTRUCTION.
B. STORM SEWER STRUCTURES SHALL BE IN ACCORDANCE WITH SECTION 403 OF THE CURRENT MICHIGAN DEPARTMENT OF TRANSPORTATION (MDOT) STANDARD SPECIFICATIONS FOR CONSTRUCTION.

COMMERCIAL AND INDUSTRIAL SITE DEVELOPMENT REQUIREMENTS

A. FOR COMMERCIAL AND INDUSTRIAL SITE DEVELOPMENT ONLY. SURFACING FOR PARKING AREAS SHALL CONSIST OF A MINIMUM SURFACE THICKNESS OF 2 INCH MDOT HMA 4EL LEVELING COURSE AND 2 INCH MDOT HMA 4EL TOP COURSE AND LAID ON AN EIGHT (8) INCH MINIMUM THICKNESS BASE COURSE PLACED IN TWO (2) COMPACTED FOUR (4) INCH LAYERS OF MDOT SPECIFICATION 22A, OR APPROVED EQUIVALENT AND A TWELVE (12) INCH MINIMUM THICKNESS SAND SUBBASE OF MDOT CLASS II GRANULAR MATERIAL. THIS MINIMUM SPECIFICATION SHALL NOT BE CONSTRUED AS A SUBSTITUTE FOR SUFFICIENT PAVEMENT THICKNESS WHERE TRAFFIC CONDITIONS AND/OR SOIL CONDITIONS REQUIRE MORE SUBSTANTIAL PAVEMENT DESIGNS.
B. CONCRETE CURB AND GUTTER SHALL BE MDOT DETAIL C-4, UNLESS APPROVED OTHERWISE, WITH CONCRETE MIXTURE GRADE 3500 OR APPROVED EQUIVALENT.
C. CONCRETE PAVING MAY BE USED WHICH PROVIDES AN EQUIVALENT SECTION BASED ON AASHTO DESIGN CRITERIA.

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PROJECT NAME:
MASTER UTILITY SPECIFICATIONS

CITY OF POTTERVILLE
319 N. NELSON STREET
POTTERVILLE, MI 48876

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REVISIONS

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DATE: JANUARY, 2025
SCALE: NONE

STANDARD ROADWAY AND DRAINAGE DETAILS

JOB No. 234032
C006